



# NCC Pediatrics Continuity Clinic Curriculum: Dental Health I: Preventive Care

## Goals & Objectives:

- Learn how to perform an oral health risk assessment and provide anticipatory guidance.
- Recognize the preventive role of fluoride in water, toothpaste, varnish.
- Review how to apply fluoride varnish and how to properly document this procedure.

## Pre-Meeting Preparation:

- “Fluoride and Dental Caries Prevention in Children” (*PIR, 2014*)
- “Fluoride Use in Caries Prevention in the Primary Care Setting” (*AAP Clinical Report, 2020*)
  - Oral Health Risk Assessment Tool
- Mission Statement & Treatment Policy of WR-B Dental School
  - Includes Tricare/United Concordia Dental Link—*Try to find a pediatric provider in your area!*
- [Smiles for Life National Oral Health Curriculum](#)
  - Scroll down and select "Child Oral Health" option.
  - *You do NOT need to register in order to access the pre/post tests and curriculum*

## Conference Agenda:

- Review Dental Health I Quiz
- Complete Dental Health I Cases
- Hands-on Demo: Fluoride varnish treatments. *Residents—practice on each other.*

Post-Conference: Board Review Q&A

## Extra-Credit:

- [AAP Oral Health “Protecting Tiny Teeth Toolkit”](#) —training program
- [CDC website: Oral Health—links for providers and parents](#)
  - “Using Fluoride to Prevent and Control Dental Caries” (*MMWR 2001*)
- [AAP Policy Statement: Maintaining and Improving the Oral Health of Young Children \(2023\)](#)
- “Smiles for Life” Modules: [www.smilesforlifeoralhealth.org](http://www.smilesforlifeoralhealth.org)
- “Disparities in the Quality of Pediatric Dental Care: New Research. . .” (*Society for Research in Child Development, 2018*)
- “Promoting Children's Health Equity with Medical-Dental Integration” (*AMA J. of Ethics, 2022*)
- “Fluoride and Dental Caries Prevention in Children” (*PIR, 2014*) older review article

# Dental Caries: Early Intervention and the Role of the Pediatrician

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## PRACTICE GAP

The youngest pediatric patient population is more likely to visit a pediatrician than a dentist; thus, it is critical that pediatricians be knowledgeable about dental caries, its prevention and management, criteria for referral, and barriers to care.

**OBJECTIVES** *After completing the article, readers should be able to:*

1. Describe the epidemiological trends related to morbidity of dental disease and utilization of oral health services for the pediatric population.
2. Describe the critical role that pediatricians can play in preventing and addressing dental disease.
3. Describe the importance of the incorporation of caries risk assessment, anticipatory guidance, and appropriate referrals as part of the health supervision visits.
4. List barriers for the establishment of a dental home.

## ABSTRACT

Despite improvements in oral morbidity levels and access to care among the pediatric population, there are still major disparities in the United States. Results of national surveys have documented a decrease in the number of children receiving either a dental examination or a cleaning. This finding is particularly concerning for toddlers and infants, as early preventive dental visits and the establishment of a dental home is cost-effective and leads to enhanced oral health outcomes over the life span. Many infants and toddlers do not visit a dentist, suggesting that the recommendations of the American Academy of Pediatrics and the American Academy of Pediatric Dentistry to establish a dental home are not appropriately adopted.

The American Academy of Pediatric Dentistry (AAPD) recommends that every child have an established dental home by 12 months of age. (1) Frequently, the

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## ABBREVIATIONS

AAP American Academy of Pediatrics  
AAPD American Academy of Pediatric Dentistry

initial step for establishing a dental home is a referral from a physician. Thus, it is critical that pediatricians be knowledgeable about dental caries, its prevention and management, criteria for referral, and barriers to care. (2) The American Academy of Pediatrics (AAP) recommends assessing whether a child has a dental home by 6 months of age and at 9 months of age. In the absence of a dental home, the AAP Bright Futures guidelines recommend performing an oral health risk assessment and referring to a dental home. The AAP guidelines also recommend performing a risk assessment by 12 months and 18 months of age. (3) This approach fosters the delivery of appropriate preventive and routine oral health-care, thus improving oral health knowledge, practices, and outcomes, especially among children at high risk for early childhood caries. (4)(5)

Despite improvements in oral morbidity levels and access to care among the pediatric population, there are still major disparities in the United States. A comparison of dental caries prevalence among youth 2 to 19 years old using 2011 to 2012 vs 2015 to 2016 data from the National Health and Nutrition Examination Survey showed that the prevalence of total dental caries decreased from 50.0% to 45.8% and of untreated dental caries decreased from 16.1% to 13.0%. For the age group 2 to 5 years, in 2015 to 2016 the total and untreated dental caries were 21.4% and 8.8%, respectively. (6) Although the decrease in morbidity levels is encouraging, in terms of utilization, there was a decrease in the percentage of children 1 to 17 years of age who had a dental examination or cleaning between 2019 and 2020 (83.8% vs 80.9%) according to data from the National Health Interview Survey. For the age group 1 to 4 years, the decrease was statistically significant (58.6% vs 51.3%). The same report documented that children living in families with incomes below 400% of the federal poverty level were less likely to receive an oral examination and cleaning than their peers. (7) A recent study assessing utilization for children younger than 3 years using Medical Expenditure Panel Survey data from 1996 to 2016 concluded that utilization levels had increased the most for young children compared with their peers aged 4 to 17 years. However, close to 95% of children younger than 1 year and 69% of those 2 to 3 years of age did not visit a dentist in 2016. The authors also noted that the percentage of children 2 to 3 years of age who were advised by a medical provider to visit a dentist increased from 28% in 2001 to 49% in 2016. Although medical providers continue to play an increasing role in advocating for early dental visits, the establishment of a dental home does not seem to be adopted by families and dental providers. (8) The same

study revealed that in 2016, 91% of children younger than 1 year and 81% of those 2 to 3 years of age had an office-based physician visit compared with only 5% and 31%, respectively, who had dental visits. (8)

## SOCIAL DETERMINANTS OF HEALTH AND THE ROLE OF THE PEDIATRICIAN

According to the World Health Organization, social determinants of health refer to “the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life.” (9) The role of pediatricians in addressing social determinants of health was brought up by Kempe et al (10) 60 years ago when they presented the concept of child abuse. Dental caries is a multifactorial disease involving social, political, behavioral, and medical factors. Given its complexity, dental caries can be controlled only if environmental elements such as neighborhood, family structure, nurturing of children, and socioeconomic status are understood. (11) Infants, toddlers, and children with special health-care needs, particularly those uninsured and publicly insured, face barriers to care due to inadequate pediatric training of general dental practitioners in dental school, (12) low participation of dentists in the Medicaid program, (13)(14)(15)(16) and misdistribution of dentists. (17)(18)

Toddlers from low-income families are more likely to receive primary care or pediatric services than dental services. An annual study found that 85% of toddlers from low-income families had a visit to a primary care provider and only 20% visited a dental provider. (19) One of the most common barriers to receiving dental care is difficulty finding a dentist who participates in Medicaid. In 2016, of 196,468 dentists, only 7,853, or 4%, were pediatric dentists. (20) Although 73% of pediatric dentists in the United States participate in Medicaid, only 43% of dentists participate in either Medicaid or the Children’s Health Insurance Program. (21) Since the 1980s, multiple studies have documented that the predoctoral pediatric dental curriculum is not adequate. (22) Therefore, general dentists are not equipped with the skills and knowledge to handle pre-cooperative children and children with extensive dental needs.

Pediatric medicine has long recognized the need to train both clinicians and effective advocates. Advocacy at the clinical level focuses on individual patients with either a medical or social health need. By identifying children who face barriers to care, applying primary preventive principles, and providing appropriate referrals based on risk, pediatricians could prevent future disease and costly surgical procedures. Bader et al (23) found that after a

brief 2-hour training in infant oral health, primary care pediatric providers were able to accurately identify children with dental caries with good specificity (92%–100%) and sensitivity (87%–99%). (24) These findings suggest that incorporation of an oral health screen as part of a pediatrician's routine examination would allow identification of children with moderate or high caries risk levels and appropriate referral, facilitating the establishment of a dental home and enhancing oral health outcomes.

## RATIONALE FOR THE YEAR 1 DENTAL VISIT

Caries among children is the best predictor of oral health problems among adults; current caries is the best predictor of future caries. (25) In 1953, Clark and Leavell introduced the concept of 3 levels of prevention: primary, secondary, and tertiary. (26) Primary prevention seeks to prevent the start of the disease process through health promotion, risk factor reduction, and other health protective measures; secondary prevention takes place after onset of the disease and seeks to avoid and arrest its spread; and tertiary prevention seeks to rehabilitate or prevent total disability after a disease has run its course. Through the incorporation of primary and secondary preventive approaches, pediatricians can prevent and manage dental caries as a chronic condition. Studies have shown that the incorporation of oral health risk assessment, anticipatory guidance, and basic preventive approaches in pediatricians' protocols have led to improved access to preventive dental services. (27)(28) Although there are no studies assessing the effect of referrals by a primary care clinician to a dental provider on caries incidence, (29) early preventive dental visits lead to subsequent increased utilization of preventive services and lower dental care–related costs. (5)

Using a collaborative approach with dental providers has the potential to identify, prevent, and treat at-risk children early in the disease process, avoiding costly dental treatments and a lifetime of oral sequelae. However, because the capacity of the current dental workforce is limited—specifically, those serving the low-income and Medicaid patient populations—it would be more beneficial to prioritize referral of at-risk children. Pediatricians can continue conducting periodic health assessments and, based on risk levels, determine whether a referral is necessary. (30)

## CARIES RISK ASSESSMENT

The traditional management of dental caries relied on a surgical or restorative approach as the only tool to prevent progression of the disease. However, evidence shows that the surgical approach alone does not deter the disease

process and recurrence. (31) Therefore, contemporary management of dental caries acknowledges the multifactorial nature of dental caries and the role of early detection, identification of the patient's disease risk, understanding each individual's disease process, and active surveillance.

Caries risk assessment is an essential component of comprehensive and effective prevention strategies. Risk assessment prevents oral disease by identifying children at moderate and high risk for caries, developing an individualized caries management plan, determining the frequency of services, and anticipating caries progression or stabilization. (32)(33)(34) Although there is a lack of longitudinal studies in pediatric dentistry, the benefits of risk assessment to manage caries have proved to be of great value due to the multifactorial and chronic nature of the disease. For this reason, caries risk assessment protocols involve multiple variables, such as diet, fluoride exposure, host susceptibility, and oral micro-organisms, and their interaction with behavioral and sociocultural factors. (32)(35)

Risk assessment should be performed just as the first primary teeth erupt and should be reevaluated as part of each subsequent health supervision visit. Performing an oral examination at this young age can be facilitated by placing the child on a knee-to-knee position. This is done by sitting and facing the parent with the knees touching. The parent holds the child facing them and proceeds to lean the child backward onto the physician's lap. An appropriate oral examination can be performed by gently lifting the upper lip, wiping the teeth with a gauze pad, and visually assessing for changes in color or breaks on the enamel. The oral soft tissues, such as the tongue, lips, cheeks, palate, and gingiva, should also be examined for lesions such as ulcerations, swelling, or redness.

