

Oral Health Care during
Pregnancy and Early Childhood
Practice Guidelines



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Executive Summary

Health care professionals should recognize the importance of good oral health and make certain that the need for dental care during pregnancy and early childhood is met. Pregnancy is a unique time in a woman's life and is characterized by complex physiological changes. These changes can adversely affect oral health during pregnancy. Pregnancy is also an opportune time to educate women about preventing dental caries in young children, one of the most common childhood problems. Evidence suggests that most young children acquire caries-causing bacteria from mothers. Improving the oral health of expectant and new mothers and providing oral health counseling may reduce the transmission of such bacteria from mothers to children, thereby delaying the onset of caries.

Emerging evidence shows an association between periodontal infection and adverse pregnancy outcomes, such as premature delivery and low birth weight. While some studies have shown that interventions to treat periodontal disease will improve pregnancy outcomes, conclusive clinical interventional trials are not yet available to confirm the preliminary results. Nevertheless, control of oral diseases improves a woman's quality of life and has the potential to reduce the transmission of oral bacteria from mothers to children.

Several organizations have undertaken efforts to promote oral health. The National Center for Education in Maternal and Child Health published *The Bright Futures in Practice: Oral Health* to promote and improve the health and well being of infants, children and adolescents. The American Dental Association, the American Academy of Pediatric Dentistry, the American Academy of Periodontology and the American Academy of Pediatrics have issued statements and recommendations for improving the oral health of pregnant women and young children.

To reinforce these recommendations and to provide guidance, the New York State Department of Health convened an expert panel of health care professionals who are involved in promoting the health of pregnant women and children. The panel reviewed literature, identified existing interventions, practices and guidelines, assessed issues of concern, and developed recommendations. Since it is highly unlikely that a sufficient number of studies will be available in the near future to make evidence-based recommendations for all clinical situations, the group relied on expert consensus when controlled studies were not available to address specific issues and concerns.

The panel developed separate recommendations for prenatal, oral health and child health professionals. While specific treatments require attention to individual clinical situations, these recommendations are intended to bring about changes in the health care delivery system and to improve the overall standard of care. The panel anticipates that these recommendations will be reviewed periodically and updated as new information becomes available. The panel recommendations are summarized on the following pages.

RECOMMENDATIONS FOR ALL HEALTH CARE PROFESSIONALS

All health care professionals should advise women that:

- Dental care is safe and effective during pregnancy. Oral health care should be coordinated among prenatal and oral health care providers.
- First trimester diagnosis and treatment, including needed dental x-rays, can be undertaken safely to diagnose disease processes that need immediate treatment.
- Needed treatment can be provided throughout pregnancy; however, the time period between the 14th and 20th week is ideal.
- Elective treatment can be deferred until after delivery.
- Delay in necessary treatment could result in significant risk to the mother and indirectly to the fetus.

All health care professionals should advise women that the following actions will improve their health:

- Brush teeth twice daily with a fluoride toothpaste and floss daily.
- Limit foods containing sugar to mealtimes only.
- Choose water or low-fat milk as a beverage. Avoid carbonated beverages during pregnancy.
- Choose fruit rather than fruit juice to meet the recommended daily fruit intake.
- Obtain necessary dental treatment before delivery.

All health care professionals should advise women that the following actions may reduce the risk of caries in children:

- Wipe an infant's teeth after feeding, especially along the gum line, with a soft cloth or soft bristled toothbrush.
- Supervise children's brushing and use a small (size of child's pinky nail) amount of toothpaste.
- Avoid putting the child to bed with a bottle or sippy cup containing anything other than water.
- Limit foods containing sugar to mealtimes only.
- Avoid saliva-sharing behaviors, such as sharing a spoon when tasting baby food, cleaning a dropped pacifier by mouth or wiping the baby's mouth with saliva.
- Avoid saliva-sharing behaviors between children via their toys, pacifiers, etc.
- Visit an oral health professional with child between six and 12 months of age.

RECOMMENDATIONS FOR PRENATAL CARE PROVIDERS

Prenatal care providers are encouraged to integrate oral health into prenatal services by taking the following actions:

- Assess problems with teeth and gums and make appropriate referral to an oral health care provider.
- Encourage all women at the first prenatal visit to schedule an oral health examination if one has not been performed in the last six months, or if a new condition has occurred.
- Encourage all women to adhere to the oral health professional's recommendations regarding appropriate follow-up.
- Document in the prenatal care plan whether the woman is already under the care of an oral health professional or a referral is made.
- Facilitate treatment by providing written consultation for the oral health referral (Appendix A).
- Develop a list of oral health referral sources that will provide services to pregnant women.
- Share appropriate clinical information with oral health professionals.
- Respond to any questions that the oral health professional may ask.

Prenatal care providers may suggest the following to reduce tooth decay in pregnant women experiencing frequent nausea and vomiting:

- Eat small amounts of nutritious foods throughout the day (Appendix B).
- Use a teaspoon of baking soda (sodium bicarbonate) in a cup of water as a rinse after vomiting to neutralize acid.
- Chew sugarless or xylitol-containing gum after eating.
- Use gentle tooth brushing and fluoride toothpaste to prevent damage to demineralized tooth surfaces.

RECOMMENDATIONS FOR ORAL HEALTH PROFESSIONALS

Oral health professionals should render all needed services to pregnant women because:

- Pregnancy by itself is not a reason to defer routine dental care and necessary treatment for oral health problems.
- First trimester diagnosis and treatment, including needed dental x-rays, can be undertaken safely to diagnose disease processes that need immediate treatment.
- Needed treatment can be provided throughout the remainder of the pregnancy; however, the time period between the 14th and 20th week is ideal.

Oral health professionals are encouraged to take the following actions for pregnant women:

- Plan definitive treatment based on customary oral health considerations including:
 - Chief complaint and medical history
 - History of tobacco, alcohol and other substance use
 - Clinical evaluation
 - Radiographs when needed
- Develop and discuss a comprehensive treatment plan that includes preventive, restorative and maintenance care.
- Provide emergency care at any time during pregnancy as indicated by oral condition.
- Provide dental prophylaxis and treatment during pregnancy, preferably during early second trimester but definitely prior to delivery.

Oral health professionals are encouraged to take the following actions for infants and young children:

- Assess the risk for oral diseases in children beginning at six months by identifying risk indicators including:
 - Inadequate fluoride exposure (Appendix C)
 - Past or current caries experience of siblings, parents and other household members
 - Lack of age-appropriate oral hygiene efforts by parents
 - Frequent and prolonged exposure to sugary substances or use of night time bottle or sippy cup containing anything other than water
 - Medications that contain sugar
 - Clinical findings of heavy maxillary anterior plaque or any signs of decalcification (white spot lesions)
 - Special health care needs
- Provide necessary treatment or facilitate appropriate referral for children assessed to be at increased risk for oral disease or in whom carious lesions or white spot lesions are identified.

RECOMMENDATIONS FOR CHILD HEALTH PROFESSIONALS

Child health professionals are encouraged to take the following actions:

- Provide counseling and anticipatory guidance to parents and caretakers concerning oral health during well child visits.
- Assess the risk for oral diseases in children beginning at six months of age by identifying risk indicators including:
 - Inadequate fluoride exposure (Appendix C)
 - Past or current caries experience of siblings, parents and other household members
 - Lack of age-appropriate oral hygiene efforts by parents
 - Frequent and prolonged exposure to sugary substances or use of night time bottle or sippy cup containing anything other than water
 - Medications that contain sugar
 - Clinical findings of heavy maxillary anterior plaque or any signs of decalcification (white spot lesions)
 - Special health care needs
- Refer and follow-up children with moderate and high risk indicators as soon as possible. See AAPD recommendations in Appendix D.
- Facilitate appropriate referral for disease management of children assessed to be at increased risk for oral disease or in whom carious lesions or white spot lesions are identified.
- Assist parents/caretakers in establishing a dental home for the children and for themselves.
- Develop a list of oral health referral sources that will provide services to young children and children with special health care needs.

CHAPTER 1:

Oral Health Care in Pregnancy and Early Childhood

INTRODUCTION

According to the Surgeon General's report, *Oral Health in America*, perceptions must change to improve oral health and to make it an accepted component of general health (1). A follow-up report titled *A National Call to Action to Promote Oral Health* urges actions to reduce health disparities (2). Strategies to change the perceptions of health care professionals include updating health curricula and continuing education courses, training health care providers to conduct oral screenings as part of routine physical examinations and to make appropriate referrals and promoting interdisciplinary training in counseling patients about how to reduce risk factors common to oral and general health. Two population groups that can benefit immensely from these changes are pregnant women and young children (3).

Pregnancy and early childhood are particularly important times to access oral health care because the consequences of poor oral health can have a lifelong impact (1;2;4-9). Several national organizations have provided recommendations for improving oral health during pregnancy and early childhood. The National Center for Maternal and Child Health published *Bright Futures in Practice: Oral Health* to promote and improve the health and well being of infants, children and adolescents (5). The Community Preventive Services Task Force, the American Dental Association, the American Academy of Pediatric Dentistry, the American Academy of Periodontology and the American Academy of Pediatrics have issued statements and recommendations for improving oral health (10-14). Improving the oral health of pregnant women prevents complications of dental diseases during pregnancy, has the potential to decrease early childhood caries and may reduce preterm and low birth weight deliveries. Assessment of oral health risks in infants and young children, along with anticipatory guidance, has the potential to prevent early childhood caries. No comprehensive guidelines exist that address the oral health needs of pregnant women. The Institute of Medicine suggests that it is appropriate to develop guidelines when a problem is common or expensive, great variation exists in practice patterns, and sufficient scientific evidence exists to determine appropriate and/or optimal practice (15). Guidelines are, therefore, needed to assist health care professionals in improving clinical practice and to promote oral health in pregnant women and children.

For many women, pregnancy is the only time they have medical and dental insurance and thus provides a unique opportunity to access care (16). It is also a time when women are more receptive to changing behaviors that have been associated with an increased risk of poor pregnancy outcomes. Once the pregnancy is completed, some women may have difficulty accessing dental care due to loss of insurance coverage and preoccupation with childcare (17;18). In addition, children have multiple preventive health care visits during the first year of life, which provide an opportunity for child health professionals to improve the oral health of children.

Oral health problems are common in pregnant women and in young children (1;18-20). Gingivitis, characterized by bleeding gums, is a reversible process. About one-quarter of women of reproductive age have tooth decay. Periodontal disease, that is, breakdown of tooth attachment to the bone, can be detected in 37 to 46 percent of women of reproductive age and in up to 30 percent of pregnant women.

Tooth decay is the single most common chronic disease of childhood, causing untold misery for children and their families (21). Dental caries among preschoolers is common, affecting 28 percent of two to five year old children. According to the National Health and Nutrition Examination Survey, approximately 46.9 percent of tooth surfaces among females 18 years of age and older show signs of decay (18). Estimates concerning the prevalence of untreated tooth decay among women of reproductive age range from 22 percent among those 15 years of age to 25 percent among those aged 35 to 44. In New York State, 39 percent of pregnant women are enrolled in the Medicaid program. Among the Medicaid enrollees, only 34 percent had visited a dentist and about 30 percent reported dental problems during pregnancy. In contrast, 55 percent of pregnant women with other insurance had visited a dentist, while 22 percent reported a dental problem (3).

Variations in oral health practice patterns reflect several factors (1;3;22). First, oral health screening and referral are not routinely included in prenatal care. Second, many oral health professionals are hesitant to treat pregnant women. Third, while most children do not visit a dentist until age three, these same children usually have visited a child health professional 11 times for well-child visits during the same time period.

Although there are gaps in knowledge, there is sufficient evidence to recommend appropriate oral health care for pregnant women and young children. For these reasons, the New York State Department of Health convened an expert panel to develop clinical practice guidelines for health care professionals.

ORAL HEALTH AND PREGNANCY

Effect of Pregnancy on Oral Health

Dental problems such as caries, erosion, epulis, periodontal infection, loose teeth, and ill-fitting crowns, bridges, and dentures (prostheses) may have special significance during pregnancy (5;8;9;19;23-25). Tooth decay is the result of repeated acid attacks on the tooth enamel. Any increase in tooth decay during pregnancy may be due to changes in diet and oral hygiene. Nausea and vomiting in pregnancy can cause extensive erosion. Pregnancy gingivitis is present in over 30 percent of pregnant women. At the time of labor and delivery, dislodged teeth or prostheses could cause complications.

Effect of Oral Health On Pregnancy: Association Between Periodontal Disease and Preterm/Low Birth Weight

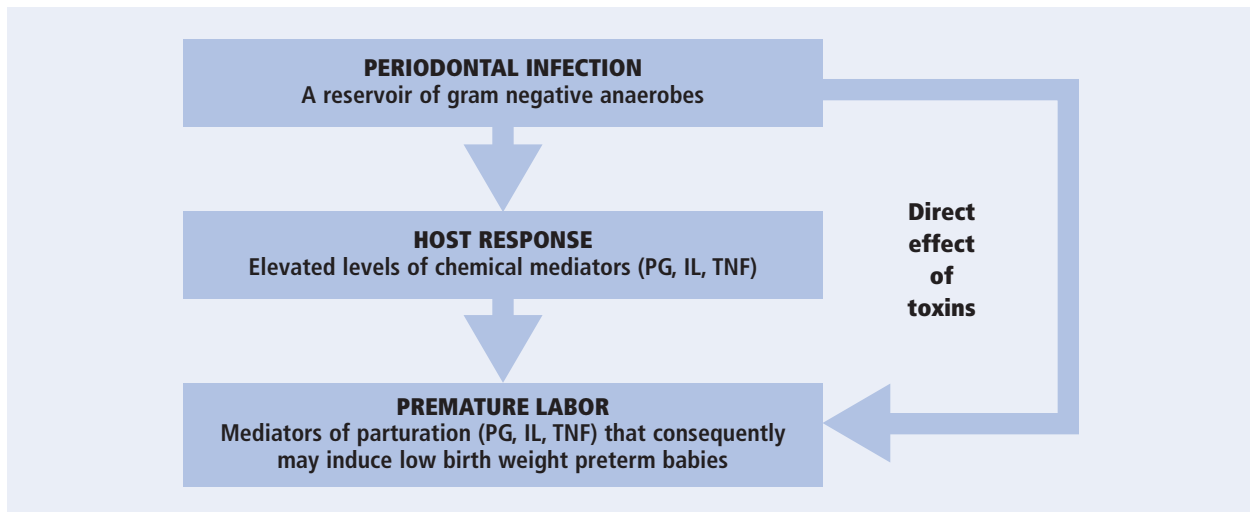
Periodontal disease is caused by gram-negative anaerobic bacteria. Studies have suggested that periodontal infection may contribute to the birth of preterm/low birth weight babies (26-43).

The bacteria responsible for periodontal disease are capable of producing a variety of chemical inflammatory mediators such as prostaglandins, interleukins and tumor necrosis factor that can directly affect the pregnant woman (Figure 1). The individual host response, partially mediated by specific genotype, also plays an important role as a determinant of disease expression (44).

In a recent systematic review, Scannapieco et al. reported that several studies implicated periodontal disease as a risk factor for preterm/low birth weight (43). They found, however, that few of the studies assessed the impact of prevention and treatment of periodontal disease on birth outcomes. Although the authors stated that it was not clear whether periodontal diseases played a causal role in adverse pregnancy outcomes, preliminary evidence suggested that periodontal intervention might reduce these adverse outcomes.

Three prospective intervention studies have tested the effect of periodontal treatment on the outcome of preterm delivery/low birth weight (45-48). Lopez and colleagues published two studies conducted

Figure 1. Periodontal Disease and Preterm Low Birthweight: Proposed Biological Mechanism



(Adapted from "Does periodontal disease relate to pre-term low birth weight babies?": The Colgate Oral Care Report 11(3);2001:page 3).

in Santiago, Chile (47). In one study, pregnant women with gingivitis were randomized to receive periodontal treatment prior to 28 weeks gestation (early) or postpartum (delayed). The rate of preterm/low birth weight delivery was 9.5 percent in the delayed treatment group and 1.5 percent in the early treatment group. In another study, 400 women were randomly assigned to either the experimental group, which received periodontal treatment before 28 weeks of gestation or to a control group that received treatment after delivery. The rate of preterm/low birth weight delivery in the control group was 8.6 percent, while the rate in the treatment group was 2.5 percent. Jeffcoat et al. published preliminary results of an on-going trial that randomized women in the second trimester to one of three treatment groups: dental prophylaxis and placebo, periodontal treatment and placebo, and periodontal treatment and antibiotics. Preliminary data indicated that delivery at less than 35 weeks occurred among 6.3 percent of a referent control group, 4.9 percent of those that received prophylaxis and placebo, 3.3 percent of those that received periodontal treatment and antibiotics and 0.8 percent of those that received periodontal treatment with placebo (46). Mitchell-Lewis et al. compared 74 pregnant teenagers who received periodontal treatment to 90 teenagers who did not receive treatment during pregnancy. The rate of preterm/low birth weight delivery was 18.9 percent in the control group and 13.5 percent in the treatment group (48).

In a recent systematic review of periodontal disease and adverse pregnancy outcomes by Xiong et al., 25 studies were identified (49). Adverse pregnancy outcomes included not only preterm/low birth weight but also miscarriage and preeclampsia. Eighteen studies suggested an association between periodontal disease and increased risk of adverse pregnancy outcomes (OR 1.1 - 20.0) and 7 studies found no evidence of an association (OR 0.78 - 2.54).

