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Caries risk assessment, prevention, and management in pediatric dental care

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The recent increase in the prevalence of dental caries among young children has highlighted the need for a new approach to prevent caries in children at a younger age. New disease prevention management models call for children to have their first visit to the dentist at age 1 or when their first tooth erupts. This article addresses early childhood caries risk assessment, prevention, and management strategies in young children using the concept of

the “dental home” and a simple six-step protocol to conduct an effective and comprehensive infant oral care visit. Age-specific anticipatory guidance recommendations—including early parental education, timely intervention, and/or referral—have been included for counseling parents during early childhood dental visits.

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The general dentist is in the unique position of establishing a dental care program for pregnant women, which is considered the first step toward disease prevention for infants and toddlers.

Background

Dental caries remains the most prevalent chronic childhood disease in the U.S., five times more common than asthma and seven times more common than hay fever.¹⁻³ This disease, known as *early childhood caries* (ECC) (formerly termed *nursing bottle caries* or *baby bottle tooth decay*), is currently defined as the presence of one or more decayed (that is, cavitated or noncavitated lesions), missing (due to caries), or filled surfaces in any primary tooth in a child age 6 or younger.⁴ Among children under the age of 3, any sign of smooth-surface caries is indicative of severe early childhood caries (S-ECC).⁴ ECC is prevalent among young children, particularly in underserved populations and racial/ethnic minorities.⁵ Approximately 75% of ECC is found in approximately 8% of children between the ages of 2 and 5.⁶ Compared to other

age groups, where caries rates remain unchanged, the caries rate among preschoolers has increased to 28%.^{7,8}

It is well-documented that caries is a transmissible infectious disease in which pathogenic risk factors prevail over protective factors, producing demineralization of tooth structure. If the disease is allowed to progress, surface cavitation and dental tissue destruction will result.

Mutans streptococci (MS) is considered one of the most important pathogens in the cariogenic process because of its ability to stick to smooth tooth surfaces and produce copious amounts of acid. It is recognized that these micro-organisms can be transmitted from caregiver to child through close contact with or through the exchange of saliva (vertical transmission)—for example, through kissing on the mouth, sharing utensils or cups, and so forth. Caregivers with high levels of pathogenic bacteria in their mouths can communicate these bacteria into a child's mouth even before the eruption of the first tooth. It has been shown that infants with high levels of MS or those with early colonization are more likely to develop ECC.⁹⁻¹³

Establishment of a dental home

Signs of ECC can be detected soon after the eruption of the first tooth. Its progression is entirely preventable, provided that risk indicators are identified and preventive oral health practices are implemented at a young age.¹⁴ For this reason, the AGD, the ADA, the American Academy of Pediatric Dentistry, and the American Academy of Pediatrics all have recommended that children should see a dentist by age 1 (or when the first tooth erupts) and that a dental home be established as soon as possible.^{4,15,16} The *dental home* is defined as the ongoing relationship between the dentist and the patient—including all aspects of oral health care—delivered in a comprehensive, continuously accessible, coordinated, family-centered way.¹⁶ Establishment of a dental home (including referral to dental specialists when appropriate) should begin by the time the child is 12 months old.¹⁶

A dental home should be established so that children can make regular dental visits that include caries risk assessment, individualized

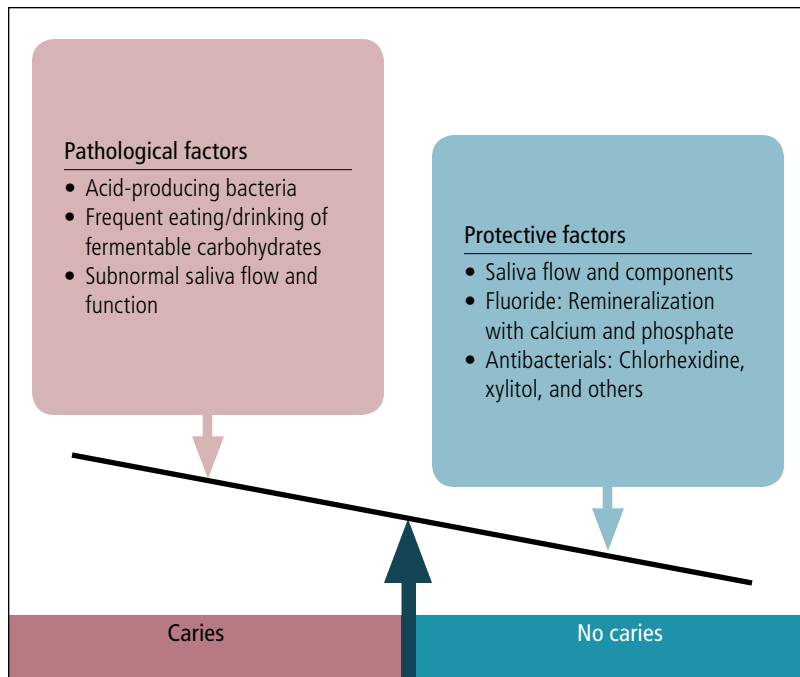


Fig. 1. An illustration of the caries balance concept.