Some infants and young children are at higher risk for early childhood caries based on particular factors, such as newly established oral microflora, the child's immune system, characteristics of newly erupted primary teeth (such as enamel hypoplasia), and developing dietary habits and food preferences. (36) When performing caries risk assessment, it is important to address parental and caregiver factors and behaviors that may negatively influence risk levels in their children, such as having untreated decay and transmitting cariogenic bacteria by sharing the same utensils or kissing their children on the mouth. Communication strategies that have been proved to increase parental behavior change are motivational interviewing and self-determination theory, (37)(38)(39)(40) which highlight the importance of addressing these problems in a sensitive and effective manner.

The caries risk assessment tool for nondental providers can be used by pediatricians to identify factors that influence caries initiation and progression. (32) Periodic reassessment allows the practitioner to individualize prevention strategies and to determine whether past strategies have been effective in decreasing children's caries risk. Classification of caries risk is based on the greater number of factors, either high or low risk, for the child. Referral to a dentist is warranted when the child presents white spot lesions, enamel defects, and/or visible cavities or fillings (Table 1).

## ANTICIPATORY GUIDANCE

Anticipatory guidance consists of counseling parents and caretakers about their children's health and physical and psychological developmental milestones. (41)(42) Individualized discussion and counseling should be an integral part of each health supervision visit. Oral health-focused anticipatory guidance provides education for parents on topics that encompass diet and nutrition, oral hygiene, nonnutritive habits, and injury prevention with a focus on any assessed risk factors. (1)(41)(43)(44) To emphasize oral disease prevention benefits, effective anticipatory guidance should include the following:

1. Infant oral hygiene instruction: Parents should start brushing infants' teeth as soon as teeth erupt. For children younger than 3 years, it is recommended to brush at least twice a day with a smear of fluoridated toothpaste the size of a grain of rice, and for children up to age 6 years, with a pea-sized amount of fluoridated toothpaste. (45) Brushing should last for at least 2 minutes. For children who do not have the ability to spit, it is recommended to wipe the teeth with a wet gauze pad to prevent toothpaste ingestion. Flossing is indicated between any teeth with closed contacts because the toothbrush is less effective. Children should be assisted and supervised approximately up to age 7 years, depending on the child's ability to perform routine personal hygiene techniques. (32)(46)(47)
2. Nonnutritive oral habits assessment: Pacifier or digit sucking that persists beyond age 3 years may result in permanent dentoalveolar changes. (48) Frequency, intensity, and duration of nonnutritive habits should be assessed before recommending weaning strategies.
3. Diet and nutrition assessment: The development of dietary habits and food preferences is established as early as age 1 year and may influence the caries risk and general health of a child. (49) Nighttime bottle-feeding and

breastfeeding for infants older than 24 months has been found to contribute to increased risk of caries. (34) It is recommended to cleanse the gums and teeth after every feeding and only drink water after bedtime. It is also recommended to reduce frequency and bedtime intake of formula and sweetened beverages for children who use bottles or sippy cups. (50) Snacking between meals, excess consumption of carbohydrates, and frequent intake of sweetened beverages will also contribute to an increased risk of caries. (49)(51)

4. Dental injury prevention: Parents and caretakers should protect infants by covering sharp furniture corners, using car safety seats, and avoiding electrical cord mouth injuries. (43)(52) Children with a dentofacial injury should be assessed by a pediatric dentist as soon as possible.

Oral health education and anticipatory guidance should take place during infant health supervision visits and at every dental visit. This will allow parents and clinicians to identify growth delays, dentofacial injuries, poor oral hygiene, and presence of carious lesions, among other problems. Evaluating tooth development and pattern of eruption can help parents better understand the benefit of fluoride in newly erupted teeth that are at high risk for caries. (42)

## PREVENTIVE MEASURES

Decades of research have shown that early childhood caries is a multifactorial disease, and current preventive strategies aim to address the involved factors. These factors may include teeth susceptibility secondary to enamel defects, quality and quantity of saliva, early oral colonization with high levels of cariogenic bacteria such as mutans streptococci, and metabolism of sugar by acidogenic bacteria. (53) Preventive measures include community-, home-, and office-based strategies.

### Community-Based Strategies

The AAPD and the AAP recognize that community water fluoridation is a prevention strategy that is safe and effective in reducing dental caries, with greater benefits in primary dentition. Optimal levels of community water fluoridation have been found to reduce decayed, missing, and filled primary teeth by 35%. (54) Fluoride prevents and arrests tooth decay through different mechanisms: 1) systemically by ingestion and incorporation into the enamel during tooth formation; 2) topically by decreasing demineralization and promoting remineralization after

tooth development; and 3) by inhibiting glycolysis by microorganisms, which hinders their ability to metabolize carbohydrates and produce acids. There is no evidence linking community water fluoridation with adverse health outcomes. (54)(55)(56) In 2015, the US Department of Health and Human Services determined that 0.7 ppm, equivalent to 0.7 mg of fluoride per liter of water, was the optimal fluoride level in drinking water to prevent tooth decay. (57) For guideline purposes, the optimal concentration provides the best balance of protection from dental caries while limiting the risk of dental fluorosis. Dental fluorosis, the hypomineralization of enamel caused by the long-term absorption of fluoride that is ingested for long periods during tooth development, can range from barely discernible white lines (mild) to mottling and pitting of the tooth (severe). In 2006, the National Research Council released its report “Fluoride in Drinking Water: A Scientific Review of EPA’s Standards.” The report noted strong evidence for a true population threshold for severe fluorosis at 2 ppm in the water supply. Basically, severe enamel fluorosis is absent when the water supply contains less than 2 ppm of fluoride. (58) Only severe enamel fluorosis is considered an adverse health effect; milder forms are considered only to be esthetically displeasing.

### Home-Based Strategies

Using over-the-counter fluoridated products, regardless of the fluoridation status of a community’s public water supply, has been found to be beneficial in preventing dental caries. (59) Fluoride-containing products include toothpastes, gels, and mouth rinses. Toothpaste contains 1,000 ppm of fluoride; therefore, it is important to use an age-appropriate amount and to prevent swallowing of toothpaste due to the potential risk of fluorosis and toxicity. It is recommended to use the product for 2 minutes at least twice a day and to follow recommendations by a physician or dentist who is familiar with the caries risk of the child. Fluoride gels and mouth rinses can be found with or without a prescription and are suitable for daily use, unless otherwise indicated. Rinses are not indicated for children younger than 6 years due to the risk of swallowing. Toddler training toothpastes, which do not contain fluoride, do not provide any caries protection or plaque reduction benefit and are, therefore, not recommended.

Preventive strategies address vertical transmission, from mother, father, or caregiver to child, and horizontal transmission, which occurs among siblings and peers. Bacterial transmission from parent to infant can occur through home practices such as sharing utensils, blowing on food,

and kissing babies on the mouth. Similarly, siblings or peers who share pacifiers, food, or teething toys can also horizontally transmit bacteria. These transmission patterns constitute the process by which the oral microbiome is established and developed from the time a child is born until early childhood. Parents or caregivers who have untreated decay and poor oral hygiene have an increased likelihood of passing on higher levels of cariogenic bacteria to their infants. Therefore, primary prevention aims to optimize the mother’s oral flora to reduce virulent cariogenic bacteria (mutans streptococci), which is transmitted from the mother to the infant. Early parental counseling on bacterial transmission can bring awareness to home practices. Encouraging good oral health for the caregivers can protect infants’ oral microflora. Seeking dental care for the mother as early as during pregnancy is safe and beneficial for both mother and infant. (60)

Xylitol is a sugar substitute that cannot be metabolized by cariogenic bacteria. Early studies established that xylitol is safe for human consumption and that xylitol gum is effective at reducing plaque; however, the chewing action may have influenced the effectiveness of plaque removal. (61)(62)(63) Multiple systematic reviews have studied whether xylitol can reduce the transmission of mutans streptococci from mother to child, as well as the effect of reducing mutans streptococci in children. (61)(62)(63)(64)(65)(66)(67)(68) The results for short-term and long-term caries reduction have been inconclusive. (64)(65)(68) Clinical trials have incorporated xylitol at high doses and high frequencies, which makes it challenging to develop a treatment protocol. (64) The AAPD supports the use of xylitol as a noncariogenic sugar substitute and its role in plaque reduction. However, there is inconsistent evidence on the effect of xylitol on mutans streptococci and caries in children. The AAPD recognizes that there is a need for further research to determine adequate dosage and to develop a protocol for safe and optimal use of xylitol-containing products. (66)

### Office-Based Strategies

The Centers for Disease Control and Prevention (CDC) guidelines for fluoride supplementation are based on the level of fluoride found in drinking water; therefore, for communities that obtain their daily water intake from wells, it is important to test for fluoride content as well as assessing other dietary sources before considering fluoride supplementation. (69) The AAPD recommends fluoride supplementation for children at high caries risk whose water fluoride exposure is determined to be suboptimal (<0.6 ppm of fluoride) after accounting for all sources of

dietary fluoride, such as infant formula, juice, and water fountains. (47) It is important to keep in mind that most bottled water is nonfluoridated and that water treatments such as reverse osmosis and distillation remove fluoride from the water. Supplementation is not indicated for infants who drink formula reconstituted with fluoridated water.