The results of ongoing intervention trials will provide more definitive data to help craft future guidelines for oral health care during pregnancy. Without waiting for the outcome of these clinical trials, health care professionals can take actions now to address oral health problems in pregnant women.

Magnitude of Public Health Burden of Preterm/Low Birth Weight Babies

Preterm birth is a leading cause of neonatal mortality in the United States (50). Preterm birth is defined as delivery prior to 37 weeks gestation; low birth weight is defined as newborns weighing

less than 2500 grams or 5.5 pounds. On a national level, in 2001, 11.1 percent of all births were preterm and 7.7 percent were low birth weight. In fact, New York State ranked 20th nationally in percent of preterm births in 2002 (51). It is important to note that not all premature infants are low birth weight and that not all low birth weight infants are premature. Preterm births account for 35 percent of all US health care spending for infants and 10 percent of all such spending for children. Preterm births are responsible for three-quarters of neonatal mortality and one half of long-term neurologic impairments in children. Despite the numerous management methods proposed, the incidence of preterm birth has changed little over the past 40 years (52).

Maternal Oral Health and Early Childhood Caries

Dental caries is the most prevalent chronic infectious disease of our nation's children (1). Severe dental caries is a particular problem in young children because of the difficulty in managing them in a dental office, as well as the multiple visits required to treat them. Caries in primary teeth is also predictive of future caries risk. A review of the literature shows that there are several critical events in the causation of caries in young children (23;24;53). The first event is the acquisition of infection with *Streptococcus mutans*, the bacteria most responsible for caries initiation (53). The second event is the accumulation of *Streptococcus mutans* to pathogenic levels secondary to frequent and prolonged exposure to caries-promoting carbohydrates, particularly common sugar. The third event is rapid demineralization of enamel, which if unchecked leads to cavitations.

Cariogenic or decay-causing bacteria are typically transmitted from mother or caregiver to child by behaviors that directly pass saliva, such as sharing a spoon when tasting baby food, cleaning a dropped pacifier by mouth or wiping the baby's mouth with saliva (24;53;54). Colonization can occur any time after the child is born, but the bacteria have the greatest potential for being retained in the mouth after a tooth or other hard surface, such as an obturator in a child with cleft palate, is present in the mouth. The earlier that cariogenic bacteria occupy ecological niches in the child's mouth, the greater the percentage of the child's plaque that will be comprised of these bacteria. As the child grows older, cariogenic bacteria become less able to colonize within a child's mouth, as the available ecological niches are filled with other organisms. The mother is the most common donor as noted in DNA fingerprinting studies that show genotype matches between mothers and infants in over 70 percent of cases (54;55). For this reason, mothers who themselves have experienced extensive past or current caries have a particularly strong need for counseling on how to avoid early transmission of cariogenic bacteria to their offspring.

Reducing transmission of cariogenic bacteria can be accomplished by reducing the maternal reservoir, avoiding vectors, and increasing the child's resistance to colonization (53;56;57). Maternal *Streptococcus mutans* reservoirs can be suppressed by applying topical chlorhexidine or fluoride, chewing xylitol-containing gums, and dietary counseling to reduce frequency of simple carbohydrate ingestion (58). Transmission vectors can be identified and managed through anticipatory guidance about healthy behaviors like minimizing saliva-sharing activities. Resistance to colonization can be accomplished by limiting the child's frequency of carbohydrate intake or application of fluoride varnish. A daily rinse with a combination of 0.05 percent sodium fluoride and 0.12 percent chlorhexidine beginning in the sixth month of pregnancy and continuing until delivery has been reported to result in significant reductions in levels of dental caries-causing bacteria, consequently delaying the colonization of such bacteria among offspring (59). A study conducted by Gunay et al. demonstrated the effectiveness of a primary prevention program initiated during pregnancy that significantly improved the oral health of mothers and their children (60). One longitudinal study

showed that chewing xylitol-containing gum three to five times a day interfered with the transmission of bacteria from mother to child (61;62). Thus, interventions for the mother, which may decrease the spread of cavity causing bacteria to their infant or young child, have the potential to control dental caries in children.

ORAL HEALTH AND EARLY CHILDHOOD

Dental caries is a common childhood problem. It is five times more prevalent than asthma. Although dental caries is preventable, almost 28 percent of children aged two to five years experience the disease (21). A virulent form of dental caries in children younger than six is generally defined as early childhood caries (ECC). Because management of these children in dental offices is difficult, treatment is often rendered in operating rooms, increasing the cost of care. Furthermore, there is a high rate of relapse of caries in these children. According to the Medical Expenditure Panel Survey, the cost of dental services account for almost one fourth of total health care expenditures in children (19;63).

Child health professionals, including but not limited to physicians, physician assistants, nurse practitioners and nurses, can play a significant role in reducing the burden of this disease. While most children do not visit a dentist until age three, children have visited a child health professional up to eleven times for well-child visits by this age. Dental caries impacts children's functioning including eating, sleeping, speaking, learning and growth. Other dental conditions such as oral clefts and orthodontic problems can jeopardize their physical growth, self-esteem and capacity to socialize. Thus, well-child visits provide an opportunity for oral health risk assessment, counseling, early detection and referral. Recently the American Academy of Pediatrics adopted new recommendations regarding the inclusion of oral health in anticipatory guidance during well-child care visits (13). The recommendations specify that the first dental risk assessment should occur as early as six months of age. The establishment of a dental home should occur by approximately one year of age.

USE OF THESE GUIDELINES

These recommendations have been developed to assist health care professionals to educate women about oral health and to improve the overall health of women and children. These guidelines can be used by: 1) prenatal care providers to integrate oral health risk assessment and referral into routine prenatal care; 2) oral health professionals to provide appropriate treatment for pregnant women; 3) child health professionals to include oral health risk assessment as part of well-child care and to provide referral.

These guidelines will enable health care professionals to work together as a team to improve the care delivered to mothers and children. This improved integration of care is expected to have significant health benefits.

REFERENCES

1. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. NIH Publication No. 00-4713, Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, May 2000.
2. U.S. Department of Health and Human Services. A National Call to Action to Promote Oral Health. NIH Publication No. 03-5303, Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention, National Institutes of Health, National Institute of Dental and Craniofacial Research, May 2003.
3. New York State Department of Health. Oral Health Plan for New York State. Albany, NY: New York State Department of Health, 2005.
4. Oral Health and Learning. National Center for Education in Maternal and Child Health, 2001.
5. Casassimo P. Bright Futures in Practice: Oral Health. Arlington, VA: National Center for Education in Maternal and Child Health, 1996.
6. Lewit EM, Monheit AC. Expenditures on Health Care for Children and Pregnant Women. *Future Child* 1992; 2(2):95-114.
7. The Face of a Child: Surgeon General's Workshop and Conference on Children and Oral Health. Proceedings; 2000 June 12-13; Washington DC; National Institute of Dental and Craniofacial Research, 2001 May. Available from: <http://www.nidcr.nih.gov/AboutNIDCR/SurgeonGeneral/Children.htm>
8. Gajendra S, Kumar JV. Oral health and pregnancy: a review. *N Y State Dent J* 2004; 70(1):40-44.
9. Edelstein BL. Foreword to the Supplement on Children and Oral Health. *Ambulatory Pediatrics* 2002; 2(2):139-140.
10. Recommendations on Selected Interventions to Prevent Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries. *Am J Prev Med* 2004; 23(1S):16-19.
11. American Dental Association. Compendium Update: State innovations to improve access to oral health care for low income children. Chicago, IL: American Dental Association, 2004.
12. American Academy of Periodontology statement regarding periodontal management of the pregnant patient. *J Periodontol* 2004; 75(3):495.
13. Hale KJ. Oral health risk assessment timing and establishment of the dental home. *Pediatrics* 2003; 111(5 Pt 1):1113-1116.
14. American Academy of Pediatric Dentistry. Policy on Oral Health Care Programs for Infants, Children, and Adolescents. Reference Manual 2005- 2006.
15. Field MJ, Lohr KN, eds. Guidelines for Clinical Practice: From Development to Use. Washington, DC: National Academy Press, 1992.
16. Timothe P, Eke PI, Presson SM, Malvitz DM. Dental care use among pregnant women in the United States reported in 1999 and 2002. *Prev Chronic Dis* 2005; 2(1):A10.
17. Gaffield ML, Gilbert BJ, Malvitz DM, Romaguera R. Oral health during pregnancy: an analysis of information collected by the pregnancy risk assessment monitoring system. *J Am Dent Assoc* 2001; 132(7):1009-1016.

18. Allston AA. Improving Women's Health and Perinatal Outcomes: The Impact of Oral Diseases. Baltimore, MD: Women's and Children's Health Policy Center, 2001.
19. Oral Health U.S., 2002. Dental, Oral and Craniofacial Data Resource Center, 2002.
20. Crall JJ. Opportunities for improving maternal and infant health through prenatal oral health care. In: McCormick MC, Siegal JE, editors. Prenatal Care. Cambridge: University Press, 2005: 261-270.
21. Beltran-Aguilar ED, Barker LK, Canto MT, Dye BA, Gooch BF, Griffin SO et al. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis—United States, 1988-1994 and 1999-2002. *MMWR* 2005; 54(3):1-43.
22. U.S. Department of Health and Human Services. Healthy People 2010. 2nd ed. With Understanding and Improving Health and Objectives for Improving Health. Washington, DC, U.S. Government Printing Office, 2000.
23. Berkowitz RJ. Acquisition and transmission of mutans streptococci. *J Calif Dent Assoc* 2003; 31(2):135-138.
24. Caufield PW, Cutter GR, Dasanayake AP. Initial acquisition of mutans streptococci by infants: evidence for a discrete window of infectivity. *J Dent Res* 1993; 72(1):37-45.
25. Douglass JM, Douglass AB, Silk HJ. A practical guide to infant oral health. *Am Fam Physician* 2004; 70(11):2113-2120.
26. Dasanayake AP, Russell S, Boyd D, Madianos PN, Forster T, Hill E. Preterm low birth weight and periodontal disease among African Americans. *Dent Clin North Am* 2003; 47(1):115-1xi.
27. Goepfert AR, Jeffcoat MK, Andrews WW, Faye-Petersen O, Cliver SP, Goldenberg RL et al. Periodontal disease and upper genital tract inflammation in early spontaneous preterm birth. *Obstet Gynecol* 2004; 104(4):777-783.
28. Hubbard S, Shanks A. Relationship between periodontal disease and preterm low birth weight infants. *Tenn Med* 2004; 97(2):81.
29. Khader YS, Ta'ani Q. Periodontal diseases and the risk of preterm birth and low birth weight: a meta-analysis. *J Periodontol* 2005; 76(2):161-165.
30. Lief S, Boggess KA, Murtha AP, Jared H, Madianos PN, Moss K et al. The oral conditions and pregnancy study: periodontal status of a cohort of pregnant women. *J Periodontol* 2004; 75(1):116-126.
31. Madianos PN, Lief S, Murtha AP, Boggess KA, Auten RL, Jr., Beck JD et al. Maternal periodontitis and prematurity. Part II: Maternal infection and fetal exposure. *Ann Periodontol* 2001; 6(1):175-182.
32. Madianos PN, Bobetsis GA, Kinane DF. Is periodontitis associated with an increased risk of coronary heart disease and preterm and/or low birth weight births? *J Clin Periodontol* 2002; 29 Suppl 3:22-36.
33. Marin C, Segura-Egea JJ, Martinez-Sahuquillo A, Bullon P. Correlation between infant birth weight and mother's periodontal status. *J Clin Periodontol* 2005; 32(3):299-304.
34. Mokeem SA, Molla GN, Al Jewair TS. The prevalence and relationship between periodontal disease and pre-term low birth weight infants at King Khalid University Hospital in Riyadh, Saudi Arabia. *J Contemp Dent Pract* 2004; 5(2):40-56.

35. Moreu G, Tellez L, Gonzalez-Jaranay M. Relationship between maternal periodontal disease and low-birth-weight pre-term infants. *J Clin Periodontol* 2005; 32(6):622-627.
36. Noack B, Klingenberg J, Weigelt J, Hoffmann T. Periodontal status and preterm low birth weight: a case control study. *J Periodontal Res* 2005; 40(4):339-345.
37. Oertling KM, Barsley R. The relationship between periodontal disease and preterm low birth weight and a new Medicaid dental program intervention for pregnant women. *LDA J* 2003; 62(4):10-13.
38. Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G et al. Periodontal infection as a possible risk factor for preterm low birth weight. *J Periodontol* 1996; 67(10 Suppl):1103-1113.
39. Offenbacher S, Jared HL, O'Reilly PG, Wells SR, Salvi GE, Lawrence HP et al. Potential pathogenic mechanisms of periodontitis associated pregnancy complications. *Ann Periodontol* 1998; 3(1):233-250.
40. Offenbacher S, Lief S, Boggess KA, Murtha AP, Madianos PN, Champagne CM et al. Maternal periodontitis and prematurity. Part I: Obstetric outcome of prematurity and growth restriction. *Ann Periodontol* 2001; 6(1):164-174.
41. Riche EL, Boggess KA, Lief S, Murtha AP, Auten RL, Beck JD et al. Periodontal disease increases the risk of preterm delivery among preeclamptic women. *Ann Periodontol* 2002; 7(1):95-101.
42. Sanchez AR, Kupp LI, Sheridan PJ, Sanchez DR. Maternal chronic infection as a risk factor in preterm low birth weight infants: the link with periodontal infection. *J Int Acad Periodontol* 2004; 6(3):89-94.
43. Scannapieco FA, Bush RB, Paju S. Periodontal disease as a risk factor for adverse pregnancy outcomes. A systematic review. *Ann Periodontol* 2003; 8(1):70-78.
44. Romero R, Chaiworapongsa T, Kuivaniemi H, Tromp G. Bacterial vaginosis, the inflammatory response and the risk of preterm birth: a role for genetic epidemiology in the prevention of preterm birth. *Am J Obstet Gynecol* 2004; 190(6):1509-1519.
45. Jeffcoat MK, Geurs NC, Reddy MS, Cliver SP, Goldenberg RL, Hauth JC. Periodontal infection and preterm birth: results of a prospective study. *J Am Dent Assoc* 2001; 132(7):875-880.
46. Jeffcoat MK, Hauth JC, Geurs NC, Reddy MS, Cliver SP, Hodgkins PM et al. Periodontal disease and preterm birth: results of a pilot intervention study. *J Periodontol* 2003; 74(8):1214-1218.
47. Lopez NJ, Smith PC, Gutierrez J. Periodontal therapy may reduce the risk of preterm low birth weight in women with periodontal disease: a randomized controlled trial. *J Periodontol* 2002; 73(8):911-924.
48. Mitchell-Lewis D, Engebretson SP, Chen J, Lamster IB, Papapanou PN. Periodontal infections and pre-term birth: early findings from a cohort of young minority women in New York. *Eur J Oral Sci* 2001; 109(1):34-39.
49. Xiong X, Buekens P, Fraser WD, Beck J, Offenbacher S. Periodontal disease and adverse pregnancy outcomes: a systematic review. *BJOG* 2006; 113(2):135-143.
50. ACOG Practice Bulletin. Assessment of risk factors for preterm birth. Clinical management guidelines for obstetrician-gynecologists. Number 31, October 2001. *Obstet Gynecol* 2001; 98(4):709-716.

51. March of Dimes. Born too soon and too small in New York. <http://www.marchofdimes.com/peristats.asp>. Accessed on March 22, 2006.
52. ACOG practice bulletin. Management of preterm labor. Number 43, May 2003. *Obstet Gynecol* 2003; 101(5):1039-1047.
53. Berkowitz RJ. Causes, treatment and prevention of early childhood caries: a microbiologic perspective. *J Can Dent Assoc* 2003; 69(5):304-307.
54. Caufield PW, Wannemuehler YM, Hansen JB. Familial clustering of the *Streptococcus mutans* cryptic plasmid strain in a dental clinic population. *Infect Immun* 1982; 38(2):785-787.
55. Caufield PW. Dental caries: an infectious and transmissible disease where have we been and where are we going? *N Y State Dent J* 2005; 71(2):23-27.
56. Kohler B, Andreen I. Influence of caries-preventive measures in mothers on cariogenic bacteria and caries experience in their children. *Arch Oral Biol* 1994; 39(10):907-911.
57. Li Y, Dasanayake AP, Caufield PW, Elliott RR, Butts JT, III. Characterization of maternal *mutans streptococci* transmission in an African American population. *Dent Clin North Am* 2003; 47(1):87-101.
58. Milgrom P., Weinstein P. *Early Childhood Caries. A team approach to prevention and treatment.* Seattle: University of Washington, 1999.
59. Brambilla E, Felloni A, Gagliani M, Malerba A, Garcia-Godoy F, Strohmenger L. Caries prevention during pregnancy: results of a 30-month study. *J Am Dent Assoc* 1998; 129(7):871-877.
60. Gunay H, Dmoch-Bockhorn K, Gunay Y, Geurtsen W. Effect on caries experience of a long-term preventive program for mothers and children starting during pregnancy. *Clin Oral Investig* 1998; 2(3):137-142.
61. Isokangas P, Soderling E, Pienihakkinen K, Alanen P. Occurrence of dental decay in children after maternal consumption of xylitol chewing gum, a follow-up from 0 to 5 years of age. *J Dent Res* 2000; 79(11):1885-1889.
62. Soderling E, Isokangas P, Pienihakkinen K, Tenovuo J, Alanen P. Influence of maternal xylitol consumption on mother-child transmission of *mutans streptococci*: 6-year follow-up. *Caries Res* 2001; 35(3):173-177.
63. Ezzat-Rice TM, Kashihara D, Machlin S. *Health care expenses in the United States, 2000.* AHRQ Pub No. 04-0022. MEPS Research Findings No. 21. Rockville, MD. Agency for Healthcare Research and Quality, 2004.

