Periodontal Diseases and Adverse Pregnancy Outcomes: A Review of the Evidence and Implications for Clinical Practice

- Initiative on Oral Health Care
- Periodontal Disease and Other Systemic Conditions
- Pregnancy Complications
- Periodontal Disease and Its Impact on Pregnancy
- Implications for Dental Hygiene Assessment, Diagnosis, and Treatment
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- Future Projections in Care of Pregnant Patients
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How many of you have received questions from your patients and other health care providers about the importance and safety of treating pregnant patients? We are so pleased to be able to bring you this timely CE supplement on a topic that is of interest to every practicing dental hygienist. Estimates are that over 50% of pregnant women have some form of gingival disease either from gingivitis or periodontitis. Infections in the mother have been identified as increasing the risk for pregnancy complications such as preterm birth and preeclampsia. In addition, pregnancy complications substantially increase the burden to the public by escalating health care costs (estimated at billions of dollars per year), not to mention the emotional trauma to families who experience an adverse pregnancy outcome.

This supplement will update every dental hygienist on the latest evidence about the impact of periodontal disease on pregnancy and includes the most recent treatment recommendations for pregnant patients. The paper thoroughly reviews the literature on the topic as well as explains the study designs of the many investigations conducted over the years. A quick reference guide to relevant studies is included as well as information about which dental procedures are deemed safe during pregnancy. The authors have also provided you with published practice guidelines for care and web sites for easy reference.

Another important feature of this supplement is the collaboration between dental hygiene and medicine in the writing of this piece. Heather Jared, BSDH, MS, is a graduate of the University of North Carolina, where she received both her BS degree and MS degree in Dental Hygiene. While in graduate school, Heather conducted her thesis project on the topic of adverse pregnancy outcomes and it grew into a full-time job as a research associate professor at UNC. Heather is now part of the Center of Oral and Systemic Diseases, with the primary responsibility of planning and conducting clinical trials. Kim Boggess, MD, an obstetrician, is an associate professor of Obstetrics & Gynecology in the Division of Maternal-Fetal Medicine at the University of North Carolina in Chapel Hill, NC.

Collaboration with other health care professionals is vital to the improvement of health for our patients and for moving our profession forward in the future.

Finally, I want to extend sincere appreciation to Philips Sonicare for their support of this supplement and their dedication to the improvement of oral health throughout the world.

Rebecca S. Wilder, RDH, BS, MS
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Heather Jared, BSDH, MS and Kim A. Boggess, MD

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SUBMISSIONS

Please submit manuscripts for possible publication in the Journal of Dental Hygiene to Katie Barge at katieb@adha.net.
Introduction

Periodontal diseases are a group of conditions that cause inflammation and destruction to the supporting structures of the teeth. These chronic oral infections are characterized by the presence of a biofilm matrix that adheres to the periodontal structures and serves as a reservoir for bacteria. Dental plaque biofilm is a complex structure of bacteria that is marked by the excretion of a protective and adhesive matrix. Within this matrix are gram-negative anaerobic and microaerophilic bacteria that colonize on the tooth structures, initiate the inflammatory process, and can lead to bone loss and the migration of the junctional epithelium, resulting in periodontal pocketing and periodontal disease. This bacterial insult can result in destruction of the periodontal tissues which precipitates a systemic inflammatory and immune response.

For many years, it was believed that specific pathogenic bacteria found within dental plaque biofilm were solely responsible for periodontal diseases. While it is known that pathogenic bacteria are one facet of the disease process and are consistently present, it is not the only cause of periodontitis. The host response to the bacterial insult modulates the severity of the disease by activating the immune system to mediate the disease process. How well the host responds to the pathogenic bacteria modulates how the disease is initiated and progresses. This is evidenced by the fact that gingivitis does not always progress into periodontitis.

Over the years, several risk factors for periodontitis have been identified. For example, stress, poor dietary habits with high sugar intake, smoking and tobacco use, obesity, age, and poor dental hygiene all contribute to the development of periodontal disease. Other major risk factors include clenching or grinding teeth, genetic factors, other family factors, other medical diseases such as diabetes, cancer, or AIDS, defective dental restorations medication use, and conditions that change estrogen levels (puberty, pregnancy, menopause). Eighty percent of individuals with periodontal disease have at least one risk factor that increases their susceptibility to the infectious process and subsequent tissue damage. Often multiple factors are present.

Abstract

Periodontal diseases affect the majority of the population either as gingivitis or periodontitis. Recently there have been many studies that link or seek to find a relationship between periodontal disease and other systemic diseases including, cardiovascular disease, diabetes, stroke, and adverse pregnancy outcomes. For adverse pregnancy outcomes, the literature is inconclusive and the magnitude of the relationship between these 2 has not been fully decided. The goal of this paper is to review the literature regarding periodontal diseases and adverse pregnancy outcomes, and provide oral health care providers with resources to educate their patients. Alternatively, this paper will also discuss what is occurring to help increase the availability of care for pregnant women and what oral health care providers can do to help improve these issues.

Keywords: gingivitis, periodontitis, preterm labor, preterm birth, low birth weight

Initiative on Oral Health Care

The first-ever Surgeon General’s Report on Oral Health in 2000 outlined the prevalence of oral diseases such as dental caries and periodontal infection. It also identified vulnerable populations that have a higher prevalence of oral disease, and that significant racial/ethnic and socioeconomic disparities exist in the United States. Subsequently, the surgeon general put forth a call for action...
to promote access to oral health care for all, reduce the morbidity of oral diseases, and eliminate oral health disparities. The report concluded that oral diseases can be associated with systemic conditions, including diabetes, heart disease, and adverse pregnancy outcomes. Specifically, the report stressed that periodontal treatment during pregnancy is an important strategy to potentially improve maternal and infant health.5

Oral health and its relationship to systemic health is important to society because up to 90% of the worldwide population is affected by periodontal disease—either gingivitis or periodontitis.7 Reports indicate that up to 30% of the general population has a genetic predisposition to periodontitis and a conservative estimate is that over 35 million people in the United States have periodontitis.7

Periodontal Disease and Other Systemic Conditions

There is considerable interest in the link between oral and systemic health among dental and medical providers. Current evidence suggests that periodontal disease is associated with an increased risk for cardiovascular disease,8,9 diabetes,10,11 community and hospital acquired respiratory infections,12 and adverse pregnancy outcomes.13-15 Individuals with periodontal disease have approximately a 1.5 – 1.9 increased odds for developing cardiovascular disease.8,9 There appears to be a bidirectional relationship between periodontal disease and diabetes with a 2- to 3-fold increased risk for diabetes among individuals with tooth loss. Teeth and periodontium may serve as a reservoir and may contribute to respiratory infections. Individuals with poor oral hygiene such as dental decay have a 2- to 9-fold increase odds for pneumonia.12 Many recent studies have reported that maternal periodontal disease may be an independent contributor to abnormal pregnancy outcomes including preterm birth, low birth weight, risk for preeclampsia, mortality, and growth restriction. However, the causality of how periodontitis influences pregnancy outcomes has not been established.14-25

