

Preventive Guidelines for the Preschool Patient

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This article focuses on risk-based caries prevention and specific protective measures for preschool pediatric patients, to provide an age-appropriate approach designed for individual caries risk and optimize preventive care for preschoolers both in-office and at home.

The first dental visit should include a caries risk assessment to determine if the child is at low, moderate or high risk. This assessment will determine the most appropriate oral hygiene program in terms of home care, frequency of visits and radiographic evaluation. Parental awareness of the need for and methods of prevention also should be determined, along with anticipated patient/parent compliance.

Caries Risk Assessment:

Medical History

The dentist must determine if a child requires frequent or daily oral medication. The majority of oral suspensions are sweetened with sucrose in order to make them more palatable for children; unfortunately, some suspensions contain as much as 60% sugar.^{1,2} Sugar is used because it is inexpensive, is considered to be safe by the drug manufacturers and keeps bacterial and mold growth down. This frequent exposure to sugar may increase the risk of caries. Extrinsic staining (particularly on the facial surface of the mandibular primary incisors) may be noted on examination. Saccharin, which is used less frequently, may cause extrinsic staining as well. The need for brushing,

especially after the bedtime dose of medication, should be stressed. The lower lip should be gently retracted to access the mandibular incisors.

Amoxicillin's contribution to mottling of the enamel or fluorosis has recently been questioned. Hong et al suggested that excessive consumption of amoxicillin during a child's first year may contribute to primary tooth fluorosis; fluoride intake was still considered to be the most predictive of primary tooth fluorosis.³ Primary tooth fluorosis occurs on the buccal surface of the second primary molars; these molars begin to form in utero at 18 weeks and are completed when a child is 10 months old. Fluorosis of the buccal surface of the second primary molars may not present an esthetic problem; however fluorosis of the maxillary permanent incisors (which begin to form at three to four months of age) could be a cause for concern.

Quality of Enamel and Occlusal Morphology

The risk of caries increases if the enamel is hypocalcified or hypoplastic. Congenital enamel defects may be monitored without intervention if no clinical caries are evident. A glass ionomer or fluoride varnish may be indicated if the oral hygiene is poor or if the diet is contributing to enamel breakdown. A flat or non-glossy appearance of the enamel of the primary maxillary incisors is often predictive of excessive juice intake. Parents should be counseled regarding the effect of the combination of sugar and acid causing enamel dissolution or breakdown. Constant use of the "sippy cup" is as detrimental as a baby bottle containing cariogenic drinks. ⁴

The morphology of the occlusal surfaces of the primary molars should be noted. Flat occlusal morphology suggests a low risk for occlusal caries, while deep pits and fissures warrant discussion regarding salivary clearance of snacks. Starchy snacks such as

crackers and chips should be discouraged. To determine if salivary clearance has been effective, parents are advised to check for food residue in occlusal pits and fissures 20 minutes after the child has eaten a common snack; if the pits and fissures are filled with food, the snack should be discontinued.

For children with early childhood caries or those who are considered to be at risk, chewing gum sweetened with xylitol has been shown to reduce caries experience.⁵ Xylitol inhibits and suppresses *Streptococcus mutans* and compared to sorbitol, it is not fermented by *S. mutans* or *S. sobrinus*.⁶ Combinations of xylitol and sorbitol in chewing gum are equally effective in reducing plaque levels, but are less effective in reducing *S. mutans* than pure xylitol.⁷

Interdental Spacing

In the author's experience, a three-year-old child who lacks posterior interproximal spacing is at increased risk for interproximal caries by the time he or she is 4.5 years old. Parents should receive instruction in flossing. For home flossing, the child should be placed in a semi-supine position with a good light source; parents often have commented to the author how this approach facilitates flossing their children. Wild Flossers (Johnson & Johnson, New Brunswick, NJ; 800.526.3967) and Stages Kids' Flossers (Oral-B, South Boston, MA; 800.566.7252) both have child-friendly designs and are simple to use. The floss can be dipped in toothpaste for easier flossing through tight contacts and to provide some interproximal fluoride.