Professionally applied topical fluoride, such as fluoride varnish, is a powerful tool in the hands of pediatricians that allows them not only to prevent early childhood caries but also to reverse the progression of early-stage caries in young patients. For many children who are at high risk for caries for reasons such as lack of access to fluoridated water or limited access to dental care, for example, fluoride varnish is a cost-effective intervention that pediatricians can provide. The use of fluoride varnish is a US Preventive Services Task Force grade B recommendation that is also endorsed by the Bright Futures schedule, which has fluoride varnish applied by pediatricians at 6 months of age or at the time of the first tooth eruption. For children younger than 6 years at high risk for caries, it is recommended to use 5% sodium fluoride or 2.26% weight fluoride (22.6 mg fluoride/mL) varnish every 3 to 6 months. (47) Pediatricians should use unit doses of varnish to reduce the potential for harm. The application procedure consists of drying the teeth with a gauze pad before proceeding to use a small brush to coat all surfaces of the teeth with a thin film of varnish. The varnish will harden as soon as saliva touches the teeth. For best results, it is recommended the patient refrain from eating or drinking for 30

minutes after fluoride varnish application. The possibility of fluorosis related to varnish applications is ruled out given the low frequency of fluoride administration. (70) Fluorosis associated with toothpaste is typically mild, thus it carries only a small risk of esthetically objectionable hypomineralization. (71)

Silver diamine fluoride (SDF) is a solution that contains 24% to 28% silver and 5% to 6% fluoride and is a cost-effective and minimally invasive treatment to arrest caries. (72) Although the exact mechanism is not known, it is understood that the silver acts as a bactericidal agent, and the fluoride promotes remineralization of dentin and enamel. The only known contraindication is a silver allergy. As a nonsurgical intervention, SDF is widely used to manage caries, especially in the youngest patients, because it can arrest the progression of disease until the children are able to cope with traditional chairside treatment. The main disadvantage is an esthetic concern due to the permanently blackened carious lesions, and SDF can temporarily stain the skin if it comes into contact during the application procedure. (69) For this reason, it is useful to show a picture of SDF-treated teeth to parents when requesting informed consent before treatment. Compared with fluoride varnish, SDF has been found to be more effective for arresting caries, and no toxicity or adverse effects have been reported. Case selection is paramount and should take into account the severity of the lesions and the individual caries risk of the patient. Although no severe pulpal damage or reaction to SDF has been reported, SDF should not be placed on teeth with exposed pulps. Therefore, teeth with

**Table 1.** Caries Risk Assessment Form for 0- to 3-Year-Olds for Physicians and Other Nondental Health-care Providers

FACTOR	OVERALL ASSESSMENT	
	HIGH RISK	LOW RISK
Biological		
Mother/primary caregiver has active cavities	Yes	
Parent/caregiver has a low socioeconomic status	Yes	
Child has >3 between-meal sugar-containing snacks or beverages per day	Yes	
Child is put to bed with a bottle containing natural or added sugar	Yes	
Child has special health-care needs	Yes	
Child is a recent immigrant	Yes	
Protective		
Child receives optimally fluoridated drinking water or fluoride supplements		Yes
Child has teeth brushed daily with fluoridated toothpaste		Yes
Child receives topical fluoride from health professional		Yes
Child has dental home/regular dental care		Yes
Clinical findings		
Child has white spot lesions or enamel defects	Yes	
Child has visible cavities or fillings	Yes	
Child has plaque on teeth	Yes	

Circling conditions that apply to a specific patient helps the health-care worker and parent understand the factors that contribute to or protect from caries. Risk assessment categorization of low or high is based on a preponderance of factors for the individual. However, clinical judgment may justify the use of 1 factor (eg, frequent exposure to sugar-containing snacks or beverages, visible cavities) in determining overall risk.

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**Table 2.** Example of a Caries Management Pathway for 0- to 5-Year-Olds

RISK CATEGORY	INTERVENTIONS				
	DIAGNOSTICS	FLUORIDE	DIETARY COUNSELING	SEALANTS	RESTORATIVE
Low risk	Recall every 6–12 mo Radiographs every 12–24 mo	Drink optimally fluoridated water Twice daily brushing with fluoridated toothpaste	Yes	Yes	Surveillance
Moderate risk	Recall every 6 mo Radiographs every 6–12 mo	Drink optimally fluoridated water Twice daily brushing with fluoridated toothpaste Fluoride supplements Professional topical treatment every 6 mo	Yes	Yes	Active surveillance of noncavitated (white spot) caries lesions Restoration of cavitated or enlarging caries lesions
High risk	Recall every 3 mo Radiographs every 6 mo	Drink optimally fluoridated water Twice daily brushing with fluoridated toothpaste Professional topical treatment every 3 mo Silver diamine fluoride on cavitated lesions	Yes	Yes	Active surveillance of noncavitated (white spot) caries lesions Restoration of cavitated or enlarging caries lesions

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deep carious lesions should be closely monitored clinically and radiographically by a dentist. Although at this time the AAP has not yet published any official recommendation for pediatricians to apply SDF, the American Medical Association recently approved a new category III *Current Procedural Terminology* code for the application of SDF. This code will go into effect in July 2023, allowing health plans to determine how to structure payments for this office-based therapy.

Caries management pathways are tools designed to guide health-care providers to determine individualized management protocols based on patients' caries risk and age (Table 2). Caries management protocols for children younger than 6 years were first introduced in 2011. (73) These protocols are based on evidence-based dentistry and expert panel opinions. The information is updated on par with new evidence from up-to-date systematic and peer-reviewed literature, expert panels, and practitioners' clinical experiences. Caries management protocols are designed to be used to reassess the risk of the patient at every visit as part of active surveillance. (74) Evidence shows that caries progression can be deterred, therefore allowing the clinician to recommend surgical treatment only for carious lesions that have progressed. (75)(76) From a diagnostic perspective, a dental provider may recommend radiographs based on caries risk to rule out interproximal lesions and to assess caries progression.

Cariou lesions detected at the earliest stage are known as white spot lesions, for they appear as dull white bands on the smooth surface of the tooth, along the gum line. The first areas where carious lesions usually appear in young children is on the upper anterior teeth. It is useful to retract the upper lip and dry the teeth with a gauze pad to assess the area adequately. Progression of these lesions may be deterred or even reversed with adequate hygiene, diet, and exposure to topical fluoride. If the disease advances, the lesions will turn yellow or brown as the enamel cavitates and breaks down. This lesion change is indicative of an immediate need for referral for dental treatment (Fig 1).

### BARRIERS TO IMPLEMENTATION

In 2021, 49% of children in the United States were enrolled in Medicaid or the Children's Health Insurance Program, amounting to almost 39 million children. (77) The high prevalence of dental disease among US children led to the Medicaid program to reimburse medical providers for the provision of preventive dental services as part of health supervision visits. Studies at the state level have demonstrated that the provision of oral health services in medical offices leads to increased access to preventive





**Figure 1.** Severe early childhood caries in a 3-year-old. The incipient caries lesion (white spot lesion) circled in blue can be managed by implementing appropriate diet and constant remineralization; ie, periodic fluoride varnish application plus brushing with a fluoridated toothpaste. The caries lesion circled in orange shows breakdown of the enamel. Restorative care may be required if remineralization attempts are not successful and breakage continues. The caries lesion circled in red shows broken enamel and exposed dentin. Caries arrest with silver diamine fluoride may be attempted until the child is a candidate for conventional restorative treatment.

services. (78)(79)(80) According to the AAP, all 50 states and the District of Columbia Medicaid programs provide this benefit for young children. (81) However, a 2016 study documented that only 4.3% of children 0 to 5 years old who were enrolled in Medicaid received these services. (82)

This shortcoming may be the result of inconsistent referral criteria, barriers to adoption, and lack of education. Studies have shown that when it comes to caries risk assessment, pediatricians are more likely to refer to a dental provider when dental disease is evident rather than when behavioral risk factors are high. (83) A study assessing physicians' adherence to dental guidelines found that underreferral averaged 40%. (84) Thus, there is a missed opportunity for the timely establishment of a dental home before the onset of dental disease. In terms of barriers to adoption, primary care providers have reported difficulty integrating oral health services into their practice, resistance among colleagues and staff in their offices, difficulties with referrals due to a shortage of dentists, and low parental motivation. (84)(85) Finally, research suggests that lack of education may be a barrier to pediatrician's involvement in oral health activities. The 2006 AAP Annual Survey of Graduating Residents found that 35% did not receive oral health training during residency, and among those who did, 73% had less than 3 hours of training. Only 21% perceived their training to be either good or

excellent in preparing them to perform oral health risk assessments. (86) Similarly, the national surveys of pediatricians of 2008 and 2012 documented lack of professional training as a moderate to significant barrier to the provision of oral health services. (87)(88) The AAP, through its Education and Quality Improvement in Pediatric Practice online program, offers a comprehensive module on oral health best practices that addresses training deficiencies while meeting maintenance of certification of the American Board of Pediatrics. (89)

## CONCLUSION

Despite increases in dental care use among infants and toddlers, many of these children do not visit a dentist, suggesting that the AAP's and AAPD's recommendations to establish a dental home are not appropriately adopted. Although the limited number of dental providers participating in the Medicaid program is a limiting barrier for effective referrals, pediatricians can play a key role through primary and secondary prevention activities to prevent the onset and limit the extent of dental disease.

## Summary

- Fluoride varnish 2.26% is recommended for children younger than 6 years every 3 to 6 months. (Based on strong research evidence) (90)
- For infants and toddlers, fluoride toothpaste use is effective in caries control. (Based on some research evidence as well as consensus) (91)
- Establishment of the dental home is a cost-effective approach that decreases the needs for treatment and enhances oral health outcomes. (Based on some research evidence as well as consensus) (3)(92)
- Caries risk assessment can accurately quantitate a child's disease susceptibility and allow for targeted preventive measures. (Based primarily on consensus due to lack of relevant clinical studies) (36)

## DEDICATION

In memory of Amos Deinard, MD, MPH, FAAP: pediatrician, role model, and oral health champion for the underserved.



References and teaching slides for this article can be found at <https://doi.org/10.1542/pir.2022-005626>.



1. The chief quality officer of a Federally Qualified Community Health Center in a medically underserved area is interested in improving the pediatric oral health-care provided by the center. The chief quality officer and the pediatric clinic medical director designed a quality improvement project aimed at increasing the percentage of enrolled children who received an oral health risk assessment, preventive anticipatory guidance, and fluoride varnish application and had a dental home established as per the AAP Bright Futures guidelines. From the following list of possible barriers, which is the most common and the hardest barrier to overcome in achieving the aims of this project?
  - A. Ensuring compliance of the pediatricians with conducting the caries risk assessment.
  - B. Finding a dentist who participates in Medicaid.
  - C. Improving the Federally Qualified Community Health Center clinical staff's competence in fluoride varnish application.
  - D. Improving the pediatricians' competence in providing anticipatory guidance and answering parents' questions about oral health.
  - E. Increasing the knowledge of the pediatricians about the pathophysiology of dental caries.
  
2. A 4-month-old boy is seen in the clinic for a routine health maintenance visit. He is healthy with no medical problems. Since his last visit, he had no illnesses. His mother reports that he seems to be teething as he drools a lot and tries to bite on things. He is the product of a full-term pregnancy with no perinatal complications. He takes no medications. He is up-to-date on his immunizations and is due for his 4-month vaccines today. Developmental assessment shows normal growth and development. He is afebrile with stable vital signs. Physical examination shows normal gums with an edentulous mouth. The remainder of the physical examination shows normal findings. Which of the following is the most appropriate timing of starting to conduct the oral health risk assessment on this patient?
  - A. After the eruption of the first primary teeth and as part of each subsequent health maintenance visit.
  - B. At the 6-month health maintenance visit and as part of each subsequent health maintenance visit.
  - C. At the 1-year health maintenance visit and as part of each subsequent health maintenance visit.
  - D. At the 18-month health maintenance visit if the child has no dental home by then and as part of each subsequent health maintenance visit.
  - E. During this visit and as part of each subsequent health maintenance visit.

