

Clinical Considerations for an Infant Oral Health Care Program

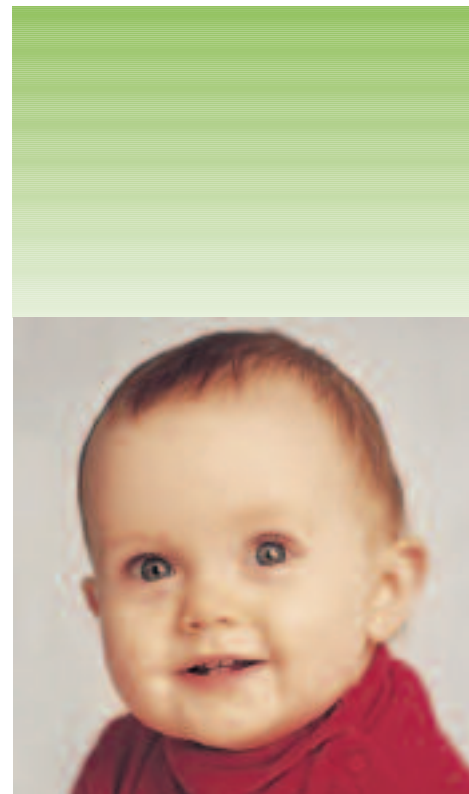
Francisco J. Ramos-Gomez,
DDS, MS, MPH
Associate Professor of Pediatric Dentistry
University of California, San Francisco
San Francisco, California

Abstract: *The American Academy of Pediatric Dentistry and the American Association of Pediatrics recommend dental assessments and evaluations for children during their first year of life. Early dental intervention evaluates a child's risk status based on parental interviews and oral examinations. These early screenings present an opportunity to educate parents about the medical, dental, and cost benefits of preventive—rather than restorative—care and may be more effective in reducing early childhood caries than traditional infectious disease models. A comprehensive infant oral care program includes: (1) risk assessments at regularly scheduled dental visits; (2) preventive treatments such as fluoride varnishes or sealants; (3) parental education on the correct methods to clean the baby's mouth; and (4) incentives to encourage participation in ongoing educational programming. Recruiting mothers during pregnancy improves the likelihood that they will participate in the assessment program. To maximize interest, trust, and success among participating parents, educational and treatment programs must be tailored to the social and cultural norms within the community being served.*

A successful infant oral care program is based on early intervention.^{1,2} It improves access to care, provides counseling and anticipatory care guidance for disadvantaged children between the ages of 6 months and 5 years, and helps to prevent early childhood caries. Many children who require emergency dental treatment are affected by early childhood caries (also known as baby-bottle tooth decay or nursing caries). The prevalence of this disease varies from 5% to 72%, depending on diagnostic criteria, age, race, and population.³ In California, the chance of a child experiencing early childhood caries before entering school is about 1 in 7, and more than half of California's school-children experience toothaches on a daily basis.⁴ Early childhood caries can manifest itself in severe pain, infection, abscesses, chewing difficulty, malnutrition, gastrointestinal disorders, and low self-esteem. The decay of primary teeth can affect children's growth, lead to malocclusion by adversely affecting the correct guidance of the permanent dentition, and cause poor speech articulation.

Prenatal Care Intervention Programs for Pregnant Women

The earliest opportunity to provide education about infant oral health is during the pregnancy.⁵ Pregnant women are especially interested in their children's overall health and well-being and the cost benefits of preventive care rather than restorative treatments.^{6,7} Because poor maternal periodontal health appears to be associated with preterm labor and low birth weight outcomes, prenatal counseling and dental care for expectant mothers may result in improved pregnancy outcomes.⁸ Effective prenatal counseling programs educate parents about healthy feeding habits and the dangers associated with using food to modify their children's behavior. An expectant mother also must be aware of her own caries balance so that she can understand what puts her at risk, her baby's health at risk, and what protective measures can give her newborn an early healthy start.⁹ Most mothers are not aware that their oral health status affects that of their babies. The transmission of *Streptococcus mutans*



occurs at an early age because mothers with poor oral health inoculate their babies' mouths even before the first tooth appears.