CHAPTER 2:

Recommendations for Prenatal Care Providers

BACKGROUND

Oral health should be an integral part of prenatal care (1;2). Although we have known for a long time that oral health is important, some pregnant women are not receiving oral health care services (2;3). Prenatal care providers can play a crucial role in breaking down barriers to access and raising awareness about the importance of oral health. Furthermore, they can dispel misconceptions, such as the belief that bleeding in the mouth is “normal” during pregnancy, pain during dental procedures is unavoidable, x-rays during pregnancy are harmful to the fetus and postponing treatment until after pregnancy is safer for the fetus and mother. Some oral health professionals also have concerns about the effects of x-rays and medications including anesthetic agents, antibiotics and analgesics on the fetus. While structural, financial, personal and cultural barriers may present problems in finding appropriate sources of dental care for pregnant women, prenatal care providers can play a significant role by educating pregnant women and advocating for appropriate oral health care in their communities.

Improving oral health during pregnancy not only enhances the overall health of women but also contributes to improving the oral health of their children. In the past, some oral health professionals have postponed treatment because of the uncertainty about the risk of x-rays and bacteremia (4;5). However, deferring appropriate treatment may cause unforeseen harm to the woman and possibly to the fetus for several reasons. First, women may self-medicate with over the counter medications like acetaminophen to control pain. Second, untreated cavities in mothers may increase the risk of caries in children. Finally, untreated oral infection may become a systemic problem during pregnancy and may contribute to preterm and/or low birth weight deliveries. Recently, the American Academy of Periodontology urged oral health professionals to provide preventive services as early in pregnancy as possible and to provide treatment for acute infection or sources of sepsis irrespective of the stage of pregnancy (6). For many women, completing treatment of oral diseases during pregnancy assumes greater importance because health and dental insurance may be available only during pregnancy. Consequently, the prenatal period is a unique opportunity for obtaining oral health services.

ROLE OF PRENATAL CARE PROVIDER

Pregnancy is a “teachable moment” when women are motivated to change behaviors that have been associated with poor pregnancy outcomes. The prenatal care team can be very influential in encouraging women to maintain a high level of oral hygiene, to visit an oral health professional, and to promote completion of all needed treatment during the pregnancy. Oral health care services should be integrated with prenatal services for all pregnant women. The prenatal care provider is encouraged to:

- Assess problems with teeth and gums and make appropriate referral to an oral health professional.
- Encourage all women at the first prenatal visit to schedule an oral health examination if one has not been performed in the last six months, or if a new condition has occurred.
- Encourage all women to adhere to the oral health professional’s recommendations regarding appropriate follow-up.

- Document in the prenatal care plan whether the patient is already under the care of an oral health professional or a referral is made.
- Facilitate treatment by providing written consultation for the oral health referral (Appendix A).
- Develop a list of referral sources in the community who will provide services to pregnant women.
- Share appropriate clinical information with oral health professional.
- Answer questions that the oral health professional may ask.
- Educate pregnant women about care that will improve their oral health:
 - Brush teeth twice daily with a fluoride toothpaste and floss daily.
 - Limit foods containing sugar to mealtimes only.
 - Choose water or low-fat milk as a beverage. Avoid carbonated beverages during pregnancy.
 - Choose fruit rather than fruit juice to meet the recommended daily fruit intake for you and your child.
 - Obtain necessary dental treatment before delivery.
- Assist pregnant women in dealing with nausea and vomiting:
 - Eat small amounts of nutritious yet noncariogenic foods throughout the day (Appendix B).
 - Use a teaspoon of baking soda (sodium bicarbonate) in a cup of water as a rinse after vomiting to neutralize acid.
 - Chew sugarless or xylitol-containing gum after eating.
 - Use gentle tooth brushing and fluoride toothpaste to prevent damage to demineralized tooth surfaces.
- Advise women that the following actions may reduce the risk of caries in children:
 - Wipe an infant's teeth after feeding, especially along the gum line, with a soft cloth or soft bristled toothbrush.
 - Supervise children's brushing and use a small (size of child's pinky nail) amount of toothpaste.
 - Avoid putting the child to bed with a bottle or sippy cup containing anything other than water.
 - Limit foods containing sugar to mealtimes only.
 - Avoid saliva-sharing behaviors, such as sharing a spoon when tasting baby food, cleaning a dropped pacifier by mouth or wiping the baby's mouth with saliva.
 - Avoid saliva-sharing behaviors between children via their toys, pacifiers, etc.
 - Visit an oral health professional with child between six and 12 months of age.

WHAT SHOULD HAPPEN AT THE PRENATAL VISIT?

At the first prenatal visit, the prenatal care provider should conduct an assessment to identify patients who require immediate oral health care and make appropriate referrals. This assessment should include interviewing the patient regarding problems in the mouth, previous dental visits and the availability of a dental provider.

Interview

The following two interview questions are recommended for incorporation into the initial prenatal visit (See Figure 2):

1. Do you have bleeding gums, toothache, cavities, loose teeth, teeth that do not look right or other problems in your mouth?

If the woman answers yes, the prenatal care provider should:

- Refer the patient to a dentist.
- Stress the importance of a dental visit within one month.
- Assist the pregnant woman in accessing dental care, as needed.

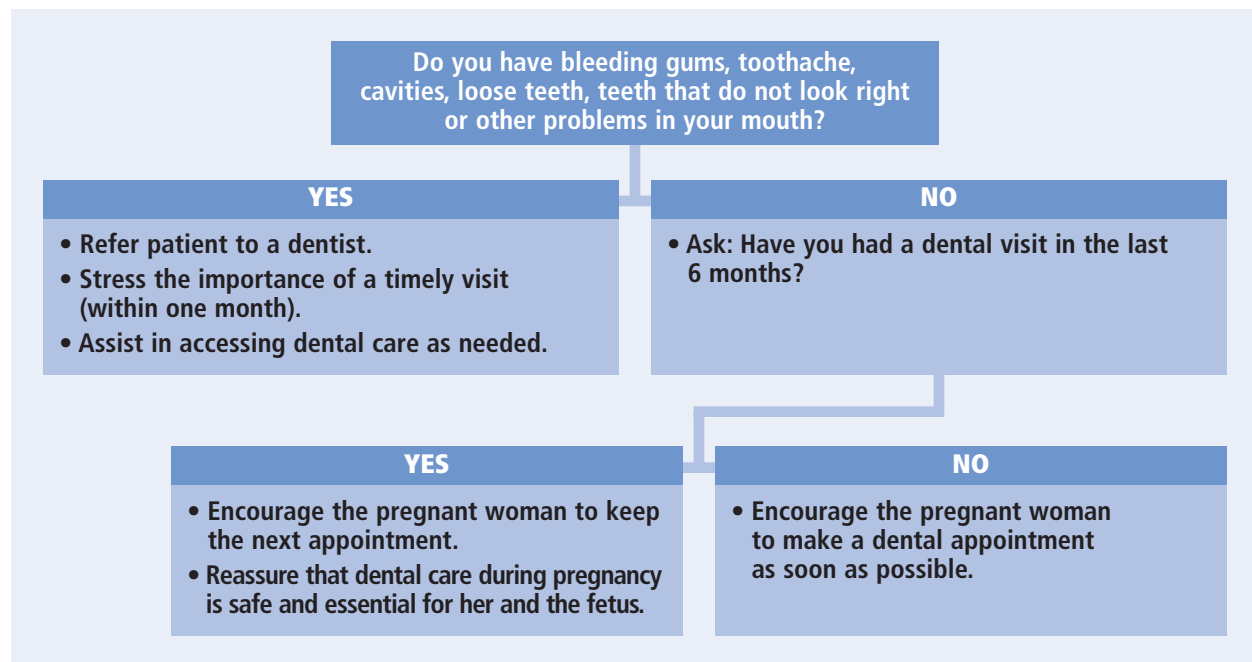
If the woman answers no to the above question, the prenatal care provider should ask the following question:

2. Have you had a dental visit in the last six months?

If the woman answers yes, the prenatal care provider should encourage her to keep the next appointment, which may occur during pregnancy, and reassure her that dental care during pregnancy is safe and essential. Counsel her that delaying treatment may result in significant risk to her and indirectly to the fetus.

If the woman answers no, the prenatal care provider should encourage the pregnant woman to make a dental appointment as soon as possible, preferably before 20 weeks of gestation.

Figure 2. Questions the Prenatal Provider Should Ask



Education

The prenatal care provider should include the following in the education of pregnant women.

- Educate the pregnant woman about the importance of her oral health, not only for her overall health, but also for the oral health of her children and possibly to improve the outcome of her current pregnancy. A list of resources for educational materials is provided in Appendix E.
- Advise the pregnant woman that:
 - Dental care is safe and effective during pregnancy. Oral health care should be coordinated among prenatal and oral health care providers.
 - First trimester diagnosis and treatment, including needed dental x-rays, can be undertaken safely to diagnose disease processes that need immediate treatment.
 - Needed treatment can be provided throughout pregnancy; however, the time period between the 14th and 20th week is ideal.
 - Elective care can be deferred until after delivery.
 - Delay in obtaining necessary treatment could result in significant risk to her and indirectly to the fetus.

ORAL HEALTH CARE AT THE DENTAL OFFICE

During a visit to the dental office, patients are examined for dental caries, periodontal or gum disease, impacted, erupted or destructed teeth and other problems. Some patients may require more extensive treatment, such as scaling and root planing to control periodontal disease, root-canal therapy or extractions of teeth. Dental procedures such as bridgework and cosmetic dentistry are generally deferred until after the pregnancy.

QUESTIONS THE ORAL HEALTH PROFESSIONAL MAY ASK

Can I take x-rays?

Yes. Diagnostic x-rays can be used during pregnancy (7-11).

Generally, dentists advise intraoral x-rays at intervals ranging from every six to thirty-six months (12). One to four intraoral bitewing or periapical views are taken with the x-ray film in the mouth. If additional information is needed, a dentist may want to take a panoramic x-ray (extraoral) that gives a good picture of all teeth.

X-ray imaging of the mouth is not contraindicated in pregnancy and should be utilized as required to complete a full examination and treatment. Diagnostic x-rays are safe during pregnancy (7-12). The number and type of x-rays will depend upon the clinical conditions. The mean skin exposure from a typical dental x-ray is approximately 0.1mrad. A full mouth series of 22 dental x-rays will result in a total exposure of 2.2mrad. The oral health professional should provide shielding for the pregnant woman's abdomen and neck from x-ray exposure in the dental office.

The Food and Drug Administration has provided detailed guidelines for the use of radiographs in dental offices. These guidelines are found in Appendix F.

Can I inject local anesthetic with epinephrine?

Yes. Local anesthetic with epinephrine can be used during pregnancy.

Lidocaine with epinephrine is considered safe during pregnancy. Lidocaine (2%) is a category B drug in contrast to mepivacaine (3%) which is a category C drug. Lidocaine with epinephrine prolongs the length of anesthesia because the drug is absorbed slowly. There is a theoretical concern about the effect of epinephrine on uterine muscle. No scientific studies, however, could be found to confirm this effect in pregnant women. The frequency of malformations was not increased among reviews of almost 300 children whose mothers were given lidocaine during early pregnancy (11;13).

Can I use 30 percent nitrous oxide in the dental office?

The use of nitrous oxide should be limited to cases where topical and local anesthetics are inadequate. In such situations, consultation with the prenatal care provider would be prudent. Adequate precautions must be taken to prevent hypoxia, hypotension and aspiration (13). Alterations in anatomy and physiology induced by pregnancy have anesthetic implications and present potential hazards for the mother and the fetus. Therefore, most anesthesiologists prefer to use local and regional anesthetics for pregnant women.

Pregnant women require lower levels of nitrous oxide to achieve sedation. Therapeutic dosage of standard drugs for monitored anesthetic care (MAC) for intravenous and inhalation sedation is markedly reduced in pregnancy. Thus, the pregnant woman may become obtunded when the usual dosages of drugs for conscious sedation are administered. A pulse oximeter should always be used for pregnant women receiving MAC. In addition, maternal oxygen saturation should be maintained at 95 percent or higher to ensure adequate oxygenation of the fetus.

A pregnant woman is considered to always have a “full stomach” due to delayed gastric emptying and incompetent lower esophageal sphincter. Thus, pregnant women are at increased risk for aspiration (13;14). Therefore, prophylactic measures to prevent aspiration should be used, particularly during the third trimester. A woman with multiple gestation is at increased risk for aspiration in the mid-second trimester because of the large uterus. Maintaining a semi-seated position and avoiding excessive sedation are required to prevent aspiration. Conscious sedation should be the last possible alternative in the third trimester. These women may be best treated with general anesthesia in the hospital setting (13).

What medications can I prescribe?

Appropriate treatment of pain and infection is important. Definitive treatment should not be postponed because of pregnancy. Dentists typically use antibiotics and analgesics for treating infection and controlling pain. Pharmacotherapeutics should not be a substitute for appropriate and timely dental procedures. Recommendations for some commonly used drugs (15) are summarized in Table 1.

Table 1. Acceptable and Unacceptable Drugs for Pregnant Women

These drugs may be used during pregnancy.	FDA Category	These drugs should NOT be used during pregnancy.	FDA Category
ANTIBIOTICS Penicillin Amoxicillin Cephalosporins Clindamycin Erythromycin (except for estolate form)	B B B B B	ANTIBIOTICS Tetracyclines Erythromycin in the estolate form Quinolones Clarithromycin	D B C C
ANALGESICS Acetaminophen Acetaminophen with codeine Codeine Hydrocodone Meperidine Morphine After 1st trimester for 24 to 72 hrs only Ibuprofen Naprosyn	B C C C B B B B	ANALGESICS Aspirin	C

Should the pregnant woman be positioned in a special way?

When the pregnant woman lies flat on her back, the uterus in the third trimester can press on the inferior vena cava and impede venous return to the heart. This decrease in venous return can cause decreased oxygen to the brain and uterus. The pregnant woman may complain of dizziness and/or nausea. Placing a small pillow under the woman’s right hip, so called left uterine displacement, or having the woman lean on her left side moves the uterus off the vena cava (16). This intervention can easily be done in the dental chair. In addition, it is recommended that a pregnant woman’s head should not be lower than her feet while performing dental procedures.

When should restorations (fillings for cavities in teeth) and other necessary dental treatment be performed?

Needed oral health treatment should be provided any time during the pregnancy (11). Prenatal care providers have traditionally postponed non-emergent medical treatment until the first trimester has passed. This practice has been based on theoretical concerns for potential harm to the fetus during the period of organogenesis. There is no compelling evidence that precludes dental treatment any time during pregnancy including the first trimester. The early second trimester (14 to 20 weeks) is the ideal time to perform all dental procedures. At this stage in gestation, the threat for teratogenicity has passed, nausea and vomiting are less common and the uterus is not large enough to cause discomfort. Another reason for completing treatment is that some pregnant women may require general anesthesia with intubation at delivery. Because pre-anesthesia evaluation usually occurs at the time of labor, problems such as loose teeth and temporary restorations should be remedied prior to the estimated date of delivery.

What advice should I give about the use of dental amalgam (silver-mercury) fillings during pregnancy?

All health professionals should educate women about the potential harm that can accrue from untreated caries during pregnancy. Women with symptomatic caries or deep decay should be treated promptly, including in the first trimester. The oral health professional and the pregnant woman should determine the best treatment options based on an evaluation of the benefits, risks and alternatives of using dental amalgam fillings.

At present, there is no evidence that the exposure of the fetus to mercury released from the mother's existing amalgam fillings causes any adverse effect (17-21). There is international agreement that the scientific data do not confirm the presence of a significant health hazard from use of dental amalgam. Nevertheless, Germany, Austria and Canada have restricted the use of amalgams in certain populations including pregnant women. In addition, Sweden and Denmark are phasing out all mercury containing materials because of environmental concerns (17).

Dental amalgam is the most common material used for repairing a posterior tooth. Resins (composites), glass-ionomer, gold or porcelain restorations are alternative materials. Dental amalgams are often more durable than resin or glass-ionomer fillings and less costly than gold or porcelain restorations, but little is known about any of these materials in relation to pregnancy. Bisphenol-A, one of the chemicals in the resin, has been shown to be an endocrine disrupter in animal studies (22). If one were to apply the Food and Drug Administration (FDA) Use-In-Pregnancy Ratings for Drugs (23) to dental amalgam or resin material, each could be considered as Category B (i.e., penicillin and acetaminophen) or C (i.e., acetaminophen with codeine).

Mercury vapor (elemental mercury, a form of inorganic mercury) is released during amalgam removal or placement and may be inhaled and absorbed into the bloodstream through which it crosses the placental barrier. This procedure may temporarily increase the mercury level in blood. However, use of rubber dam and high speed evacuation (suction) can markedly reduce such vapor inhalation (21). According to a recent systematic review, there is insufficient evidence to support or refute the hypothesis that mercury exposure from dental amalgam restorations contributes to adverse pregnancy outcomes (17). A study conducted by Hujuel et al. found that the placement of dental amalgams during pregnancy did not increase the risk of low birth weight babies (19).