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3. During the health maintenance visit of an 18-month-old girl, the physician noted on examination of the child's mouth the presence of white spot lesions on the front upper and lower incisors at the gum lines. When asked about the child's diet, the mother states that the child is a "picky eater" for solids foods and prefers milk and juices. She drinks five 8-oz bottles of milk a day with several bottles of fruit juices between meals. In addition to dietary counseling and fluoride varnish application today, which of the following is the most appropriate step in management?
- A. Reassurance that the fluoride varnish application will reverse the white spots.
  - B. Reassurance that the white spots are seen on the primary teeth, which will be lost and replaced by permanent teeth.
  - C. Reassurance that the white spots seen are the beginning of mineralization of a whiter enamel.
  - D. Referral to a pediatric dentist if there is evidence of visible caries on a follow-up assessment in 3 months.
  - E. Referral to a pediatric dentist today.
4. A 9-month-old boy is brought to the clinic by his mother for a health maintenance visit. He is a healthy child with no medical problems and has not had any recent illnesses since he was last seen at 6 months of age. He takes no medications. The mother noted that since his last visit, his 2 central lower incisors came in and he seems to be teething and getting more teeth. Which of the following is the most appropriate anticipatory guidance message to provide her regarding tooth brushing advice in this patient?
- A. Start brushing the child's teeth after all his teeth have finished erupting.
  - B. Start brushing twice a day with a pea size of fluoridated toothpaste.
  - C. Start brushing twice a day with a pea size of nonfluoridated toothpaste.
  - D. Start brushing twice a day with a smear of fluoridated toothpaste.
  - E. Start brushing twice a day with water and no toothpaste.
5. The mother of the patient in the vignette in question 4 is concerned about adverse effects from fluoride exposure and asked about how fluoride works and what it does to the teeth. Which of the following is not a mechanism by which fluoride prevents and arrests tooth decay?
- A. Decreases demineralization after tooth development when applied topically.
  - B. Gets incorporated into the enamel during tooth formation when ingested.
  - C. Inhibits glycolysis by micro-organisms, thus decreasing their acid production.
  - D. Promotes overgrowth of certain "good" bacteria that inhibit the growth of cariogenic bacteria when applied topically.
  - E. Promotes remineralization after tooth development when applied topically.



# Fluoride Use in Caries Prevention in the Primary Care Setting

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Dental caries remains the most common chronic disease of childhood in the United States. Caries is a largely preventable condition, and fluoride has proven effectiveness in caries prevention. This clinical report aims to clarify the use of available fluoride modalities for caries prevention in the primary care setting and to assist pediatricians in using fluoride to achieve maximum protection against dental caries, while minimizing the likelihood of enamel fluorosis. Fluoride varnish application is now considered the standard of care in pediatric primary care. This report highlights administration, billing, and payment information regarding the fluoride varnish procedure.

## abstract

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Dental caries (ie, tooth decay) is an infectious disease caused by bacteria on the tooth surface metabolizing carbohydrates and producing acid, which dissolves tooth enamel. If unchecked, this process continues through the tooth and into the pulp, resulting in pain and tooth loss. This can further progress to local infections (ie, dental alveolar abscess or facial cellulitis), systemic infection, and, in rare cases, death. Dental caries in the United States is responsible for many of the 51 million school hours lost per year as a result of dental-related illness, which translates into lost work hours for the adult caregiver.<sup>1</sup> Early childhood caries is the single greatest risk factor for caries in the permanent dentition. Good oral health is a necessary part of overall health, and studies have demonstrated adverse effects of poor oral health on multiple chronic conditions, including diabetes control.<sup>2</sup> Therefore, failure to prevent caries has health, educational, and financial consequences at both the individual and societal levels.

Dental caries is the most common chronic disease of childhood,<sup>1</sup> with 59% of 12- to 19-year-olds having at least 1 documented cavity.<sup>3</sup> Caries is a “silent epidemic” that disproportionately affects poor, young, minority populations and children living below 100% of the poverty level.<sup>1</sup> In the United States, 25% of 2- to 5-year-old children from low socioeconomic and minority groups experience 80% of dental disease.<sup>4</sup> Among 3- to 5-year-olds, untreated dental decay was significantly greater for non-

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Hispanic Black and Hispanic children (19.3% and 19.8%, respectively) than for non-Hispanic white children (11.3%).<sup>4</sup> This disparity persisted among children 6 to 9 years and 13 to 15 years of age.<sup>4</sup> Dental caries is a global problem, with early childhood caries prevalence among socioeconomically disadvantaged groups reported to be as high as 70%.<sup>5</sup> It has been suggested that health beliefs, self-efficacy, access to care, and parents' attitudes and practices related to dietary and oral hygiene behaviors may contribute to this disparity.<sup>6</sup>

Children with special health care needs, including those with developmental delay, complex neurodevelopmental disabilities, or congenital heart disease are also affected disproportionately.<sup>7,8</sup> In a study of Head Start children, those with developmental delays had a caries prevalence ratio that was 1.26 times higher than classmates without developmental delays.<sup>8</sup> This difference may be attributable to challenges with home care routines such as toothbrushing and use of medications with high sugar content, among other factors.<sup>8</sup> Children with special health care needs are frequently considered as a group when determining caries risk. However, some diagnoses place children at greater risk for caries, whereas other children are at decreased or similar risk as children without special health care needs. In a retrospective longitudinal study of children with autism spectrum disorder, Down syndrome, congenital heart disease, and cerebral palsy, Frank et al<sup>7</sup> determined that the caries risk among the group of children with special health care needs was higher than among the control subjects but the risk differed significantly by diagnosis. The caries burden was greatest in children with congenital heart disease, followed by those with autism spectrum disorders.<sup>7</sup> For children with Down

syndrome, the risk was close to that of controls and considerably lower than the other 3 groups of children with special health care needs.<sup>7</sup>

Unfortunately, dental caries prevalence in young children increased between the previous 2 national surveys, despite improvements among older children.<sup>9</sup> Many children do not receive dental care at young ages, and because the risk of dental caries is heavily influenced by parenting practices, pediatricians have a unique opportunity to participate in the primary prevention of dental caries. The 2007–2016 Medical Expenditure Panel Survey demonstrated that 88.8% of infants and 1-year-olds have office-based physician visits annually, compared with only 3.6% of infants and 1-year-olds having general dental visits (American Academy of Pediatrics [AAP], unpublished analysis of 2007–2016 Medical Expenditure Panel Survey, August 2019). Studies show that health care dollars are saved with simple home and primary care setting prevention measures.<sup>10</sup>

The development of dental caries requires 4 components: teeth, bacteria, carbohydrate exposure, and time. Once teeth emerge, they become colonized with cariogenic bacteria. The bacteria metabolize carbohydrates and create acid as a byproduct. The acid dissolves the mineral content of enamel (demineralization) and, over time, with repeated acid attacks, the enamel surface disintegrates and results in a cavity in the tooth. Protective factors that help to remineralize enamel include exposing the teeth to fluoride, limiting the frequency of carbohydrate consumption (to 3 meals and 2 healthy snacks per day), choosing less cariogenic foods (selecting cheese or raw carrots over candy or crackers; selecting fresh fruit over dried fruit or processed fruit snacks), practicing good oral hygiene (brushing twice

a day for 2 minutes and flossing between all teeth that touch), and receiving regular dental assessments and care. If carious lesions are identified early, the process can be halted or reversed by modifying the patient's individual risk and protective factors. The AAP's publications "Maintaining and Improving the Oral Health of Young Children"<sup>11</sup> and *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents*<sup>12</sup> discuss these concepts in greater depth and provide targeted anticipatory guidance. For primary prevention to be effective, it is imperative that pediatricians be knowledgeable about the process of dental caries, social determinants of oral health, prevention of the disease, and available interventions, including fluoride.

Fluoride is available from many sources, divided into 3 major categories: tap water (and foods and beverages processed with fluoridated water), home administered, and professionally applied. The widespread decline in dental caries in many developed countries, including the United States, has been largely attributable to the use of fluoride. Fluoride has 3 main mechanisms of action<sup>13</sup>:

1. Fluoride promotes enamel remineralization.
2. Fluoride reduces enamel demineralization.
3. Fluoride inhibits bacterial metabolism and acid production.

The mechanisms of fluoride are both topical and systemic, but the topical effect is the most important, especially over the life span.<sup>14</sup>

There has been substantial public and professional debate about fluoride, and a great deal of information is available, often with confusing or conflicting messages. Excess fluoride ingestion during tooth development can result in subsurface

hypomineralization and porosity between the developing enamel rods, termed enamel fluorosis.<sup>15</sup> Fluorosis of permanent teeth occurs when excessive fluoride is ingested during the time that tooth enamel is being mineralized; therefore, the risk is influenced by both dose and frequency of ingestion. Recent evidence also suggests a genetic susceptibility or resistance to the development of fluorosis.<sup>16</sup> Fluorosis develops in children younger than 8 years, with the most susceptible period for permanent maxillary incisor fluorosis (central teeth) between 15 and 30 months of age.<sup>17-19</sup> The vast majority of enamel fluorosis is mild or very mild and characterized by small white striations or opaque areas not readily noticeable to the casual observer and is of minimal clinical consequence.

Moderate and severe forms of enamel fluorosis are uncommon in the United States but have both an aesthetic concern and, potentially, a structural concern with pitting, brittle incisal edges and weakened groove anatomy in the permanent 6-year molars.<sup>20</sup> After 8 years of age, there is no further risk of fluorosis except for the third molars because all other permanent tooth enamel is fully mineralized.

Dental and governmental organizations (the American Dental Association [ADA], American Academy of Pediatric Dentistry [AAPD], and Centers for Disease Control and Prevention [CDC]) have all published guidelines on the use of fluoride. In 2001, the AAP endorsed the CDC publication "Recommendations for Using

Fluoride to Prevent and Control Dental Caries in the United States."<sup>21</sup>

The 2 intents of this clinical report are as follows:

1. to assist pediatricians in using fluoride to achieve maximum protection against dental caries, while minimizing the likelihood of enamel fluorosis; and
2. to clarify what advice should be given by pediatricians regarding fluoride in the primary care setting.

### CURRENT INFORMATION REGARDING FLUORIDE USE IN CARIES PREVENTION

Sources of ingested fluoride include drinking water, infant formula, fluoride toothpaste, prescription fluoride supplements, fluoride mouth rinses, professionally applied topical

#### Oral Health Risk Assessment Tool

The American Academy of Pediatrics (AAP) has developed this tool to aid in the implementation of oral health risk assessment during health supervision visits. This tool has been subsequently reviewed and endorsed by the National Interprofessional Initiative on Oral Health.

##### Instructions for Use

This tool is intended for documenting caries risk of the child; however, two risk factors are based on the mother or primary caregiver's oral health. All other factors and findings should be documented based on the child.

The child is at an absolute high risk for caries if any risk factors or clinical findings, marked with a ▲ sign, are documented yes. In the absence of ▲ risk factors or clinical findings, the clinician may determine the child is at high risk of caries based on one or more positive responses to other risk factors or clinical findings. Answering yes to protective factors should be taken into account with risk factors/clinical findings in determining low versus high risk.

