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Oral Health in Pregnancy

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ABSTRACT

Oral health is crucial to overall health. Because of normal physiologic changes, pregnancy is a time of particular vulnerability in terms of oral health. Pregnant women and their providers need more knowledge about the many changes that occur in the oral cavity during pregnancy. In this article we describe the importance of the recognition, prevention, and treatment of oral health problems in pregnant women. We offer educational strategies that integrate interprofessional oral health competencies.

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In the last decade, the importance of oral health during pregnancy has garnered the attention of policymakers, foundations, agencies, and health care providers who serve pregnant women and young children. The U.S. Surgeon General (U.S. Department of Health and Human Services, 2000), World Health Organization (Petersen, 2008), and American College of Obstetricians and Gynecologists (American College of Obstetricians and Gynecologists Women's Health Care Physicians & Committee on Health Care for Underserved Women, 2013) have all recognized that oral health is an integral part of preventive health care for pregnant women and their newborns. Three Institute of Medicine reports (2011, 2013; Institute of Medicine & National Research Council, 2011) highlighted the significance of addressing oral health as a population health issue for pregnant women. In 2012, the Oral Health Care During Pregnancy Expert Workgroup highlighted the importance of the provision of oral health care to pregnant women in their landmark document, *Oral Health During Pregnancy: A National Consensus Statement.* The U.S. Department of Health and Human Services, Health Resources and Services Administration (HRSA) released *Integration of Oral Health and Primary Care Practice* (2014), which outlines interprofessional oral health core clinical competencies appropriate for primary care providers including nurse practitioners (NPs), nurse-midwives (NMs), medical doctors (MDs), doctors of osteopathic medicine (DOs), and physician assistants (PAs).

During pregnancy, many changes occur in the oral cavity that can be linked to periodontal disease, which includes gingivitis and periodontitis. Studies have indicated that there is a connection between "increased plasma levels of pregnancy hormones and a decline in periodontal health status" (Wu, Chen, & Jiang, 2015, p. 8). Approximately 60% to 75% of pregnant women have gingivitis (American Dental Association Council on Access, Prevention, and Interprofessional Relations, 2006). Although various numbers have been reported for the prevalence of periodontitis in pregnancy, almost half of adults in the United States have this condition (Eke, Dye, Wei, Thornton-Evans, & Genco, 2012).

During pregnancy, a woman's oral health can affect her health and the health of her unborn child. The purpose of this article is to present information on the importance of women's health care providers in the recognition, prevention, and management of oral health problems during pregnancy. Strategies that integrate interprofessional oral health competencies into women's health care provider education and practice are provided.

Periodontal Disease in Pregnancy

Periodontal disease, including gingivitis and periodontitis, has been associated with pregnancy (Wu et al., 2015). According to the American Academy of Periodontology, *periodontal disease* is "an inflammatory disease that affects

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Lack of oral health care during pregnancy can negatively affect mother and newborn.

the soft and hard structures that support the teeth" (n.d., "The Causes and Symptoms," para. 2). *Gingivitis*, the early stage of periodontal disease, occurs when "the gums become swollen and red due to inflammation," and *periodontitis,* the most serious form of periodontal disease, occurs when the "gums pull away from the tooth and supporting gum tissues are destroyed" (American Academy of Periodontology, n.d., "The Causes and Symptoms," para. 2).

Gingivitis

Figuero, Carrillo-de-Albornoz, Martín, Tobías, and Herrera (2013) reported in their systematic review that the relationship between pregnancy and gingivitis confirmed "the existence of a significant increase in gingivitis throughout pregnancy and between pregnant versus post-partum or non pregnant women" (p. 457). Ehlers, Callaway, Hortig, Kasaj, and Willershausen (2013) compared the dental evaluation and gingival crevicular fluid from 40 pregnant women and 40 age-matched nonpregnant control subjects. They found that 80% of pregnant women had gingival inflammation compared with 40% of control subjects. Gogeneni et al. (2015) reported that pregnant women with gingivitis and pregnant women with gingivitis and gestational diabetes mellitus (GDM) had high levels of systemic C-reactive protein. These findings indicate that gingivitis is a problem in pregnant women.