The elemental mercury found in dental amalgams is different from methyl mercury, a form of organic mercury. The consumption of fish and seafood is the major source of organic mercury (17;20). The ingestion of methyl mercury during pregnancy is more of a concern than mercury vapor released from dental amalgams.

REFERENCES

1. Crall JJ. Opportunities for improving maternal and infant health through prenatal oral health care. In: McCormick MC, Siegal JE, eds. *Prenatal Care*. Cambridge: University Press, 2005. 261-270.
2. Allston AA. *Improving Women's Health and Perinatal Outcomes: The Impact of Oral Diseases*. Baltimore, MD: Women's and Children's Health Policy Center, 2001.
3. New York State Department of Health. *Oral Health Plan for New York State*. Albany, NY: New York State Department of Health, 2005.
4. Hujoel PP, Bollen AM, Noonan CJ, del Aguila MA. Antepartum dental radiography and infant low birth weight. *JAMA* 2004; 291(16):1987-1993.
5. Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. *Clin Microbiol Rev* 2000; 13(4):547-558.
6. American Academy of Periodontology statement regarding periodontal management of the pregnant patient. *J Periodontol* 2004; 75(3):495.
7. ACOG Committee Opinion. Number 299, September 2004 (replaces No. 158, September 1995). Guidelines for diagnostic imaging during pregnancy. *Obstet Gynecol* 2004; 104(3):647-651.
8. National Council on radiation protection and measurement. Report No. 54: Medical radiation exposure of pregnant and potentially pregnant women, 1977.
9. Toppenberg KS, Hill DA, Miller DP. Safety of radiographic imaging during pregnancy. *Am Fam Physician* 1999; 59(7):1813-8, 1820.
10. Matteson SR, Joseph LP, Bottomley W, Finger HW, Frommer HH, Koch RW et al. The report of the panel to develop radiographic selection criteria for dental patients. *Gen Dent* 1991; 39(4):264-270.
11. Cunningham FG, Gant NF, Leveno KJ, Gilstrap LC, Hauth JC, Wenstrom KD, eds. *Williams Obstetrics*. 21st ed. New York: McGraw-Hill; 2001.
12. American Dental Association and US Department of Health and Human Services. The selection of patients for dental radiographic examinations. <http://www.ada.org/prof/resources/topics/radiography.asp#radiographs>. Accessed on March 22, 2006.
13. Rosen MA. Management of anesthesia for the pregnant surgical patient. *Anesthesiology* 1999; 91(4):1159-1163.
14. Creasy RK, Resnik R. *Maternal-Fetal Medicine: Principles and Practice*. 5th ed. Philadelphia: WB. Saunders, 2004.
15. Briggs GG, Freeman RK, Yaffe ST. *Drugs in pregnancy and lactation: A reference guide to fetal and neonatal risk*. 7th ed. Baltimore: Lippincott Williams and Wilkins, 2005.
16. Wasylko L, Matsui D, Dykxhoorn SM, Rieder MJ, Weinberg S. A review of common dental treatments during pregnancy: implications for patients and dental personnel. *J Can Dent Assoc* 1998; 64(6):434-439.
17. Life Sciences Research Office. *Review and analysis of the literature on the potential adverse health effects of dental amalgam*. Bethesda, MD, 2004.

18. United States Food and Drug Administration Center for Devices and Radiological Health Consumer Information. Consumer Update: Dental Amalgam. [updated 2002 Dec 31; cited 2005 Aug, 30]. <http://www.fda.gov/cdrh/consumer/amalgams.html>. Accessed on March 22, 2006
19. Hujoel PP, Lydon-Rochelle M, Bollen AM, Woods JS, Geurtsen W, del Aguila MA. Mercury exposure from dental filling placement during pregnancy and low birth weight risk. *Am J Epidemiol* 2005; 161(8):734-740.
20. March of Dimes. During your pregnancy: Mercury. http://www.marchofdimes.com/pnhec/159_15759.asp. Accessed on March 22, 2006
21. Whittle KW, Whittle JG, Sarll DW. Amalgam fillings during pregnancy. *Br Dent J* 1998; 185(10):500.
22. Olea N, Pulgar R, Perez P, Olea-Serrano F, Rivas A, Novillo-Fertrell A et al. Estrogenicity of resin-based composites and sealants used in dentistry. *Environ Health Perspect* 1996; 104(3):298-305.
23. Food and Drug Administration. Use-in-Pregnancy Ratings for Drugs. www.uptodate.com. Accessed on Dec 15, 2005.

CHAPTER 3:

Recommendations for Oral Health Professionals

BACKGROUND

In developing a treatment plan for the pregnant woman, oral health professionals should consider the gestational age of the fetus, harmful maternal behaviors and other medical conditions. Because the second trimester is considered the safest time to provide oral health and other surgical care, oral health professionals need to know the estimated date of delivery. After the baby is born, the mother may be too busy to attend to dental appointments and may lose her health insurance coverage. In addition, oral health professionals should be aware of certain physiological changes that occur during pregnancy. Every pregnant woman is expected to receive a comprehensive oral evaluation at some time during the pregnancy, as regular six-month examinations is the standard of care for the general population.

Time Line of Pregnancy

The estimated date of delivery is calculated by counting 40 weeks from the first day of the last menstrual period (1). Pregnancy is divided into three trimesters, roughly three months for each trimester or 14 weeks based on a 42-week gestation. Because of the current widespread use of ultrasound, it is more common for women to report the number of completed weeks of gestation. The first trimester, defined as starting at the first day of the last menstrual period and continuing until 13 weeks and six days, is when organogenesis takes place. Technically, the conceptus is called an embryo until the ninth week, when it becomes a fetus. It is during the embryonic period when the risk of teratogenicity exists (2). The second trimester and the third trimester start at 14 weeks and at 28 weeks of gestation respectively.

First Trimester: Pregnancy Loss and Teratogenesis

Sporadic pregnancy loss occurs in 10 to 15% of all clinically recognized pregnancies in the first trimester (3). Most of these losses are due to karyotypic abnormalities. Organogenesis, development of the organs, takes place in the first ten weeks of gestation. Usually, in order for an environmental factor to be considered a teratogen, exposure must occur during the first ten weeks of gestation.

Malformations are present in two to three percent of live full-term newborn babies (1;4;5).

Performing dental procedures during early pregnancy has never been reported to increase the rate of malformations.

Second Trimester

The safest time to perform procedures during pregnancy is in the early second trimester, 14 to 20 weeks gestation. The risk of pregnancy loss is lower compared to that in first trimester and organogenesis is completed. For example, cervical cerclage and thyroidectomy are two relatively common surgical procedures performed on pregnant women typically in the early second trimester (1;4). The pregnant uterus is below the umbilicus until 20 weeks gestation and the woman is generally more comfortable than she will be as the pregnancy progresses.

Third Trimester

In the third trimester, the uterus can press on the inferior vena cava and pelvic veins, which impedes venous return to the heart. This decrease in venous return can cause a decrease in the amount of oxygen delivered to the brain and uterus (1). Women who are supine may have nausea or vomiting.

Harmful Maternal Behaviors: Tobacco, Alcohol and Recreational Drugs

Oral health professionals play a significant role in counseling patients concerning the harmful effects of tobacco, alcohol and recreational drugs. During the pregnancy, the consequences of these behaviors are profound. Multiple studies have demonstrated a clear association between maternal smoking and perinatal morbidity and mortality (6-10). Women who smoke are at increased risk for low birth weight babies, bleeding during pregnancy, premature labor and preterm rupture of membranes. Infant health risks associated with maternal smoking include sudden infant death syndrome, hospitalization and neurodevelopmental abnormalities.

There is no known safe amount of alcohol consumption during pregnancy. Fetal alcohol syndrome is a preventable birth defect characterized by growth restriction, facial abnormalities and central nervous dysfunction. Many more babies, however, are diagnosed with fetal alcohol effect, which is a lesser degree of the syndrome. Fetuses of women who ingest six drinks per day are at a 40 percent risk of developing some features of the fetal alcohol syndrome (5;9). Some data suggest that binge drinking, for example on the weekend, is more likely to cause this syndrome than daily intake of alcohol (1). It is safest to consider all use of alcohol during pregnancy as harmful, including some alcohol-containing mouth rinses.

Depending on the geographic location, it is estimated that 1 to 40 percent of pregnant women have used cocaine, marijuana, diazepam or other prescription drugs at some time during the pregnancy while one in ten neonates are exposed to mood-altering drugs during pregnancy (5;7). For these reasons, oral health evaluation during pregnancy presents a unique opportunity to counsel women concerning these high-risk behaviors.

PREGNANCY AND TREATMENT CONSIDERATIONS

Hypertensive Disorders of Pregnancy

Oral health professionals should be aware of hypertensive disorders because of increased risk of bleeding during procedures and should consult with the prenatal care provider before initiating dental procedures in women with uncontrolled severe hypertension. Blood pressure values of greater than or equal to 140/90 mmHg are considered mild hypertension and values greater than or equal to 160/110 mmHg are considered severe hypertension. Hypertensive disorders of pregnancy, including chronic or preexisting hypertension and the development of hypertension during pregnancy, occur in 12 to 22 percent of pregnancies (11). Up to 5 percent of pregnant women have chronic hypertension (12). By definition, chronic hypertension is diagnosed prior to pregnancy or during the first 20 weeks of gestation.

Preeclampsia is a syndrome defined by hypertension and proteinuria during pregnancy. Eclampsia is defined as the new onset of grand mal seizures in a woman with preeclampsia. The diagnostic criteria for superimposed preeclampsia include new onset proteinuria in a woman with diagnosed chronic hypertension. Preeclampsia occurs in 5 to 8 percent of pregnancies. Hypertensive disorders are associated with adverse outcomes including premature birth, intrauterine growth restriction, fetal demise, placental abruption and cesarean delivery (11).

Several physiologic changes occur during pregnancy that can affect chronic hypertension. Two of the most significant changes are the increase in blood volume and the decrease in blood pressure that begin by the end of the first trimester. The blood pressure reaches its lowest level at 16 to 18 weeks. This decrease in blood pressure is the result of changes in the renin-angiotensin system and the development of physiologic anemia of pregnancy (1).

Diabetes and Pregnancy

Gestational diabetes or type III diabetes occurs in 2 to 5% of pregnant women in the United States (13) and is most commonly diagnosed after 24 weeks of gestation. Pre-existing type II diabetes, characterized by insulin resistance, is more likely to continue after delivery especially if the woman is obese. Up to 50% of women with gestational diabetes will go on to develop type II diabetes in middle age, especially with risk factors of a positive family history and obesity. Type I diabetes, with underlying autoimmune pathogenesis, may also be initially diagnosed during pregnancy.

For women with diabetes diagnosed prior to pregnancy, oral health is particularly important as acute and chronic infections make control of diabetes more difficult (14). Diabetes control is particularly important during the first trimester. Rates of congenital anomalies increase as the degree of uncontrolled diabetes increases. Ideally, all women should be seen for oral health care prior to conception. Oral health care is even more important for women with diabetes who require meticulous pre-conception control of the disease to reduce the risk of congenital malformations (1). Ongoing control of diabetes during pregnancy further decreases the risk of adverse pregnancy outcomes such as preeclampsia and large-for-gestational age (macrosomic) newborns (1;4).

Heparin and Pregnancy

A small number of pregnant women with a diagnosis of thrombophilia may be given one or two injections of heparin daily to improve pregnancy outcome. Thrombophilia is a genetic or acquired hematologic condition that predisposes women to blood clots, pregnancy loss and/or fetal growth restriction. Heparin increases the risk for bleeding complications during dental procedures (15-17).

Risk of Aspiration

Pregnant women have delayed gastric emptying due to hormonal changes and an incompetent esophageal valve. As a result, pregnant women are considered to always have a “full stomach” and thus are at increased risk for aspiration (1;4;18).

Food and Drug Administration (FDA) Use-in-Pregnancy Ratings for Drugs

Most people are exposed to a variety of chemicals. Although a few agents have been shown to be teratogenic in humans, the teratogenic potential of many of these agents is not known (1;19).

In 1979, the FDA developed a classification system to provide therapeutic guidance for the use of drugs during pregnancy. This system combines assessment of several kinds of risk, including congenital anomalies, fetal effects, perinatal risks and therapeutic risk-benefit ratio. Few research studies of drugs have included pregnant women. Most medications prescribed for common diseases can be used with relative safety (with a few notable exceptions like thalidomide) because there have been few adverse drug reports. Moreover, the untreated disease or condition itself may pose more serious risks to both mother and fetus than any unsubstantiated risks from the medications. It is important that health care professionals who care for pregnant women are familiar with the following

classification of drugs (1;19). Most drugs are category C (66%) or B (19%) while only 0.7% are category A (20).

FDA Use-in-Pregnancy Ratings for Drugs (21)

Category A – Controlled studies show no risk – Adequate, well-controlled studies in pregnant women have failed to demonstrate risk to the fetus.

Category B – No evidence of risk in humans – Either animal studies show risk (but human findings do not) or, if no adequate human studies have been done, animal findings are negative.

Category C – Human studies are lacking and animal studies are either positive for fetal risk or lacking as well. However, potential benefits may justify the potential risk.

Category D – Positive evidence of risk – Investigational or post marketing data show risk to the fetus. Nevertheless, potential benefits may outweigh the risk, such as some anticonvulsive medications.

Category X – Contraindicated in pregnancy – Studies in animals or humans, or investigational or post marketing reports have shown fetal risk, which clearly outweighs any possible benefit to the patient, such as isotretinoin and thalidomide.

Considerations for Nitrous Oxide Use in the Dental Office

The use of nitrous oxide should be limited to cases where topical and local anesthetics are inadequate. In such situations, consultation with the prenatal care provider would be prudent. Adequate precautions must be taken to prevent hypoxia, hypotension and aspiration (18). Alterations in anatomy and physiology induced by pregnancy have anesthetic implications and present potential hazards for the mother and the fetus. Therefore, most anesthesiologists prefer to use local and regional anesthetics for pregnant women.

Pregnant women require lower levels of nitrous oxide to achieve sedation. Therapeutic dosage of standards drugs for monitored anesthetic care (MAC) for intravenous and inhalation sedation is markedly reduced in pregnancy. Thus, the pregnant woman may become obtunded, when the usual dosages of drugs for conscious sedation are administered. A pulse oximeter should always be used for pregnant women receiving MAC. In addition, maternal oxygen saturation should be maintained at 95 percent or higher to ensure adequate oxygenation of the fetus.

A pregnant woman is considered to always have a “full stomach” due to delayed gastric emptying and incompetent lower esophageal sphincter. Thus, pregnant women are at increased risk for aspiration (4;18). Therefore, prophylactic measures to prevent aspiration should be used particularly during the third trimester. A woman with multiple gestation is at increased risk for aspiration in the mid-second trimester because of the large uterus. Maintaining a semi-seated position and avoiding excessive sedation are required to prevent aspiration. Conscious sedation should be the last possible alternative in the third trimester. These women may be best treated with general anesthesia in the hospital setting (18).

Use of Diagnostic X-rays During Pregnancy

According to the American College of Radiology, no single diagnostic procedure results in a radiation dose significant enough to threaten the well being of the developing embryo and fetus (22). Current evidence suggests that there is no increased risk to the fetus with regard to congenital malformation, growth retardation, or abortion from ionizing radiation at a dose of less than five rad (23;24).

According to Matteson et al., the recommended guidelines need not be altered for a pregnant patient (25). Uterine doses for a full-mouth radiographic series have been shown to be less than one mrem. On the other hand, the uterine doses from naturally occurring background radiation during the nine months of pregnancy can be expected to be about 75 mrem. The goal is to minimize x-ray exposure to the fetus.

Hujoel et al. recently reported an association between dental x-rays in the first trimester and term low birth weight babies (26). The authors hypothesized that the total x-ray exposure to the maternal thyroid gland could cause low birth weight. Several weaknesses in the study indicate that it is highly unlikely that this association is causal (27-29). There is no reason, at this time, to believe that the risk of low birth weight babies outweighs the benefits of exposing pregnant women to a limited number of dental x-rays with appropriate thyroid collar and apron.

The U.S. Food and Drug Administration has provided detailed guidelines for prescribing dental radiographs (Appendix F). The guidelines recommend the use of health history and clinical judgment to determine the need for and type of radiographic images for diagnosis. Every precaution should be taken to minimize radiation exposures by using protective thyroid collars and aprons whenever possible.

Mercury Fillings and Human Health Problems

At present, there is no evidence that the exposure of the fetus to mercury released from the mother's existing amalgam fillings causes any adverse effect (30-35). There is international agreement that the scientific data do not confirm the presence of a significant health hazard from use of dental amalgam. Nevertheless, Germany, Austria and Canada have restricted the use of amalgams in certain populations including pregnant women. In addition, Sweden and Denmark are phasing out all mercury-containing materials because of environmental concerns (30).

Dental amalgam is the most common material used for repairing a posterior tooth. Resins (composites), glass-ionomer, gold or porcelain restorations are alternative materials. Dental amalgams are often more durable than resin or glass-ionomer fillings and less costly than gold or porcelain restorations but little is known about any of these materials in relation to pregnancy. Bisphenol-A, one of the chemicals in the resin, has been shown to be an endocrine disrupter in animal studies (36). If one were to apply the Food and Drug Administration (FDA) Use-In-Pregnancy Ratings for Drugs (21) to dental amalgam or resin material, each could be considered as Category B (i.e., penicillin and acetaminophen) or C (i.e., acetaminophen with codeine).