Patient Name: _____ Date of Birth: _____ Date: _____	
Visit: <input type="checkbox"/> 6 month <input type="checkbox"/> 9 month <input type="checkbox"/> 12 month <input type="checkbox"/> 15 month <input type="checkbox"/> 18 month <input type="checkbox"/> 24 month <input type="checkbox"/> 30 month <input type="checkbox"/> 3 year <input type="checkbox"/> 4 year <input type="checkbox"/> 5 year <input type="checkbox"/> 6 year <input type="checkbox"/> Other	
RISK FACTORS	PROTECTIVE FACTORS
<p>▲ Mother or primary caregiver had active decay in the past 12 months <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Mother or primary caregiver does not have a dentist <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Continual bottle/sippy cup use with fluid other than water <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Frequent snacking <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Special health care needs <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Medicaid eligible <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	<p>● Existing dental home <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Drinks fluoridated water or takes fluoride supplements <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Fluoride varnish in the last 6 months <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Has teeth brushed twice daily <input type="checkbox"/> Yes <input type="checkbox"/> No</p>
CLINICAL FINDINGS	
<p>▲ White spots or visible decalcifications in the past 12 months <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>▲ Obvious decay <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>▲ Restorations (fillings) present <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Visible plaque accumulation <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Gingivitis (swollen/bleeding gums) <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Teeth present <input type="checkbox"/> Yes <input type="checkbox"/> No</p> <p>● Healthy teeth <input type="checkbox"/> Yes <input type="checkbox"/> No</p>	
ASSESSMENT/PLAN	
<p><b>Caries Risk:</b> <input type="checkbox"/> Low <input type="checkbox"/> High</p> <p><b>Completed:</b> <input type="checkbox"/> Anticipatory Guidance <input type="checkbox"/> Fluoride Varnish <input type="checkbox"/> Dental Referral</p>	<p><b>Self Management Goals:</b></p> <p><input type="checkbox"/> Regular dental visits <input type="checkbox"/> Wean off bottle <input type="checkbox"/> Healthy snacks</p> <p><input type="checkbox"/> Dental treatment for parents <input type="checkbox"/> Less/No juice <input type="checkbox"/> Less/No junk food or candy</p> <p><input type="checkbox"/> Brush twice daily <input type="checkbox"/> Only water in sippy cup <input type="checkbox"/> No soda</p> <p><input type="checkbox"/> Use fluoride toothpaste <input type="checkbox"/> Drink tap water <input type="checkbox"/> Xylitol</p>

**Treatment of High Risk Children**  
If appropriate, high risk children should receive professionally applied fluoride varnish and have their teeth brushed twice daily with an age-appropriate amount of fluoridated toothpaste. Referral to a pediatric dentist or a dentist comfortable caring for children should be made with follow-up to ensure that the child is being cared for in the dental home.

Revised from American Academy of Pediatrics (AAP), Council on Pediatric Dentistry (CPD), "Fluoride Use in Pediatric Dental Care: Guidelines for Prevention and Management of Dental Caries in Children," *Pediatrics* 2002; 109(5): 1027-1036 and American Academy of Pediatric Dentistry (AAPD), "Oral Health Risk Assessment During and Establishment of the Dental Home," *Pediatrics* 1997; 100(1): 115-119.

#### Oral Health Risk Assessment Tool Guidance

##### Timing of Risk Assessment

The Bright Futures/AAP "Recommendations for Preventive Pediatric Health Care," (w/ Periodicity Schedule) recommends an oral health risk assessment at the 6- and 9-month visits. For the 12-, 18-, 24-, 30-month, and the 3- and 6-year visits, risk assessment should continue if a dental home has not been established. View the Bright Futures/AAP Periodicity Schedule—[http://brightfutures.aap.org/original\\_publications.htm](http://brightfutures.aap.org/original_publications.htm)

##### Risk Factors

###### ▲ Maternal Oral Health

Studies have shown that children with mothers or primary caregivers who have had active decay in the past 12 months are at greater risk to develop caries. This child is high risk.

###### Maternal Access to Dental Care

Studies have shown that children with mothers or primary caregivers who do not have a regular source of dental care are at a greater risk to develop caries. A follow-up question may be if the child has a dentist.

###### Continual Bottle/Sippy Cup Use

Children who drink juice, soda, and other liquids that are not water, from a bottle or sippy cup continually throughout the day or at night are at an increased risk of caries. The frequent intake of sugar does not allow for the acid it produces to be neutralized or washed away by saliva. Parents of children with this risk factor need to be counseled on how to reduce frequent snacking and choose healthy snacks such as cheese, vegetables, and fruit.

###### Frequent Snacking

Children who snack frequently are at an increased risk of caries. The frequent intake of sugared carbohydrates does not allow for the acid it produces to be neutralized or washed away by saliva. Parents of children with this risk factor need to be counseled on how to reduce frequent snacking and choose healthy snacks such as cheese, vegetables, and fruit.

###### Special Health Care Needs

Children with special health care needs are at an increased risk for caries due to their diet, xerostomia (dryness of the mouth, sometimes due to asthma or allergy medication use), difficulty performing oral hygiene, seizures, gastroesophageal reflux disease and vomiting, attention deficit hyperactivity disorder, and gingival hyperplasia or overcrowding of teeth. Premature babies also may experience enamel hypoplasia.

##### Protective Factors

###### Dental Home

According to the American Academy of Pediatric Dentistry (AAPD), the dental home is oral health care for the child that is delivered in a comprehensive, continuously accessible, coordinated and family-centered way by a licensed dentist. The AAP and the AAPD recommend that a dental home be established by age 1. Communication between the dental and medical homes should be ongoing to appropriately coordinate care for the child. If a dental home is not available, the primary care clinician should continue to do oral health risk assessment at every well-child visit.

###### Fluoridated Water/Supplements

Drinking fluoridated water provides a child with systemic and topical fluoride exposure, a proven caries reduction intervention. Fluoride supplements may be prescribed by the primary care clinician or dentist if needed. View fluoride resources on the Oral Health Practice Tools Web Page <http://aap.org/healthpractice/tools/flu>

###### Fluoride Varnish in the Last 6 Months

Applying fluoride varnish provides a child with highly concentrated fluoride to protect against caries. Fluoride varnish may be professionally applied and is now recommended by the United States Preventive Services Task Force as a preventive service in the primary care setting for all children through age 5 <http://www.uspreventiveservicestaskforce.org/Page/Topic/record-36-04-05>; summary/identical caries-in-children-from-birth-through-age-5-years-screening. For online fluoride varnish training, access the Caries Risk Assessment, Fluoride Varnish, and Counseling Module in the Smiles for Life National Oral Health Curriculum, [www.smilesforlife.org](http://www.smilesforlife.org)

###### Tooth Brushing and Oral Hygiene

Primary care clinicians can reinforce good oral hygiene by teaching parents and children simple practices. Infants should have their teeth cleaned after feedings with a wet soft toothbrush. Once teeth erupt it is recommended that children have their teeth brushed twice a day. For children under the age of 3 (and 3rd birthday) it is appropriate to recommend brushing with a smear (grain of rice amount) of fluoridated toothpaste twice per day. Children 3 years of age and older should use a pea-sized amount of fluoridated toothpaste twice a day. View the AAP Clinical Report on the use of fluoride in the primary care setting for more information. <http://pediatrics.appublications.org/content/early/2014/09/15/peds.2014.1696>



FIGURE 1  
AAP Oral Health Risk Assessment Tool.

fluoride, and some foods and beverages.<sup>22</sup> Preventive strategies for caries can be tailored by focusing on key risk factors for dental caries associated with diet, bacteria, saliva, and status of the teeth (both current and previous caries experience).<sup>11</sup> The AAP Oral Health Risk Assessment Tool (Fig 1) is recommended in *Bright Futures: Guidelines for Health Supervision of Infants, Children, and Adolescents* and endorsed by the National Interprofessional Initiative on Oral Health. This tool can be found at [www.aap.org/en-us/Documents/oralhealth\\_RiskAssessmentTool.pdf](http://www.aap.org/en-us/Documents/oralhealth_RiskAssessmentTool.pdf).

Table 1 provides condensed recommendations for use of fluoride modalities in patients at low and high risk of caries as described in the following sections.

### Fluoride Toothpaste

Fluoride toothpaste has consistently been proven to provide a caries-preventive effect for individuals of all ages.<sup>21,23</sup> In the United States, the fluoride concentration of over-the-counter (OTC) toothpaste ranges from 1000 to 1100 ppm. This translates into 1 mg of fluoride in a 1-inch (1 g) strip of paste. A pea-sized amount of toothpaste is approximately one-quarter of an inch. Therefore, a pea-sized amount of toothpaste containing 1000 to 1100 ppm fluoride would have approximately 0.25 mg of fluoride. Most fluoride toothpastes in the United States contain sodium fluoride, sodium monofluorophosphate, or stannous fluoride as the active ingredient.

Children younger than 6 years are more likely to ingest toothpaste and increase the risk of fluorosis. Fluorosis risk can be minimized by using the recommended amounts of toothpaste and storing toothpaste where young children cannot access it without parental help. Parents should supervise children younger than 8 years to ensure the proper amount of toothpaste and effective brushing technique.

### Recommendations and Dosing

The use of fluoride toothpaste should begin with the eruption of the first tooth. For children younger than 3 years, the recommended amount is a smear or grain of rice size (approximately 0.1 mg of fluoride). Once the child has turned 3 years of age and is more able to consistently expectorate, a pea-sized amount of toothpaste (approximately 0.25 mg of fluoride) should be used.<sup>24,25</sup> It is preferable to spit, but not rinse, after brushing. Expecting without rinsing reduces the amount of fluoride swallowed and leaves some fluoride available in the saliva for uptake by the dental plaque. Parents should be strongly advised to supervise their child's use of fluoride toothpaste to avoid overuse or ingestion, especially with children who have complex neurodevelopmental disabilities and cannot consistently expectorate.

High-concentration toothpaste (5000 ppm) is available by prescription only, and this decision is usually made by a dental health professional. The active ingredient in this toothpaste is

sodium fluoride. This agent can be recommended for children 6 years and older and adolescents who are at high risk of caries and who are able to expectorate after brushing. Examples of children for whom high-concentration fluoride toothpaste might be indicated are those with history of dental caries and new lesions, children with xerostomia, and those with gastroesophageal reflux causing dental erosion. Dental health professionals may also prescribe this agent for adolescents who are undergoing orthodontic treatment because they are at increased risk of caries during this time.<sup>26</sup>

### Fluoride Varnish

Fluoride varnish is a concentrated topical fluoride applied to the teeth that sets on contact with saliva. Advantages of this modality are that it is well tolerated by infants and young children, has a prolonged therapeutic effect, and can be applied by both dental and nondental health professionals in a variety of settings.<sup>27</sup> The concentration of fluoride varnish is 22 600 ppm (2.26% fluoride ion), and the active ingredient is sodium fluoride. The unit dose packaging from most manufacturers provides a specific measured amount (0.25 mL, providing 5 mg of fluoride ion). The application of fluoride varnish during an oral screening is of benefit to children, especially those with limited access to dental care. The current AAPD recommendation for children at high risk of caries is that fluoride varnish be applied to the teeth every 3 to 6 months.<sup>28</sup> The 2013 ADA

**TABLE 1** Summary of Fluoride Modalities for Low- and High-Risk Patients

Fluoride Modality	Low Caries Risk	High Caries Risk
Toothpaste	Starting at tooth emergence (smear of paste until age 3, then pea-sized)	Starting at tooth emergence (smear of paste until age 3, then pea-sized)
Fluoride varnish	Every 3–6 mo starting at tooth emergence	Every 3 mo starting at tooth emergence
Mouth rinse OTC	Do not use	Starting at age 6 y if the child can reliably swish and spit
Community water fluoridation	Yes	Yes
Dietary fluoride supplements	Yes, if drinking water supply is not fluoridated	Yes, if drinking water supply is not fluoridated

guideline recommends application of fluoride varnish at least every 6 months to both primary and permanent teeth of those at elevated caries risk.<sup>29</sup> Medicaid pays both physicians and dentists for the application of fluoride varnish in all 50 states.