preventive strategies, and anticipatory guidance.¹⁷ Periodic supervision of care intervals (also known as *periodicity*) should be determined based on the disease risk for each individual patient.¹⁶

Pediatricians, family practitioners, and other medical providers see children frequently during infancy and early childhood. These practitioners are ideally suited to screen young children for caries risk and refer these patients for dental care. If physicians are to refer children for their first dental visit at age 1, the dental community must be willing and prepared to accept infants and pregnant women as patients. Since general dentists comprise 80% of practicing dentists and see the majority of children seeking dental care, it is important for these dentists to embrace the concepts of the dental home, infant oral health, and perinatal health.¹⁸

Perinatal oral health

Dentists have come to recognize the critical role that a mother plays in ensuring her child's oral health. However, women often do not receive oral health care and education in a timely manner.¹⁹ Many women do not know that they should seek dental care during their pregnancy, while many others who do know this are often unable to find a dentist who is willing to provide it.²⁰ Because new mothers are more likely to be receptive to ideas that would improve their offspring's oral health, dental and obstetric providers have a prime opportunity to educate mothers about the changes that could affect their children.²¹ It is important for general dentists to provide expectant mothers with comprehensive dental care, as recent studies have shown that it is safe to provide care at any point during pregnancy.²²⁻²⁴

The benefits of prevention, diagnosis, and treatment of oral diseases (including the use of radiographs and local anesthetics) during pregnancy exceed the risks inherent in treatment or those associated with not providing care. Improving the oral health of expectant mothers by reducing their pathogenic bacteria levels will postpone the child's acquisition of oral bacteria and may delay the development of ECC.²³

Initial infant oral care visit

Infants and parents will benefit from an early infant oral health visit and the establishment of a dental home. Explaining exactly what to expect during this visit may allay parental fears and concerns. Parents should be warned that children might cry during the visit, just as they would when they are hungry, tired, or placed in a new situation. Understanding the benefits of this preventive visit will help parents cope, even if their child cries and is uncooperative.

An infant oral care examination and caries risk assessment follows a simple six-step protocol, as described below.

Caries risk assessment

An individualized risk assessment of an infant or toddler will help both health care providers and parents/caregivers identify and understand the factors associated with ECC, so that a cooperative and proactive preventive care plan can be developed. The specific information gained from a systematic assessment of caries risk guides the dentist in the decision-making process to establish treatment and preventive protocols for children with oral disease and for those deemed to be at risk.

To achieve the best management and outcomes for good oral health, the caries risk assessment should be

done as early as possible—preferably before the onset of disease. Caries risk assessment and subsequent management of the disease in children is crucial due to the known fact that caries in the primary dentition is a strong predictor of caries in the permanent dentition.^{25,26}

The caries balance concept states that the progression or reversal of dental caries is determined by the balance between pathological factors and protective factors (Fig. 1).²⁷⁻²⁹ These risk factors are determined from interviews with the parent(s) and a clinical assessment. The caries risk assessment form in Figure 2 provides an easy way to compile and keep a record of the information that will aid the dentist in determining the infant/child's caries risk. This form is broken down into three major categories: biological risk factors, protective factors, and disease indicators from a clinical examination.

Biological risk factors are obtained from the caretaker interview and include biological or lifestyle factors that contribute to the development or progression of caries. These risk factors include a mother with active decay or recently placed dental restorations, a family with a low socioeconomic status, a caregiver with low health literacy, and a child who frequently intakes fermentable carbohydrates or sweetened drinks and/or sleeps with a bottle or sippy cup containing milk or juice.

Protective factors are also obtained during the interview. These are biological and/or therapeutic factors, measures, and behaviors that, when used consistently, could reduce a child's risk for ECC. These factors include optimal exposure to fluoride and access to regular dental care (for example, the presence of a dental home).

Child's name: _____

Biological factors	High risk factors	Moderate risk factors	Protective factors
Mother/primary caregiver has active caries	Yes		
Parent/caregiver has low socioeconomic status	Yes		
Child has more than three snacks or beverages containing sugar per day between meals	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 factors			
Child receives fluoridated drinking water or fluoride supplements			Yes
Child's teeth are 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 more than one decayed, missing, or filled tooth surface (DMFS)	Yes		
Child has active white spot lesions or enamel defects	Yes		
Child has elevated mutans streptococci	Yes		
Child has plaque on teeth		Yes	

Modified from: Ramos-Gomez F, Crall J, Slayton R, Featherstone JD. Caries risk assessment appropriate for the age one visit. *J Calif Dent Assoc* 2007;35(10):687-702; and ADA Caries Risk Assessment Forms.