Treatment of periodontal infection may reduce the risk of other systemic conditions. In a randomized clinical trial to estimate the effect of periodontal therapy on traditional and novel risk factors for cardiovascular disease and on markers of inflammation, DiAiuto et al found that therapy reduced inflammatory cytokines, blood pressure, and cardiovascular risk scores.26 In a small treatment trial, type 2 diabetic patients showed improved diabetic control (lower HbA1c levels) after periodontal treatment.27 Several investigators have reported similar effects of oral health regimens on reduced risk for nosocomial respiratory infections. Treatment of mechanically ventilated patients with a daily oral hygiene regimen consisting of an 0.12% chlorhexidine gluconate wash reduced the risk for nosocomial pneumonia.28,29 Recently, studies have been inconclusive on the effects of periodontal therapy during pregnancy for preventing adverse pregnancy outcomes.30-32 Treatment of oral infections may represent a novel approach to improving general health.

It is estimated that over 50% of pregnant women suffer from some form of gingival disease, either gingivitis or periodontitis,26,27 with the reports of prevalence fluctuating between 30%-100% for gingivitis and 5%-20% for periodontitis.33 The prevalence of periodontal diseases during pregnancy substantiates the strategy set forth by the surgeon general, in that periodontal treatment during pregnancy may potentially improve maternal and infant health.5

Pregnancy Complications

Maternal infections have long been recognized as increasing the risk for pregnancy complications such as preterm birth and preeclampsia. Preterm birth is delivery at less than 37 weeks gestation. Prematurity rates continue to increase. The latest statistics from the National Center for Health Statistics showed that for 2005 the preterm birth rate grew to 12.7%. This is up from 12.5% in 2004 and the preliminary reports for 2006 indicate an additional increase in the rates up to 12.8%. Since 1990, the rate of preterm birth has increased more than 20%.34

Understanding prematurity is important because it is the leading cause of death in the first month, causing up to 70% of all perinatal deaths.35 Even late premature infants, those born between 34 and 36½ weeks gestation,36 have a greater risk of feeding difficulties, thermal instability, respiratory distress syndrome, jaundice, and delayed brain development.34 Prematurity is responsible for almost 50% of all neurological complications in newborns, and leads to lifelong complications in health, including but not limited to visual problems, developmental delays, gross and fine motor delays, deafness, and poor coping skills. These complications increase the health care dollars spent on each child. On average, the medical cost alone for a preterm birth is 10 times greater than the medical costs for a full-term birth. In 2005, the nationwide cost of preterm birth was more than $26.2 billion for health care, educational costs, and lost productivity.34 Although there have been advances in technology to help save the infants who are born premature or low birth weight, the lifelong problems associated with these conditions have not been abated.

Periodontal Disease and Its Impact on Pregnancy

Periodontal infection is one of many infections that have been associated with adverse pregnancy outcomes. The hypothesis that periodontal conditions influence the outcome of a pregnancy is not a new idea. In 1931, Galloway identified that the focal infection found in teeth, tonsils,
Sinuses, and kidneys pose a risk to the developing fetus. His information dated back to 1916 when pregnant guinea pigs were inoculated with streptococci eluted from human stillborn fetuses. This inoculation resulted in a 100% abortion rate. To show the impact on humans, he obtained a full mouth radiographic series on 242 women presenting for prenatal care. Fifteen percent (n=57) had an apical abscess and the suggested treatment was extraction of the affected tooth. Of those who were treated, none resulted in a miscarriage or stillbirth. Galloway summarized that removal of a known focal infection, which had clearly demonstrated to be a source of danger to any pregnant woman, was more beneficial than allowing the infection to harbor throughout the pregnancy. He went on to suggest that all foci of infection should be removed early in pregnancy.37

It is widely recognized that good oral health maintains the structures within the oral cavity. However, it is not universally accepted that oral health may be an independent contributor to abnormal pregnancy outcomes. Many studies have been conducted and the literature is controversial on the role periodontitis has and its influence on adverse pregnancy outcomes.

Recognition and understanding of the importance of oral health for systemic health has led to significant research into the role of maternal oral health and pregnancy outcomes. During pregnancy, changes in hormone levels promote an inflammatory response that increases the risk of developing gingivitis and periodontitis. As a result of varying hormone levels without any changes in the plaque levels, 50%-70% of all women will develop gingivitis during their pregnancy, commonly referred to as pregnancy gingivitis. This type of gingivitis is typically seen between the second and eighth month of pregnancy.38 Increased levels of the hormones progesterone and estrogen can have an effect on the small blood vessels of the gingiva, making it more permeable.39,40 This increases the mother’s susceptibility to oral infections, allowing pathogenic bacteria to proliferate and contribute to inflammation in the gingiva. This hyperinflammatory state increases the sensitivity of the gingiva to the pathogenic bacteria found in dental biofilm. Females often see these changes during other periods of their life when hormones are fluctuating, such as puberty, menstruation, pregnancy, and again at menopause.39-41 Recent research suggests that the presence of maternal periodontitis has been associated with adverse pregnancy outcomes, such as preterm birth,19,20,23 preeclampsia,29 gestational diabetes,42 delivery of a small-for-gestational-age infant,14 and fetal loss.43 The strength of these associations ranges from a 2-fold to 7-fold increase in risk. The increased risks suggest that periodontitis may be an independent risk factor for adverse pregnancy outcomes.