Periodontitis

Recent studies have shown an association between periodontitis during pregnancy and low birth weight (LBW), very low birth weight (VLBW), preeclampsia, and GDM (Corbella et al., 2016; Guimarães et al., 2012; Ha, Jun, Ko, Paik, & Bae, 2014; Xiong et al., 2009). Guimarães et al. (2012) showed in their cross-sectional study of 1,206 postpartum women that "maternal periodontitis was associated with a decrease in mean birth weight, as well as LBW and VLBW" (p. 1024). Corbella et al. (2016) conducted a meta-analysis of studies in which researchers controlled for periodontitis as a risk factor associated with negative pregnancy outcomes. They chose 22 out of 422 studies, which included 17,053 subjects. They found that there was an association between periodontitis and negative consequences in pregnancy; however, this association was weak (Corbella et al., 2016).

Xiong et al. (2009) found that periodontitis was associated with GDM (77.4% of pregnant women with GDM had periodontis) with an adjusted odds ratio of 2.6 and a confidence interval of 95% in their case-control study of 53 pregnant women with GDM and 106 without GDM. Ha et al. (2014) found "a significant relationship between periodontitis and preeclampsia in never smokers" (p. 869) in their prospective cohort study of 283 pregnant women who had never smoked, 67 with periodontitis and 216 without periodontitis.

Although these studies did not show conclusive evidence of the link between periodontal disease and negative pregnancy outcomes, periodontal treatment is safe for pregnant women, avoids the adverse consequences of periodontitis (e.g., pain, tooth loss) for the mother, and is not associated with any negative infant or maternal outcomes (Wrzosek & Einarson, 2009).

Access to Care

Access to dental care is reported to be related to multiple factors and situations that may be concurrent. Examples of these factors and situations include the following: (a) race/ethnicity (Azofeifa, Yeung, Alverson, & Beltrán-Aguilar, 2014; Hwang, Smith, McCormick, & Barfield, 2011), (b) age and income level (Azofeifa et al., 2014), (c) personal stressors (Le, Riedy, Weinstein, & Milgrom, 2009), (d) lack of education (Azofeifa et al., 2014), (e) lack of perceived need (Marchi, Fisher-Owens, Weintraub, Yu, & Braveman, 2010), (f) insurance coverage (Cigna Corporation, 2015), and (g) sociodemographic differences (Azofeifa et al., 2014; Hwang et al., 2011).

Hwang et al. (2011) analyzed Pregnancy Risk Assessment Monitoring System data from 2004 through 2006 and found significant disparities in race and ethnicity in the oral health experiences of pregnant women. Black non-Hispanic and Hispanic women were significantly less likely to receive dental care during pregnancy than White non-Hispanic women. Through their use of data from the 1999 through 2004 National Health and Nutrition Examination Survey, Azofeifa et al. (2014) showed significant sociodemographic disparities in dental service use and self-reported oral health among U.S. women in general and between pregnant and nonpregnant women. The probability of having a dental visit within the year

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significantly increased as the pregnant woman's age, education, and income increased.

There is evidence that a high percentage of pregnant women do not visit a dentist. For example, the Cigna Corporation (2015) recently conducted a national survey of 801 pregnant women, only half of whom had dental insurance. They found that although 76% of pregnant women reported that they had a dental problem, only 57% reported a dental visit during pregnancy. Those with dental insurance were twice as likely to visit the dentist.

Le et al. (2009) and Marchi et al. (2010) studied why women did not access dental care during pregnancy. Le et al. conducted a telephone interview with 51 randomly selected pregnant women who participated in an Oregon oral health pilot study. They reported that both personal stressors (e.g., financial, employment, and domestic) and dental care issues (e.g., time, cost, attitudes of dental providers, and comprehension of importance of oral health) were some of the barriers that prevented pregnant women from accessing dental care during pregnancy. Marchi et al. (2010) used a population-based survey of over 21,000 pregnant patients and found that the primary reason the women did not access dental care was because of lack of perceived need and that the second most common reason was financial barriers. In a study conducted by Morgan, Crall, Goldenberg, and Schulkin (2009), 77% of obstetrician-gynecologists reported that their patients had been refused dental services because of pregnancy.

Unfortunately, dental care is not a mandated essential for adults in the Patient Protection and Affordable Care Act (2010). Many women do not have a dental benefit with their public or private health plans. Although many states provide a Medicaid dental benefit during pregnancy (National Health Law Program, 2012), these benefits may end when the woman gives birth or shortly thereafter, so timely oral assessment by health professionals and the facilitation of access to appropriate dental care is a priority. Furthermore, access to dental care during pregnancy remains limited because only 32% of the 193,300 U.S. dentists in 2011 reported that they accepted Medicaid (Medicaid-CHIP State Dental Association, n.d.). These findings on access to care highlight the need to improve education in oral health and access for U.S. women of childbearing age.

Health care providers lack information on the oral health care needs of pregnant women.