Circling those conditions that apply to a specific patient helps the practitioner and parent understand the factors that contribute to or protect against caries. Risk assessment categorization of low, moderate, or high is based on a preponderance of factors. However, clinical judgment may justify the use of one factor in determining overall risk, for instance, frequent exposure to sugar-containing snacks or beverages, or more than one DMFS.

Overall assessment of the child's dental caries risk:
 High Moderate Low

Self-management goals:
 1 _____ 2 _____

Practitioner signature: _____
Date: _____

Fig. 2. A sample caries risk assessment form for children from ages 1–5. (© Copyright 2010-2011 by the American Academy of Pediatric Dentistry. Reprinted with permission.)

Table 1. CAMBRA dental caries treatment protocol guidelines for children up to age 2.

Risk category	Diagnostic			Fluoride
	Periodic oral examinations	Radiographs	Saliva test	
Low	Annual	Posterior bitewings at 12–24 month intervals if proximal surfaces cannot be examined visually or with a probe	Optional baseline	In office: no; Home: brush twice each day with a smear of fluoride toothpaste
Moderate	Every six months	Posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Recommended	In office: FV at initial visit and recalls; Home: brush twice each day with a smear of fluoride toothpaste; Caregiver: OTC sodium fluoride treatment rinses
Moderate; non-compliant	Every three to six months	Posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a smear of fluoride toothpaste combined with a smear of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses
High	Every three months	Anterior (No. 2 occlusal film) and posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a smear of fluoride toothpaste combined with a smear of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses
High; non-compliant	Every one to three months	Anterior (No. 2 occlusal film) and posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a smear of fluoride toothpaste combined with a smear of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses
Extreme	Every one to three months	Anterior (No. 2 occlusal film) and posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a smear of fluoride toothpaste combined with a smear of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses



Fig. 3. An example of the knee-to-knee position.

Disease indicators are findings, obtained during the clinical examination of the child, that are proven to have a strong correlation to the presence of the disease. These include cavitated carious lesions and white spot lesions/decalcifications, recent restorations, presence of plaque, gingival bleeding (an indicator of heavy plaque), and dry mouth.

A risk assessment categorization of low, moderate, or high is based on a preponderance of the factors circled on the caries risk

Preventive intervention					Restoration	
<i>Xylitol</i>	<i>Sealants</i>	<i>Antibacterials</i>	<i>Anticipatory guidance /counseling</i>	<i>Self-management goals</i>	<i>White spots/ precavitated lesions</i>	<i>Existing lesions</i>
Not required	No	No	Yes	No	n/a	n/a
Child: xylitol wipes; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	No	Yes	No	Treat with fluoride products as indicated to promote remineralization	n/a
Child: xylitol wipes; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	n/a
Child: xylitol wipes; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	Intermediate therapeutic restoration (ITR) or conventional restorative treatment as patient cooperation and family circumstances allow
Child: xylitol wipes; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow
Child: xylitol wipes; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow

assessment form. These specific patient conditions will help both the practitioner and the parent(s) understand the factors that contribute to or protect the patient from caries.

Proper positioning

Proper positioning of the child is critical to conducting an effective and efficient clinical examination. Knee-to-knee positioning (Fig. 3) allows the child to see the parent throughout the examination, while the parent can directly observe

findings and receive hygiene instructions while gently helping to stabilize the child during the examination. In general, the knee-to-knee position should be used for children between the ages of 6 months and 3 years, or up to age 5 for children with special health care needs. Children over the age of 3 may be able to sit forward on their caregiver’s lap or sit alone in a chair.

Examiners and caregivers need to work together to ensure that the transition from the interview to the examination runs smoothly

for the child. The clinician should explain what will happen prior to starting the examination and anticipate that young children might cry, which is developmentally appropriate behavior.

Toothbrush prophylaxis

For most young children, a toothbrush prophylaxis is efficient for removing plaque. It is also non-threatening to young children and serves to demonstrate the proper technique of brushing to the caregiver.^{30,31}

Table 2. CAMBRA dental caries treatment protocol for children from ages 3–6.

