Improving the Delivery of Oral Health Care in Pregnancy

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Abstract

The physiologic changes that occur during pregnancy can increase risk of maternal periodontal disease. This is more often observed in women seeking prenatal care in community health centers. Poor oral health in pregnancy can negatively impact birth outcomes and the oral health of children born to mothers with a history of perinatal periodontal disease. Despite the evidence of importance and safety, oral health continues to be overlooked during prenatal care visits. There is a lack of interprofessional collaboration between prenatal and dental providers leading to missed opportunities and preventable adverse maternal and fetal health outcomes. Several professional organizations have affirmed that dental care and treatment during pregnancy is safe and recommended to prevent complications during and after pregnancy. In previous studies, barriers preventing pregnant women from receiving oral health exams, oral health education, and referrals include lack of provider awareness regarding the importance of oral health, lack of dental coverage for pregnant women, and reluctance among dental providers to treat women during pregnancy. The Maternal Oral Health Screening (MOS) tool has been used successfully to increase oral health screening in early pregnancy. The MOS was installed in a prenatal care intake form in an electronic health record at a federally qualified health center (FQHC). An education program about oral health care recommendations and safety of oral health care in pregnancy was presented to prenatal care staff. The intervention resulted in increased oral health screening and referral for dental care for pregnant people enrolled at the FQHC.

Keywords: oral health, oral health screening, pregnancy, clinician education, health outcomes

Perinatal Oral Health: DNP Project Report

Prenatal care is essential for the prevention of pregnancy complications and the promotion of positive birth outcomes. A pregnant woman visits her provider several times throughout her pregnancy, with more frequent visits toward the end of the pregnancy. Typically, the first visit involves completion of a comprehensive health history and physical exam. However, an often overlooked but important aspect to consider is the patient's oral health status. Oral health assessment and education is necessary to ensure the overall health of both the mother and the baby.

Problem Statement

In a Southwest metropolitan area, oral health is not routinely assessed in people seeking prenatal care in Federally Qualified Health Centers (FQHCs) (ACOG, 2017; Rideaux, 2020; Shanah, 2019). Oral health status plays a role in, not only pregnancy outcomes but in the future dental health of the unborn child. Poor oral health in the prenatal period can lead to the growth of cariogenic bacteria, such as *Streptococcus mutans,* its presence in the saliva can then be passed to infants through spoon-sharing or licking of pacifiers, resulting in childhood caries or cavities (American College of Obstetricians and Gynecologists [ACOG], 2017). To minimize transmission and colonization in infants, dental care during pregnancy is safe and recommended (ACOG, 2017). Periodontal disease may also influence the development of preeclampsia and the risk of preterm delivery (Radochova et al., 2019). The populations most often affected by perinatal periodontal disease are African American women, smokers, people of low socioeconomic status and the uninsured. The main source of healthcare for the latter two groups are public assistance programs and FQHC (ACOG, 2017). Lack of knowledge and education among providers and, perhaps, their attitude toward making oral health a priority during the

prenatal period have contributed to system-wide barriers to access to oral health in pregnancy within some FQHCs. Lastly, access to dental care is low among disadvantaged populations, leading to a higher incidence of untreated oral disease (ACOG, 2017).

Purpose and Rationale

Prenatal oral health is an important yet often neglected health service (Xiao et al., 2019). Some form of periodontal disease occurs in nearly 40% of all pregnant women (ACOG, 2017). Although prenatal clinicians acknowledge the importance of oral health during pregnancy, most do not screen for oral health concerns during prenatal visits and even less likely than dentists to recommend and refer for dental services (ACOG, 2017). Complications in pregnancy from poor oral health could be prevented if more providers and patients are made aware of the risk of undetected and untreated oral conditions. Women are often more receptive to adopting healthier behaviors during pregnancy (ACOG, 2017). George and colleagues developed and validated a two-item high sensitivity, low specificity instrument to assess maternal oral health, the Maternal Oral Screening (MOS) Tool. When used routinely to screen pregnant women for the presence of dental problems in need of attention, the MOS was found to increase collaboration, receipt of oral health education, and dental treatment during pregnancy (George et al., 2015). Oral health assessment and education is necessary to ensure the overall health of both the mother and the baby. The purpose of this project is to increase screening for oral health conditions and referral for dental care in pregnant women early in pregnancy. Raising awareness of the safety and benefits of oral health status screening and treatment may lead to improved delivery of oral health care to pregnant women. Installing the MOS tool into an electronic health record (EHR) as part of the standardized initial prenatal care interview has been shown to be an effective strategy

to increase adherence to current guidelines and increase receipt of dental care in pregnant women (George et al., 2015).