Maternal Factors

A "Window of Infectivity" has been described as the time when a child initially acquires *S. mutans*. The earliest age described is prior to the eruption of the first tooth with

bacteria being isolated from Bohn's nodules, and as late as eleven years of age.^{8,9} According to Wan et al, mothers whose children were infected more frequently tended to have high levels of *S. mutans*, poor oral hygiene, periodontal disease, low socio-economic status, and engaged in frequent snacking, compared to mothers of noninfected infants.¹⁰ Slavkin reported that the genotypes of *S. mutans* isolated from the saliva of Mothers and their female infants were identical 88% of the time.¹¹

Bacterial transmission occurs by a vertical route from parent/caretaker to the child. The cariogenic bacteria may be transferred to the child through the tasting of food; the sharing of utensils, cups, and pacifiers; and kissing. This information should encourage women to reduce oral levels of cariogenic bacteria through restorations, xylitol chewing gum, and antiseptic rinses, as well as by using fluoride in topical office treatments, rinses and/or varnish prior to delivery. A study by Lewis et al reported that when pediatricians were asked if cavity-causing bacteria could be transmitted between mother and child, 60% of the pediatricians answered incorrectly.¹² The dental team may provide the only counseling in this area. Maternal smoking habits have also been linked with caries prevalence.¹³

Diet

Although sugar consistently has been implicated in caries experience, early introduction of salty meals and foods has been implicated regarding the increased risk of early childhood caries.¹⁴ A food's consistency or nature is more important than its actual amount of fermentable carbohydrates. Highly retentive foods are more cariogenic than those that are cleared rapidly by saliva.

The most critical consideration is the number of times per day that the teeth are exposed to fermentable carbohydrates.¹⁵ Juice consumption outside of mealtime should be addressed and discouraged. White grape juice presents the additional concern of fluorosis in the preschool child with its high fluoride content.¹⁶ Carbonated soft drinks also may contain high levels of fluoride.¹⁷ Chewable vitamins are very popular, although children at high risk for caries should discontinue taking chewable vitamins sweetened with sugar; sorbitol may be a better alternative.

Oral Hygiene

The dentist should determine parental awareness of preventive measures. Because infants can be infected with *S. mutans* prior to tooth eruption, brushing should begin when the first tooth erupts. ¹⁸ Parents should be in charge of a child's brushing until the child is able to tie his or her shoes or write his or her name clearly---usually at five to six years of age. No particular technique for brushing is necessary, but the dentist/hygienist should stress that all surfaces must be brushed. The brush can be rotated in the posterior to brush open interproximal areas; a large model can be very helpful for demonstration.

If the child's mouth is stretched wide open, the buccal surfaces may be difficult to access. With the mouth partially closed, the cheeks are more flaccid and the buccal surfaces much more accessible. The author finds the Stages 3 toothbrush (Oral-B) to be ideal for this age group. The blue area on the brush provides a guide as to how much toothpaste should be dispensed. The head is small and rounded at the tip with a rubber-like covering. With the occurrence of intraoral puncture wounds from impaling a toothbrush, this rounded, softer tip is very good for safety considerations.

If the child refuses any toothpaste, do not use it. If the child is caries active, the benefit of fluoridated toothpaste should be considered; parents should try various toothpastes until an acceptable one is found. Dentists should discuss the risk of fluorosis from toothpaste consumption. The pediatric formulations are sweeter than the adult formulations and less abrasive, but contain the same amount of fluoride (1,000ppm) as adult formulations. The transverse method of dispensing toothpaste to the brush can insure minimal fluoride exposure.¹⁹

Parents must be firm with children regarding the need for toothbrushing. Generally, fluoridated toothpaste is not recommended until the child reaches two years of age. Some studies recommend avoidance until age three. A 2000 study reported that children who started using a fluoridated toothpaste in a non-fluoridated area before age three were 4.43 times more likely to experience dental fluorosis than those who started using it after age three.²⁰ Unless the child is caries active, toothpaste without fluoride is recommended prior to age three. Battery powered brushes do not appear to be any better than manual toothbrushes for plaque removal or gingival health among children age five or under. ²¹.

Fluoride Exposure

Due to the increasing incidence of fluorosis, the Centers for Disease Control (CDC) issued new guidelines for the prevention of dental caries.²² (www.cdc.gov/mmwr/previre/mmwrhtml/rr5014a1.htm) The report recommends cautious use of fluoride supplements in children under six years of age. Other recent articles have noted an increase in enamel fluorosis among fluoride-deficient communities.²³ Beltran-Aguilar et al suggested reducing the fluoride concentration in water, the contributor to fluorosis that can be controlled most easily.²⁴ Fluoride supplements in the form of

chewable tablets are indicated for the high caries risk child, but the parent should be informed of the risk of fluorosis among children prior to age six.

Studies describe a halo effect with the myriad of sources that add to the fluoride exposure from toothpaste among preschool children. Juices, soft drinks, preservatives in foods, and incorrect assumption that the drinking water has less than optimal fluoride, all contribute to excessive fluoride exposure for the preschooler's developing enamel.²⁵ Water can be analyzed for fluoride levels using a kit from FluoriCheck. (Omni Oral Pharmaceuticals, West Palm Beach, FL; 800.445.3386) It is important for parents to understand that the post-eruptive topical effect of fluoride is far more beneficial than the pre-eruptive effect for inhibition of demineralization and inhibition of bacterial enzymes.^{26,27,28}

Fluoride rinses are not recommended for children below six years of age. For the cooperative child, topical fluoride in-office treatments may begin at three years of age. A 2.0% neutral topical fluoride may be more tolerable for a child's first treatment and for children with a strong gag reflex. A one-minute application is adequate for the primary dentition. Foams are accepted better than gels and significantly reduce fluoride exposure and retention.²⁹ A fluoride menu with pictures of the different flavors may be used.