Mercury vapor (elemental mercury, a form of inorganic mercury) is released during amalgam removal or placement and may be inhaled and absorbed into the bloodstream through which it crosses the placental barrier. This procedure may temporarily increase the mercury level in blood. However, use of rubber dam and high speed evacuation (suction) can markedly reduce such vapor inhalation. According to a recent systematic review, there is insufficient evidence to support or refute the hypothesis that mercury exposure from dental amalgam restorations contributes to adverse pregnancy outcomes (30). A study conducted by Hujoel et al. found that the placement of dental amalgams during pregnancy did not increase the risk for low birth weight babies (32).

The elemental mercury found in dental amalgams is different from methyl mercury, a form of organic mercury. The consumption of fish and seafood is the major source of organic mercury (30;33). The ingestion of methylmercury during pregnancy is more of a concern than mercury released from dental amalgams.

All health professionals should educate women about the potential harm that can accrue from untreated caries during pregnancy. Women with symptomatic caries or deep decay should be treated promptly at any time during pregnancy. The oral health professional and the pregnant woman should determine the best treatment options based on an evaluation of the benefits, risks and alternatives of using dental amalgams.

Prophylactic Antibiotics During Pregnancy

Pregnancy in and of itself is not an indication for prophylactic antibiotics during dental procedures, although bacteremia can occur as a result of dental procedures. Transient bacteremia is well documented following such procedures as tooth extractions, gingivectomy, supra- and subgingival scaling, ultrasonic scaling and subgingival irrigation (37). While the occurrence of bacteremia is common following dental procedures, clinical trials have not reported any adverse effects of dental interventions on pregnant women.

Criteria for prescribing antibiotics to prevent subacute bacterial endocarditis are the same for pregnant women as they are for all individuals. Antibiotics are used prophylactically to prevent subacute bacterial endocarditis in all patients at increased risk as delineated in the American College of Cardiology guidelines (38).

Xylitol-Containing Chewing Gum

The role of sucrose and other fermentable carbohydrates in the causation of dental caries is well known (39;40). Xylitol, a naturally occurring sweetener, has been added to chewing gums, candy, toothpastes and chewable fluoride tablets because of its potential to reduce dental caries. A National Institutes of Health consensus development conference on the diagnosis and management of dental caries identified xylitol-containing products as an effective caries preventive agent (41). Significant reduction of mother-child transmission of *Streptococcus mutans* occurred in a group of Finnish mothers chewing xylitol-containing gum two to three times a day, while their children were between three and 24 months of age (42). Although xylitol-containing chewing gum is promising as a caries preventive agent, there is still uncertainty, however, as to the frequency, amount and duration of chewing required for reducing bacterial transmission.

ROLE OF ORAL HEALTH PROFESSIONAL

The role of the oral health professional includes providing preventive and treatment care, and anticipatory guidance for pregnant women. Oral health professionals should render all needed services to pregnant women because:

- Pregnancy by itself is not a reason to defer routine dental care and necessary treatment for oral health problems.
- First trimester diagnosis and treatment, including needed dental x-rays, can be undertaken safely to diagnose disease processes that need immediate treatment.
- Needed treatment can be provided throughout pregnancy; however, the time period between the 14th and 20th week is ideal.

WHAT SHOULD HAPPEN AT THE ORAL HEALTH CARE VISIT?

The oral health professional is encouraged to:

- Consider the following when planning definitive treatment:
 - Chief complaint and medical history
 - History of tobacco, alcohol and other substance use
 - Clinical evaluation
 - Radiographs when needed
- Develop and discuss a comprehensive treatment plan that includes preventive and maintenance care.
- Educate pregnant women about care that will improve their oral health:
 - Brush teeth twice daily with a fluoride toothpaste and floss daily.
 - Limit foods containing sugar to mealtimes only.
 - Choose water or low-fat milk as a beverage. Avoid carbonated beverages during pregnancy.
 - Choose fruit rather than fruit juice to meet the recommended daily fruit intake.
 - Obtain necessary dental treatment before delivery.

MANAGEMENT OF ORAL HEALTH PROBLEMS IN PREGNANT WOMEN

The oral health professional is encouraged to:

- Implement best practices in the assessment of caries risk and management of caries in pregnant women.
- Perform a comprehensive gingival and periodontal examination, which includes a periodontal probing depth record.
- Consider the following as strategies to decrease maternal cariogenic bacterial load:
 - Suggest fluoride toothpaste along with fluoride mouth rinses depending on the fluoridation status of water.
 - Restore untreated caries.
 - Recommend chlorhexidine mouth rinses and fluoride varnish as appropriate.
 - Recommend the use of xylitol-containing chewing gum.
- Use the following when clinically indicated (See Table 1 for acceptable and unacceptable drugs):
 - Local anesthetic with epinephrine
 - Analgesics such as acetaminophen and/or codeine, antibiotics including penicillins, cephalosporins and erythromycins, excluding erythromycin estolate

- Radiographs with thyroid collar and abdominal apron
- Non-steroidal anti-inflammatory drugs for 48 to 72 hours.
- Avoid aspirin, aspirin-containing products, erythromycin estolate and tetracycline.
- Discuss the benefits, risks and alternatives to treatments prior to fourteen weeks gestation including prophylaxis, root planing and scaling.
- Complete restorations with permanent materials, if possible, during pregnancy.
- Complete all necessary dental procedures prior to delivery.
- Consult with the prenatal care provider when considering:
 - Deferring treatment because of pregnancy
 - Co-morbid conditions that may affect management of dental problems such as diabetes, hypertension or heparin treated thrombophilia
 - An anesthesia other than a local block such as intravenous sedation or general anesthesia to complete the dental procedure

Table 1. Acceptable and Unacceptable Drugs for Pregnant Women

These drugs may be used during pregnancy.	FDA Category	These drugs should NOT be used during pregnancy.	FDA Category
ANTIBIOTICS Penicillin Amoxicillin Cephalosporins Clindamycin Erythromycin (except for estolate form)	B B B B B	ANTIBIOTICS Tetracyclines Erythromycin in the estolate form Quinolones Clarithromycin	D B C C
ANALGESICS Acetaminophen Acetaminophen with codeine Codeine Hydrocodone Meperidine Morphine After 1st trimester for 24 to 72 hrs only Ibuprofen Naprosyn	B C C C B B B B	ANALGESICS Aspirin	C

ORAL HEALTH DURING EARLY CHILDHOOD

Oral health professionals are encouraged to take the following actions for infants and children:

- Assess the risk for oral diseases in children beginning at six months by identifying risk indicators including:
 - Inadequate fluoride exposure (Appendix C)
 - Past or current caries experience of siblings, parents and other household members
 - Lack of age-appropriate oral hygiene efforts by parents
 - Frequent and prolonged exposure to sugary substances or use of night time bottle or sippy cup containing anything other than water
 - Medications that contain sugar
 - Clinical findings of heavy maxillary anterior plaque or any signs of decalcification (white spot lesions)
 - Special health care needs
- Provide necessary treatment or facilitate appropriate referral for children assessed to be at increased risk for oral disease or in whom carious lesions or white spot lesions are identified.

Although there is insufficient evidence to make definitive recommendations to prevent early childhood dental caries, many clinicians recommend interventions to disrupt the chain of events that is implicated in the development of caries. These include:

- Reducing the bacterial reservoir in mothers and intimate caretakers by restoring carious lesions and using therapeutic agents such as fluorides and chlorhexidine solutions.
- Avoiding saliva-sharing behaviors of mothers and other intimate caregivers, such as tasting food before feeding, cleaning a dropped pacifier by mouth and wiping the baby's mouth with saliva.
- Avoiding saliva-sharing behaviors between children via their toys, pacifiers etc.
- Encouraging feeding choices that reduce the frequency and amount of caries- promoting sugars such as those contained in fruit juices and infant formula preparations (See Appendix G).
- Avoiding bottles and sippy cups, especially just before sleep, and encouraging the use of water as an alternative to sugary liquids.
- Wiping an infant's teeth after feeding, especially along the gum line, with a soft cloth or soft bristled toothbrush.
- Beginning to wean children from bottle and sippy cup by nine to ten months of age.
- Supervising children's tooth brushing with a small amount of fluoride toothpaste (size of child's pinky finger nail).
- Applying antimicrobial agents such as 10% povidone-iodine solution periodically to the dentition of babies at high risk for early childhood caries.
- Applying fluoride varnishes two to three times per year.

REFERENCES

1. Cunningham FG, Gant NF, Leveno KJ, Gilstrap III LC, Hauth JC, Wenstrom KD. Williams Obstetrics. 21st ed. McGraw-Hill Medical Publishing Division, 2001.
2. Moore KL. Before we are born. W.B. Saunders Co., 1989.
3. ACOG practice bulletin. Management of recurrent pregnancy loss. Number 24, February 2001. (Replaces Technical Bulletin Number 212, September 1995). American College of Obstetricians and Gynecologists. *Int J Gynaecol Obstet* 2002; 78(2):179-190.
4. Creasy R K, Resnik R. Maternal-Fetal Medicine Principles and Practice. 5th ed. Philadelphia: W. B. Saunders, 2004.
5. ACOG educational bulletin. Teratology. American College of Obstetricians and Gynecologists. *Int J Gynaecol Obstet* 1997; 57:319-326.
6. Guidelines for perinatal care. Gilstrap LC, Oh W, editors. 5th Edition. 2002. American Academy Pediatrics and American College of Obstetricians and Gynecologists.
7. March of Dimes. Illicit Drug Use During Pregnancy. http://www.marchofdimes.com/professionals/14332_1169.asp. Accessed on March 22, 2006.
8. March of Dimes. Smoking During Pregnancy. http://www.marchofdimes.com/professionals/14332_1171.asp. Accessed on March 22, 2006.
9. March of Dimes. Drinking Alcohol During Pregnancy. http://www.marchofdimes.com/professionals/14332_1170.asp. Accessed on March 22, 2006.
10. U.S. Department of Health and Human Services. The Health Consequences of Smoking: A Report of the Surgeon General. 2004. U.S. Department of Health and Human Services, Centers for Disease Control, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.
11. ACOG practice bulletin. Diagnosis and management of preeclampsia and eclampsia. Number 33, January 2002. *Obstet Gynecol* 2002; 99(1):159-167.
12. ACOG Practice Bulletin. Chronic hypertension in pregnancy. ACOG Committee on Practice Bulletins. *Obstet Gynecol* 2001; 98(1):suppl-85.
13. ACOG Practice Bulletin. Clinical management guidelines for obstetrician-gynecologists. Number 30, September 2001. Gestational diabetes. *Obstet Gynecol* 2001; 98(3):525-538..
14. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. NIH Publication No. 00-4713, Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research.
15. ACOG Practice Bulletin #68: Antiphospholipid syndrome. *Obstet Gynecol* 2005; 106(5 Pt 1):1113-1121.
16. Lockwood CJ, Rand JH. The immunobiology and obstetrical consequences of antiphospholipid antibodies. *Obstet Gynecol Surv* 1994; 49(6):432-441.
17. Lockwood CJ. Inherited thrombophilias in pregnant patients: detection and treatment paradigm. *Obstet Gynecol* 2002; 99(2):333-341.
18. Rosen MA. Management of anesthesia for the pregnant surgical patient. *Anesthesiology* 1999; 91(4):1159-1163.

19. Koren G, Pastuszak A, Ito S. Drugs in pregnancy. *N Engl J Med* 1998; 338(16):1128-1137.
20. Weiner CP, Buhimichi C. *Drugs for Pregnant and Lactating Women*. Churchill Livingstone, 2004.
21. Food and Drug Administration. Use-in-Pregnancy Ratings for Drugs. www.updodate.com. Accessed on 12-15-2005.
22. ACOG Committee Opinion. Number 299, September 2004. Guidelines for diagnostic imaging during pregnancy. *Obstet Gynecol* 2004; 104(3):647-651.
23. National Council on radiation protection and measurement. Report No. 54: Medical radiation exposure of pregnant and potentially pregnant women. National Council on radiation protection and measurement. 1977.
24. Toppenberg KS, Hill DA, Miller DP. Safety of radiographic imaging during pregnancy. *Am Fam Physician* 1999; 59(7):1813-8, 1820.
25. Matteson SR, Joseph LP, Bottomley W, Finger HW, Frommer HH, Koch RW et al. The report of the panel to develop radiographic selection criteria for dental patients. *Gen Dent* 1991; 39(4):264-270.
26. Hujoel PP, Bollen AM, Noonan CJ, del Aguila MA. Antepartum dental radiography and infant low birth weight. *JAMA* 2004; 291(16):1987-1993.
27. Boice JD, Jr., Stovall M, Mulvihill JJ, Green DM. Dental x-rays and low birth weight. *J Radiol Prot* 2004; 24(3):321-323.
28. Moore W, Preece JW. Radiography and low birth weight. *J Am Dent Assoc* 2004; 135(7):858, 860, 862.
29. Reiman RE. Antepartum dental radiography and low birth weight. *JAMA* 2004; 292(9):1019-1.
30. Life Sciences Research Office. Review and analysis of the literature on the potential adverse health effects of dental amalgam. Bethesda, MD. 2004.
31. United States Food and Drug Administration Center for Devices and Radiological Health Consumer Information. Consumer Update: Dental Amalgam. [updated 2002 Dec 31; cited 2005 Aug, 30]. <http://www.fda.gov/cdrh/consumer/amalgams.html>. Accessed on March 22, 2006.
32. Hujoel PP, Lydon-Rochelle M, Bollen AM, Woods JS, Geurtsen W, del Aguila MA. Mercury exposure from dental filling placement during pregnancy and low birth weight risk. *Am J Epidemiol* 2005; 161(8):734-740.
33. March of Dimes. During your pregnancy. Mercury. <http://www.marchofdimes.com/pnhec/159-15759.asp>. Accessed on Nov 29, 2005.
34. Wasylko L, Matsui D, Dykxhoorn SM, Rieder MJ, Weinberg S. A review of common dental treatments during pregnancy: implications for patients and dental personnel. *J Can Dent Assoc* 1998; 64(6):434-439.
35. Whittle KW, Whittle JG, Sarll DW. Amalgam fillings during pregnancy. *Br Dent J* 1998; 185(10):500.
36. Olea N, Pulgar R, Perez P, Olea-Serrano F, Rivas A, Novillo-Fertrell A et al. Estrogenicity of resin-based composites and sealants used in dentistry. *Environ Health Perspect* 1996; 104(3):298-305.
37. Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. *Clin Microbiol Rev* 2000; 13(4):547-558.

38. Durack DT. Prevention of infective endocarditis. *N Engl J Med* 1995; 332(1):38-44.
39. Burt BA. The use of sorbitol- and xylitol-sweetened chewing gum in caries control. *J Am Dent Assoc* 2006; 137(2):190-196.
40. Milgrom P, Ly KA, Roberts MC, Rothen M, Mueller G, Yamaguchi DK. Mutans streptococci dose response to xylitol chewing gum. *J Dent Res* 2006; 85(2):177-181.
41. NIH. Diagnosis and Management of Dental Caries Throughout Life. NIH Consensus Statement. <http://consensus.nih.gov/2001/2001DentalCaries115PDF.pdf> 18(1), 1-24. Accessed on March 26, 2006.
42. Soderling E, Isokangas P, Pienihakkinen K, Tenovuo J, Alanen P. Influence of maternal xylitol consumption on mother-child transmission of mutans streptococci: 6-year follow-up. *Caries Res* 2001; 35(3):173-177.

CHAPTER 4:

Recommendations for Child Health Professionals

BACKGROUND

Dental caries is a common childhood condition. It is five times more prevalent than asthma. Although dental caries is preventable, almost 28 percent of children aged two to five years experience the disease (1-3). A virulent form of dental caries in young children less than six years of age is generally defined as early childhood caries (ECC). Because it is difficult to manage these children in dental offices, treatment is often rendered in operating rooms, increasing the cost of care. Furthermore, there is a high rate of relapse of caries in these children. According to the Medical Expenditure Panel Survey, the cost of dental services accounts for almost one fourth of total health care expenditures in children (4).

Child health professionals, including but not limited to physicians, physician assistants, nurse practitioners and nurses, can play a significant role in reducing the burden of this disease (5;6). While most children do not visit a dentist until age three, these same children usually have visited a child health professional 11 times for well-child visits during the same time period. Dental caries impacts children's functioning, including eating, speaking, learning and growth (1;2;7-10). Other dental conditions such as oral clefts and orthodontic problems can jeopardize their physical growth, self-esteem and capacity to socialize. Therefore, integrating oral health evaluation into well-child visits provides an opportunity for risk assessment, counseling, early detection and referral. Recently, the American Academy of Pediatrics adopted new recommendations about the inclusion of oral health in preventive guidance during well-child visits (11). The recommendations specify that the first dental risk assessment should occur beginning at six months of age and that the establishment of a dental home should occur by approximately one year of age for children considered to be at risk for caries. The dental home concept is modeled after the medical home concept, which is defined as care that is accessible, family centered, continuous, comprehensive, coordinated, compassionate and culturally competent. Establishment of the dental home provides an opportunity to foster the development of preventive oral health habits that can help keep children free from oral disease.

Dental caries, which can begin as early as 12 months of age, is now recognized as a bacterial infection that can be transmitted from a parent or another intimate caregiver to an infant or child (11-14). Therefore, health professionals should identify women at high risk for dental caries as early as possible, preferably during pregnancy, to provide anticipatory guidance and early intervention.