In 1996, Offenbacher et al reported a potential association between maternal periodontal infection and delivery of a preterm or low-birth-weight infant.19 In a case-control study of 124 pregnant women, observations suggested that women who delivered at least 37 weeks gestation or an infant weighed less than 2500 g had significantly worse periodontal infection than control women. In another case-control study conducted by Dasanayake, women who delivered a full-term infant weighing less than 2500 grams were matched to women who delivered full term infants weighing more than 2500 grams. All women received a periodontal evaluation after delivery, and poor periodontal health was determined to be an independent risk factor for delivering a low-birth-weight infant.22 Two prospective cohort studies23,44 found that moderate to severe periodontitis identified early in pregnancy is associated with an increased risk for spontaneous preterm birth, independent of other traditional risk factors. In the first study, investigators from the University of Alabama conducted a prospective evaluation of over 1300 pregnant women. Complete medical, behavioral, and periodontal data were collected between 21 and 24 weeks gestation. Generalized periodontal infection was defined as 90 or more tooth sites with periodontal ligament attachment loss of 3 mm or more. The risk for preterm birth was increased among women with generalized periodontal infection; this risk was inversely related to gestational age. After adjusting for maternal age, race, tobacco use, and parity, this relationship remained. The adjusted odds ratio for a preterm birth < 37 weeks for those women who now had generalized periodontal disease was 4.5 (95% CI, 2.2-9.2). The adjusted odds ratio increased to 5.3 (95% CI, 2.1-13.6) for preterm birth < 35 weeks gestation, and to 7.1 (95% CI, 1.7-27.4) for preterm birth < 32 weeks gestation.33

In the second study, Offenbacher et al44 conducted a prospective study of obstetric outcomes of over 1000 women who received an antepartum and postpartum periodontal examination. Moderate to severe periodontal infection was defined as 15 or more tooth sites with pockets depth greater than or equal to 4 mm. The incidence of increased periodontal pocketing, defined as clinical disease progression, was determined by comparing site-specific probing measurements between the antepartum and postpartum examinations. Disease progres-
tion was considered present if 4 or more tooth sites had an increase in pocket depths by 2 mm or more, with the postpartum probing depth being 4 mm or greater. Compared to women with periodontal health, the relative risk for spontaneous preterm birth < 37 weeks gestation was significantly elevated for women with moderate-severe periodontal infection (adj RR 2.0, 95% CI, 1.2-3.2), adjusting for maternal age, race, parity, previous preterm birth, tobacco use, markers of socioeconomic status, and presence of chorioamnionitis. Periodontal disease progression was found to be an independent risk factor for delivery < 32 weeks gestation (adj RR 2.4, 95% 1.1-5.2). The data from these 2 studies are important given the relationship between maternal periodontal disease and very preterm birth (< 32 weeks gestation), and the significant neonatal morbidity and mortality associated with very preterm birth.44

Santos-Pereira et al studied 124 women between the ages of 15-40 to determine if chronic periodontitis increased the risk of experiencing preterm labor (PTL). In this cross-sectional trial, women who were admitted for preterm labor, with intravenous tocolysis, were enrolled into the PTL group. The control group consisted of term pregnancies that were admitted following the PTL mother. Periodontal examinations were performed within 36-48 hours after delivery and before discharge. Chronic periodontitis was described as one site with clinical attachment loss (CAL) > 1 mm with gingival bleeding. The severity of periodontitis was classified as early (CAL <3mm), moderate (CAL > 3 mm and < 5 mm), and severe (CAL >5mm). The extent of periodontitis was either localized, CAL < 30%, or generalized CAL > 30%. They concluded that chronic periodontitis increased the risk of having preterm labor (odds ratio of 4.7 (95% CI: 1.9-11.9)), preterm birth (odds ratio 4.9 (95% CI: 1.9-12.8)), and a low-birth-weight infant (OR 4.2(95% CI: 1.3-13.3)).45

Pitiphat et al conducted a prospective study to determine if self-reported periodontitis was a risk factor for poor pregnancy outcomes. Women who reported periodontitis had a significant increase in risk for those who reported having periodontitis and poor pregnancy outcomes (adj OR 2.2: 95%CI 1.05-4.85). The authors concluded that periodontitis is an independent risk factor for poor pregnancy outcomes. However, caution should be taken when interpreting these results due to the sample size and the indirect measurement of periodontitis.46

In yet another prospective cohort, Agueda et al enrolled over 1200 women to evaluate the association between periodontitis and preterm birth and/or low birth weight. All women were between the ages of 18-40 and were enrolled between 20-24 weeks gestation. Demographic data, socioeconomic status, and medical and obstetric history were collected. Full mouth periodontal examinations, (PD, CAL, BOP) were performed by a single calibrated examiner and recorded at 6 sites per tooth. Periodontal disease was defined as 4 or more teeth with one or more sites with PD >4mm and CAL >3mm at the same site.44 After adjusting for confounding variables, a significant association was found between preterm birth and periodontitis (Adj OR 1.7 95% CI: 1.08-2.88). However no significant association was found between low birth weight and periodontitis.47

While there are data suggesting a relationship between maternal periodontal infection and preterm birth,
several studies have failed to demonstrate such an association. In one of the largest studies to date, Moore et al examined the relationship between multiple periodontal parameters, including mean probing depths, percent of tooth sites with probing depths greater than or equal to 4 mm, percent of sites with bleeding on probing, and percent of sites with clinical attachment loss greater than or equal to either 2 or 3 mm. Moore found no difference in the periodontal parameters between women with preterm birth and without preterm birth. However, they did find a positive association between maternal periodontal infection and spontaneous abortion between 12 and 24 weeks (adj OR 2.5, 95% CI 1.2-5.4). In a case-control study, Budeneli and colleagues found no differences in periodontal infection between women who delivered preterm versus full term. However, women were at significantly increased risk for preterm birth if either P. gingivalis or C. rectus were found in the subgingival plaque.

In a more recent case-control study, Vettore et al recruited 542 postpartum women who were over 30 years old. The investigators sought to explore the relationship between periodontal disease and preterm low birth weight. Cases were divided into 3 groups: low birth weight (n = 96), preterm (n = 110), and preterm and low birth weight (n = 63). Cases were compared to controls who were non-preterm and non-low-birth-weight individuals (n = 393). Periodontal measurements were collected and later stratified into 15 definitions of periodontal disease for analysis. Other covariates were also recorded and used for analysis. The results of this study indicated that periodontal disease levels were higher in control individuals than in cases, and that the extent of periodontal disease did not increase risk of preterm low birth weight. They also showed that in the preterm low birth weight group that the mean pocket depth and the frequency of sites with CAL > 3 mm were lower than in the control group. It was concluded that periodontal disease was not more severe in women with preterm low-birth-weight babies.

Two recent meta-analyses of the association between maternal periodontal disease and preterm birth have been published. Vergnes et al examined 17 studies and reported a pooled estimate odds ratio for preterm birth.
of 2.83 (95% CI: 1.95-4.10, P < .0001). Xiong et al performed a systematic review and meta-analysis of 44 studies (26 case control, 13 cohort, and 5 controlled trials) to examine the relationship between maternal periodontal disease and adverse pregnancy outcome. The meta-analysis showed that maternal treatment of periodontal disease reduced the rate of preterm low birth weight infants as a group (pooled RR 0.53, 95% CI: 0.30-0.95, P< .05), but not preterm or low birth weight individually.