Oral Health Practice Behavior of Women's Health Care Providers

Many health professionals are aware of the importance of oral health, but often they do not address it as part of their provision of preconception, prenatal, or well woman care (Hashim & Akbar, 2014; Morgan et al., 2009). Hashim and Akbar found that 95.4% of gynecologists surveyed had knowledge about the association between oral health and pregnancy and that 85.2% recommended dental visits for their patients. However, they also found that many gynecologists mistakenly believed that dental x-ray imaging (73%) and local dental anesthesia (59.3%) were unsafe. Similarly, Morgan et al. found that 84% of obstetrician-gynecologists were aware of the importance of oral health in pregnancy but that 54% did not ask about oral health issues and 69% did not provide information on oral health. Furthermore, only 62% recommended dental visits for their patients. In a summary of its survey of pregnant patients, Cigna Corporation (2015) reported that "only 44% of women surveyed say their doctor talked to them about oral health during their pregnancy visits" (p. 2). Many dentists are unwilling to see pregnant patients because of liability concerns, yet they may face more liability from not treating pregnant patients than from treating them (National Maternal and Child Oral Health Policy Center, 2012). This suggests that dentists may still lack knowledge about the oral–systemic connection.

Essential Oral Health Competencies

Women and their health care providers, including dentists, need more knowledge and clarification about the safety of dental treatments during pregnancy. Dental care during pregnancy is safe, and there are appropriate guidelines for the treatment of pregnant patients (Oral Health Care During Pregnancy Expert Workgroup, 2012). Dental visits can take place during any trimester and, if urgent, should never be delayed (Silk, Douglass, Douglass, & Silk, 2008). The risk of radiation exposure is extremely low when lead aprons are used during dental x-ray imaging (Kurien et al., 2013). The most common medications and anesthetics prescribed by dentists are in U.S. Food and Drug Administration Category B,

and these drugs have not been found to be a risk to the fetus (Oral Health Care During Pregnancy Expert Workgroup, 2012; Silk, Douglass, & Douglass, 2012).

The perinatal period offers a teachable moment for oral health care and can potentially have an effect on maternal and infant health (American College of Obstetricians and Gynecologists Women's Health Care Physicians, Committee on Health Care for Underserved Women, 2013; California Dental Association Foundation & American College of Obstetricians and Gynecologists, District IX, 2010). The 2013 Committee Opinion from the American College of Obstetricians and Gynecologists recommends that all health care providers assess oral health at the first prenatal visit (American College of Obstetricians and Gynecologists Women's Health Care Physicians, Committee on Health Care for Underserved Women, 2013). Subsequent prenatal visits provide numerous opportunities to implement oral health promotion interventions, including anticipatory guidance and referrals for dental care. Women's health care providers can incorporate oral–systemic health into all patient encounters from preconception counseling through prenatal and postpartum anticipatory guidance by transitioning the traditional HEENT (i.e., head, eyes, ears, nose, and throat) examination to the HEENOT (i.e., head, eyes, ears, nose, oral cavity, and throat) examination (Haber et al., 2015). The four essential questions to include in an oral history are presented in Table 1. Hummel, Phillips, Holt, and Hayes (2015) introduced the Oral Health Delivery Framework (see Figure 1) that guides the integration of the HEENOT (Haber et al., 2015) approach into the history, physical examination, and treatment plan.

Table 1: Oral Health History From Smiles for Life Prenatal Oral Health Pocket Card

Questions
1. Do you brush twice a day and floss daily?
2. Do you have a dentist, dental insurance?
3. Have you seen the dentist in the past 6 months for a regular check-up and cleaning?
4. Do you need any dental treatment completed?

Note. Adapted from "Prenatal Oral Health Pocket Card," by H. Silk, A. Douglass, & J. Douglass, 2012, *Smiles for Life: A National Oral Health Curriculum*. Copyright 2012 by Smiles for Life. Adapted with permission.