Fluoride varnish is the most recent preventive adjunct for the pediatric patient; it is simple to apply and highly effective for incipient caries on smooth surfaces. Fluor Protector varnish (Ivoclar Vivadent, Inc., Amherst, NY; 800.533.6825) has been shown to reduce interproximal caries on primary teeth.³⁰ It may also be applied to the entire dentition as a preventive measure, similar to a sealant or as an atraumatic restorative material. Other commercially available varnishes include Duraphat (Colgate-Palmolive,

Canton, MA; 800.763.0246), Duraflor (Medicom, Montreal, Canada; 800.800.361.2862), and CavityShield (Omnia Oral Pharmaceuticals). To date, only the state of Washington offers an insurance code for fluoride varnish, although progress is being made toward FDA approval for its use in caries prevention.

For the caries active preschooler, fluoride varnish may be substituted for the traditional topical fluoride treatment. After a toothbrush or rubber cup prophylaxis, the teeth are dried with a 2x2 gauze sponge or compressed air. The varnish may be applied with a Benda Brush (Centrix Corporation, Shelton, CT; 800.235.5862), a sponge-tipped applicator or the brush that is supplied with some varnish kits. Varnish may be flossed through closed contacts. The child should not eat, drink, or brush his or her teeth for about an hour following the application. Frequency of application should be determined by the child's caries risk assessment. The recommendations in the literature range from every six months to once every three months to three applications over a one-week period.³¹ The risk of toxicity and fluorosis are not considered to be significant.

Caries Experience

The child who presents with decay on his or her maxillary primary incisors would be classified as a high caries risk. Children who develop caries on the maxillary primary incisors by age three are eight times more likely to develop future buccal/lingual and interproximal caries than caries-free children at the same age.³² Children who experience early caries are at high risk for future caries in the permanent dentition.^{33,34} For caries active children who are too young or unable to cooperate for quality restorations without sedation or general anesthesia, atraumatic restorative treatment (ART) is minimally invasive and requires no local anesthesia. Caries are excavated with

hand instruments or slow speed, avoiding the pulp. (This procedure is not indicated for use with acute pulpitis or abscess.) Glass ionomer cement typically is used for the restoration and may be placed with a gloved finger. Fuji 1X GP (GC America Inc., Alsip, IL; 800.323.7063) is packaged in capsules and sets in about two minutes. The glass ionomers provide sustained fluoride release, caries inhibition or arrest and chemical adhesion to the tooth, avoiding the additional steps and time required for conventional bonding. Their poor wear and retention make the glass ionomers best suited for one-surface restorations in the primary dentition.³⁵

ART is an appropriate choice for indirect pulp capping, due to glass ionomer's ability to form a physiochemical bond to dentin and its thermal expansion properties. Post treatment, dentin hardness is increased, suggesting tissue remineralization.³⁶ Caries-active children should be seen every three to four months rather than every six months. Weinstein et al concluded that 45 minutes of parental counseling with motivational interviewing and six brief follow-up telephone calls were more effective than traditional education with pamphlets and a video.³⁷

Dentists and hygienists should inform parents about the caries risk and the individually-designed preventive program. Table 1 presents some possible supporting statements for the low risk child.

Table 1

- There is no history of chronic use of antibiotics or other sugary medicines
- The chewing surfaces of the baby molars are flat
- The enamel is ideal with good generalized spacing
- Mother and/or father have no to low decay history

- The diet would not contribute to decay
- Parents are aware of good oral hygiene and compliant
- Fluoride exposure is adequate
- There are no caries

Problems in a few or all of these areas may determine the child to be at moderate or high risk, requiring the incorporation of additional preventive measures both in-office and at home.

Conclusion

The ability to provide restorative treatment for this age group is often limited by behavior. Sedation or general anesthesia may be necessary in order to insure quality treatment that also protects the developing psyche. Implementing age-appropriate preventive practices with both systemic and topical fluoride and atraumatic restorative treatment in conjunction with educating parents, are proven methods of successful alternatives to reduce or inhibit early childhood caries. Utilizing the Caries Risk Assessment for individual evaluation will offer clinicians an organized approach for appropriate and timely intervention for caries-active preschool children. The benefits of incorporating these personalized guidelines for our youngest patients will positively influence a lifetime of oral health.

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