Risk category	Diagnostic			
	Periodic oral examinations	Radiographs	Saliva test	Fluoride
Low	Annual	Posterior bitewings at 12–24 month intervals if proximal surfaces cannot be examined visually or with a probe	Optional baseline	In office: no; Home: brush twice a day with a pea-sized amount of fluoride toothpaste
Moderate	Every six months	Posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Recommended	In office: FV at initial visit and recalls; Home: brush twice a day with a pea-sized amount of fluoride toothpaste; Caregiver: OTC sodium fluoride treatment rinses
Moderate; non-compliant	Every three to six months	Posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a pea-size of fluoride toothpaste combined with a pea-size of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses
High	Every three months	Anterior (No. 2 occlusal film) and posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a pea-size of fluoride toothpaste combined with a pea-size of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses
High; non-compliant	Every one to three months	Anterior (No. 2 occlusal film) and posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a pea-size of fluoride toothpaste combined with a pea-size of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses
Extreme	Every one to three months	Anterior (No. 2 occlusal film) and posterior bitewings at 6–12 month intervals if proximal surfaces cannot be examined visually or with a probe	Required	In office: FV at initial visit and recalls; Home: brush twice a day with a pea-size of fluoride toothpaste combined with a pea-size of 900 ppm calcium phosphate paste, leave on at bedtime; Caregiver: OTC sodium fluoride treatment rinses

For this step, the examiner retracts the child’s lips and cheeks and demonstrates brushing along the gingival margins. The spongy handle of an age-appropriate toothbrush can be used to prop open the child’s mouth. During this Tell-Show-Do encounter, caregivers should be encouraged to brush both their own teeth and the child’s at least twice a day, especially before bedtime. Fluoride toothpaste is one of the most effective tools for caries prevention and it is safe for children to use as soon as the first tooth erupts.^{32,33}

A pea-sized amount of toothpaste is recommended for children between the ages of 2 and 6, while a “smear” is appropriate for children under the age of 2.³⁴

Clinical examination

During this examination, the examiner counts the child’s teeth aloud, using the toothbrush handle to prop open the mouth if necessary. Many providers make a game of this task, singing songs, engaging the child’s attention, and, if all else fails, distracting the child with a brightly colored toothbrush or toy. Praise

the child at each step for his or her cooperation and/or good behavior. If the child is able to cooperate, the examiner should also inspect the soft tissues, hard tissues, and occlusion at this time.

Data from the clinical examination should be combined with data from the caregiver interview to determine the child’s overall caries risk and formulate an individualized treatment plan. Visible plaque and its locations should be documented, as should white spot lesions, brown spots (which may indicate caries on the occlusal

Preventive intervention						Restoration
<i>Xylitol</i>	<i>Sealants</i>	<i>Antibacterials</i>	<i>Anticipatory guidance/counseling</i>	<i>Self-management goals</i>	<i>White spot/precavitated lesions</i>	<i>Existing Lesions</i>
Not required	No	No	Yes	No	n/a	n/a
Child: xylitol wipes/products to substitute for sweet treats or when unable to brush; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	No	Yes	No	Treat with fluoride products as indicated to promote remineralization	n/a
Child: xylitol wipes/products to substitute for sweet treats or when unable to brush; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	n/a
Child: xylitol wipes/products to substitute for sweet treats or when unable to brush; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow
Child: xylitol wipes/products to substitute for sweet treats or when unable to brush; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow
Child: xylitol wipes/products to substitute for sweet treats or when unable to brush; Caregiver: two sticks of gum or two mints four times a day	Fluoride-releasing sealants recommended on deep pits and fissures	Recommend for caregiver	Yes	Yes	Treat with fluoride products as indicated to promote remineralization	ITR or conventional restorative treatment as patient cooperation and family circumstances allow

surface), tooth defects, deep pits/fissures, tooth anomalies, missing and decayed teeth, existing and defective restorations, gingivitis or other soft tissue abnormalities, occlusion, and indications of trauma.

Fluoride treatment

The ADA recommends that children categorized as high caries risk receive a full-mouth topical fluoride varnish (FV) application every three months.³⁵ Children with a moderate caries risk should receive FV every six months, even if the child lives in a community

with fluoridated water. The provider should reiterate the cumulative benefit of FV, even if it has been mentioned earlier in the visit. After application, the child should be limited to a soft diet (that is, no crunchy or chewy foods) for the remainder of the day; in addition, for the varnish to be effective, the parent/caregiver should not brush the child’s teeth until the next day.

Assignment of risk, anticipatory guidance, and counseling

Once all of the data have been gathered and recorded in the caries

risk assessment form, the practitioner can evaluate and determine the child’s risk for developing carious lesions. The practitioner should record all “Yes” answers to each question within the three areas of risk assessment and record any “No” answers to a protective factor under the High Risk column. A “No” response to a protective factor is equal to a high risk factor. High risk factors can be mitigated by affirmative protective factors, which help to determine if a child is at moderate or even low risk for caries development.

Table 3. Age-specific anticipatory guidance.