Background/Significance

Hormonal and immunologic changes during pregnancy can exacerbate inflammation of the gingiva, increasing the mother's chances of developing periodontal disease (Adams et al., 2017; ACOG, 2017; Hoerler et al., 2019). Poor oral health is associated with unfavorable pregnancy and birth outcomes as well as an increased risk for infant and childhood caries. Yet routine dental assessment continues to be overlooked by patients and providers (Skvoretz et al., 2016). Skvoretz et al. (2016) explain that the prevalence of poor oral health and missed prevention opportunities have combined to rank periodontal disease as a silent epidemic in the United States (U. S.). Mothers with periodontal diseases are 1.61 times more likely to experience preterm delivery and 1.65 times more likely to give birth to a baby with low birth weight when compared to those mothers without periodontal disease (Xiao et al., 2019).

Several barriers that contribute to the lack of oral health screening and dental care during pregnancy have been identified. These barriers include lack of education for providers and patients, limited or no dental coverage, and transportation difficulties (ACOG, 2017). The perception among patients and clinicians that oral health care during pregnancy is unnecessary or unsafe is common misinformation and a misunderstanding (Stephens et al., 2020). Medicaid programs regularly provide dental benefits for children; however, dental coverage for adults and pregnant women varies by state and is often optional, making basic dental care difficult to obtain (Eke et al., 2019). Additionally, coverage is often only for emergent dental concerns rather than basic care; therefore, many women do not seek routine prenatal oral health care (Xiao et al., 2019).

Pregnant Women Seeking Prenatal Care in FQHCs

Most of the women receiving prenatal care in FQHCs come from underserved communities. Despite the benefits and safety of dental care during pregnancy, few women seek the service, particularly in socioeconomically disadvantaged populations (Adams et al., 2017). The American College of Obstetricians and Gynecologists (ACOG; 2017) explain that because income level and insurance coverage correlate with access to dental care, poorer women who depend on public health insurance are less likely to receive dental care. It is also difficult to find a dentist willing to treat pregnant women or one who accepts Medicaid even if dental care is a covered benefit in their state (National Maternal and Child Oral Health Resource Center, 2019; Stephens et al., 2020). In the U. S., approximately one-half of all births are paid for by Medicaid (National Maternal and Child Oral Health Resource Center, 2019). Stephens et al. (2020) examined oral health in underserved women in North Carolina to inform policy changes that would aid in improving access and use of dental services. The authors discovered that, of the pregnant women surveyed, less than 20% reported seeking a dental provider during pregnancy. Oral screenings among those same participants revealed that 33% had untreated dental caries (Stephens et al., 2020). Xiao and colleagues (2019) sought to understand the significance of socioeconomic disadvantages and maternal oral health to develop an approach that targeted those populations and improve pregnancy and oral health outcomes (Xiao et al., 2019). Based on their findings, the study team determined that unmet oral health necessities are particularly common among pregnant women of low socioeconomic status in the U. S. In their sample of participants, 79% of those who were pregnant had at least one untreated decaying tooth (Xiao et al., 2019).

Interventions to Promote Oral Health Care During Pregnancy

Treatment for periodontal disease during pregnancy is safe (ACOG, 2017; Hoerler et al., 2019). However, Hoerler et al. (2019) found that, although they are aware of the importance and safety of treatment during pregnancy, providers do not include questions about oral health status in their health interviews, conduct screenings, or refer their pregnant patients to a dental professional. The authors suggested that to correct this deficit an interprofessional approach to educate dental hygienists and prenatal care clinicians about the current recommended practices in prenatal care could increase awareness of the need to include an assessment of oral health as part of standard care for pregnant women (Hoerler et al., 2019). Skvoretz et al. (2016) conducted a bibliometric analysis to determine if interprofessional collaboration and communication occur between prenatal and dental clinicians. In their metanalysis the reviewers found data to support that the necessary relationship between providers that would facilitate oral healthcare for pregnant women does not occur. In addition, there was evidence that the clinicians who participated in the studies limited their reading of peer reviewed articles to those that are within their specific field of practice (Skvoretz et al., 2016).