Evaluation of existing literature leads to several conclusions about prevention of caries. First, it is important to recognize the therapeutic value of a small amount of fluoride introduced through brushing two to three times a day (15). Parents or caregivers of children under six years of age should brush children's teeth or supervise brushing. Because children under six years of age have not fully developed the swallowing reflex, using large quantities of toothpaste should be discouraged to avoid enamel fluorosis. Children under the age of two should use fluoride toothpastes only after consultation with a dentist. Second, children should be protected from adult transmission of *Streptococcus mutans* early in their lives, especially before two years of age (14). Third, mothers and other caregivers should be advised that caries is an infectious disease. The caries-causing bacteria, including *Streptococcus mutans*, can be spread from mother, intimate caregiver, siblings, and other children by saliva-sharing

behaviors. Fourth, feeding sugary liquids especially at night may increase the risk for caries. Therefore, child health care professionals should focus on the message to reduce the exposure to common sugars (16;17). Fifth, mothers and other caregivers should be advised to begin the process of weaning children from the bottle and sippy cup by nine to ten months of age. Health care professionals should exercise cultural sensitivity when discussing this topic with women in communities where extended bottle usage is normative. Sixth, while every child should be seen by a dentist before the first birthday, it is particularly important to refer and follow-up on children who have risk indicators (11). Finally, child health professionals should utilize community resources such as caseworkers and community health workers for conducting follow-up and facilitating transportation to dental appointments.

ROLE OF CHILD HEALTH PROFESSIONAL

Child health professionals should incorporate interview questions, risk assessment, screening and anticipatory guidance during well-child check ups. Because the *Streptococcus mutans* may colonize the child's mouth anytime after the first tooth erupts, appropriate interventions can alter the risk for tooth decay (14). By six months of age, every infant should receive an oral health risk assessment from a child health professional. One of the most important ways for health professionals to ensure that infants and young children enjoy optimal oral health is by performing risk assessments to identify those at risk for oral health problems, including dental caries, malocclusion and injury (11;16;18). Risk assessment of infants and young children for oral health problems is based on the premise that all infants and children are not equally likely to develop such problems. Performing a risk assessment for infants and young children can help child health professionals develop plans to meet each infant's or young child's preventive and treatment needs. During each visit, child health professionals can include questions about oral health issues and provide anticipatory guidance while discussing other age appropriate concerns. Children with chronic disease may require special assessment and treatment of oral diseases.

The American Academy of Pediatrics recommends that all child health care professionals develop the knowledge to perform oral health risk assessments on all patients beginning at six months of age. In addition, children at significant risk for caries should be entered into an aggressive anticipatory guidance and intervention program (11).

Child health professionals are encouraged to take the following actions:

- Assess the risk for oral diseases in the child beginning at six months of age by identifying the risk indicators such as:
 - Inadequate fluoride exposure
 - Caries in siblings, parents and other household members
 - Lack of age-appropriate oral hygiene efforts by parents
 - Frequent and prolonged exposure to sugary substances or use of night time bottle or sippy cup containing anything other than water
 - Medications that contain sugar
 - Clinical findings of heavy maxillary anterior plaque or any signs of decalcification (white spot lesions)
 - Special health care needs
- Facilitate appropriate referral for management for children assessed to be at increased risk for oral disease or in whom carious lesions or white spot lesions are identified.
- Develop a list of oral health referral sources who will provide services to young children and children with special health care needs
- Assist parents/caretakers in establishing a dental home for the child and for themselves.
- Advise women that the following actions may reduce the risk of caries in children:
 - Wipe an infant's teeth after feeding, especially along the gum line, with a soft cloth or soft bristled toothbrush.
 - Supervise children's brushing and use a small (size of child's pinky nail) amount of toothpaste.
 - Avoid putting the child to bed with a bottle or sippy cup containing anything other than water.
 - Feed foods containing sugar at mealtimes only and limit the amount.
 - Avoid saliva-sharing behaviors, such as sharing a spoon when tasting baby food, cleaning a dropped pacifier by mouth, or wiping the baby's mouth with saliva.
 - Avoid saliva-sharing behaviors between children via their toys, pacifiers etc.
 - Visit an oral health professional with child between six and 12 months of age.
- Educate pregnant women and new parents about care that will improve their oral health:
 - Brush teeth twice daily with a fluoride toothpaste and floss daily.
 - Eat foods containing sugar at mealtimes only and in limited amounts.
 - Choose water or low-fat milk as a beverage. Avoid carbonated beverages during pregnancy.
 - Choose fruit rather than fruit juice to meet the recommended daily fruit intake.
 - When possible, obtain necessary dental treatment before delivery.

WHAT SHOULD HAPPEN IN AN OFFICE VISIT?

According to the American Academy of Pediatrics, every child should receive an oral health risk assessment by six months of age by a child health professional. In addition, children at significant risk for caries should be entered into an aggressive anticipatory guidance and intervention program. The American Academy of Pediatric Dentistry encourages parents and other health care providers to help establish a dental home by 12 months of age (11). The American Academy of Pediatric Dentistry has developed a tool to determine risk based on history and physical examination (Table 1). Although every child should have a dental visit as soon as the first tooth erupts, children with moderate and high risk indicators should be referred and followed up as soon as possible (19).

Some interview questions that can assist in identifying the risk classification are presented below:

Interview questions to ask parents of infants and young children:

- Does your child have special health care needs?
- Does your child take medications that may change the flow and/or composition of the saliva, such as asthma medications?
- Do you have a family dentist? Does your dentist provide care for young children?
Have you made an appointment for your infant's first dental visit?
- Has this child had a cavity in the last one or two years?
- Have your other children had any dental problems? Have you had any problems with your own teeth?
- Does your child go to bed with a bottle containing anything other than water? Does your child drink from a cup?
- Is your child exposed to fluoride in drinking water, fluoride supplements or toothpaste?

Clinical Evaluation

The American Academy of Pediatrics has provided guidelines for conducting clinical evaluation of children (20). A dental chair is not needed to perform an oral examination. For infants and children younger than three years, place the child in the parent's lap facing the parent. The provider and parent should sit face to face with knees touching. The child should then lie back (with the child's legs around the parent's waist) laying his or her head in the provider's lap with the head nestled in the provider's abdomen (Figure 1). An alternative position is to have the parent nestle the child in the parent's arm, while the provider examines the child's mouth. By age three years, children are able to lie on

Figure 1. Position of the child for conducting clinical evaluation



Source: Douglass J, Douglass A, Slik H. A practical guide to infant oral health. *American Family Physician* 2004; 70(11):2113-2119. Reproduced with permission. Copyright © American Academy of Family Physicians. All Rights Reserved.

Table 1. American Academy of Pediatric Dentistry Caries-Risk Assessment Tool*

RISK FACTOR TO CONSIDER (For each item below, circle the most accurate response found to the right under "Risk Indicators.")	RISK INDICATORS		
	HIGH	MODERATE	LOW
PART 1 – HISTORY (Determined by interviewing the parent/primary caregiver)			
Child has special health care needs	Yes		No
Child has condition that impairs salivary flow/composition	Yes		No
Child's use of dental home	None	Irregular	Regular
Time lapsed since child's last cavity	<12 months	12 to 24 months	>24 months
Child wears braces or orthodontic/oral appliances	Yes		No
Child's mother has active decay present	Yes		No
Socioeconomic status of child's caregiver	Low	Mid-level	High
Frequency of exposure to between meal sugars/cariogenic foods (include ad lib use of bottle/sippy cup containing juice or carbonated beverage)	>3	1 to 2	Mealtime only
Child's exposure to fluoride	Does not use fluoridated toothpaste; drinking water is not fluoridated; not taking fluoride supplements	Uses fluoridated toothpaste; usually does not drink fluoridated water; does not take fluoride supplements	Uses fluoridated toothpaste; drinks fluoridated water or takes fluoride supplements
PART 2 – CLINICAL EVALUATION (Determined by examining the child's mouth)			
Visible plaque on anterior teeth	Present		Absent
Gingivitis		Present	Absent
Areas of demineralization (white-spot lesions)	More than one	One	None
Enamel characteristics: hypoplasia, defects, retentive pits/fissures	Present		Absent
PART 3 – SUPPLEMENTAL ASSESSMENT (Optional)			
Radiographic enamel caries	Present		Absent
Levels of mutans streptococci	High	Moderate	Low

*Based on AAPD Policy on Use of a Caries-risk Assessment Tool (CAT) for infants, Children and Adolescents. *Pediatr Dent.* 2004(7): 25-27.

Each child's overall assessed risk for developing decay is based on the highest level of risk indicator circled above (i.e. a single risk indicator in any area of the "high-risk" category classifies a child as being "high-risk.")

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an examination table or sit on the lap of the caregiver (with child and caregiver facing the provider) so that the caregiver can steady the child. Regardless of the method used to look in the child's mouth, a good light source is essential. All teeth should be examined.

When examining a child's mouth, the child health professional should:

- Assess oral hygiene (e.g., presence of plaque or debris on the teeth).
- Provide education about removal of plaque and debris using the appropriate-sized toothbrush.
- Inspect all tooth surfaces using a mouth mirror.
- Assess for white spots or tooth decay.

ORAL HEALTH CARE FOR YOUNG CHILDREN

Infant oral health care begins ideally with prenatal oral health counseling for parents, a service that should be provided by all health professionals. This early involvement will form the foundation on which positive experiences can be built. In its early stages, the effects of dental caries are largely reversible through existing interventions like the application of topical fluorides. Once a child is determined to be at risk for caries, a referral to a dentist is required. According to the Department of Health and Human Services, primary pediatric oral health care is best delivered in a "dental home," where competent oral health professionals provide continuous and comprehensive services. Ideally a dental home should be established at a young age (i.e., not later than 12 months of age in high-risk populations), while caries and other disease processes can be managed effectively with minimal or no restorative or surgical treatment (18). The recommendations for preventive dental care are provided in Appendix H.

An adequate dental home should be expected to provide children and their parents with:

- An accurate examination and risk assessment for dental diseases.
- An individualized preventive dental health program based upon the examination and risk assessment.
- Anticipatory guidance about growth and developmental issues (e.g., teething, thumb sucking, or pacifier habits).
- Advice for injury prevention and a plan for dealing with dental emergencies.
- Information about proper care of the child's teeth and supporting structures.
- Information about proper diet and nutrition practices.
- Pit and fissure sealants.
- A continuing care provider who accomplishes restorative and surgical dental care when necessary in a manner consistent with the parents' and child's psychological needs.
- Interceptive orthodontic care for children with developing malocclusions.
- A place for the child and parent to establish a positive attitude about dental health.
- Referrals to dental specialists, such as endodontists, oral surgeons, orthodontists, pediatric dentists and periodontists, when care cannot be directly provided within the dental home, and
- Coordination of care with the infant/child's primary care medical provider.

REFERENCES

1. The Face of a Child: Surgeon General's Workshop and Conference on Children and Oral Health. Proceedings; 2000 June 12-13; Washington DC; National Institute of Dental and Craniofacial Research, 2001 May.
2. U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. NIH Publication No. 00-4713, Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, May 25, 2000.
3. Beltran-Aguilar E D, Barker L K, Canto M T, Dye B A, Gooch B F, Griffin S O et al. Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis – United States, 1988-1994 and 1999-2002. *MMWR* 2005; 54/SS(3):1-43.
4. Ezzati-Rice TM, Kashihara D, Machlin S. Health care expenses in the United States, 2000. Rockville, MD: Agency for Healthcare Research and Quality; 2004. MEPS Research Findings No. 21. AHRQ Pub. No. 04-0022.
5. Edelstein BL. Foreword to the Supplement on Children's Oral Health. *Ambulatory Pediatrics* 2002; 2(2):139-140.
6. Crall JJ. Opportunities for improving maternal and infant health through prenatal oral health care. In: McCormick MC, Siegal JE, editors. *Prenatal Care*. Cambridge: University Press, 2005; 261-270.
7. Acs G, Lodolini G, Kaminsky S, Cisneros GJ. Effect of nursing caries on body weight in a pediatric population. *Pediatr Dent* 1992; 14(5):302-305.
8. Acs G, Shulman R, Ng MW, Chussid S. The effect of dental rehabilitation on the body weight of children with early childhood caries. *Pediatr Dent* 1999; 21(2):109-113.
9. Acs G, Ng MW. Early childhood caries and well being. *Pediatr Dent* 2002; 24(4):288.
10. Ayhan H, Suskan E, Yildirim S. The effect of nursing or rampant caries on height, body weight and head circumference. *J Clin Pediatr Dent* 1996; 20(3):209-212.
11. Hale KJ. Oral health risk assessment timing and establishment of the dental home. *Pediatrics* 2003; 111(5 Pt 1):1113-1116.
12. Caufield PW, Griffen AL. Dental caries. An infectious and transmissible disease. *Pediatr Clin North Am* 2000; 47(5):1001-19.
13. Caufield PW, Cutter GR, Dasanayake AP. Initial acquisition of mutans streptococci by infants: evidence for a discrete window of infectivity. *J Dent Res* 1993; 72(1):37-45.
14. Berkowitz RJ. Causes, treatment and prevention of early childhood caries: a microbiologic perspective. *J Can Dent Assoc* 2003; 69(5):304-307.
15. Recommendations for using fluoride to prevent and control dental caries in the United States. Centers for Disease Control and Prevention. *MMWR* 2001; 50(RR-14):1-42.
16. Casamassimo P. *Bright Futures in Practice: Oral Health*. Arlington, VA: National Center for Education in Maternal and Child Health. 1996.
17. Douglass JM, Douglass AB, Silk HJ. A practical guide to infant oral health. *Am Fam Physician* 2004; 70(11):2113-2120.

18. Department of Health and Human Services. Centers for Medicare and Medicaid Services. A Guide to Dental Care in Medicaid. 2004 October. <http://www.hhs.gov/MedicaidDentalCoverage/Downloads/dentalguide.pdf>.
19. American Academy of Pediatric Dentistry Council on Clinical Affairs. Oral Health Policies: Policy on use of a caries risk assessment tool (CAT) for infants, children, and adolescents. Adopted 2002. http://www.aapd.org/media/Policies_Guidelines/P_CariesRiskAssess.pdf. Accessed on March 22, 2006.
20. American Academy of Pediatrics. Oral health risk assessment training for pediatricians and other child health professionals. American Academy of Pediatrics, 2006.

APPENDIX A: Consultation Form for Pregnant Women to Receive Oral Health Care

Referred To: _____ Date: _____

Patient Name: Last _____ First _____

DOB: _____ Estimated Delivery Date: _____ Week of Gestation Today: _____

Known Allergies: _____

Precautions: None Specify (If any): _____

This patient may have routine dental evaluation and care, including but not limited to:

- Oral health examination
- Dental x-ray with abdominal and neck lead shield
- Dental prophylaxis
- Local anesthetic with epinephrine
- Scaling and root planing
- Root canal
- Extraction
- Restorations (amalgam or composite) filling cavities

Patient may have: (Check all that apply)

- Acetaminophen with codeine for pain control
- Alternative pain control medication: (Specify) _____
- Penicillin
- Amoxicillin
- Clindamycin
- Cephalosporins
- Erythromycin (Not estolate form)

Prenatal Care Provider: _____ Phone: _____

Signature: _____ Date: _____

DO NOT HESITATE TO CALL FOR QUESTIONS

DENTIST'S REPORT
(for the Prenatal Care Provider)

Diagnosis: _____

Treatment Plan: _____

Name: _____ Date: _____ Phone: _____

Signature of Dentist: _____

APPENDIX B: Healthy Diet During Pregnancy



EATING FOR TWO

What You Need To Know

You don't have to give up all the foods you love when you're pregnant. You just need to eat smart and make sure that most of your choices are healthy ones. You only need 300 extra calories per day to support your baby's growth and development.

What You Can Do

Follow the serving recommendations. And watch your portions – you may be eating more than you think! Avoid too much sugar and fat in your diet.

Your Healthy Diet

In January 2005, the federal government issued new dietary guidelines for Americans. The guidelines are for people who aren't pregnant and who eat about 2,000 calories per day. New recommendations for pregnant women haven't come out yet.

Check with your health care provider to see if you need to make any changes to the guidelines below during pregnancy.

Fruit: 2-4 servings per day. Sample of 1 serving:

- 1/2 cup fresh, frozen or canned fruit
- 1 medium whole fruit (orange, apple, banana)
- 3/4 cup fruit juice (avoid unpasteurized juices)

Vegetables: 3-5 servings per day. Sample of 1 serving:

- 1/2 cup raw or cooked vegetables
- 1 small baked potato
- 3/4 cup vegetable juice (avoid unpasteurized juices)

Grains: 6-11 servings per day. Sample of 1 serving:

- 1 slice bread
- 1 cup dry cereal
- 1/2 cup cooked rice, pasta or cereal

Proteins: 3-4 servings per day. Sample of 1 serving:

- 2 ounces meat, poultry or fish (see Note 1)
- 2 tablespoons peanut butter
- 1/2 cup beans

Milk Products: 3-4 servings per day. Sample of 1 serving:

- 1 cup milk
- 1 cup yogurt
- 2 1-inch cubes cheese (see Note 2)

The Food Pyramid

In April 2005, the federal government issued its new food pyramid. The pyramid helps people choose healthy foods and the amounts that are right for them. It takes into account how much physical activity a person does every day.

The pyramid is for people who aren't pregnant. New recommendations for pregnant women haven't come out yet.

Check with your health care provider about using the pyramid during pregnancy.