	Prenatal	Birth to age 1	Ages 2–3	Ages 3–6
Take-home message for caregivers	<p>Baby teeth are important!</p> <p>Parents'/caregivers' oral health affects the baby's oral health.</p> <p>Parents/caregivers should obtain regular dental check-ups and get treatment if necessary.</p> <p>Schedule child's first dental appointment by age 1.</p> <p>Use of fluorides, including brushing the teeth with a fluoride toothpaste, is the most effective way to prevent tooth decay</p>	<p>Baby teeth are important!</p> <p>Parents'/caregivers' oral health affects the baby's oral health.</p> <p>Parents/caregivers should obtain regular dental check-ups and get treatment if necessary.</p> <p>Parents/caregivers should avoid sharing with their child things that have been in their mouths.</p> <p>Schedule child's first dental appointment by age 1.</p> <p>Prevention is less costly than treatment.</p> <p>Use of fluorides, including brushing the teeth with a fluoride toothpaste, is the most effective way to prevent tooth decay.</p>	<p>Baby teeth are important!</p> <p>Parents'/caregivers' oral health affects the baby's oral health.</p> <p>Parents/caregivers should obtain regular dental check-ups and get treatment if necessary.</p> <p>Parents/caregivers should avoid sharing with their child things that have been in their mouths.</p> <p>Prevention is less costly than treatment.</p> <p>Use of fluorides, including brushing the teeth with a fluoride toothpaste, is the most effective way to prevent tooth decay.</p>	<p>Baby teeth are important!</p> <p>Parents'/caregivers' oral health affects the child's oral health.</p> <p>Parents/caregivers should obtain regular dental check-ups and get treatment if necessary.</p> <p>Parents/caregivers should avoid sharing with their child things that have been in their mouths.</p> <p>Prevention is less costly than treatment.</p> <p>Use of fluorides, including brushing the teeth with a fluoride toothpaste, is the most effective way to prevent tooth decay.</p>
Oral health and hygiene	<p>Encourage parents/caregivers to obtain dental check-ups and, if necessary, treatment before birth of the baby to reduce cavity-causing bacteria that can be passed to the baby.</p> <p>Encourage parents/caregivers to brush teeth with fluoride toothpaste.</p>	<p>Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce the spread of bacteria that can cause tooth decay.</p> <p>Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths.</p> <p>Encourage parents/caregivers to become familiar with the normal appearance of the child's gums.</p> <p>Emphasize using a washcloth or toothbrush to clean teeth and gums after the eruption of the first tooth.</p> <p>Encourage parents/caregivers to check front and back teeth for white, brown, or black spots (signs of cavities).</p>	<p>Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce the spread of bacteria that can cause tooth decay.</p> <p>Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths.</p> <p>Review parent's/caregiver's role in brushing toddler's teeth.</p> <p>Discuss brush and toothpaste selection.</p> <p>Problem-solve oral hygiene issues.</p>	<p>Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce the spread of bacteria that can cause tooth decay.</p> <p>Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths.</p> <p>Discuss the continued responsibility of parents/caregivers to help children under 8 to brush their teeth.</p> <p>Encourage parents/caregivers to consider dental sealants for primary and permanent first molars</p>
Oral development	<p>Describe primary tooth eruption patterns (first tooth usually erupts between 6 and 10 months of age).</p> <p>Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem.</p>	<p>Discuss primary tooth eruption patterns.</p> <p>Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem.</p> <p>Discuss teething and ways to soothe sore gums, such as chewing on teething rings and washcloths.</p>	<p>Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem.</p> <p>Discuss teething and ways to soothe sore gums, such as chewing on teething rings and washcloths.</p>	<p>Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem.</p>