George et al. (2016a) assessed the specificity and sensitivity of the MOS and found that it could be incorporated into standard prenatal care electronic and paper-based questionnaires and easily implemented into routine prenatal care to identify dental problems that require further evaluation by a dental professional. It was suggested that the use of the MOS tool by prenatal providers followed by a dental care referral can facilitate further screening and assessments from a dental clinician (George et al., 2016a). In another study conducted by the same authors, a Midwifery-Initiated Oral Health Dental Service (MIOH-DS) program was assessed as a means to bridge the gap between prenatal care and receipt of dental services (George et al., 2018). They

found the program to be successful in increasing knowledge, dental service use, and oral hygiene in pregnant women (George et al., 2018).

In their search for a strategy to compensate for the lack of oral healthcare in pregnancy in rural communities Jiang et al. (2015) conducted a randomized controlled trial for the efficacy of use of a mouth wash during pregnancy to reduce the incidence of periodontal disease. They proposed the use of a safe, antimicrobial mouthwash by pregnant women less than 20 weeks pregnant and diagnosed with periodontal disease. Their hypothesis was that it would be an effective, inexpensive, sustainable, and simple intervention to improve pregnancy outcomes (Jiang et al., 2015). Although follow-up was not completed before the results of their trial were released, this is a strategy that warrants further exploration and may prove beneficial for populations living in rural or underserved communities who have difficulty accessing dental services.

Current Practice

Gaps in continuity of oral healthcare persist in clinical practice, including oral health education and screening during the prenatal period, despite current research and recommendations (Adams et al., 2017). Pregnant women are not obtaining proper dental care, and providers rarely discuss the importance of oral health during perinatal care (George et al., 2018). Interaction across disciplines is not occurring and referrals to dental services are uncommon.

Desired Outcomes

The expected outcome for the final step in this ongoing project is that both prenatal and dental professionals collaborate to ensure that adequate oral health is promoted and obtainable for every pregnant woman seen in FQHCs. The Perinatal and Infant Oral Health Quality

Improvement (PIOHQ) Initiative 2013-2019 funded by the Maternal and Child Health Bureau aims to decrease the prevalence of periodontal disease in at-risk pregnant women and infants by increasing access to proper oral health services (National Maternal and Child Oral Health Resource Center, 2019). The goal for the future of oral health as it relates to pregnancy is for prenatal clinicians, often the first point of contact for a pregnant woman, to assess and educate patients. Dental care clinicians will also collaborate and feel confident in providing services to pregnant women.

Common Themes

The appraisal of current literature reveals the importance of oral health in pregnancy, yet it continues to be excluded from routine prenatal care. Those most affected by the lack of dental care are women in underserved communities. The strongest correlation throughout the research was between poor maternal oral health and the transmission of microorganisms to the infant, leading to an increased risk for dental caries throughout childhood. These findings demonstrate a need to improve interprofessional collaboration to increase education and expand access to proper oral health care in pregnancy.

Internal Evidence

In a system of FQHCs in the Southwest United States, two gap analyses were completed to obtain internal evidence to understand, in this system of clinics, the factors that facilitate and prevent access to oral health care during pregnancy (Rideaux, 2020; Shanah, 2019). Surveys were completed to evaluate prenatal and dental provider's knowledge, beliefs and behaviors related to oral health in pregnancy (Rideaux, 2020; Shanah, 2019).

What was found was that oral health screenings are not consistently performed during prenatal care and referrals are not generated for pregnant women to access dental services. The

result of the failure to routinely follow current recommended practice is that the patients are not

being informed about the importance of oral health in pregnancy or encouraged to see a dental

provider. There is a lack of policies or procedures for the collaboration between dental and

perinatal providers, no system-wide process for tracking referrals, and a lack of empiric evidence

related to the occurrence of dental screening and care in pregnancy throughout each system,

which makes it difficult to determine the magnitude of the problem. Further, there are concerns

among dental providers related to the safety of treating pregnant women. This is important to

address because certain dental disorders can be exacerbated during pregnancy, possibly leading

to poor pregnancy outcomes. These disorders may include gingivitis, benign oral gingival

lesions, tooth erosion, mobility of the teeth, cavities, and periodontitis, leading to precipitous

preterm labor (ACOG, 2017). Further evaluation and change should occur to prevent these

negative outcomes. The evidence presented demonstrates the importance of oral health care

during pregnancy for the health of both the mother and her family. It is necessary to continue to

explore ways in which providers can consistently provide oral health education and resources.

PICO Question

This inquiry has led to the PICO question: In women seeking prenatal care in a

community health center, how will an oral health screening tool versus no screening tool

improve the receipt of dental care during pregnancy?