**Inconsistencies with Previous Studies**

While there are conflicting data regarding the association of periodontal diseases and adverse pregnancy outcomes, the reasons have yet to be identified. However, there are several differences and biases among the published data worth addressing. While the definitions of preterm birth, very preterm birth, low birth weight, small for gestational age, and other obstetric findings are well defined, no consensus has yet been achieved on the definition of periodontitis in periodontal research. A consensus on a definition is essential to optimize the interpretation, comparison, and validation of clinical data. With no universally agreed upon definition, any prior definitions may prove to be obsolete as we gain further information regarding the pathophysiology of the associations reported. Clinical markers of periodontal disease, such as gingival recession, clinical attachment loss, or bleeding on periodontal probing, may be late manifestations of the local infection, such that bacterial exposure may have already occurred with subsequent downstream deleterious effects. Recognition of the variation in clinical criteria used to define periodontal infection is important when critiquing the literature. In addition to the lack of a consistent clinical definition, several of the studies45,48,49 with no association between maternal periodontal disease and adverse pregnancy outcomes did not control for potential confounding variables. Another potential reason for the disparate findings among studies is the differences in populations studied. Most studies that showed an association between periodontal disease and adverse pregnancy outcomes have consistently been found in populations with a high incidence of preterm deliveries and within economically-challenged families. Quite the opposite is true for those studies that did not show an association. They were usually conducted in countries with universal health care and a lower incidence of preterm birth or low-birth-weight infants. Differential access to health care insurance, dental care, and prenatal care, may confound the relationship between maternal periodontal disease and adverse pregnancy outcome. Disparities in oral health may also be partially explained by racial differences in inflammatory and immune responses, as discussed previously (Table 1).

Another factor to consider when reviewing studies and synthesizing the results is the study design. The study design will influence the ability to reach a conclusion or determine causality. Case-control studies are limited in their experimental design because they cannot demonstrate causality. Prospective studies offer an advantage of studying the cause-effect relationship since the experiment can be designed and participants enrolled and followed over time with the outcome variable unknown at enrollment. Cohort studies involve 2 groups of people and compare a particular outcome of interest in groups that are alike in many ways but differ in some characteristics. Cross-sectional studies investigate a population at a point in time without regard to influencing factors that occurred prior to the study. The randomized clinical trial eliminates study bias by randomly assigning participants to the study groups. Neither the participant nor the researcher has any influence on which participant is assigned to each group. Random assignment to study groups prevents foreknowledge of study outcomes (Table 2).

Despite the controversy regarding the association between maternal periodontal infection and adverse pregnancy outcomes, several investigators have reported that periodontal treatment during pregnancy leads to a reduction in preterm birth risk. Lopez et al enrolled over 800 women in a randomized trial of periodontal treatment during pregnancy versus delayed treatment, and found almost a 5-fold reduction in preterm birth among women treated during pregnancy. In a pilot trial of periodontal treatment, Offenbacher et al found a trend toward reduced preterm birth among women treated during pregnancy compared with those who delayed therapy until postpartum. This study demonstrated that women who were treated during pregnancy had a significant improvement in oral health measures and a reduction in oral pathogen burden. The women treated during pregnancy showed an improvement in clinical markers of periodontal infection, with reduction in clinical attachment loss and reduction in bleeding on dental probing. In another randomized, intent to treat study, Taranum et al found that nonsurgical periodontal treatment during pregnancy reduced the risk of preterm births (p<0.001) and low birth weight (p<0.002). An inverse correlation existed between CAL and birth weight in the control group, which may suggest that higher CAL were associated with lower birth weights. There was also an inverse correlation between gestational age and periodontal characteristic in both groups. This may suggest that shorter gestational ages were associated with higher values among periodontal parameters. These data are encouraging, as most periodontal diseases are both preventable and treatable, and thus would be of significant public health interest in pregnancy if a cause-effect relationship with preterm birth can be demonstrated.

However, excitement over periodontal treatment to prevent preterm birth must be tempered in light of a recently published study on periodontal treatment during pregnancy. Michalowicz et al studied 814 women at 3 clinical facilities. Women were
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<td>Healthy PD: pocket depths &lt; 4mm, Mild PD: 1-15 tooth sites with pocket depths &gt; 4mm and BOP present, Severe PD: &gt;15 tooth sites with pocket depths &gt; 4mm and BOP present</td>
<td>52 women Cases: preeclampsia &lt; 34 weeks</td>
<td>Periodontal disease more prevalent among cases vs. controls (82% vs. 37%)</td>
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<td>Novak/2006 J Public Health Dent</td>
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<td>Periodontal disease (PD) was defined as one or more teeth with probing depth &gt; or = 4mm, loss of attachment &gt; or = 2 mm, and bleeding on probing</td>
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<td>Women with history of GDM twice as likely to have periodontal disease</td>
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<td>Xiong/2006 Am J Obstet Gynecol</td>
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<td>Periodontal disease (PD) was defined as one or more teeth with one or more sites with probing depth &gt; or = 4mm, loss of attachment &gt; or = 2mm, and bleeding on probing</td>
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<td>Cota/2006 J Periodontol</td>
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<td>588 women Cases: preeclampsia</td>
<td>Women with periodontal disease at 1.8-fold increased risk for preeclampsia</td>
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<td>Jarjoura/2005 Am J Obstet Gynecol</td>
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<td>US</td>
<td>Case-Control</td>
<td>Periodontal Health: no attachment loss or gingival inflammation, Gingivitis: gingival inflammation and no attachment loss, Mild periodontitis: 3-5 mm of attachment loss in any one sextant, Severe periodontitis: &gt;5 mm of attachment loss in any one sextant</td>
<td>103 women Cases: spontaneous PTB &lt; 32 weeks</td>
<td>Periodontal disease more common among cases vs. controls</td>
</tr>
<tr>
<td>Cankci/2004 Aust N Z J Obstet Gynecol</td>
<td>Turkey</td>
<td>Case-Control</td>
<td>The presence of four or more teeth with one or more sites with PD ≥ 4 mm that bled on probing, and with a clinical attachment loss ≥ 3 mm at the same site, was diagnosed as periodontal disease.</td>
<td>82 women Cases: preeclampsia</td>
<td>Periodontal disease associated with increased risk of preeclampsia, OR 3.5 (1.1-11.9)</td>
</tr>
<tr>
<td>Dasanayake/1998 Ann Periodontol</td>
<td>Thailand</td>
<td>Case-Control</td>
<td>Periodontal health was defined using CPITN and DMFT scores</td>
<td>100 women Cases: LBW</td>
<td>Periodontal disease associated with LBW, OR 3.0 (1.39 – 8.33)</td>
</tr>
<tr>
<td>Offenbacher/1996 J Periodontol</td>
<td>US</td>
<td>Case-Control</td>
<td>Extent of sites with clinical attachment level &gt; 2, 3 or 4 mm</td>
<td>124 women Cases: PTB/LBW</td>
<td>Periodontal disease associated with PTB/LBW, OR 7.5 (1.9-28.8)</td>
</tr>
<tr>
<td>Santo-Pereira/2007 J Clin Periodontol</td>
<td>Brazil</td>
<td>Cross-sectional</td>
<td>Periodotitis was classified as Early: CAL&lt;3mm, Moderate CAL &gt; 3mm and &lt;5mm, Severe CAL &gt; 5mm and as localized (CAL &lt; 30%) or generalized (CAL &gt;30%)</td>
<td>124 women Preterm labor defined as &lt; 37 weeks</td>
<td>Periodontal disease more prevalent in women with preterm vs. term labor (62% vs. 27%)</td>
</tr>
</tbody>
</table>