Under the Patient Protection and Affordable Care Act,<sup>30</sup> payers are required to cover, without cost-sharing, preventive services recommended by the US Preventive Services Task Force (USPSTF) and *Bright Futures* guidelines. The USPSTF recommended in 2014 that primary care clinicians apply fluoride varnish to the primary teeth of all infants and children starting at the age of primary tooth eruption (B recommendation).<sup>31</sup> All children 5 years and younger deserve to have application of fluoride varnish fully covered, as per USPSTF recommendations, as part of health maintenance and preventive care and for fluoride varnish application to be a covered benefit and separately paid service (ie, not considered incidental to the office visit). All practices should be paid separately and appropriately according to the definition of the *Current Procedural Terminology (CPT) code*, which defines fluoride application as a separately identifiable procedure. Fluoride varnish payment should not be bundled with routine preventive evaluation and management services because definitions of preventive care under those specific CPT codes do not include fluoride varnish application. Information regarding coding, billing, and payment for fluoride varnish application can be found on the AAP Web site ([www.aap.org/oralhealth](http://www.aap.org/oralhealth)) and the Pew Center on the States Web site ([www.pewstates.org/research/analysis/reimbursing-physicians-for-fluoride-varnish-85899377335](http://www.pewstates.org/research/analysis/reimbursing-physicians-for-fluoride-varnish-85899377335)). Many AAP Chapters have chapter oral health advocates who promote and advocate for pediatric oral health within their community. Contact

information for these chapter oral health advocates can be found at [www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Oral-Health/Pages/Chapter-Oral-Health-Advocates.aspx](http://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Oral-Health/Pages/Chapter-Oral-Health-Advocates.aspx).

#### *Indications for Use*

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. Medical and dental professionals are encouraged to work in collaboration to ensure that fluoride varnish is being applied.

#### *Instructions for Use*

Fluoride varnish must be applied by a dentist, dental auxiliary professional, physician, nurse, or other health care professional on the basis of individual state practice acts. It should not be dispensed to families to apply at home. Application of fluoride varnish is most commonly performed in the context of a well-child visit. Teeth are dried with a 2-inch gauze square, and then the varnish is painted onto all surfaces of the teeth with a brush. The dose recommended for young children is 0.25 mL, which is available in single-dose applicator kits. Children can eat and drink immediately after application and are instructed to eat soft foods and not to brush their teeth on the evening after the varnish application to maximize the contact time of varnish on the teeth. Children should resume brushing twice daily with fluoridated toothpaste the following morning.

#### **OTC Fluoride Rinse**

OTC fluoride rinse provides a lower concentration of sodium fluoride than toothpaste or varnish. The concentration is most commonly 230 ppm (0.05% sodium fluoride). Expert panels on this topic have concluded that OTC fluoride rinses should not be

recommended for children younger than 6 years because of their limited ability to rinse and spit and increased risk of swallowing higher than recommended amounts of fluoride.<sup>32</sup> A teaspoon (5 mL) of OTC fluoride rinse contains approximately 1 mg of fluoride. For children older than 6 years, OTC rinses provide additional topical fluoride that may assist in the prevention of enamel demineralization. However, the evidence for an anticaries effect is limited, and decisions to recommend OTC fluoride rinses should be made in consultation with the child's dental health care provider.<sup>33,34</sup>

#### **Dietary Fluoride Supplements**

The USPSTF recommended in 2014 that primary care clinicians prescribe dietary fluoride supplements for children living in communities with nonfluoridated water or who drink well water that does not contain fluoride.<sup>31</sup> Because there are many sources of fluoride in water supplies and processed food and drinks, it is essential that all potential sources of fluoride be assessed before prescribing a dietary supplement, including consideration of differing environmental exposures (dual homes and child care). As a general guideline, if the source of drinking water in the primary home is fluoridated tap or well water, children will not require fluoride supplementation, even if they primarily drink bottled water because the teeth are exposed to fluoride through food preparation and brushing. The risk of fluorosis is high if fluoride supplements are given to a child consuming fluoridated water.<sup>35</sup> Information about the fluoridation levels in many community water systems can be found on the CDC Web site "My Water's Fluoride" ([https://nccd.cdc.gov/doh\\_mwf/default/default.aspx](https://nccd.cdc.gov/doh_mwf/default/default.aspx)). Not all communities report this information to the CDC, so it may be necessary to contact the local water department to determine the level of



fluoride in the community water. Well water must be tested for fluoride content before prescribing supplements, and this testing is available in most areas through the state or county public health laboratory. Challenges with dietary fluoride supplementation include determining the child's fluoride exposures and proper administration of the medication.

It is important to note that the USPSTF recommendations vary from the ADA and AAPD guidelines, which both recommend fluoride supplementation only be considered for children who drink fluoride-deficient water and are also at high risk for dental caries.<sup>36,37</sup> No caries risk assessment tool has been validated for pediatricians to use, but the AAP Oral Health Risk Assessment Tool was piloted through the Quality Improvement Innovation Network, and more than 80% of practices found the tool easy to implement because clinicians did not need to significantly alter current practice to incorporate risk assessment. Identification of high-risk patients for oral health referral increased from 11% to more than 87% with the use of this tool (Brightening Oral Health Workgroup and Quality Improvement Innovation Networks, AAP, Brightening Oral Health: Teaching and Implementing Oral Health Risk Assessments in Pediatric Care project, unpublished data, 2009).

#### Guidelines for Use

The CDC-recommended fluoride supplementation dosage schedule is provided in Table 2. Supplements can be prescribed in liquid, tablet, or lozenge form. Tablets are preferable for children who can chew because they gain an additional topical benefit to the teeth during the chewing process. Liquid supplements are recommended for younger children and should ideally be added to water or put directly into the child's mouth. Addition of the fluoride supplement

**TABLE 2** Fluoride Supplementation Schedule for Children

Age	Fluoride Ion Level in Drinking Water, ppm <sup>a</sup>		
	<0.3	0.3–0.6	>0.6
Birth to 6 mo	None	None	None
6 mo to 3 y	0.25 mg/d <sup>b</sup>	None	None
3–6 y	0.50 mg/d	0.25 mg/d	None
6–16 y	1.0 mg/d	0.50 mg/d	None

Source: Centers for Disease Control and Prevention.<sup>21</sup>

<sup>a</sup> 1.0 ppm = 1 mg/L.

<sup>b</sup> 2.2 mg of sodium fluoride contains 1 mg of fluoride ion.

to milk or formula is not recommended because absorption of fluoride is reduced in the presence of calcium.<sup>38</sup> The risk of fluorosis can be minimized by health care providers verifying that there are no other sources of fluoride exposure before prescribing systemic fluoride supplements.

#### Other Sources of Fluoride

Fluoride is present in processed foods and beverages and may be naturally occurring in some areas of the country. The presence of fluoride in juices and carbonated beverages does not counteract the cariogenic nature of these beverages.

#### Breastfeeding and Reconstitution of Infant Formula

The AAP recommends exclusive breastfeeding for the first 6 months of life, and there is no need during this period of time to supplement with fluoride or water that is fluoridated. A study of infant feeding practices revealed that 70% to 75% of mothers who fed their infants formula used tap water to reconstitute the powdered formula.<sup>39</sup> According to 2014 CDC data,<sup>40</sup> approximately 74% of US households using a community public water supply received optimally fluoridated water.<sup>41</sup> Before the emergence of the primary teeth, tap water can be used to reconstitute formula. There is a small risk of fluorosis in the permanent dentition if a fluoridated water source is used to reconstitute formula.<sup>22</sup> If families elect to purchase water, it is

appropriate to buy water with no added fluoride before tooth emergence. After tooth emergence, formula should be mixed with optimally fluoridated tap water or nursery water with fluoride, or fluoride supplements should be prescribed. It should be noted that most bottled water has suboptimal concentrations of fluoride and that fluoride content is not listed unless fluoride is added by the manufacturer. Fluoride is often added to "nursery" water, and this must be declared on the packaging. Dietary fluoride supplements should not be prescribed for children drinking infant formula reconstituted with fluoridated water.

#### Community Water Fluoridation

Community water fluoridation is the practice of adding a small amount of fluoride to the water supply to achieve a fluoride concentration of 0.7 ppm. Community water fluoridation was heralded by the CDC as 1 of the top 10 public health achievements of the 20th century.<sup>42</sup> Community water fluoridation is a safe, efficient, and cost-effective way to prevent tooth decay and has been shown to reduce tooth decay by 25%.<sup>43</sup> It prevents tooth decay by providing both topical and systemic exposure of low levels of fluoride to the teeth over time. Although more than 210 million Americans live in communities with optimally fluoridated water, more than 70 million others do not have access to fluoridated water in their public water system.<sup>41</sup> The fluoridation status of a community water supply can be determined by contacting the local water department or accessing the CDC Web site "My Water's Fluoride" ([https://nccd.cdc.gov/doh\\_mwf/default/default.aspx](https://nccd.cdc.gov/doh_mwf/default/default.aspx)).

#### Recommended Concentration

Community water fluoridation was initiated in the United States in the 1940s. In 2015, the US Department of Health and Human Services finalized

a recommendation to lower the optimal fluoride concentration in drinking water to 0.7 mg/L.<sup>44</sup> This fluoride concentration replaced the previous recommendation, which was based on climate and ranged from 0.7 mg/L in warmest climates to 1.2 mg/L in coldest climates.<sup>44</sup> The change was recommended because recent studies revealed **no variation in water consumption by young children on the basis of climate and to adjust for an overall increase in fluoride intake through foods and beverages processed with fluoridated water, fluoridated mouth rinses, and fluoride toothpastes.**

#### *Evidence Supporting Community Water Fluoridation*

Despite overwhelming evidence supporting the safety and preventive benefits of fluoridated water, **community water fluoridation continues to be a controversial and highly emotional issue.** Opponents express a number of concerns that have been addressed or disproven by validated research. The only scientifically documented adverse effect of excess (nontoxic) exposure to fluoride is fluorosis. An increase in the incidence of mild enamel fluorosis among teenagers has been cited as a reason to discontinue fluoridation, although this is a cosmetic condition with no detrimental health outcomes. Recent opposition has sometimes centered on the question of who decides whether to fluoridate: elected and/or public officials or the voters. Some opponents believe fluoridation to be mass medication and call into question the ethics of community water fluoridation, but **courts have consistently upheld that it is legal and appropriate for a community to adopt a fluoridation program.**<sup>45</sup> Opponents express concern about the quality and source of fluoride, claiming that the additives (fluorosilicic acid, sodium fluoride, or sodium fluorosilicate), in their concentrated form, are highly toxic byproducts of the

production of phosphate fertilizer and may include other contaminants, such as arsenic. **The quality and safety of fluoride additives are ensured** by Standard 60 of the National Sanitation Foundation/American National Standards Institute, a program commissioned by the US Environmental Protection Agency (EPA), and testing is conducted to confirm that the concentrations of arsenic or other substances are below those allowed by the EPA.<sup>46</sup> Finally, there have been many **unsubstantiated or disproven claims that fluoride leads to kidney disease, bone cancer, and compromised IQ.** More than 3000 studies or research articles have been published on the subject of fluoride or fluoridation.<sup>47</sup> Few topics have been as thoroughly researched as community water fluoridation, and the overwhelming weight of the evidence (along with over 75 years of experience) supports the safety and effectiveness of this public health practice.