Notes

1. Some fish are unhealthy to eat during pregnancy. Avoid swordfish, shark, king mackerel and tile fish. These fish can contain potentially risky levels of mercury. Mercury can be transferred to the growing fetus and cause serious health problems. According to the U.S. Food and Drug Administration (FDA) and the Environmental Protection Agency (EPA), a pregnant woman can safely eat up to 12 ounces (two average meals) a week of a variety of fish and shellfish that are low in mercury. These include shrimp, canned light tuna, salmon, pollock and catfish. But you should eat no more than 6 ounces of canned albacore (white) tuna per week. Canned white tuna has more mercury than canned light tuna. For the same reason, eat no more than 6 ounces of tuna steak per week. Also avoid game fish until you check its safety with your local health department. (A game fish is any fish caught for sport, such as trout, salmon or bass.) Also avoid raw fish, especially shellfish such as oysters and clams. If you eat raw fish, you could get an infection that could hurt your baby.
2. Avoid soft cheeses such as Brie, feta, Camembert, Roquefort and Mexican-style, unless they are labeled as made with pasteurized milk.

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APPENDIX C: Guidelines for Pediatric Dental Care¹

1. PREVENTIVE SERVICES

a) Use of Fluorides

Use of fluorides for the prevention and control of dental caries is documented to be both safe and highly effective. Optimizing fluoride levels in water supplies in many ways is an ideal public health measure because it is effective, relatively inexpensive, and does not require conscious daily cooperation from individuals. Daily fluoride exposure through water supplies or supplemental tablets, and monitored use of fluoride dentifrice (“pea-size” amount on brush) should be recommended for all children as a primary preventive procedure. Professional fluoride treatments should be based on caries risk. Home protocols should be advised for children considered at higher caries risk.

Systemically Administered Fluoride Supplements – Fluoride supplements should be considered for all children drinking fluoride deficient water (<0.6 ppm F). Before supplements are prescribed, it is essential to know the fluoride concentration of the patient’s drinking water. Review and, if necessary, testing of all sources of drinking water (i.e., home, day care, and school) are essential to determining the patient’s need for fluoride supplements. Once the fluoride level of the water supply has been evaluated, either through contacting public health officials or independent water analysis (especially important for families relying on well water or homes with in-house filtration systems), and other sources of dietary fluoride have been assessed, the daily dosage schedule can be recommended and reviewed with parents in the context of appropriate fluoride usage.

Dietary Fluoride Supplementation Schedule

Age	Fluoride in Drinking Water		
	Less than 0.3 ppm F	0.3-0.6 ppm F	More than 0.6 ppm F
Birth to 6 mos.	0	0	0
6 mos. to 3 yrs.	0.25 mg	0	0
3 yrs. to 6 yrs.	0.50 mg	0.25 mg	0
6 yrs. to 16 yrs.	1.00 mg	0.50 mg	0

Professionally Applied Topical Fluoride Treatment – Eight percent stannous fluoride solution, 1.23% acidulated phosphate fluoride (APF) solution or gel and 5% sodium fluoride varnish are clinically proven agents for professionally applied fluoride treatments. Selection of an agent for a specific treatment generally depends on provider preference, setting and available equipment, and factors related to the child (e.g., age, level of development). APF is widely used because of better stability, patient acceptance and ease of application. Fluoride varnish has physical properties that may minimize ingestion by young children and children with disabilities. Appropriate precautionary measures should be taken to prevent or minimize swallowing of professionally applied topical fluorides.

Self- or Parentally-Applied Fluoride – The use of fluoride containing toothpaste should be recommended as a primary preventive procedure. However, the use of fluoridated toothpaste in children who cannot expectorate consistently carries an increased risk of dental fluorosis (alteration of tooth appearance

or structure due to high levels of fluoride in the outer enamel layer of a tooth). Therefore, the risk of fluorosis must be weighed against the benefit of caries prevention in determining the use of a fluoride-containing toothpaste by a child. Parents/caregivers should be counseled on the frequency of tooth brushing and use of no more than a “pea-sized” amount of toothpaste.

Children at high risk for caries (e.g., children with orthodontic/prosthetic appliances, with special health care needs, with reduced salivary function, who are unable to clean teeth properly, who are at dietary risk, or who have high oral levels of *Streptococcus mutans* (*S. mutans*) or who are caries active should be considered for additional fluoride treatment. Daily home fluoride programs using fluoride mouth rinses or brush-on fluoride gels should be considered. If a high caries risk patient cannot or will not comply with home fluoride therapy, frequent professional fluoride treatments may be necessary.

References

1. National Institutes of Health. National Institutes of Health Consensus Development Conference Statement: Diagnosis and Management of Dental Caries throughout Life. National Institutes of Health. Accessed at www.nih.nidcr.gov, April 2, 2001.
2. Lewis DW, Ismail AI, Canadian Task Force on Periodic Health Examination. Periodic health examination, 1995 update: 2. Prevention of dental caries. *Can Med Assn J* 1995;152:836-846.
3. Kay E, Locker D. A systematic review of the effectiveness of health promotion aimed at improving oral health. *Community Dent Health* 1998;15:132-144.
4. Bawden JW: Fluoride varnish: a useful new tool for public health dentistry. *J Public Health Dent* 58: 266-269, 1998.

b) Pit and Fissure Sealants

Sealants are plastic-like materials that are bonded to caries-susceptible pits and fissures on tooth surfaces that remain decay-prone even when exposed to fluoride and are used to protect these areas from caries development or progression. Ideally, sealants should be placed as soon as technically possible after teeth erupt for maximum decay prevention; however, newly or partially erupted teeth are often hard to keep dry enough to promote good bonding of the sealant to the tooth. Sealants may be applied in conjunction with small composite resin restorations in localized areas of decay to provide protection against caries while preserving tooth structure (sometimes referred to as preventive resin restorations).

Indications/Diagnoses: Sealants are indicated as a preventive measure for high-risk primary molars, permanent molars and premolars with deep pits and/or fissures, and in the cingulum area of maxillary incisors with deep lingual pits and/or fissures. Sealants also are generally recommended as a preventive measure for permanent molars. Sealants can be applied to teeth with evidence of decay to arrest the progress of decay; however, all sealed teeth and especially those with evidence of early signs of decay need to be monitored regularly to ensure that the sealants are retained and performing effectively to arrest decay. Sealants also are often applied in conjunction with the placement of resin restorations in cases of one or more small areas of decay on fissured surfaces to provide protection against caries while preserving tooth structure.

Selected references are provided for various sections. Additional references and information related to various sections can be found in the AAPD Reference Manual, available on the Internet at www.aapd.org or from the American Academy of Pediatric Dentistry, Chicago, IL. Source: Centers for Medicare and Medicaid Services, U.S. Department of Human and Health Services. Guide to Children's Dental Care in Medicaid. Available at: www.cms.hhs.gov/MedicaidDentalCoverage/Downloads/dentalguide.pdf

APPENDIX D:

American Academy of Pediatric Dentistry Periodicity Schedule¹

PERIODICITY OF EXAMINATION, PREVENTIVE DENTAL SERVICES, ANTICIPATORY GUIDANCE AND ORAL TREATMENT FOR CHILDREN

Birth to 12 Months (For Children With Special Health Care Needs or At High Risk for Caries)

1. Complete the clinical oral assessment and appropriate diagnostic tests to assess oral growth and development and/or pathology.
2. Provide oral hygiene counseling for parents, guardians, and caregivers, including the implications of the oral health of the caregiver.
3. Remove supra- and subgingival stains or deposits as indicated.
4. Assess the child's systemic and topical fluoride status (including type of infant formula used, if any, and exposure to fluoridated toothpaste), and provide counseling regarding fluoride. Prescribe systemic fluoride supplements if indicated, following assessment of total fluoride intake from drinking water, diet, and oral hygiene products.
5. Assess appropriateness of feeding practices, including bottle and breast-feeding, and provide counseling as indicated.
6. Provide dietary counseling related to oral health.
7. Provide age-appropriate injury prevention counseling for orofacial trauma.
8. Provide counseling for non-nutritive oral habits (digit, pacifiers, etc.).
9. Provide diagnosis and required treatment and/or appropriate referral for any oral diseases or injuries.
10. Provide anticipatory guidance for parent/guardian.
11. Consult with the child's physician as needed.
12. Based on evaluation and history, assess the patient's risk for oral disease.
13. Determine the interval for periodic reevaluation.

12 to 24 Months²

1. Repeat Birth-12 month procedures every six months or as indicated by individual patient's needs/susceptibility to disease.
2. Review patient's fluoride status, including any childcare arrangements, which may impact on systemic fluoride intake and provide parental counseling.
3. Provide topical fluoride treatments every six months or as indicated by the individual patient's needs.

2 to 6 Years

1. Repeat 12-24 month procedures every six months or as indicated by individual patient's needs/susceptibility to disease. Provide age-appropriate oral hygiene instructions.
2. Complete a radiographic assessment of pathology and/or abnormal growth and development, as indicated by individual patient's needs.
3. Scale and clean the teeth every six months or as indicated by the individual patient's needs.
4. Provide topical fluoride treatments every six months or as indicated by the individual patient's needs.
5. Provide pit and fissure sealants for primary and permanent teeth as indicated by individual patient's needs.
6. Provide counseling and services (athletic mouth guards) as needed for orofacial trauma prevention.
7. Provide assessment/treatment or referral of developing malocclusion as indicated by individual patient's needs.
8. Provide diagnosis and required treatment and/or appropriate referral for any oral diseases, habits, or injuries as indicated.
9. Assess speech and language development, and provide appropriate referral as indicated.

6 to 12 Years

1. Repeat 2-6 year procedures every six months or as indicated by individual patient's needs/susceptibility to disease.
2. Provide substance abuse counseling (smoking, smokeless tobacco, etc.).

12 to 18 Years

1. Repeat 6-12 year procedures every six months or as indicated by individual patient's needs/susceptibility to disease.
2. At an age determined by patient, parent, and dentist, refer the patient to a general dentist for continuing oral care. Infant Oral Health Care

¹American Academy of Pediatric Dentistry, Reference Manual 2000-01 *Pediatr Dent* 2000;22.

²All children should have established a dental home during this period.

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APPENDIX E:

Resources

WEB SITES

Healthy People 2010: Section 21, Oral Health

<http://www.healthypeople.gov/Document/HTML/Volume2/21Oral.htm>

This site provides background information on oral health as well as the actual Oral Health 2010 objectives.

NIDCR National Oral Health Information Clearing House

<http://www.nidcr.nih.gov>

Clicking on the “Health Information” icon at the top brings up an indexed list of oral health topics.

CDC Oral Health Resources

<http://www.cdc.gov/oralhealth/>

This site is set up to permit searches and to browse by topic.

Oral Health America

<http://www.oralhealthamerica.org>

Oral Health America is a fully independent non-profit for public benefit that follows a path of broad-based public advocacy through targeted programs and communications efforts to improve oral health for all Americans. Of particular use at this site are the “Report Cards” that include topics such as the oral health of older Americans.

Maternal and Child Health Library: Knowledge Path –

Oral Health and Children and Adolescents

http://www.mchlibrary.info/KnowledgePaths/kp_oralhealth.html

This knowledge path offers a comprehensive collection of links and resources, although it may not be easy to identify the most useful resources.

Children’s Dental Health Project

<http://www.cdhp.org>

This site contains a wealth of resources about children’s oral health, particularly issues involving access to care, financing programs, and health disparities. Of particular note is the Interfaces project that explores the relationship between medicine and dentistry in meeting the oral health needs of young children.

American Academy of Pediatric Dentistry <http://www.aapd.org>

American Dental Association <http://www.ada.org>

American Academy of Pediatrics has developed a comprehensive Web site on infant and child oral health. It is scheduled to go live November 1, 2004. Contact Wendy Nelson in the AAP Division of Community Pediatrics at 1-800-433-9016 x7789.

ADDITIONAL RESOURCES

<http://www.mchoralhealth.org/>

Search the entire National Maternal and Child Oral Health Resource Center collection of print and electronic materials. Examples of the types of materials that can be found include fact sheets, curricula, manuals, standards/guidelines, conference proceedings, reports, and surveys.

A Health Professional's Guide to Pediatric Oral Health Management

A series of seven self-contained modules designed to assist health professionals (for example, physicians, physician assistants, nurses and dietitians) in managing the oral health of infants and young children.

Open Wide: Oral Health Training for Health Professionals

A series of four self-contained modules designed to help health and early childhood professionals working in community settings (for example, Head Start and WIC staff) promote oral health for infants and young children.

Bright Futures in Practice: Oral Health

National Center for Education in Maternal and Child Health

This guide is designed to help health professionals implement specific oral health guidelines during infancy, early childhood, middle childhood, and adolescence

SCREENING/RISK ASSESSMENT

Clinical Caries Risk Assessment

Kids Get Care

This assessment tool is designed to help clinicians assess children's oral health and habits. It is intended for use in both community and clinical settings, and it includes guidance for parents and other caregivers on preventive oral health practices.

<http://www.aapd.org/media/policies.asp>

The American Academy of Pediatric Dentistry's Reference Manual is divided into 5 sections: (1) definitions; (2) oral health policies; (3) clinical guidelines; (4) endorsements; and (5) resources. Oral health policies are statements relating to AAPD positions on various public health issues. Clinical guidelines are practice recommendations designed to assist the dental provider in making decisions concerning direct patient care. Adherence to the guidelines increases the probability of a favorable practice outcome and decreases the likelihood of an unfavorable practice outcome.

The American Academy of Pediatrics in partnership with the federal Maternal and Child Health Bureau (MCHB), have implemented the Pediatrics Collaborative Care (PedsCare) Program, Oral

Health Initiative. The purpose of the program is to promote improved child oral health by offering pediatricians the tools and support they need to provide community-based, collaborative care. The goal of the first stage of the initiative is to provide training on oral health care.

Oral Health Risk Assessment Training for Pediatricians and Other Child Health Professionals

This training is designed to support pediatricians and child health providers as they implement oral health risk assessments during well-child visits.

The training provides participants with an understanding of:

- The role of the child health care professional in assessing children's oral health
- The pathogenesis of caries
- Conducting an oral health risk assessment (including oral screening exam)
- Providing appropriate oral health education to families
- Developing a management plan with referrals to a dental home

APPENDIX F: Guidelines for Prescribing Dental Radiographs

Guidelines for prescribing dental radiographs (x-rays) have been developed by an expert panel from the dental profession under the auspices of the Food and Drug Administration (FDA). The panel was convened by the FDA to reach a consensus on standardizing dental radiographic procedures because dental radiographs rank second in frequency of use and in total cost to the public. The panel was also concerned about saving the patient from unwarranted exposure to radiation. The guidelines serve as recommendations that dentists can use to determine when they should take a radiograph. They help determine the type of radiograph needed, how frequently and under what conditions radiographs should be taken. Under these guidelines, a dentist will take an X-ray based on clinical observation and the patient's health history. Dental radiographs serve only as adjuncts to a comprehensive oral examination and evaluation and by themselves or in conjunction with photographs do not provide adequate information to determine a properly developed treatment plan. Radiographs taken only for administrative purposes expose the child to unnecessary radiation, and therefore are inappropriate, unethical, and violate ADA and FDA policies.

The guidelines are based on patient selection criteria, which are descriptions of clinical conditions derived from patient signs, symptoms and history that identify patients who are likely to benefit from a particular radiographic examination. The guidelines are illustrated in a chart designed to serve as a convenient reference and are offered as a supplement to professional expertise (see Table below). The recommendations in this chart are subject to clinical judgment and may not apply to every patient. They are to be used by dentists only after reviewing the patient's health history and completing a clinical examination. The recommendations do not need to be altered because of pregnancy.

Guidelines for Prescribing Dental Radiographs

Patient Category	Child		Adolescent	Adult		*Clinical situations for which radiographs may be indicated include: A. Positive Historical Findings 1. Previous periodontal or endodontic therapy 2. History of pain or trauma 3. Familial history of dental anomalies 4. Postoperative evaluation of healing 5. Presence of implants B. Positive Clinical Signs/Symptoms 1. Clinical evidence of periodontal disease 2. Large or deep restorations 3. Deep carious lesions 4. Malposed or clinically impacted teeth 5. Swelling 6. Evidence of facial trauma 7. Mobility of teeth 8. Fistula or sinus tract infection 9. Clinically suspected sinus pathology 10. Growth abnormalities. 11. Oral involvement in known or suspected systemic disease 12. Positive neurologic findings in the head and neck 13. Evidence of foreign objects 14. Pain and/or dysfunction of the temporomandibular joint 15. Facial asymmetry 16. Abutment teeth for fixed or removable partial prosthesis 17. Unexplained bleeding 18. Unexplained sensitivity of teeth 19. Unusual eruption, spacing or migration of teeth 20. Unusual tooth morphology, calcification or color 21. Missing teeth with unknown reason *Patients at high risk for caries may demonstrate any of the following: 1. High level of caries experience 2. History of recurrent caries 3. Existing restoration of poor quality 4. Poor oral hygiene 5. Inadequate fluoride exposure 6. Prolonged nursing (bottle or breast) 7. Diet with high sucrose frequency 8. Poor family dental health 9. Developmental enamel defects 10. Developmental disability 11. Xerostomia 12. Genetic abnormality of teeth 13. Many multisurface restorations 14. Chemo/radiation therapy
	Primary Dentition (prior to eruption of first permanent tooth)	Transitional Dentition (following eruption of first permanent tooth)	Permanent Dentition (prior to eruption of third molars)	Dentulous	Edentulous	
New patient* All new patients to assess dental diseases and growth and development	Posterior bite-wing examination if proximal surfaces of primary teeth cannot be visualized or probed	Individualized radiographic examination consisting of periapical/occlusal views and posterior bite-wings or panoramic examination and posterior bite-wings	Individualized radiographic examination consistin of posterior bite-wings and selected periapicals. A full mouth intraoral radiographic examination is appropriate when the patient presents with clinical evidence of generalized dental disease or a history of extensive dental treatment		Full mouth intraoral radiographic examination or panoramic examination	
Recall patient* Clinical caries or high-risk factors for caries [†]	Posterior bite-wing examination at 6-month intervals or until no carious lesions are evident.		Posterior bite-wing examination at 6- to 12-month intervals or until no carious lesions are evident	Posterior bite-wing examination at 12- to 18-month intervals	Not applicable	
No clinical caries and no high-risk factors for caries [†]	Posterior bite-wing examination at 12- to 24-month intervals if proximal surfaces of primary teeth cannot be visualized or probed	Posterior bite-wing examination at 12- to 24-month intervals	Posterior bite-wing examination at 18- to 36-month intervals	Posterior bite-wing examination at 24- to 36-month intervals	Not applicable	
Periodontal disease or a history of periodontal treatment	Individualized radiographic examination consisting of selected periapical and/or bite-wing radiographs for areas where periodontal disease (other than nonspecific gingivitis) can be demonstrated clinically		Individualized radiographic examination consisting of selected periapical and/or bite-wing radiographs for areas where periodontal disease (other than nonspecific gingivitis) can be demonstrated clinically		Not applicable	
Growth and development assessment	Usually not indicated	Individualized radiographic examination consisting of a periapical/occlusal panoramic examination	Periapical or panoramic examination to assess developing or third molars	Usually not indicated	Usually not indicated	

The recommendations contained in this table were developed by an expert dental panel comprised of representatives from the Academy of General Dentistry, American Academy of Dental Radiology, American Academy of Oral Medicine, American Academy of Pediatric Dentistry, American Academy of Periodontology, and the American Dental Association under the sponsorship of the Food and Drug Administration (FDA). The chart is being reproduced and distributed to the dental community by Eastman Kodak Company in cooperation with the FDA.