Table 1 continues on the following page
### Table 1 continued.

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Journal</th>
<th>Country</th>
<th>Study Design</th>
<th>Definition of Periodontal Disease</th>
<th>Summary</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Offenbacher/2006</td>
<td><em>Am J Obstet Gynecol</em></td>
<td>US</td>
<td>Prospective</td>
<td>Healthy PD: pocket depths &lt; 3mm without BOP; Mild PD: 1-15 sites with pocket depths &gt; 4mm or 1 or more sites with BOP; Moderate/Severe PD: 15 or more sites with pocket depths &gt; 4mm</td>
<td>1020 women received an antepartum and postpartum periodontal exam.</td>
<td>Women with periodontal disease at increased risk for PTB &lt; 32 weeks</td>
</tr>
<tr>
<td>Boggess/2005</td>
<td><em>Am J Obstet Gynecol</em></td>
<td>US</td>
<td>Prospective</td>
<td>Healthy PD: pocket depths &lt; 3mm without BOP; Mild PD: 1-15 sites with pocket depths &gt; 4mm or 1 or more sites with BOP; Moderate/Severe PD: 15 or more sites with pocket depths &gt; 4mm</td>
<td>640 Umbilical Cord Blood Samples</td>
<td>Fetal inflammation and immune response to oral pathogens increased preterm birth (PTB) risk</td>
</tr>
<tr>
<td>Pitiphat/2006</td>
<td><em>J Periodontol</em></td>
<td>US</td>
<td>Prospective</td>
<td>Self reported periodontitis validated by radiographs taken prior to pregnancy</td>
<td>101 Women</td>
<td>Periodontal disease may increase C-Reactive Protein levels during pregnancy</td>
</tr>
<tr>
<td>Boggess/2003</td>
<td><em>Obstet Gynecol</em></td>
<td>US</td>
<td>Prospective</td>
<td>Healthy PD: pocket depths &lt; 4mm; Mild PD: 1-15 tooth sites with pocket depths &gt; 4mm and BOP present; Severe PD: &gt;15 tooth sites with pocket depths &gt; 4mm and BOP present</td>
<td>850 women</td>
<td>Periodontal disease associated with preeclampsia, OR 2.4 (1.1-5.3)</td>
</tr>
<tr>
<td>Lopez/2002</td>
<td><em>J Dent Res</em></td>
<td>Chile</td>
<td>Prospective</td>
<td>Presence of 4 or more teeth showing one or more sites with probing depth 4 mm or higher, and with clinical attachment loss 3 mm or higher at the same site</td>
<td>639 women</td>
<td>Periodontal disease associated with PTB/LBW, RR 3.5(1.5-7.9)</td>
</tr>
<tr>
<td>Jeffcoat/2001</td>
<td><em>J Am Dent Assoc</em></td>
<td>US</td>
<td>Prospective</td>
<td>Periodontitis &gt; &gt; 3 sites with attachment loss of 3 mm or more; generalized periodontal disease 90 or more sites with attachment loss of 3 mm or more; Healthy Periodontium &lt;3 sites with 3 mm of attachment loss</td>
<td>1313 women</td>
<td>Periodontal disease associated with PTB, OR 4.5 (2.2-9.2)</td>
</tr>
<tr>
<td>Mitchell-Lewis/2001</td>
<td><em>Eur J Oral Sci</em></td>
<td>US</td>
<td>Prospective</td>
<td>Not defined</td>
<td>Prospective intervention study 164 women</td>
<td>Women with PTB had higher levels of oral pathogens in mouth; PTB rate less among treated women</td>
</tr>
<tr>
<td>Lopez/2005</td>
<td><em>J Periodontol</em></td>
<td>Chile</td>
<td>Randomized</td>
<td>Gingival inflammation with &gt; 25%of sites with bleeding on probing, and no sites with clinical attachment loss &gt;2 mm</td>
<td>Randomized clinical trial of periodontal treatment among women 870 with gingivitis</td>
<td>Treatment significantly reduced PTB/LBW (6% among untreated vs. 2% treated)</td>
</tr>
<tr>
<td>Lopez/2002</td>
<td><em>J Periodontol</em></td>
<td>Chile</td>
<td>Randomized</td>
<td>Periodontal disease- &gt; 4 teeth with pocket depths &gt; 4mm and CAL&gt; 3mm at the same site</td>
<td>Randomized clinical trial of antepartum vs. delay periodontal treatment to reduce PTB 400 women</td>
<td>Periodontitis was a risk factor for PTB/LBW and therapy reduced the rates of PTB/LBW</td>
</tr>
</tbody>
</table>
randomized to scaling and root planing (SCRP) during before 21 weeks gestational age (treatment group) or after delivery (control group). Women in both groups, who experienced progressive periodontal disease defined as an increase of 3mm or more in clinical attachment loss, received SCRP in those areas. The study found no reduction in preterm births < 37 weeks gestation among women in the treatment group. On closer examination, there were almost twice as many deliveries that occurred before 32 weeks gestation among women in the control group (n=18) compared to women who were treated (n=10) during pregnancy. While not statistically significant, this is suggestive evidence that periodontal disease treatment might benefit those women at risk for the earliest and most morbid preterm births.