Several studies have shown that reductions in mutans streptococci in pregnant women may result in a delayed or diminished transfer of caries-inducing bacteria to infants. Brambilla et al¹⁰ showed that a low-cost program of dietary counseling, dental prophylaxis, and appropriate use of topical fluoride and chlorhexidine could delay or prevent *S mutans* infection in children of infected mothers, thereby lowering overall rates of dental caries in children.

Of course, the mother's health during pregnancy has immediate and long-term implications for the baby's health. Oral health is no exception. Hypoplastic enamel on primary teeth generally has less to do with the infant's own health and more to do with the mother's health during pregnancy. Babies born prematurely or with very low birth weight also may have hypoplastic enamel in both primary and permanent teeth as a result of disruptions in enamel formation.

The Center to Address Disparities in Children's Oral Health (The CAN DO Center) is a partnership between the University of California, San Francisco (UCSF) School of Dentistry and the National Institute for Dental and Craniofacial Research. For the past 4 years, UCSF researchers have been conducting the MAYA Project (Mother and Youth Access Program) at the San Ysidro Community Health Center in San Diego, California, working with women beginning their second trimester of pregnancy to proactively manage *S mutans* levels.¹¹ San Ysidro is a low socioeconomic area with a large migrant Hispanic community that does agricultural work along the US-Mexican border. The program educates mothers about the infectious nature of early childhood caries and monitors their *S mutans* levels before, during, and after pregnancy. Threshold levels of *S mutans* and *Streptococcus lactobacilli* are higher for infants and toddlers from migrant, underserved minority communities, which puts them at significantly greater risk for dental disease. Fluoride varnish treatments are provided for a subgroup of children in the MAYA project until age 3. Fluoride varnishes became available in the United States in 1991 when the Food and Drug Administration (FDA) approved them for use as root desensitizers or cavity varnishes but not as a therapeutic topical fluoride. These varnishes are considered by the FDA to fall into a category of drugs and devices that

“present minimal risk and is (are) subject to the lowest level of regulation.”¹² However, the American Dental Association and the Centers for Disease Control and Prevention both have been emphatic in their support for the use of fluoride varnishes as safe and efficacious within a caries prevention program that includes caries diagnosis, risk assessment, and regular dental care.^{13,14} The success achieved in San Ysidro and in the UCSF infant oral care programs (IOCP) suggests that such preventive programs effectively and economically provide measurable public health benefits, particularly in disadvantaged and underserved communities. The basic components and guiding principles of the IOCP model are described here.

Intervention Programs for Infants and Toddlers

Historically, “intervention” occurs only after disease has been noticed. This is a dangerous approach to oral health because oral disease and early childhood caries can be difficult to detect until significant damage already has been done to the child's mouth. Early childhood caries is transmissible, preventable, and considered the most prevalent chronic infectious disease in children.¹⁵ The intervention strategies outlined in this article have been implemented and refined at UCSF's IOCP, and they are designed to prevent the formation of dental caries in the first place.

At the heart of the IOCP strategy is a combination of clinical preventive measures such as fluoride varnishes, antibacterial treatments, xylitol use, and sealants for both the mother and child in conjunction with anticipatory guidance counseling that educates caregivers on proper dental hygiene practices. Almost any child stands to benefit from an early oral care program at age 1 that includes 6 primary components: (1) a preliminary risk assessment interview with the parents or caregivers; (2) use of the knee-to-knee position; (3) use of a dental prophylaxis (toothbrush prophylaxis); (4) conducting an oral assessment (and/or dental exam); (5) providing preventive treatment (fluoride varnish); and (6) anticipatory guidance counseling. This 6-step assessment should be repeated for the child and the mother on at least 3 occasions within a year for a high-risk child, starting during the first year of life and continuing through age 5. The number of dental visits scheduled for the year should be determined by the child's risk level, determined during the initial risk assessment and examination.



Figure 1—The knee-to-knee position offers the best perspective on the child’s mouth while reducing movement and distraction.



Figure 2—The oral assessment identifies acute and prospective problems and determines the recommended course of action.

Preliminary Interview and Anticipatory Guidance

While anticipatory guidance counseling is inherent within each of the 6 steps of this program, the preliminary interview is a prime opportunity to either introduce or reintroduce the 7 primary, age-appropriate anticipatory guidance topics: parental role in oral health, oral health and hygiene, oral development, fluoride adequacy, oral habits, diet and nutrition, and injury prevention (see Table 1).