Although many health care providers may voice concern over the amount of time involved, an oral examination typically takes 1 minute to perform. During the physical examination, the provider examines the lips, mucous membranes, teeth, gums, and tongue. A plan of care, which includes education for prevention of oral health problems, maintenance of good oral health, and referral for any oral health problems is integral to the provision of whole-person care. Prevention includes information about oral hygiene, such as regular brushing twice a day and flossing daily. Women who experience vomiting should be instructed to rinse afterward with a solution of baking soda to prevent erosion of tooth enamel (Silk et al., 2008). Mothers need to know that *Streptococcus mutans,* the bacteria associated with dental caries, can be transmitted to the child, infect the child's teeth, and increase the risk for early childhood caries (Berkowitz, 2006; California Dental Association Foundation & American College of Obstetricians and Gynecologists, District IX, 2010). In a population-based study, Weintraub, Prakash, Shain, Laccabue, and Gansky (2010) showed that the odds of children

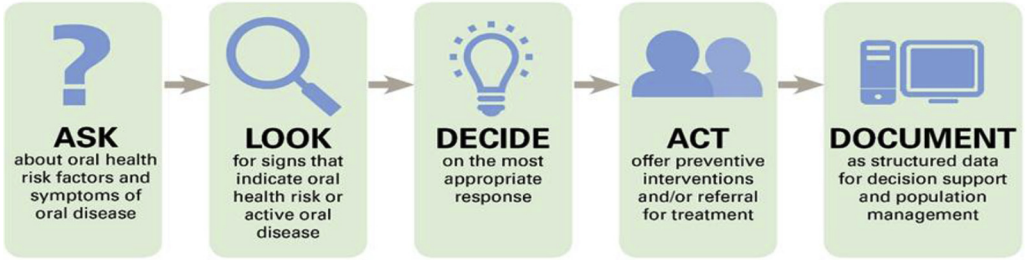

Figure 1. Oral Health Delivery Framework. Reprinted from "Oral Health: An Essential Component of Primary Care," by J. Hummel, K. E. Phillips, B. Holt, & C. Hayes, 2015, Seattle, WA: Qualis Health. Copyright 2015 by Qualis Health. Reprinted with permission.

having untreated caries almost doubled when the mother had untreated caries. To reduce the transmission of bacteria from mother to child, it is important for women's health care providers to educate mothers about good oral hygiene practices and minimal "saliva-sharing activities" (American Academy of Pediatric Dentistry, 2015, p. 51). Good maternal oral health practices have the potential to influence the child's lifelong oral health. Documentation of all oral health assessment findings and interventions is essential. The development of a network of community dentists for collaboration and referral is invaluable to offer patients for oral health maintenance.

Preparing the Next Generation of Women's Health Care Providers

Women's health care providers may lack adequate knowledge to distinguish between normal changes in oral health during pregnancy because they did not have this information in their curriculum. According to Ferullo, Silk, and Savageau (2011), about 70% of MD degree–granting ($n = 72$) and DO degree–granting ($n = 13$) schools surveyed had fewer than 5 hours of oral health education. Authors of the most recent review indicate that PA and NM programs have not required oral health content or competencies in their curricula (American College of Nurse-Midwives, 2012; National Commission on Certification of Physician Assistants, Accreditation Review Commission on Education for the Physician Assistant, American Academy of Physician Assistants, & Physician Assistant Education Association, 2012).

The National Interprofessional Initiative on Oral Health has played a leadership role in raising awareness among NP, NM, and PA faculty members; oral health is beginning to be integrated into these curricula. The National Organization of Nurse Practitioner Faculties has recently included oral health in the latest *Nurse Practitioner Core Competencies With Suggested Curriculum Content* (2014). The New York University College of Nursing Oral Health Nursing Education and Practice (OHNEP) program, the nursing arm of the National Interprofessional Initiative on Oral Health, has sponsored oral health workshops at the American College of Nurse-Midwives Annual Meeting and Exhibition in 2013, 2014, and 2015. In 2016, the OHNEP program administered a survey to all 39 Directors of Midwifery Education in the United States. The survey showed that 27 of the 30 programs (90%) that responded indicated they include oral health in the curriculum. In 2014, the PA arm of the National Interprofessional Initiative on Oral Health surveyed 182 PA Directors of accredited programs in the United States. According to Langelier, Glicken, and Surdu (2015), the survey showed that 98 of the 125 respondents (78.4%) indicated that their "programs had integrated oral health content into their curriculum," which represented an increase from 2008 (p. 62).

Clinicians who care for women during pregnancy should incorporate oral health competencies into their education and practice.

Strategies for Integrating Oral Health

In 2014, HRSA released *Integration of Oral Health and Primary Care Practice*, which outlines interprofessional oral health core clinical competencies appropriate for primary care providers, including but not limited to NPs, NMs, MDs, DOs, and PAs (U.S. Department of Health and Human Services, HRSA, 2014). *Smiles for Life: A National Oral Health Curriculum* is an interprofessional oral health curriculum designed to provide the same women's health care providers with education in oral health promotion across the lifespan (Clark et al., 2010). Three specific *Smiles for Life* courses, "Relationship of Oral Health to Systemic Health," "Oral Health and the Pregnant Patient," and "The Oral Examination," are found on the Web site (www.smilesforlifeoralhealth.org) and are recommended for qualified women's health professionals to earn continuing education credits. These and other essential resources that contain important knowledge about oral health and related interprofessional competencies for women's health care providers and students can be found in Table 2.