The data on the role of maternal periodontal infection and other adverse pregnancy outcomes are even less clear. Evidence suggests a role for inflammation and endothelial activation in the pathophysiology of preeclampsia; periodontal infection is one of many potential stimuli for these host responses. A 2-fold increased risk for preeclampsia was found among women with periodontal infection diagnosed at delivery. Others have also reported an association between maternal periodontal infection and preeclampsia. In a recent case-control study, Contreras et al found that women with preeclampsia were twice as likely to have chronic periodontitis. Also, preeclamptic women were more likely to have Porphyromonas gingivalis, Tannerella forsythensis, and Eikenella corrodens, known periodontal pathogens, compared to normotensive women. However, several other investigators have been unable to confirm an association between maternal periodontal infection and preeclampsia. The conflicting results have yet to be resolved. While other less common adverse pregnancy outcomes (eg, diabetes, small-for-gestational-age birth weight, miscarriage) may also be associated with maternal periodontal infection, data are currently too sparse to draw definitive conclusions regarding these associations and the potential benefits of treatment during pregnancy (Table 1).

<table>
<thead>
<tr>
<th>Author/Year Journal</th>
<th>Country</th>
<th>Study Design</th>
<th>Definition of Periodontal Disease</th>
<th>Summary</th>
<th>Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bassani/2007 J Clin Periodontol</td>
<td>Brazil</td>
<td>Case-Control</td>
<td>Mild PD: &gt; 3 sites in 3 or more teeth with CAL of &gt; 3 mm and &lt;5 mm Moderate PD: &gt; 3 sites in 3 or more teeth with CAL of &gt; 5 mm and &lt;7 mm Severe PD: &gt; 3 sites in 3 or more teeth with CAL of &gt; 7 mm</td>
<td>915 women Cases defined as LBW or stillbirth &gt; 28 weeks or &gt; 1000 gm</td>
<td>Similar rate of periodontal disease among cases and controls</td>
</tr>
<tr>
<td>Moore/2005 J Clin Periodontol</td>
<td>UK</td>
<td>Case-Control</td>
<td>Not defined However, only 2 sites per tooth were evaluated for PD</td>
<td>154 women Cases: periodontal disease</td>
<td>No association between periodontal disease and pregnancy outcome</td>
</tr>
<tr>
<td>Buduneli/2005 J Clin Periodontol</td>
<td>Turkey</td>
<td>Case-Control</td>
<td>Not specified</td>
<td>181 women Cases: PTB/LBW</td>
<td>No difference in periodontal disease between cases and controls</td>
</tr>
<tr>
<td>Davenport/2002 J Dent Res</td>
<td>UK</td>
<td>Case-Control</td>
<td>Severe periodontal disease defined as CPITN score 4</td>
<td>743 women</td>
<td>Similar PTB rate among cases and controls</td>
</tr>
<tr>
<td>Holbrook/2004 Acta Odontol Scand</td>
<td>Iceland</td>
<td>Prospective</td>
<td>At least probing depth &gt; 4mm</td>
<td>96 women</td>
<td>No association between periodontal disease and PTB</td>
</tr>
<tr>
<td>Moore/2004 Br Dent J</td>
<td>UK</td>
<td>Prospective</td>
<td>Not specified in this article or the article it refers to for more details. However, only two sites per tooth evaluated</td>
<td>3738 women</td>
<td>No association between periodontal disease and PTB/LBW; periodontal disease association with miscarriage or stillbirth, OR 2.5 (1.2-5.4)</td>
</tr>
<tr>
<td>Michalowicz/2006 New Engl J Med</td>
<td>US</td>
<td>Randomized Clinical Trial Intervention Study</td>
<td>&gt; 4 teeth with a probing depth of at least 4 mm and a CAL of at least 2 mm and at least 35% BOP</td>
<td>Randomized clinical trial of antepartum vs. delayed periodontal treatment to reduce PTB</td>
<td>Similar preterm birth rate among treated and delayed groups</td>
</tr>
</tbody>
</table>

*GDM-gestational diabetes*
Implications for Dental Hygiene Assessment, Diagnosis, and Treatment

Periodontal diseases are silent infections that have periods of exacerbation and quiescence that often go undiagnosed until irreparable damage occurs to the teeth and oral structures. Maintaining good oral hygiene before and during pregnancy is crucial for preventing gingivitis and periodontitis. Prevention and treatment of periodontal infection is aimed at controlling the bacterial biofilm, arresting progressive infection, and restoring lost tooth support. Dental professionals can facilitate this level of oral health through assessment, education, and proper treatment planning. 

Verifying the hormonal status and other risk factors for periodontal diseases and poor pregnancy outcomes of women during the medical history process will enable the provider to customize the treatment plan and oral hygiene instructions. Behavioral interventions such as smoking cessation, exercise, healthy diet, and maintenance of optimal weight are also useful preventive measures against periodontal dis-
Periodontal diseases are silent infections that have periods of exacerbation and quiescence that often go undiagnosed until irreparable damage occurs to the teeth and oral structures.
Due to the reluctance of some dental professionals to provide dental care during pregnancy, the state of New York established guidelines to address this problem. This comprehensive report recommends that oral health care should be coordinated among prenatal and oral health care providers. Communication between the dental community and the medical community is a necessity and a consultation form was developed to help facilitate this process (Figure 1). The New York guidelines suggest and recommend that dental treatment be provided during pregnancy, including the first trimester. However, early in the second trimester (14-20 weeks gestation) is the most favorable time to perform dental procedures. During this gestational age there is no threat of teratogenicity, nausea and vomiting have usually subsided, and the uterus is below the umbilicus, providing more comfort to the mother. Unrestored carious lesions should be restored as soon as possible as some pregnant women require general anesthesia with intubation at delivery. Some physicians are hesitant to intubate due to the increased risk of airway obstruction due to the decreased integrity of decayed teeth that could break off. If treatment is provided in the last trimester, care should be taken to prevent suppression of the inferior vena cava by keeping the woman in an upright position. Ultimately all health care providers should advise women that maintaining good oral health during pregnancy is not only safe but necessary to reduce the risk of infection to the mother and possibly the fetus.

While it remains inconclusive whether maternal periodontal treatment improves pregnancy outcome, it is clear that treatment of varying degrees of clinical periodontal disease during pregnancy is safe and improves maternal oral health. In several studies of periodontal treatment during pregnancy, oral health parameters improved following therapy. All dental services should be available to pregnant women; however, studies have shown that some treatments are best provided only during certain gestational ages (Table 3). Despite the benefit of treatment, periodontal infection in women of childbearing age remains highly prevalent, particularly among low-income women and members of racial and ethnic minority groups. Regrettably, some subgroups of women who lack access to dental care will likely miss out on dental care during pregnancy. Oral health care professionals must help bridge this gap.