The examiner greets the child and caregiver and presents an overview and expectations of the visit. Verbal positive reinforcement and praise are offered to both the parent and child on their arrival as a means to improve their enthusiasm for participating and, to some extent, reduce their anxiety level. The examiner should use this time to become acquainted with attitudes, behaviors, and beliefs that relate to the child’s health by inquiring about: (a) availability of fluoridated water or supplements at home; (b) use of fluoridated toothpaste at home; (c) history of dental exams and/or treatment of both the child *and* the parent; (d) history of dental disease and caries in the child *and* the parent; (e) extent to which the child uses a feeding bottle or “sippy cup”; and (f) diet and snacking habits.

While this initial interview design is based on recommendations published by the American Academy of Pediatric Dentistry (AAPD),¹⁶ there has been ample discussion about the most appropriate evidence-based risk assessment measure. The CAMBRA (CAries Management By Risk Assessment) group has developed a risk assessment form that includes parental interview risk indicators, protective factors, and clinical indicators of disease. Regardless of the approach used, it is important to follow an instrument that can reliably identify the children with the highest risk

level. A successful initial interview and anticipatory guidance session depends on a respectful, nonjudgmental, and friendly exchange of information between the caregiver and the examiner. Examiners should show respect toward the caregiver, recognizing their role as an adult with knowledge, life experience, valid viewpoints, and values. It is essential to listen carefully to their ideas and perspectives as well as to discuss oral health using culturally and linguistically appropriate methods of communication.

Using the Knee-to-knee Position

After completing the initial interview, the examiner assumes a knee-to-knee position with the parent or caregiver, seating the child in the caregiver’s lap facing the caregiver (Figure 1). Once situated, the examiner lowers the child’s head onto his or her lap. Some examiners may prefer having the child lying on one end of the exam table or sitting next to the exam table. However, the knee-to-knee position makes the parent an active participant in the procedure and tends to make the child feel more secure.

Toothbrush Prophylaxis

The examiner uses the handle of an age-appropriate toothbrush to prop open the child’s mouth while examining the mouth and discussing good brushing technique. “Counting” the teeth aloud and distracting the child with the toothbrush or a toy helps to minimize fuss. The examiner brushes each of the child’s teeth and shows the caregiver how to do the same. The importance of using fluoride toothpaste daily is discussed. This “show-tell-do” method creates an engaging experience for the patient and parent and tends to make subsequent appointments calmer for the child. Each child needs to be approached in a unique way to help them grow comfortable with the tools and practice of brushing,