	Prenatal	Birth to age 1	Ages 2–3	Ages 3–6
Fluoride adequacy	<p>Evaluate fluoride status of residential water supply</p> <p>Review topical and systemic sources of fluoride.</p> <p>Encourage mother to drink fluoridated tap water.</p>	<p>Evaluate fluoride status of residential water supply.</p> <p>Review topical and systemic sources of fluoride.</p> <p>Encourage drinking fluoridated tap water.</p> <p>Consider topical needs (e.g., toothpaste, fluoride varnish).</p>	<p>Re-evaluate fluoride status of residential water supply.</p> <p>Review topical and systemic sources of fluoride.</p> <p>Encourage drinking fluoridated tap water.</p> <p>Review need for topical fluorides.</p>	<p>Re-evaluate fluoride status of residential water supply.</p> <p>Review topical and systemic sources of fluoride.</p> <p>Review need for topical or other fluorides.</p>
Oral habits	<p>Encourage mother to stop smoking</p>	<p>Encourage breastfeeding.</p> <p>Advise mother that removing child from breast after feeding and wiping baby's gums/teeth with a damp washcloth reduces the risk of ECC.</p> <p>Review pacifier safety.</p>	<p>Remind mother that removing child from breast after feeding and wiping baby's gums/teeth with a damp washcloth reduces the risk of ECC.</p> <p>Begin weaning of non-nutritive sucking habits at age 2.</p>	<p>Discuss consequences of digit sucking and prolonged non-nutritive sucking (e.g., pacifier) and begin professional intervention if necessary.</p>
Diet and nutrition	<p>Emphasize eating a healthy diet and limiting the number of exposures to sugar snacks and drinks.</p> <p>Emphasize that it is the frequency of exposures, not the amount of sugar, that affects susceptibility to caries.</p> <p>Encourage breastfeeding.</p> <p>Remind parents/caregivers never to put the baby to bed with a bottle containing anything other than water or to allow feeding "at will."</p>	<p>Remind parents/caregivers never to put the baby to bed with a bottle containing anything other than water or to allow feeding "at will."</p> <p>Emphasize that it is the frequency of exposures, not the amount of sugar, that affects susceptibility to caries.</p> <p>Encourage weaning from bottle to cup by age 1.</p> <p>Encourage diluting juices with water.</p>	<p>Remind parents/caregivers never to put the baby to bed with a bottle or to allow feeding "at will."</p> <p>Discuss a healthy diet and oral health.</p> <p>Emphasize that it is the frequency of exposures, not the amount of sugar, that affects susceptibility to caries.</p> <p>Review snack choices and encourage healthy snacks.</p>	<p>Review and encourage a healthy diet.</p> <p>Remind parents/caregivers about limiting the frequency of exposures to sugar.</p> <p>Review snacking choices.</p> <p>Emphasize that the child should be completely weaned from the bottle and should be drinking exclusively from a cup.</p>
Injury prevention	<p>Encourage childproofing of home, including electrical cord safety and poison control.</p> <p>Emphasize the use of a properly secured car seat.</p> <p>Encourage caregivers to keep emergency numbers handy.</p>	<p>Review childproofing of home, including electrical cord safety and poison control.</p> <p>Emphasize the use of a properly secured car seat.</p> <p>Encourage caregivers to keep emergency numbers handy.</p>	<p>Review childproofing of home, including electrical cord safety and poison control.</p> <p>Emphasize the use of a properly secured car seat.</p> <p>Emphasize the use of a helmet when child is riding a tricycle/bicycle or is in the seat of an adult bike.</p> <p>Remind caregivers to keep emergency numbers handy.</p>	<p>Emphasize the use of a properly secured car seat.</p> <p>Encourage safety in play activities, including helmets when riding bikes and mouthguards when playing sports.</p> <p>Remind caregivers to keep emergency numbers handy.</p>

Tooth decay is caused by certain types of bacteria (bugs) that live in your mouth. When they stick to the film on your teeth (also called dental plaque), they can cause damage. The bacteria feed on what you eat, especially sugars (including fruit sugars) and cooked starches (bread, potatoes, rice, pasta, etc.). Within approximately five minutes after you eat or drink, the bacteria begin making acids as they digest your food. These acids can break into the outer surface of the tooth and melt away some of the minerals. Your saliva can balance the acid attacks as long as they don't happen very often. However, if: 1) your mouth is dry, 2) you have a lot of these bacteria, or 3) you snack frequently, then the acid causes the loss of tooth minerals. This is the start of tooth decay and leads to cavities.

Methods of controlling tooth decay

Diet

Reducing the amount of sugary and starchy foods, snacks, and drinks you consume can help to reduce tooth decay. This doesn't mean that you can never eat these types of foods, just that you should limit the number of times you eat them between main meals. A good rule is three meals per day and no more than three snacks per day.

Fluorides

Fluorides help to make teeth stronger, to protect against tooth decay, and to heal tooth decay if it has not gone too far. Fluorides are available from a variety of sources, such as drinking water and toothpastes and rinses you can buy at the supermarket or drug store. They may also be prescribed by your dentist or applied in the dental office. The daily use of fluoride is very important to help protect against the acid attacks.

Plaque removal

Plaque is a yellowish film that sticks to the surface of teeth. Brushing your teeth removes plaque and should be done twice every day. Bacteria live in plaque, so removing the plaque from your teeth on a daily basis helps to control tooth decay. Plaque is very sticky and may be hard to remove from between your teeth and from the grooves on the biting surfaces of your back teeth. If your child has an orthodontic retainer, be sure to remove it before brushing your child's teeth. Brush all surfaces of the retainer as well.