Dentists and dental hygienists must actively participate in providing treatment to pregnant women to help maintain maternal health. Knowledge of research studies (Table 1) and published guidelines can help eliminate the timidity that prevails in the dental community regarding providing dental care to pregnant women. In fact, the dental community must embrace this shift in practice guidelines. By embracing the changes, better overall health care can be provided to all women, especially those of child bearing age.

### Oral Health Knowledge in the Medical Community

To provide better oral health care, more knowledge needs to be made available to the medical community. Few studies have tried to determine if the medical community has the knowledge to help educate patients about the importance of better oral care. Siriphant et al conducted focus groups with nurse practitioners (NP) in Maryland to determine the level of knowledge regarding oral cancer. They found nurse practitioners in Maryland did not recognize oral cancer as a health problem and that the main barrier for performing oral cancer screening was a lack of knowledge. In another survey of nurse practitioners, it was established that few recognized the signs of early oral cancer. NPs who reported attending a continuing education course on oral cancer within the last 2-5 years were 3.1 times more likely to have more knowledge regarding the risk factors for oral cancer and 2.9 times more likely to have more knowledge regarding risk factors and diagnostic procedures for oral cancer.

Only a few studies have been reported in the literature that assess medical and nursing professionals’ knowledge about periodontal disease and adverse pregnancy outcomes. Wilder et al surveyed practicing obstetricians in 5 counties in North Carolina to assess their knowledge of periodontal disease and to determine their practice behaviors regarding oral disease and adverse pregnancy outcomes. While 94% of those surveyed could correctly identify bacteria as a cause of periodontitis, only 22% looked in a patient’s mouth at an initial visit. And while most (84%) considered periodontal disease a risk factor for adverse pregnancy outcomes, 49% rarely or never recommended a dental visit during pregnancy. In a recent study conducted in North Carolina, 504 nurse practitioners, physician assistants and certified nurse midwives were surveyed. The survey assessed the knowledge, behavior, and opinions about periodontal disease and its relationship to adverse pregnancy outcomes. Forty eight percent responded (n=204). Of those respondents, 63% reported looking in the patient’s mouth to screen for oral problems at the initial visit. Twenty percent felt that their knowledge of periodontal disease was current, and all agreed that their discipline should receive instruction regarding periodontal disease. Ninety-five percent felt that a collaborative effort between the health care provider and the oral health care professionals was needed and would reduce the patient’s risk of having an adverse pregnancy outcome. It is clear from the lack of studies available regarding oral health knowledge in the medical community that further studies are needed. One limitation to the future of oral health care is the lack of knowledge regarding oral care in the medical community. More education is needed within the medical community to help achieve better oral health care.
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 A NY State guidelines

Figure 1. Consultation Form for Pregnant Women to Receive Oral Health Care
NY State Oral Health Care during Pregnancy and Early Childhood Practice Guidelines
In a recent issue of the *American Journal of Maternal Child Nursing*, nurses were called to “action” to help facilitate better access to oral health care. Based on the surgeon general’s report and the National Call to Action to Promote Oral Health, these authors suggested that nurses need to partner with other key stakeholders to prevent oral disease. The nurses were called to provide, promote, and protect women by increasing their knowledge, attitudes, awareness, and skills regarding oral health. By collaborating with other health professionals’ access to oral health care can be improved.

Providing oral health education in medical and nursing curricula might be one way to begin this process. A reported oral health curriculum at the University of Washington’s medical school is reporting some success.

In addition, the New York University Dental School is collaborating with the NYU School of Nursing to provide care to patients. This is a fundamental step in providing collaborative treatment to patients across many disciplines. Oral health care professionals can take the lead in educating other providers about the importance of oral health and what should be taught to pregnant women.

### Table 3. Dental Procedures and Pregnancy

<table>
<thead>
<tr>
<th>Dental Procedure</th>
<th>Safe in Pregnancy</th>
<th>Rationale and recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prophylaxis</td>
<td>Yes</td>
<td>Dental cleanings are safe during pregnancy.</td>
</tr>
<tr>
<td>Scaling and Root Planing</td>
<td></td>
<td>Studies suggest the best gestational age for SCR&amp;P is between 14-20 weeks gestational age.</td>
</tr>
<tr>
<td>Dental Radiographs</td>
<td>Yes</td>
<td>Radiographs are safe during pregnancy. A full mouth series with 20 radiographs is estimated to deliver &lt;1mrem. During pregnancy the mother typically receives about 75mrem from naturally occurring radiation. The benefits of radiographs outweigh any negligible risks. (Matteson et al 1991 MCN; ADA 2004)</td>
</tr>
<tr>
<td>Restorations</td>
<td>Yes</td>
<td>Replacement of old amalgams should be completed using a rubber dam and high speed suction. (NY State Dept. of Public Health)</td>
</tr>
<tr>
<td>Emergency Dental Treatment</td>
<td>Yes</td>
<td>Removal of an infection or bacterial load will not only help the mother but possibly the fetus.</td>
</tr>
<tr>
<td>Local Anesthetics Category B</td>
<td>Yes</td>
<td>Category B anesthetics (including lidocaine with epinephrine and prilocaine)</td>
</tr>
<tr>
<td>Local Anesthetics Category C</td>
<td>No</td>
<td>Mepivacaine and bupivacaine</td>
</tr>
<tr>
<td>Analgesics for Pain Category B</td>
<td>Yes</td>
<td>Acetaminophen, meperidine, morphine; do not exceed recommended doses</td>
</tr>
</tbody>
</table>
| Analgesics for Pain Category C                          | With Caution      | Codeine, hydrocodone may be used with caution  
* Ibuprofen and Naprosyn should only be used in the first trimester and only for 72 hours or less |
| Antibiotic Prophylaxis for Infective endocarditis       | Yes               | For those who meet the AHA guidelines for antibiotic prophylaxis.  
Primary prophylaxis is 2gms of amoxicillin 1 hour prior to treatment  
For those allergic to penicillin one of the following regimens can be given one hour prior to treatment  
Cephalexin 2gm OR  
Clindamycin 600mg OR  
Azithromycin or clarithromycin 500 mg |
| Nitrous Oxide                                           | With caution      | Only use when topical or local are inadequate and only after approval from the obstetrician. Precautions should be taken to avoid hypoxia, hypotension, and aspiration. Lower levels may achieve sedation for a pregnant patient. (NY State 2006; FDA Guidelines for drugs in pregnancy) |

Future Projections in Care of Pregnant Patients

Amid the evidence that preventive and restorative dental services are beneficial for oral health and can help or modify systemic diseases, some insurance companies have begun to pay for expanded dental services. Insurance companies found that the cost of providing expanded dental services for some of its members decreases the amount spent on medical treatment. Based on this information, many companies have begun to offer additional dental benefits for those who have the most to gain such as pregnant women and patients with cardiovascular disease. While the literature is not clear on the association of periodontal disease and its effect on birth outcomes, it is clear the treating periodontal disease during pregnancy is beneficial for the mother and may be beneficial for the fetus. As part of these expanded services, Cigna, Delta Dental, United Health Care, and others have increased their dental benefits to include additional dental cleanings, including scaling and root planing as indicated for pregnant women. This represents a shift in the insurance industry that is beneficial to both the company and its members.