Table 1—Age-appropriate Anticipatory Guidance Topics

	PRENATAL	BIRTH TO 1 YEAR	1 TO 2 YEARS	3 TO 5 YEARS
Take-home message for caregivers	<ul style="list-style-type: none"> • Baby teeth are important! • Parent's/caregiver's oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-ups and get treatment if necessary. • Schedule child's first dental appointment by age 1. • Use of fluorides, including tooth-brushing with fluoride toothpaste, is the most effective way to prevent tooth decay. 	<ul style="list-style-type: none"> • Baby teeth are important! • Parent's/caregiver's oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-ups and get treatment if necessary. • Parents/caregivers should avoid sharing with their child items that have been in their mouths. • Schedule child's first dental appointment by age 1. • Prevention is less costly than treatment. • Use of fluorides, including tooth-brushing with fluoride toothpaste, is the most effective way to prevent tooth decay. 	<ul style="list-style-type: none"> • Baby teeth are important! • Parent's/caregiver's oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-ups and get treatment if necessary. • Parents/caregivers should avoid sharing with their child items that have been in their mouths. • Schedule child's first dental appointment by age 1. • Prevention is less costly than treatment. • Use of fluorides, including tooth-brushing with fluoride toothpaste, is the most effective way to prevent tooth decay. 	<ul style="list-style-type: none"> • Baby teeth are important! • Parent's/caregiver's oral health affects baby's oral health. • Parents/caregivers should obtain regular dental check-ups and get treatment if necessary. • Parents/caregivers should avoid sharing with their child items that have been in their mouths. • Prevention is less costly than treatment. • Use of fluorides, including tooth-brushing with fluoride toothpaste, is the most effective way to prevent tooth decay.
Oral health and hygiene	<ul style="list-style-type: none"> • Encourage parents/caregivers to obtain dental check-ups and, if necessary, treatment before birth of baby to reduce cavity-causing bacteria that can be passed to the baby. • Encourage parents/caregivers to brush teeth with fluoride toothpaste. 	<ul style="list-style-type: none"> • Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce spread of bacteria that can cause tooth decay. • Encourage parents/caregivers to avoid sharing with their child items that have been in their mouths. • Encourage parents/caregivers to become familiar with the normal appearance of child's gums. • Emphasize using a washcloth or toothbrush to clean teeth and gums with eruption of the first tooth. • Encourage parents/caregivers to check front and back teeth for white, brown, or black spots (signs of cavities). 	<ul style="list-style-type: none"> • Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce spread of bacteria that can cause tooth decay. • Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths. • Review parent's/caregiver's role in brushing toddler's teeth. • Discuss brush and toothpaste selection. • Problem-solve oral hygiene issues. • Schedule child's first dental visit by age 1. 	<ul style="list-style-type: none"> • Encourage parents/caregivers to maintain good oral health and get treatment, if necessary, to reduce spread of bacteria that can cause tooth decay. • Encourage parents/caregivers to avoid sharing with their child things that have been in their mouths. • Discuss parent's/caregiver's continued responsibility to help children under age 8 to brush their teeth. • Encourage parents/caregivers to consider dental sealants for primary and first permanent molars.
Oral development	<ul style="list-style-type: none"> • Describe primary tooth eruption patterns (first tooth usually erupts between 6 and 10 months of age). • Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem. 	<ul style="list-style-type: none"> • Discuss primary tooth eruption patterns. • Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem. • Discuss teething and ways to soothe sore gums, such as chewing on teething rings and washcloths. 	<ul style="list-style-type: none"> • Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem. • Discuss teething and ways to soothe sore gums, such as chewing on teething rings and washcloths. 	<ul style="list-style-type: none"> • Emphasize importance of baby teeth for chewing, speaking, jaw development, and self-esteem.

but praise from the dentist and the parent has proven to be the most effective patient motivator.

Oral Risk Assessment

The child's oral health condition will be ascertained during the oral examination phase by looking for chalky white spots, obvious tooth decay, or tooth defects. Based on the initial interview and the findings of the oral exam, the child's risk level can be determined (Figure 2).

When facilities and resources permit, the assessment also should include a salivary analysis, which might include a measurement of *S mutans*, *S lactobacilli*, calcium, phosphate, and fluoride levels in saliva. Early childhood caries development, effects of drug-induced caries, and a diet evaluation survey

also should be considered.

After completing the oral exam, the examiner returns the child to an upright position on the caregiver's lap and relates the findings of the exam. A Caries Risk Assessment Chart may be filled out and given to the caregiver to quantify and document the risk factors affecting the child.

Preventive Treatment

Children categorized as moderate to high risk should be given a full-mouth topical fluoride varnish (Figure 3), even if the child lives in a community that already receives the benefits of water fluoridation.¹⁷ Several preventive treatment options are included in a comprehensive IOCP. One option is the application of fluoride varnish by dental person-

Table 1—Age-appropriate Anticipatory Guidance Topics (continued)