#### *Naturally Occurring Fluoride in Drinking Water*

The **optimal fluoride concentration** in drinking water is 0.7 ppm, an amount proven beneficial in reducing tooth decay.<sup>44</sup> Naturally occurring fluoride may be below or above these levels in some areas. Under the Safe Drinking Water Act,<sup>48</sup> the EPA requires **notification by the water supplier if the fluoride concentration exceeds 2 ppm.** In areas where naturally occurring fluoride concentrations in drinking water exceed 2 ppm, people should **consider an alternative water source or home water treatments to reduce the risk of fluorosis in young children.**<sup>49</sup> Well water should be **tested** for the concentration of fluoride, and this testing is most commonly performed through the local health department.

#### *Fluoride Toxicity*

**Toxic levels of fluoride are possible, particularly in children, resulting**

from ingesting large quantities of fluoride supplements, fluoridated toothpaste, or fluoride mouth rinse. **The toxic dose of elemental fluoride is 5 to 10 mg of fluoride/kg of body weight.**<sup>50</sup> Lethal doses in children have been calculated to be between **8 and 16 mg/kg.** When prescribing sodium fluoride supplements, it is recommended to limit the quantity prescribed at one time to no more than a 4-month supply. Parents should be advised to **keep fluoride products out of the reach of young children and to supervise their use.**

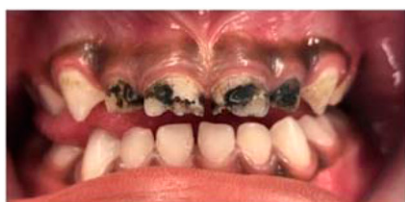
#### *Fluoride-Removal Systems*

A number of **water treatment systems** are effective in **removing fluoride from water,**<sup>51</sup> including reverse **osmosis and distillation.** Parents should be counseled on the use of these and activated alumina filters in the home and, should they choose to use one that removes fluoride, the potential adverse effects on the family's oral health. **Commonly used home carbon filters (eg, Brita or PUR) do not remove fluoride.**<sup>51</sup> Families concerned about heavy metals or other impurities in their home water supply can use an activated carbon filter and still retain the benefits of fluoridated water.

#### **Silver Diamine Fluoride**

Silver diamine fluoride (SDF) is a **minimally invasive, low-cost liquid solution that is painted on cavitated lesions.** In young children, SDF provides a **nonsurgical technique to manage carious lesions until the child can cope with traditional restorative dental care and, potentially, avoid sedation or a general anesthetic.**<sup>52</sup> SDF has been used in Japan for more than 40 years and was cleared by the US Food and Drug Administration in 2014 to **treat tooth sensitivity in adults.**<sup>53,54</sup> Similar to fluoride varnish, SDF (38% solution) has been used **off-label in children and adults to stabilize dental caries and reduce dental sensitivity.** At present, the use

of SDF in the United States is largely limited to the dental profession because there are no formal professional guidelines for use outside of dentistry. SDF is indicated for the arrest of cavitated carious lesions in primary teeth as part of a comprehensive caries management program.<sup>52</sup> Information about SDF is included in this report in expectation of questions to pediatricians about this increasingly publicized intervention and increasing numbers of SDF-treated teeth seen in pediatric practices. The mechanism of SDF action is poorly understood, but silver ions are known to be antimicrobial, and the fluoride prevents further enamel demineralization. After SDF application, the lesions must be followed to assess their hardness state. Additional treatments can be applied to obtain sufficient hardness. The only known contraindication to SDF is silver allergy, but SDF is not indicated for carious lesions involving the pulp. The only significant adverse effect of SDF is that the carious lesion turns black (Figs 2 and 3), which can be esthetically problematic for some. SDF can also temporarily stain the skin black if it accidentally comes into contact with the epithelium, and SDF can cause mucosal irritation for approximately 48 hours after mucosal contact. Care must be taken when applying SDF to a cavitated lesion to avoid contact with the child's mucosa or skin. Details of SDF application technique for dental health professionals are delineated in the AAPD Chairsides Guide.<sup>54</sup>



**FIGURE 2**  
Permanent staining of carious lesions after SDF application. Photograph courtesy of Martha Ann Keels, DDS, PhD.



**FIGURE 3**  
Three-year stabilization of a carious lesion on 1 primary molar after SDF application. Photograph courtesy of Martha Ann Keels, DDS, PhD.

### SUGGESTIONS FOR PEDIATRICIANS

1. Know how to assess caries risk. As recommended by the AAP in “Maintaining and Improving the Oral Health of Young Children” and the fourth edition of Bright Futures, pediatricians should perform oral health risk assessments on all children at every routine well-child visit beginning at 6 months of age. The Oral Health Risk Assessment Tool has been developed by the AAP and Bright Futures and endorsed by the National Interprofessional Initiative on Oral Health. This tool can be accessed at [www.aap.org/en-us/Documents/oralhealth\\_RiskAssessmentTool.pdf](http://www.aap.org/en-us/Documents/oralhealth_RiskAssessmentTool.pdf). The tool is a guide to help clinicians counsel patients about oral health and counsel in reducing risk.
2. Recommend use of fluoridated toothpaste starting at the eruption



**FIGURE 4**  
Diagram of smear versus pea-sized amount of fluoride toothpaste.

of the first tooth. A smear or grain of rice sized amount is recommended for children younger than 3 years, and a pea-sized amount of toothpaste is appropriate for most children starting at 3 years of age (see Fig 4).

3. Apply fluoride varnish according to the periodicity schedule and bill using the CPT code 99188.

Fluoride varnish is a proven tool in early childhood caries prevention. Additional training on oral screenings, fluoride varnish indications and application, and office implementation can be found in the Smiles for Life Curriculum Course: Caries Risk Assessment, Fluoride Varnish and Counseling<sup>55</sup> at [www.smilesforlifeoralhealth.org](http://www.smilesforlifeoralhealth.org). Additionally, the AAP Children's oral health Web site is a resource for oral health practice tools at <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Oral-Health/Pages/Oral-Health-Practice-Tools.aspx>.

4. Know how to determine the concentration of fluoride in a child's primary drinking water and determine the need for systemic supplements.<sup>21</sup>
5. Advocate for water fluoridation in your local community. Public water fluoridation is an effective and safe method of protecting the most vulnerable members of our population from dental caries. Pediatricians are encouraged to advocate on behalf of public water fluoridation in their communities and states. For additional information and water fluoridation facts and detailed questions and answers, see the following:
  - o <http://www.ilikemyteeth.org>;
  - o [www.ada.org/en/public-programs/advocating-for-the-public/fluoride-and-fluoridation-facts](http://www.ada.org/en/public-programs/advocating-for-the-public/fluoride-and-fluoridation-facts); and

o <http://www.cdc.gov/fluoridation/>.

6. Understand indications for SDF and be able to recognize the clinical appearance of SDF-treated teeth.

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#### ABBREVIATIONS

AAP: American Academy of Pediatrics  
AAPD: American Academy of Pediatric Dentistry  
ADA: American Dental Association  
CDC: Centers for Disease Control and Prevention  
CPT: Current Procedural Terminology  
EPA: US Environmental Protection Agency  
OTC: over-the-counter  
SDF: silver diamine fluoride  
USPSTF: US Preventive Services Task Force

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# Oral Health Risk Assessment Tool





The American Academy of Pediatrics (AAP) has developed this tool to aid in the implementation of oral health risk assessment during health supervision visits.

## Instructions for Use

This tool is intended for documenting caries risk of the child, however, two risk factors are based on the mother or primary caregiver's oral health. All other factors and findings should be documented based on the child.

The child is at an absolute high risk for caries if any risk factors or clinical findings, marked with a  sign, are documented yes. In the absence of  risk factors or clinical findings, the clinician may determine the child is at high risk of caries based on one or more positive responses to other risk factors or clinical findings. Answering yes to protective factors should be taken into account with risk factors/clinical findings in determining low versus high risk.

Visit:  6 month,  9 month,  12 month,  15 month,  18 month,  24 month,  30 month,  3 years,  4 years,  5 years,  6 years,  other \_\_\_\_\_

RISK FACTORS	PROTECTIVE FACTORS	CLINICAL FINDINGS
<p> Mother or primary caregiver had active decay in the past 12 months Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Mother or primary caregiver does not have a dentist Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p>• Existing dental home Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Drinks fluoridated water or takes fluoride supplements Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Fluoride varnish in the last 6 months Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Has teeth brushed daily Yes <input type="checkbox"/> No <input type="checkbox"/></p>	<p> White spots or visible decalcifications in the past 12 months Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p> Obvious decay Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p> Restorations (fillings) present Yes <input type="checkbox"/> No <input type="checkbox"/></p>
<p>• Continual bottle/sippy cup use with fluid other than water Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Frequent snacking Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Special health care needs Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Medicaid eligible Yes <input type="checkbox"/> No <input type="checkbox"/></p>		<p>• Visible plaque accumulation Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Gingivitis (swollen/bleeding gums) Yes <input type="checkbox"/> No <input type="checkbox"/></p>
		<p>• Teeth present Yes <input type="checkbox"/> No <input type="checkbox"/></p> <p>• Healthy teeth Yes <input type="checkbox"/> No <input type="checkbox"/></p>
<p>Caries Risk: <input type="checkbox"/> Low <input type="checkbox"/> High</p> <p>Completed: <input type="checkbox"/> Anticipatory Guidance <input type="checkbox"/> Fluoride Varnish <input type="checkbox"/> Dental Referral</p>		

## Treatment of High Risk Children

If appropriate, high-risk children should receive professionally applied fluoride varnish and have their teeth brushed daily with an age-appropriate amount of fluoridated toothpaste. Referral to a pediatric dentist or a dentist comfortable caring for children should be made with follow-up to ensure that the child is being cared for in the dental home.