Saliva

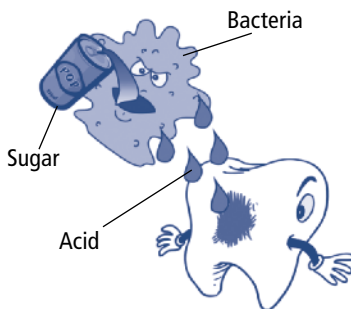
Saliva is important for healthy teeth. It balances acids and provides other ingredients that protect the teeth. If you cannot brush after a meal or snack, you can chew sugar-free gum. This will stimulate the flow of saliva to help reduce the effect of acids. Sugar-free candy or mints can also be used, but some of them contain acids themselves. Acids in sugar-free candy will not cause tooth decay, but they can slowly dissolve the tooth surface over time (a process called *erosion*). Some sugar-free gums are made to help fight tooth decay, while some gums contain baking soda, which neutralizes the acids produced by the bacteria in plaque. **Gum that contains xylitol as its first listed ingredient is the gum of choice.** This type of gum has been shown to protect against tooth decay and to reduce the number of bacteria that cause decay.

Antibacterial mouthrinses

Rinses that your dentist can prescribe are able to reduce the number of bacteria that cause tooth decay and can be useful in patients at high risk for tooth decay. These rinses are recommended only for children who can rinse and spit.

Sealants

Sealants are plastic coatings brushed onto the biting surfaces of back teeth to protect the deep grooves from decay. In some people, the grooves on the surfaces of the teeth are too narrow and deep to clean with a toothbrush. These grooves may decay even if you brush them regularly. Sealants are an excellent preventive measure for children and young adults at risk for this type of decay.



For example, children who frequently eat snacks or drink juice may be at only moderate risk if they live in a community that has fluoridated water and if they brush twice a day with a fluoride toothpaste.

However, some factors are preponderant, and a "Yes" response to the biological factor "Mother/primary caregiver has active caries" or to the clinical findings "Child has more than one decayed, missing, or filled tooth surface (dmfs)" or "Child has active white spot lesions or enamel defects" immediately places the child at high or extreme high risk.

When the risk factors outweigh the protective factors, there is an increased likelihood for the development of caries, which places the child in a high risk category. When protective factors prevail and risk factors are controlled, the child can be considered low risk. Most importantly, though, the clinician's experience and expertise is a vital component for determining a child's ultimate risk, which serves as the basis for an individualized treatment plan for each infant and caregiver. An approach that considers expected parental compliance to recommended treatment protocols is essential for children at moderate or high caries risk.

The treatment protocol guidelines presented in this article outline care paths for children with moderate or high risk as well as guidelines for a child who has non-compliant parents and who is at moderate or high risk. Table 1 lists caries management by risk assessment (CAMBRA) treatment protocol guidelines and recommendations for children up to age 2; Table 2 lists guidelines and recommendations for children from ages 3–6. Chlorhexidine rinses, FV, and xylitol-based products may be employed to modify the maternal

Fig. 4. A parent/caregiver handout: How tooth decay happens. From: Patient information on tooth decay. Available at: http://www.cdafoundation.org/library/docs/jour0303/consensus_forms.pdf. (© Copyright 2003 by the California Dental Association. Reprinted with permission.)

<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Regular dental visits for child	Family receives dental treatment	Wean off bottle (at least no bottle during sleep)	Brush with fluoride toothpaste at least twice a day	Only water or milk in sippy cup
<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Less or no juice	Healthy snacks	No soda	Chew xylitol gum	Drink tap water
Check the goals you will focus on between today and your next visit.				
On a scale of 1–10, how confident are you that you can accomplish your goals? <input type="radio"/> ① <input type="radio"/> ② <input type="radio"/> ③ <input type="radio"/> ④ <input type="radio"/> ⑤ <input type="radio"/> ⑥ <input type="radio"/> ⑦ <input type="radio"/> ⑧ <input type="radio"/> ⑨ <input type="radio"/> ⑩				
My promise: I agree to the goals checked and understand that staff may ask me how I am doing with my goals.				
Date: _____ Signed by: _____				
Review date: _____ Comments: _____ Staff initials: _____				
Review date: _____ Comments: _____ Staff initials: _____				

IMPORTANT: The last thing that touches your child's teeth before bedtime is a toothbrush with fluoride toothpaste.

Fig. 5. Self-management goals for parents/caregivers.

transmission of cariogenic bacteria to infants.¹⁶ The risk analysis should allow the caregiver to determine any changes that must be made concerning the child's diet, tooth-brushing habits, and fluoride application.