Some state governments have answered the call to promote better oral health care by providing dental benefits to those who typically have none. In 2004, the Minnesota Department of Health partnered with the Minnesota Board of Dentistry and Minnesota Department of Human Services to make available resources and programs aimed at providing better access to dental care. This was accomplished by providing critical access dental provider designations, expanded authorization for dental hygienists and expanded duties for dental auxiliaries, a dental practice donation program, providing licensure of foreign trained dentists and retired dentists, and establishing a dentist loan-forgiveness program. In 2003, the Utah Department of Health (UDH) launched a program that served as a pilot study, which enabled pregnant women on Medicaid to receive dental examinations, treatment of decayed teeth, and a prophylaxis. UDH followed this up by expanding dental benefits available to Utah’s pregnant Medicaid population. These women now have access to receive free dental check-ups, including x-rays, dental prophylaxis, restorations, root canals, and emergency treatment. As states and companies continue to expand their dental services provided for pregnant women, the overall health benefit will become apparent.

Future Directions for Research and Education

Future directions of oral health research should target oral health care before, during and after pregnancy. Studies that utilize the Centers for Disease Control’s Pregnancy Risk Assessment Monitoring System (PRAMS) report that only 23%-43% of pregnant women receive dental care during pregnancy, a rate which is only one-half to two-thirds the overall use of dental services among US women. In addition, data explaining the racial/ethnic disparities in oral health among pregnant women are lacking. Pregnant women’s perceptions of oral health, and the barriers and motivations to their seeking dental care, must be assessed to adequately introduce preventive information on oral health into their prenatal care, which is one of the first steps in reducing health disparities.

Further studies are needed to better understand the mechanism of periodontal disease-associated preterm birth and to tailor treatment to those women who might benefit the most. Confirmation of periodontal infection as an independent risk factor for adverse pregnancy outcomes and identification of those at greatest risk would be of significant public health importance because periodontal infection is both preventable and curable. At present, however, there is insufficient evidence for health care policy recommendations to provide maternal periodontal treatments for the purpose of reducing the risk of adverse pregnancy outcome regardless of its other benefits.

Further educational opportunities need to be provided for allied health professionals and the medical community to help alleviate the problems with access to dental care. Relationships between professional schools need to be forged so that cross-educational opportunities can be provided to all disciplines. Training and education should be expanded to prepare dental hygienists to partner with physicians and nurse practitioners to provide a minimum level of care for those who have no access to dental care. These services could include an oral screening, oral hygiene instructions, toothbrush prophylaxis, referrals if needed, application of fluoride, and nutritional counseling. The dental community could partner with the medical community to provide dental and medical services within the same office, providing better access to care.

Given the relationship between maternal and infant oral health and periodontal infection and general
health and well-being, oral health care should be a goal in its own right for all individuals, including reproductive-aged and pregnant women. There is no evidence to suggest that dental examination or treatment is deleterious to the pregnant woman or her developing fetus. Infective endocarditis prophylaxis is recommended for all dental procedures for those individuals at high risk for infective endocarditis. Pregnant women who meet American Heart Association guidelines for infective endocarditis prophylaxis and undergo these dental procedures should be treated similar to nonpregnant individuals.

Regardless of the potential for improved oral health to improve pregnancy outcomes, public policies that support comprehensive dental services for vulnerable women of child-bearing age should be expanded so that their oral and general health is safeguarded, and the morbidity of childhood caries reduced. Mechanisms to educate women and their health care providers about the importance of oral health need to be in place, and improvement in the access to care for all must occur if oral health interventions are to make an important impact on pregnancy outcomes.

Conclusion

The importance of providing oral health care for pregnant women cannot be disputed. Data suggest that maternal oral health impacts pregnancy health; further research on the causal nature of this association is ongoing to determine if there is a relationship. Current guidelines and data suggest that dental care during pregnancy is safe. However, scaling and root planing is best accomplished between 14-20 weeks gestational age. Providing dental care for pregnant women will help remove potentially harmful bacteria from dissemination and possibly leading to other complications. As oral health care providers we can educate our patients regarding the importance of oral health and on important preventive measures to maintain oral health.

References

Additional References

Web sites
American Dental Hygienists’ Association  
www.adha.org
National Institutes of Health  
www.nih.gov
National Institute of Dental and Craniofacial Research  
www.nidcr.nih.gov
Centers for Disease Control and Prevention  
www.cdc.gov
American Dental Association  
www.ada.org
American Academy of Periodontology  
www.perio.org
NY State Oral Health Care during Pregnancy and Early Childhood Practice Guidelines  
www.health.state.ny.us/publications/0824/pda/windows_mobile/0824.pdf
www.nidcr.nih.gov/AboutNIDRR/Surgeon General/ExecutiveSummary.htm
American Pregnancy Association  
www.americanpregnancy.org
Academy of General Dentistry  
www.agd.org
Healthy People 2010: Section 21, Oral Health  
Oral Health America  
www.oralhealthamerica.org
Maternal and Child Health Library: Knowledge Path – Oral Health and Children and Adolescents  
www.mchlibrary.info/KnowledgePaths/kp_oralhealth.html
Children's Dental Health Project  
www.cdhp.org

Brochures
Dental Care for Your Baby  
American Academy of Pediatric Dentistry  
www.aapd.org/publications/brochures/babycare.asp
A Healthy Mouth for Your Baby  
National Institutes of Health  
www.nidcr.nih.gov/HealthInformation/DiseasesAndConditions/ChildrensOralHealth/Healthy-Mouth/default.htm
Philips Sonicare FlexCare

Clinically proven to remove more interproximal and overall plaque biofilm than Oral-B Triumph1 and Sonicare Elite2

Gentle on dentin3

Personalised care settings

Vibration-cancelling system for 80% less vibration4

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Clinically proven to significantly improve gum health in only 2 weeks5

Simplicity is more than a brush, it’s superior oral health.

Introducing FlexCare. Our most advanced sonic technology combined with the ProResults brush head makes brushing even more effective for you and your patients.

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www.sonicare.com

1In vitro study
2Compared with Oral-B Triumph
3Compared with Sonicare Elite