	PRENATAL	BIRTH TO 1 YEAR	1 TO 2 YEARS	3 TO 5 YEARS
Fluoride adequacy	<ul style="list-style-type: none"> Evaluate fluoride status in residential water supply. Review topical and systemic sources of fluoride. Encourage mother to drink fluoridated tap water. 	<ul style="list-style-type: none"> Evaluate fluoride status of residential water supply. Review topical and systemic sources of fluoride. Encourage drinking of fluoridated tap water. Consider topical needs (eg, toothpaste, fluoride varnish). 	<ul style="list-style-type: none"> Reevaluate fluoride status of residential water supply. Review topical and systemic sources of fluoride. Encourage drinking of fluoridated tap water. Review need for topical fluorides. 	<ul style="list-style-type: none"> Reevaluate fluoride status in residential water supply. Review sources of fluoride. Review need for topical or other fluorides.
Oral habits	<ul style="list-style-type: none"> Encourage mother to stop smoking. 	<ul style="list-style-type: none"> Encourage breast-feeding. Advise mother that removing child from breast after feeding and wiping baby's gums/teeth with damp washcloth reduces the risk of early childhood caries. Review pacifier safety. 	<ul style="list-style-type: none"> Remind mother that removing child from breast after feeding and wiping baby's gums/teeth with damp washcloth reduces the risk of early childhood caries. Begin weaning of nonnutritive sucking habits at 2 years old. 	<ul style="list-style-type: none"> Discuss consequences of digit sucking and prolonged non-nutritive sucking (eg, pacifier) and begin professional intervention if necessary.
Diet and nutrition	<ul style="list-style-type: none"> Emphasize eating a healthy diet and limiting number of exposures to sugary snacks and drinks. Emphasize that it is the frequency of exposures, not the amount of sugar, that affects susceptibility to caries. Encourage breast-feeding. Remind parents/caregivers never to put baby to bed with a bottle with anything other than water in it or to allow feeding "at will." 	<ul style="list-style-type: none"> Remind parents/caregivers never to put baby to bed with a bottle with anything other than water in it or to allow feeding "at will." Emphasize that it is the frequency of exposures, not the amount of sugar, that affects susceptibility to caries. Encourage weaning from bottle to cup by 1 year of age. Encourage diluting juices with water. 	<ul style="list-style-type: none"> Remind parents/caregivers never to put baby to bed with a bottle or to allow feeding "at will." Discuss healthy diet and oral health. Emphasize that it is the frequency of exposures, not the amount of sugar, that affects susceptibility to caries. Review snack choices and encourage healthy snacks. 	<ul style="list-style-type: none"> Review and encourage healthy diet. Remind parents/caregivers about limiting the frequency of exposures to sugar. Review snacking choices. Emphasize that child should be completely weaned from bottle and drinking exclusively from a cup.
Injury prevention	<ul style="list-style-type: none"> Encourage child-proofing of home, including electrical cord safety and poison control. Emphasize use of properly secured car seat. Encourage caregivers to keep emergency numbers handy. 	<ul style="list-style-type: none"> Review child-proofing of home, including electrical cord safety and poison control. Emphasize use of properly secured car seat. Encourage caregivers to keep emergency numbers handy. 	<ul style="list-style-type: none"> Review child-proofing of home, including electrical cord safety and poison control. Emphasize use of properly secured car seat. Emphasize use of helmet when child is riding tri/bicycle or in seat of adult bike. Remind caregivers to keep emergency numbers handy. 	<ul style="list-style-type: none"> Emphasize use of properly secured car seat. Have emergency numbers handy. Encourage safety in play activities, including helmets on bikes and mouth guards in sports. Remind caregivers to keep emergency numbers handy.

nel at 1- or 3-month intervals.¹⁸ Varnish can reduce caries by 40% to 51% among children aged 4 to 5 and may result in 50% to 70% reductions in pit-and-fissure surfaces.¹⁹ Even greater reductions in approximal surfaces have been demonstrated.²⁰⁻²² Another option is swabbing the teeth with chlorhexidine solution, which can measurably decrease *S mutans* and *S lactobacilli* levels. Other studies suggest that povidone-iodine swabbing also can reduce these pathogens. If used in conjunction with counseling, the application of fluoride varnish can be a very effective method in reducing early childhood caries.

Recent study findings by Weintraub and colleagues support using fluoride varnish to prevent early childhood caries and to reduce caries prevalence in very young children.²³ Fluoride varnish efficacy in this age group provides additional rationale for an early dental visit, especially for children in high caries-risk groups, because applying fluoride varnish at this first

visit and counseling based on anticipatory guidance can help reduce future dental disease in young children.²³ Guidelines from the AAPD¹⁶ and the American Association of Public Health Dentistry²⁴ support a dental assessment by a child's first birthday or first tooth eruption.

Anticipatory Guidance Counseling

Following the exam and risk assessment, supplementary counseling for parents is indicated if the child is determined to be at high risk for oral disease and early childhood caries (Figure 4). This anticipatory guidance counseling expands on the same 7 age-specific topics introduced during the initial risk assessment visit (parental role in oral health; oral health and hygiene; oral development; fluoride adequacy; oral habits; diet and nutrition; and injury prevention).

Anticipatory guidance is most effective when it is tailored to the specific community in which it is being provided. Cultural norms and social



Figure 3—Fluoride varnish applied to all biting surfaces greatly reduces the risk for caries, especially in high-risk children.