Source: American Dental Association, U.S. Food & Drug Administration. The Selection of Patients for Dental Radiograph Examinations. Available at: www.ada.org

MODULE 3: PREVENTION OF TOOTH DECAY

3.3 Feeding and Eating Practices

- Do not put the infant or child to sleep with a bottle or sippy cup or allow frequent and prolonged bottle feedings or use of a sippy cup containing beverages high in sugar (for example, fruit drinks, soda, or fruit juice), milk, or formula during the day or at night.
- Do not use a bottle to calm an infant or to put an infant to bed. Instead of a bottle try:
 - Giving the infant a favorite blanket or toy.
 - Offering the infant a clean pacifier.
 - Holding, patting, or rocking the infant.
 - Reading to the infant.
 - Softly talking or singing to the infant.
- If an infant is accustomed to being put to bed with a bottle, offer a bottle filled with plain water. If the infant does not adapt initially to the plain water, it may be necessary to fill the bottle with a mixture of juice and water, reducing the amount of juice slightly each night until only water is used.
- Hold the infant or child while feeding. Never prop a bottle (that is, use pillows or any other objects to hold a bottle in the infant's mouth).
- Never add cereal to a bottle. This causes sugary fluids to pool around the teeth and can also cause choking if the infant is unable to swallow the extra food. Instead, always feed infants and children solid foods with a spoon or fork, or, if the infant or child is coordinated enough, encourage self-feeding.
- Introduce a small cup when the infant can sit up without support.
- As the infant begins to eat more solid foods and drink from a cup, the infant can be weaned from the bottle. Begin to wean the infant gradually, at about 9 to 10 months. By 12 to 14 months, most infants can drink from a cup.
- Do not dip pacifiers in sweetened foods like sugar or honey.
- Serve age-appropriate healthy snacks such as fruit, vegetables, grain products (especially whole grain), and dairy products instead of foods high in sugar such as candy, cookies, or cake. (See Module 4, section 4.6.)
- Offer snacks at regular times between meals only. If a child snacks frequently, brush the child's teeth three times a day.

- Make sure the child drinks plenty of water throughout the day, especially between meals and snacks.
- Don't offer food in return for good behavior. This teaches children that foods are rewards and can lead to the development of unhealthy habits.

Source: Open Wide: Oral Health Training for Health Professionals, National Center for Education in Maternal and Clinical Health and Georgetown University. Used with permission.

APPENDIX H:

Selected Evidence Reviews and Guidelines

Oral Health in America: A Report of the Surgeon General

“As a remote gram-negative infection, periodontal disease may have the potential to affect pregnancy outcome.”

American Academy of Periodontology Statement Regarding Periodontal Management of the Pregnant Patient. J Periodontol, March 2004.

“Preventive oral care services should be provided as early in pregnancy as possible. However, women should be encouraged to achieve a high level of oral hygiene prior to becoming pregnant and throughout their pregnancies. If examination indicates a need for periodontal scaling and root planning or more involved periodontal treatment, these procedures are usually scheduled early in the second trimester. The presence of acute infection, abscess, or other potentially disseminating sources of sepsis may warrant prompt intervention, irrespective of the stage of pregnancy.”

American Academy of Pediatrics Policy Statement Oral Health Risk Assessment Timing and Establishment of the Dental Home

“Pediatricians and pediatric health care professionals should develop the knowledge base to perform oral health risk assessments on all patients beginning at six months of age. Patients who have been determined to be at risk of development of dental caries or who fall into recognized risk groups should be directed to establish a dental home six months after the first tooth erupts or by one year of age (whichever comes first). The ideal deterrence to early childhood caries is the establishment of the dental home when indicated by the unique needs of the child. Although not always feasible because of manpower and participation issues, best practice dictates that whenever feasible, all patients should have a comprehensive dental examination by a dentist in the early toddler years.”

Guide To Children’s Dental Care In Medicaid – CMS, DHHS Emphasis on Early Initiation of Oral Health Care

“Science has provided a clear understanding that tooth decay is an infectious, transmissible, destructive disease caused by acid-forming bacteria acquired by toddlers from their mothers shortly after their first teeth erupt (generally around six months of age). In its early stages, the effects of dental caries are largely reversible through existing interventions (e.g., fluorides) that promote replacement of lost minerals from the outer layer of the tooth (enamel). These findings, combined with epidemiological data on the occurrence of tooth decay in infants and young children, suggest that true primary prevention must begin in the first to second year of life. This evidence also suggests that particular attention should be paid to the oral health of expectant and new mothers.”

Infant Oral Health Care

“Infant oral health care begins ideally with prenatal oral health counseling for parents, a service that should be provided by knowledgeable health care providers such as obstetricians, family physicians, pediatricians and nurse practitioners, as well as dental providers. Actual infant oral health care visits

focusing on relevant history taking, clinical examination of oral structures, risk assessment, counseling, anticipatory guidance and necessary follow-up interventions should begin early, ideally before dental diseases are established. This early involvement is viewed as the foundation on which a lifetime of positive oral health and dental care experiences can be built, thus minimizing costs associated with treatment of dental diseases.”

First Dental Visit

“Despite growing recognition of the above [importance of oral health care in infants], a discrepancy exists between dental and public health organizations’ versus the American Academy of Pediatrics’ recommended age for a first dental visit. American Academy of Pediatric Dentistry (AAPD) policy, as reflected in its “Periodicity of Examination, Preventive Dental Services, and Oral Treatment for Children,” recommends that children be seen by a dentist following the eruption of the first tooth, but not later than 12 months of age. The AAPD recommendation is embraced by the Bright Futures consortium of 28 child health organizations and is consistent with the policies of the dental and public health groups including the American Dental Association, American Dental Hygienists Association and the American Public Health Association. In contrast, the American Academy of Pediatrics (AAP) recommends that every child should begin to receive oral health risk assessments by six months of age from a pediatrician or a qualified pediatric health care professional, and that infants identified as having significant risk of caries or being in a high-risk group should be entered into an aggressive anticipatory guidance and intervention program provided by a dentist between six and twelve months of age. NOTE: Under the Medicaid program, states are required to develop their own dental periodicity schedules after appropriate consultations with dental groups involved in child health care or states may adopt a nationally recognized dental periodicity schedule.”

DENTAL X-RAYS

American Dental Association and U.S. Department of Health and Human Services (Revised: 2004)

“Once a decision to obtain radiographs is made, it is the dentist’s responsibility to follow the ALARA Principle (As Low as Reasonably Achievable) to minimize the patient’s exposure to radiation.

Examples of good radiologic practice include:

- *Use of the fastest image receptor compatible with the diagnostic task*
- *Collimation of the beam to the size of the receptor whenever feasible*
- *Proper film exposure and processing techniques*
- *Use of leaded aprons and thyroid collars*

The amount of scattered radiation striking the patient’s abdomen during a properly conducted radiographic examination is negligible. However, there is some evidence that radiation exposure to the thyroid during pregnancy is associated with low birth weight. Protective thyroid collars substantially reduce radiation exposure to the thyroid during dental radiographic procedures. Because every precaution should be taken to minimize radiation exposure, protective thyroid collars and aprons should be used whenever possible. This practice is strongly recommended for children, women of childbearing age and pregnant women.”

U.S. Preventive Services Task Force Summary of Recommendations

“The USPSTF recommends that primary care clinicians prescribe oral fluoride supplementation at currently recommended doses to preschool children older than six months of age whose primary water source is deficient in fluoride.

The USPSTF found fair evidence that, in preschool children with low fluoride exposure, prescription of oral fluoride supplements by primary care clinicians leads to reduced dental caries. The USPSTF concluded that the benefits of caries prevention using oral fluoride supplementation outweigh the potential harms of dental fluorosis, which in the United States are primarily observed as a mild cosmetic discoloration of the teeth.

The USPSTF concludes that the evidence is insufficient to recommend for or against routine risk assessment of preschool children by primary care clinicians for the prevention of dental disease.

The USPSTF found no validated risk-assessment tools or algorithms for assessing dental disease risk by primary care clinicians and little evidence that primary care clinicians are able to systematically assess risk for dental disease among preschool-aged children. The USPSTF further found little evidence that either counseling of parents or referring high-risk children to dental care providers results in fewer caries or reduced dental disease. Thus, the USPSTF concluded there is insufficient evidence to determine the balance between the benefits and harms of routine risk assessment to prevent dental disease among preschool children.”

Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States. MMWR August 17, 2001/50(RR14): 1-14.

Table 4. Quality of evidence, strength of recommendation, and target population of recommendation for each fluoride modality to prevent and control dental caries

Modality ¹	Quality of evidence (grade)	Strength of recommendation (code)	Target population ²
Community water fluoridation	II-1	A	All areas
School water fluoridation	II-3	C	Rural, nonfluoridated areas
Fluoride toothpaste	I	A	All persons
Fluoride mouthrinse	I	A	High risk ³
Fluoride supplements			
Pregnant women	I	E	None
Children aged <6 years	II-3	C	High risk
Children aged 6 to 16 years	I	A	High risk
Persons aged >16 years	⁽⁴⁾	C	High risk
Fluoride gel	I	A	High risk
Fluoride varnish	I	A	High risk

¹Modalities are assumed to be used as directed in terms of dosage and age of user.

²Quality of evidence for targeting some modalities to persons at high risk is grade III (i.e., representing the opinion of respected authorities) and is based on considerations of cost-effectiveness that were not included in the studies establishing efficacy or effectiveness.

³Populations believed to be at increased risk for dental caries are those with low socioeconomic status or low levels of parental education, those who do not seek regular dental care, and those without dental insurance or access to dental services. Individual factors that possibly increase risk include active dental caries; a history of high caries experience in older siblings or caregivers; root surfaces exposed by gingival recession; high levels of infection with cariogenic bacteria; impaired ability to maintain oral hygiene; malformed enamel or dentin; reduced salivary flow because of medications, radiation treatment, or disease; low salivary buffering capacity (i.e., decreased ability of saliva to neutralize acids); and the wearing of space maintainers, orthodontic appliances, or dental prostheses. Risk can increase if any of these factors are combined with dietary practices conducive to dental caries (i.e., frequent consumption of refined carbohydrates). Risk decreases with adequate exposure to fluoride.

⁴No published studies confirm the effectiveness of fluoride supplements in controlling dental caries among persons aged >16 years.

ADA Statement On Dental Amalgam (Revised January 8, 2002)

Dental amalgam (silver filling) is considered a safe, affordable and durable material that has been used to restore the teeth of more than 100 million Americans. It contains a mixture of metals such as silver, copper and tin, in addition to mercury, which chemically binds these components into a hard, stable and safe substance. Dental amalgam has been studied and reviewed extensively, and has established a record of safety and effectiveness.

Issued in late 1997, the FDI World Dental Federation and the World Health Organization consensus statement on dental amalgam stated, *“No controlled studies have been published demonstrating systemic adverse effects from amalgam restorations.”* The document also states that, *aside from rare instances of local side effects of allergic reactions, “the small amount of mercury released from amalgam restorations, especially during placement and removal, has not been shown to cause any adverse health effects.”*

The ADA’s Council on Scientific Affairs’ 1998 report on its review of the recent scientific literature on amalgam states: *“The Council concludes that, based on available scientific information, amalgam continues to be a safe and effective restorative material.”* The Council’s report also states, *“There currently appears to be no justification for discontinuing the use of dental amalgam.”*

In an article published in the February 1999 issue of the Journal of the American Dental Association, researchers report finding *“no significant association of Alzheimer’s Disease with the number, surface area or history of having dental amalgam restorations,”* and *“no statistically significant differences in brain mercury levels between subjects with Alzheimer’s Disease and control subjects.”*

The U.S. Public Health Service issued a report in 1993 stating there is no health reason not to use amalgam, except in the extremely rare case of the patient who is allergic to a component of amalgam. This supports the findings of the Food and Drug Administration (FDA), the National Institutes of Health Technology Assessment Conference and the National Institute of Dental and Craniofacial Research, that dental amalgam is a safe and effective restorative material. In addition, in 1991, Consumer Reports noted, *“Given their solid track record . . . amalgam fillings are still your best bet.”*

In 1991, the FDA’s Dental Products Panel found no valid data to demonstrate clinical harm to patients from amalgams or that having them removed would prevent adverse health effects or reverse the course of existing diseases. The FDA’s most recent reaffirmation of amalgam’s safety was published on December 31, 2002.

The reaffirmation reads, *“FDA and other organizations of the U.S. Public Health Service (USPHS) continue to investigate the safety of amalgams used in dental restorations (fillings). However, no valid scientific evidence has ever shown that amalgams cause harm to patients.”*

It continues, *“Also, USPHS scientists analyzed about 175 peer-reviewed studies submitted in support of three citizen petitions received by FDA after the 1993 report. They concluded that data in these studies did not support claims that individuals with dental amalgam restorations will experience problems, including neurologic, renal or developmental effects, except for rare allergic or hypersensitivity reactions.”*

The U.S. Public Health Service found in 1993 *“no persuasive reason to believe that avoiding amalgams or having them removed will have a beneficial effect on health.”* In fact, it is inadvisable to have amalgams removed unnecessarily because it can cause structural damage to healthy teeth.

The ADA supports ongoing research in the development of new materials that it hopes will someday prove to be as safe and effective as dental amalgam. However, the ADA continues to believe that amalgam is a valuable, viable and safe choice for dental patients and concurs with the findings of the U.S. Public Health Service that amalgam has “*continuing value in maintaining oral health.*”

American Dental Association Statement On “Ante Partum Dental Radiography and Infant Low Birth Weight” (JAMA, April 28, 2004)

Recently published research associating pregnant women’s exposure to dental X-rays with low-weight births reinforces the importance of the American Dental Association’s long-standing recommendation that, in addition to abdominal shielding (e.g., protective aprons), dentists should use thyroid collars on all patients whenever practical to minimize radiation exposure. ADA recommendations for using leaded aprons and collars were first published in 1989 and reinforced in updated guidelines in 2001 (PDF).*

The American Dental Association recommends that pregnant women postpone elective dental x-rays until after delivery; however, there are times when an x-ray may be required during pregnancy to help dentists diagnose and treat oral disease.

Maintaining good oral health during pregnancy can be critical to the overall health of both expectant mothers and their babies. As such, pregnant women should continue to see a dentist regularly for oral exams and professional teeth cleanings. Left untreated, some maternal oral problems can potentially threaten the health of unborn children. For example, studies have shown that pregnant women with severe gum disease may be at increased risk for pre-term delivery. Preliminary follow up studies have shown professional oral health care administered during pregnancy to this at-risk group actually improved pregnancy outcomes.

Women should inform their dentists if they are pregnant, might be pregnant or plan to become pregnant. Should dental x-rays be required during pregnancy, the American Dental Association recommends that a protective thyroid collar and apron be used, unless specific clinical conditions indicate otherwise.

The not-for-profit ADA is the nation’s largest dental association, representing more than 149,000 members. The premier source of oral health information, the ADA has advocated for the public’s health and promoted the art and science of dentistry since 1859. The ADA’s state-of-the-art research facilities develop and test dental products and materials that have advanced the practice of dentistry and made the patient experience more positive. The ADA Seal of Acceptance long has been a valuable and respected guide to consumer and professional products.

*(*Council on Dental Materials, Instruments, and Equipment. Recommendations in radiographic practices: an update, 1988. Journal of the American Dental Association 1989; 118:115-7; Council on Scientific Affairs. An update on radiographic practices: information and recommendations. Journal of the American Dental Association, 2001; 132: 234-8.*)



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