Primary prevention requires more workforce capacity than the dental community alone can provide. The development of an interprofessional oral health primary care workforce capacity is integral to increasing access to oral health care for pregnant women. Heightened awareness of oral–systemic health must be included in women's health care provider education for clinicians to translate the information into practice. The OHNEP program has developed an Interprofessional Oral Health Faculty Toolkit

Table 2: Oral Health Resources

Organization	Resource	Web Site
American Academy of Pediatrics	*Bright Futures Oral Health Supervision Guidelines* (3rd ed.)	http://www.brightfutures.org
	Bright Futures in Practice: Oral Health—Pocket Guide (2nd ed.)	http://mchoralhealth.org/pocket/index.html
American Academy of Pediatric Dentistry	*Pediatric Oral Health Policies and Clinical Practice Guidelines*	http://www.aapd.org/policies
Association of American Medical Colleges	*Oral Health in Medicine Model Curriculum*	https://www.mededportal.org/about/initiatives/oralhealth
	Oral Health Management of Pregnant Patients	https://www.mededportal.org/publication/4056
Association for Prevention Teaching and Research	*Oral Health Across the Lifespan* learning modules	http://www.aptrweb.org/?PHLM_15
California Dental Association	*Perinatal Oral Health Guidelines and Policy*	http://www.cdafoundation.org/education/perinatal-oral-health
Health Resources and Services Administration	Interprofessional oral health core clinical domains and competencies	http://www.hrsa.gov/publichealth/clinical/oralhealth/primarycare/integrationoforalhealth.pdf
National Maternal and Child Oral Health Resource Center	Oral health educational resources for patients and providers	http://www.mchoralhealth.org
	Oral Health Care During Pregnancy: A National Consensus Statement	http://www.mchoralhealth.org/materials/consensus_statement.php
Oral Health Nursing Education and Practice	Oral health nursing education resources	http://www.ohnep.org
Qualis Health	Oral health delivery framework for primary care providers	http://www.safetynetmedicalhome.org/sites/default/files/White-Paper-Oral-Health-Primary-Care.pdf
Smiles for Life: A National Oral Health Curriculum	Oral health education for primary care providers	http://www.smilesforlifeoralhealth.org
Teaching Oral Systemic Health	Interprofessional oral health resources	http://www.toshteam.org

(www.ohnep.org/faculty-toolkit). This Toolkit uses the HEENOT approach that was previously described. It includes a wealth of oral–systemic health resources for health assessment, health promotion, and clinical practice for faculty, students, and practicing clinicians to teach both the theory and practice of the integration of oral health into the history and physical examination. Examples of the Toolkit's overall strategies include (a) visual aids to supplement class discussions of normal versus abnormal oral findings, (b) oral–systemic case studies, and (c) projects to develop educational resources for pregnant women, such as the development of a community resource of dental providers willing to see pregnant women. It also provides specific strategies to teach future providers how to promote effective self-management of oral and overall health in their patients through interprofessional collaborative practice, health literacy, and community service. The Toolkit provides a firm foundation for future collaborative practice, highlighting that dental referrals for pregnant women are essential to safe practice.

Women's health care providers, to provide quality and safe care, must engage their patients in an oral health discussion and offer consistent prevention messages.

Conclusion

There is sufficient evidence that the lack of oral health care during pregnancy can have negative outcomes for both mothers and their newborns. To improve the oral–systemic health outcomes for mothers and their newborns, it is essential to increase the current and future interprofessional oral health workforce capacity. Current women's health care providers and NP, NM, MD, DO, and PA students, as future women's health care providers, can increase their knowledge of the oral health care needs of pregnant women through the use of oral health educational resources. Essential resources include the OHNEP *Interprofessional Oral Health Faculty Toolkit* and the Smiles for Life modules. These resources provide a firm foundation for the integration of oral health into clinical practices. By integrating the HRSA Interprofessional Oral Health Core Clinical Competencies, the HEENOT approach, and the Oral Health Delivery Framework in clinical practice models, women's health care providers can use a "best practice" approach. Meeting the oral health needs of pregnant women and their newborns will be accomplished only through collaboration among all health care professional educators and providers to promote the incorporation of oral health needs as a gold standard for educational programs and clinical practice.

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