Figure 4—The examiner should discuss his or her findings and recommendations for follow-up, anticipatory guidance, and home care.

behaviors that may be detrimental to the child's oral health should be considered, but a dictatorial approach is not likely to encourage participation or compliance. Ultimately, the mother has to be in control of the choices she makes for her own oral health and that of her infant. Dental care practitioners who demonstrate an understanding and respect for the perspective of both mother and child are much more likely to have a productive dialogue with the patient.

Diet counseling is a central component to anticipatory guidance. Emphasis should be placed on sugar intake frequency. However, healthy breast-feeding protocols and the risk of nursing caries also should be emphasized during these visits.²⁵ While the cultural norms and traditions of the family should be acknowledged, nightly breast-feeding should be discouraged after the first primary tooth erupts, and bottle-fed infants should not be put to sleep with the bottle.

While there is much to be discussed during the visit, it is important to maintain a realistic perspective and focus on changes that can be implemented to improve the child's oral health. Helping the caregiver choose one or two small but beneficial behavior changes for the family increases the likelihood of success and helps the family incrementally build momentum toward a healthier lifestyle.

Outreach, Case Management, and Incentives

Outreach, case management, and incentives encourage attendance at the assessments and reinforce healthy habits recommended in the counseling setting. Outreach typically consists of telephone and in-person contact as well as advocacy by a public health educator or hygienist, following the model developed at the Spokane Partnership Program in Washington.²² Case man-

agement should be accomplished by helping the families in need to understand services and the complexity of the health care system and insurance plans. The goal of a good match between the patient and the provider will increase the chances of compliance and effectiveness for the IOCP visit. Incentives can include oral health products such as toothpaste, toothbrushes, and age-appropriate toys. Participants can “earn” incentive rewards based on increases in caregiver knowledge and favorable risk assessment results. Achievement charts can be given to families and monitored at home as a game.

Oral Health Care Trajectory From Birth to Age 2

New mothers should take extra care to maintain their own oral health, especially during the first 6 months of the baby's life when his or her first teeth are likely to erupt. Unfilled cavities should be filled immediately to prevent transmission of *S mutans* and other pathogens between mother and baby. The baby's gums and tongue should be cleaned after every feeding. In communities with nonfluoridated water, parents should seek their doctor's advice about fluoride supplements when the child reaches 6 months of age. Putting the baby to bed without a bottle is a crucial behavior goal during this early phase of life. Sucking during the night allows sugars to cling to teeth and initiate decay.

As the baby's teeth begin to erupt around the age of 6 months, parents have questions about the role of baby teeth. Counseling visits during this stage should include a discussion about how baby teeth promote biting and chewing for healthy nutrition, hold space for permanent teeth, and permit oral articulation required for developing speaking skills.

Between the age of 6 and 12 months, the

baby should begin drinking from a sippy cup. At 12 to 14 months, the baby should be weaned off of the bottle. A visit to the dentist should take place at this time. By age 12 to 18 months, the toddler should be off of the bottle and/or breast and the family should be taking the child to the dentist for regular check-ups and maintenance. The dentist might ask about the child's snacking behavior and warn about risks from constant snacking. Sweet or starchy foods and soda are particularly risky for the toddler to consume because of bacteria that cling and initiate attacks on the teeth. If necessary, the dentist can recommend nutritious foods for snacking. The child's teeth should be brushed in the morning and before bedtime, and the child can begin to learn how to hold the toothbrush at this age. Most children will need assistance brushing their teeth because they do not develop the coordination to brush effectively by themselves until they are between the ages of 6 and 8.

Conclusion

Early childhood caries can have devastating effects on both primary and secondary dentition and disproportionately affects low-income and underserved children. These effects impose not only immediate discomfort and ill health but also long-term social and economic consequences. Anticipatory guidance counseling refocuses dental care on the prevention of early childhood caries as a strategic measure to improve children's oral health while reducing overall costs for care—costs generally borne by the parents as well as the public health system. During pregnancy, mothers are especially interested in their own health and the health of their child, presenting a unique and opportune moment to proactively begin a discussion about oral health—related parenting skills with tangible cost and health benefits. Methodical risk assessment, improved parental oral health, and culturally calibrated education tailored to the age of the child can greatly reduce the incidence of early childhood caries and deliver measurable benefits to at-risk vulnerable populations.

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