Parents should be given additional information and anticipatory guidance on oral health prevention that is specific to the needs of their child. This information should include oral hygiene recommendations, growth and development issues (that is, teething, digit, or pacifier habits), oral habits, diet and nutrition guidelines, and injury prevention tips (see Table 3). The anticipatory guidance approach is designed to take advantage of time-critical opportunities for implementing preventive health practices and thus reduce the child's risk of preventable oral disease.¹⁸

During the child's initial visit, the dentist must counsel the parent(s) to change specific factors that may be contributing to active caries or increasing their child's

caries risk. Figure 4 presents a form that is useful in communicating the mechanisms of dental caries to parents. Their understanding of this process is crucial to the successful implementation of preventive and therapeutic measures.³⁶ A family-centered approach and customized recommendations have been shown to be more successful in engaging parents to change specific parenting practices than such generic recommendations such as "brush your teeth twice a day" and "don't eat candy."³⁷

Motivational interviewing (MI) is a counseling technique that relies on two-way communication between the clinician and the patient or parent. MI is meant to establish a therapeutic alliance that is based on rapport and trust. In this process, the clinician asks questions to help parents identify problems, listens to their concerns, encourages self-motivational statements, prepares them for change (discussing the hurdles that interfere with action), responds

to resistance, schedules follow-up appointments, and prepares the parent(s) for the family's specific and unique difficulties, which inevitably arise when instituting a consistent, lifetime dental care program for a child.

Following the brief motivational interview, the parent/caregiver is asked to commit to two self-management goals or recommendations (Fig. 5) and informed that the dentist will discuss these goals at the child's next appointment.³⁸ The form in Figure 6 can be given to parents as a reminder of their commitment to their child's well-being and can be filed in the child's dental record, so that the dentist can follow up on the family's compliance at subsequent visits.

Recall visits and periods

Clinicians must consider each child's individual needs to determine the appropriate interval between and frequency of oral examinations, based on age-specific risk assessment and planned treatment. Some

Parent/caregiver recommendations for control of dental decay

Daily oral hygiene/fluoride toothpaste treatment
 These procedures reduce the number of bacteria in the mouth and provide a small amount of fluoride to guard against further tooth decay and to repair teeth that display early decay.

Brush child's teeth with a fluoride-containing toothpaste (small smear or pea-sized amount on a soft small infant-sized toothbrush) twice daily (gently brushed by parent or caregiver)

Selective daily flossing of teeth with early caries (white spots)

Other: _____

Diet
 The aim is to reduce the number of between-meal sweet snacks that contain carbohydrates, especially sugars. Substituting snacks rich in protein, such as cheese, will also help.

OK as is

Limit bottle/nursing (to avoid prolonged contact of milk with teeth)

Replace juice or sweet liquids in the bottle with water

Limit snacking (particularly sweets)

Replace high carbohydrate snacks with cheese and protein snacks

Other: _____

Xylitol (parents/caregivers)
 Xylitol is a sweetener that bacteria cannot digest. Using xylitol-containing chewing gum or mints/lozenges is a way for parents/caregivers of children at high risk for caries to reduce the transfer of decay-causing bacteria to their baby/toddler. This is most effective when used by the parent/caregiver starting shortly after the child is born. Parents/caregivers with dental decay place their children at high risk for early childhood caries.

Parents/caregivers of children up to the age of 3 who have high bacterial levels should use xylitol mints/lozenges or xylitol gum two to four times daily.

Antibacterial rinse (parents/caregivers)
 Parents/caregivers of children at high risk for caries may require antibacterial treatment to decrease the transmission of cariogenic bacteria and to reduce the infant/child's risk of early childhood caries.

Parents/caregivers of children up to the age of 3 who have high bacterial levels should rinse with 10 mL of chlorhexidine gluconate 0.12% (by prescription only). Rinse at bedtime for one minute once a day for one week. Repeat each month for one week until the infection is controlled. Separate from fluoride use by one hour. Continue for six months or until bacterial levels remain controlled.

Practitioner signature: _____ Date: _____

Parent/caregiver signature: _____ Date: _____

Fig. 6. Parent/caregiver recommendations form.

infants and toddlers at a high risk for caries should be re-evaluated on a monthly basis. Most older children at high risk should be seen at three-month intervals for re-evaluation. Children in the moderate risk category should return every six months

for re-evaluation; low-risk children should return every 6–12 months.

After the parents have followed the recommended protocol for three to six months, they should bring the child back for reassessment. Parents need periodic encouragement

and support whenever behavioral changes are required; they should be questioned about any problems they might have had following the recommendations. It is essential to re-assess the risk status and monitor improvement on the previously set self-management goals. At every visit, the clinician should re-evaluate whether it is necessary to change the recommendations or to continue reinforcing the existing prevention protocol. Parents should know that changing dietary and home care practices does not happen overnight.

Summary

General dentists have an important role in preventing and reducing the severity of ECC in young children. By embracing the concepts of the dental home and perinatal and infant oral health, general dentists can implement preventive and treatment protocols in their practice by using an appropriate, age-specific caries risk assessment instrument to determine the caries risk of their pediatric patients.

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