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Adapted from Ramos-Gomez FJ, Crystal YO, Ng MW, Crall JJ, Featherstone JD. Pediatric dental care: prevention and management protocols based on caries risk assessment. *J Calif Dent Assoc.* 2010;38(10):746-761; American Academy of Pediatrics Section on Pediatric Dentistry and Oral Health. Preventive oral health intervention for pediatricians. *Pediatrics.* 2003; 122(6):1387-1394; and American Academy of Pediatrics Section of Pediatric Dentistry. Oral health risk assessment timing and establishment of the dental home. *Pediatrics.* 2003;111(5):1113-1116.

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## **WR-B Pediatric Dentistry: Mission Statement & Treatment Policy**

### **Mission Statement**

Support the General Practice Residency and OMFS department both clinically and academically. To provide coordinated care and management of medically compromised patients within WR. To promote optimal oral health through family-centered education and consultation.

### **Guidelines and policies**

Children and adolescents, especially medically compromised pediatric patients, may receive a dental screening appointment. The GPR and OMFS accreditation standards require specific pediatric dentistry encounters. Our screening process is guided by these requirements. Thus, based upon clinical findings, the child may be selected as a teaching case for residents. However, if space is available the child may also be seen by staff. If access to care is over 4 weeks, the patient will be directed to seek dental care for their child with a civilian pediatric dentist, as mandated by the TRICARE Dental Program.

Upon completion of the child's treatment plan, the patient may continue routine dental care for up to one year. Following this, the patient must establish a dental home for all further care (periodic exams, cleanings, treatment, and emergencies) with a civilian dentist.

Parents are encouraged to initiate their child's first dental visit no later than their first birthday. Proper oral hygiene, identification of risk factors, nutritional counseling, and anticipatory guidance can be discussed.

### **Patient referrals (for hospital providers)**

The Staff Pediatric Dentist in the Department of Hospital Dentistry provides consultative and treatment services to various departments within the hospital. Patients referred to our department will receive treatment at this facility if certain screening requirements are met. Preference is given to the following patients:

- 1.) Children with multidisciplinary, special healthcare needs
- 2.) Otherwise healthy children with acute and extensive dental needs
- 3.) Children between 6mo and 3 years old
- 4.) Littlest Warriors
- 5.) Dependents of foreign military members

Referrals can be made through CHCS, code: CAAA (Hospital Dentistry) select PEDS DEN.

**Ensure you have provided accurate contact information of the referring patient and provider.**

\* If this is an urgent matter, the referring provider can contact the front desk directly at **301-400-2060** to arrange an appointment for the child. Inpatient hospital consultations can be made by calling the front desk during normal working hours between 0730-1600. After hours consultations are made through the on-call dental pager **866-295-4913, pin# 1209395**.

### **Tricare Dental Program**

Healthy, developmentally normal children  $\geq 3$  years are encouraged to seek a dental home with a civilian provider of their choosing. Children 6mo-3 years may be seen by a provider at WR-B, as above. Tricare contracts with United Concordia for dental care for active-duty dependents. Direct parents to <http://www.tricare.mil/dental>. Click on links for "Tricare Dental Program" and "Participating Network Dentists" to get to the United Concordia website. Here, parents can search for a pediatric provider in their zip-code. ([www.tricare.mil/CoveredServices/Dental/FindDentist.aspx](http://www.tricare.mil/CoveredServices/Dental/FindDentist.aspx))



## Dental Health I Quiz

1. The AAP, ADA, and AAPD recommend that infants be scheduled for an initial dental visit within \_\_\_ months of the eruption of the first primary tooth OR no later than \_\_\_ months of age.
2. Federal Fluoridation guidelines established in 1962 state that community drinking water should contain \_\_\_\_\_ to \_\_\_\_\_ ppm fluoride.
3. Please complete the following chart for fluoride supplementation:

**Fluoride Concentration in Community Drinking Water**

Age	<0.3 ppm*	0.3-0.6 ppm	>0.6 ppm
0-6 months			
6 months-3 years			
3-6 years			
6-16 years			

\*1 parts per million (ppm) = 1mg/L

4. With whom does Tricare contract for insurance care? Were you able to find a provider on their website?
5. Risk factors for a child developing even mild fluorosis include which of the following?
  - a. The child gets frequent fluoride varnish applications from both their dentist and at well child visits from their pediatrician.
  - b. The child uses large amounts of fluorinated toothpaste when brushing teeth.
  - c. The child was prescribed an oral fluoride supplement from their pediatrician because they only drink a “little” fluorinated water.
  - d. Both b and c
6. Topical Fluoride helps prevent dental caries by inhibiting \_\_\_\_\_ and enhancing \_\_\_\_\_. It also inhibits \_\_\_\_\_.

## Dental Health I Cases

### Case 1

You are seeing siblings in clinic for well checks. Mom is concerned because her 12 month old doesn't have any teeth. She asks you, "How many teeth should she have?" Since she doesn't have any teeth, mom asks if she still needs to be doing any kind of dental hygiene.

Mom doesn't have any specific concerns about her healthy 2.5 year old. However, you notice that she has a pacifier in her mouth. Mom tried to schedule an initial visit with her own dentist, but was told that their clinic didn't see kids "less than age 3 years." When asked about teeth brushing, mom laughs and states "Ha! She won't let me brush her teeth. She has to do it herself and just chews on the brush."

**What other historical questions would you ask regarding the girls' dental health?**

Mom mentions that the family lives in the District, and that she would "never let [her] children drink the tap water." She tells you that the family "only drinks Evian."

**What guidance would you provide for the 2.5 year-old child? For the 12 month-old?**

Mom understands your guidance but wonders where she can find a pediatric dentist.

**What do you tell her?**

Mom notes during the interview that the 2.5 year old "really likes juice". Although she reassures you that it's "100% juice", she is unsure about how much juice is healthy for her daughter.

**What would you recommend?**

## Case 2

*Note: Dental Health II Module will discuss Special Needs Dental Care in greater detail*

You are seeing one of your complex continuity clinic patients today for a routine health physical. He is a 5 year old male with a history of Cerebral Palsy, ADHD and congenital heart disease. His diet consists mainly of Pediasure via a sippy cup. His medications include Ritalin for his ADHD, Robinal for drooling, and Botox injections every 8 weeks for contractures. As part of your exam you note that he has white lines on his front incisors near the gingival margin.

When asking about dental visits, mother has not been able to find a dental provider “out in town” willing to see him for routine visits because of his medical history. She does try to brush his teeth with “baby toothpaste” at least once a day. His mother is so happy with the excellent care you have provided during the visit, she gives you a big smile on the way out, and you note she multiple dental fillings.

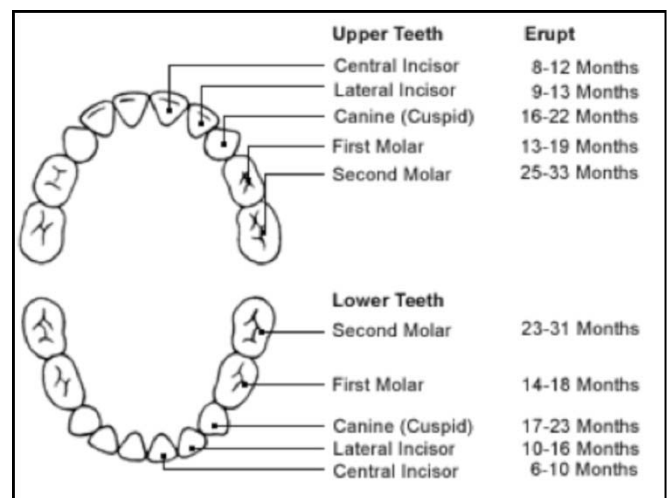
**How would you categorize this patient’s risk of early childhood caries? Why?**

**What in this patient’s history puts him at risk for caries?**

**What are physical exam findings of early childhood caries (ECC)?**

**Typically, ECC affect what teeth and in what order? (Notate on diagram →)**

**What can you do for your patient today to help improve his dental health (*which, in turn, will improve his overall health and quality of life*)?**



## Dental Health I Board Review

1. A 20-month old boy is seen for routine well child care. Physical exam reveals caries involving the maxillary incisors.

**Which one of the following is most likely to have contributed to this condition?**

- (A) The use of both fluoride drops and fluoride toothpaste simultaneously, which caused fluorosis.
- (B) Falling asleep with a water-filled bottle in the mouth
- (C) Falling asleep while breastfeeding
- (D) Oral colonization with *Staphylococcus aureus*
- (E) Living in an area in which tap water contains <0.2 ppm fluoride

2. A 7-month-old boy who is formula-fed presents to your clinic. The parents ask you how much fluoride should be in the water he drinks.

**Which of the following would be your reply?**

- (A) None
- (B) At least 0.3 ppm
- (C) At least 0.6 ppm
- (D) At least 1 ppm
- (E) At least 2 ppm

3. You are seeing a 2-year-old boy for a health supervision visit and note that the child has caries involving the central incisors. The boy still takes a bottle of chocolate milk to bed and will not fall asleep without it. He also drinks 2-3 cups of juice daily. His primary water source is a municipal water system that is not fluoridated and has a measured fluoride concentration that is less than 0.3 ppm. You counsel the mother about healthy diet and bottle use.

**Of the following, you are also MOST likely to recommend**

- (A) Daily oral fluoride supplements of 0.25mg
- (B) Daily oral fluoride supplements of 0.5mg
- (C) Monthly professional topical fluoride treatments
- (D) Regular dental checkup beginning at 3 years of age

4. A young mother in your practice presents for the 6-month health supervision visit for her third child whom she is breastfeeding. The older children are 2 and 4 years of age. The 4-year-old child recently required extensive dental extractions and capping of the deciduous teeth. You note that the 2-year-old is carrying a baby bottle of juice in the examination room. The infant you examine has 2 lower incisors.

**Of the following, the MOST appropriate advice to give this mother about her children's dental health is to**

- (A) await eruption of the upper incisors before arranging a dental appointment for the infant
- (B) begin brushing the baby's teeth with toothpaste
- (C) continue breastfeeding the infant because it may prevent caries
- (D) offer juice only from a cup to the 2-year-old child
- (E) reassure her that dental caries are not hereditary

5. A 4-month-old infant comes to your office for a health supervision visit. When you pass through the waiting room, you observe his young mother prop the infant's bottle while he is in his stroller.

**Of the following, the MOST appropriate action is to**

- (A) advise the mother to prop only bottles containing water
- (B) discuss the advantages of holding her baby during feedings
- (C) explain that the child is too young to have the bottle propped
- (D) recommend that the mother obtain a bottle sling
- (E) tell the mother that a bottle should not be propped when the infant is falling asleep

6. During a health supervision visit, you note that an 18-month-old boy has erosions of the medial portions of his maxillary central incisors and brown discoloration of several teeth. He was born at term following an uncomplicated pregnancy and has been well, except for two episodes of otitis media that were successfully treated with amoxicillin. His physical examination findings are otherwise normal.

**Of the following, the MOST likely factor contributing to this boy's findings is**

- (A) amoxicillin exposure
- (B) enamel hypoplasia
- (C) excessive fluoride exposure
- (D) exclusive breastfeeding
- (E) maternal oral colonization with *Streptococcus mutans*