Search Strategy

An extensive review of the most current literature was done to answer the PICO question. Four databases were selected according to their relevance—Academic Search Premier, Cochrane, Cumulative Index of Nursing and Allied Health Literature (CINAHL), and PubMed. Keywords and MESH terms included: *pregnancy, pregnant, pregnant women, prenatal care, women's health, maternal oral health, antenatal care, periodontal disease, oral health status, oral hygiene, oral health screening, pregnancy outcomes, preterm delivery, preterm birth, complications, outcomes, pregnancy complications.* Filters were applied to limit the search to data-based articles published between 2015 to 2020 in peer-reviewed journals in the English language to ensure a yield of current, evidence-based material. Articles included in the review were randomized and non-randomized, controlled trials, systematic reviews, and cohort studies. Exclusions included articles published before 2015, concept articles, and those in languages other than English .

A preliminary advanced search in Academic Search Premier using the keywords *pregnancy* AND *oral health* AND *screening* yielded 29 results. A PubMed search using the same keywords yielded 187 results. Using CINAHL, the initial searches with keywords *oral health* AND *pregnant* AND *outcomes* yielded 87 results. Finally, an advanced search in the Cochrane Library using the keywords *pregnancy, dental care, pregnancy outcomes* yielded 66 results. To further reduce the number of articles in the Academic Search Premier, keywords and phrases *pregnancy* AND *oral health screening* AND *outcomes* resulted in a final yield of 7. A combination of keywords and phrases such as *prenatal care* AND *periodontal disease* AND *preterm labor* resulted in a final yield of 32 in PubMed. *Pregnant women* AND *oral health* AND *complications* were used to get a pertinent final yield in CINAHL with 40 results. Finally, the

Cochrane Library produced 23 results when keywords *pregnancy, preterm labor, and outcomes* were used in the advanced search.

Grey literature from professional organizations such as the American College of Obstetricians and Gynecologists and the American Dental Association were also searched. To further narrow the number of articles and identify the ten most pertinent and high-level articles, the rapid critical appraisal checklists were used. The final ten articles that best represented the impact oral health has on pregnancy outcomes, infant oral health, and interventions to be used for the improvement of oral health in pregnancy were synthesized (see Appendix A, Table A1).

Critical Appraisal & Synthesis of Evidence

The Melnyk and Fineout-Overholt's (2019) rapid critical appraisal was used to evaluate the overall quality and strength of the evidence. Ten articles were retained that included randomized control trials (RCTs), a non-randomized control pilot trial, cohort studies, systematic reviews, and a population-based postpartum survey. The majority of the studies were considered high-level evidence providing confidence intervals (CI), level of significance (p), and mean values (M). All of the retained studies were published within the last five years. There was limited bias with one study having a selection bias, and no conflict of interest reported throughout the articles. The demographics included pregnant women, postpartum women with a mean of 25 to 30 years of age, and children up to five years of age (Appendix A, Table A1). All types of midwives were also included in one of the studies. The authors that discussed racial and ethnic characteristics and socioeconomic status demonstrated heterogeneity (Appendix A, Table A1).

Major variables of interest included oral health screening tools, dental treatment for periodontal disease, prenatal oral health education, and knowledge. Outcomes were measured

using a combination of questionnaires, dental screenings and exams, systematic searches,

Medicaid coverage status, and referrals (Appendix A, Table A1). Some of the outcomes of

interest comprised of preterm birth rates, sensitivity and specificity of an oral health screening

tool, low birth weight, oral health status and knowledge, preterm pre-labor rupture of membranes

(PPROM), and receipt of oral health education (Appendix A, Table A1).

The majority of sample sizes were appropriate, and some stated that a power analysis was

completed before beginning the study. The overall strengths of the studies included the degree of

feasible interventions or concepts in the application to evidence-based practice changes

(Appendix A, Table A1).

Discussion

The evidence supports that when prenatal and dental providers are educated about the

safety of the treatment of periodontal disease during pregnancy and review oral health during

pregnancy, the mother is more likely to seek dental services and receive the necessary care.

When oral health is managed and maintained, the possibilities of adverse birth outcomes and

later childhood caries decreases. According to the evidence presented in the synthesis, oral health

is important to address during pregnancy. While there are numerous barriers to address, an oral

health screening tool is the initial approach necessary to increase the receipt of appropriate dental

care during pregnancy. When prenatal and dental providers are given the proper education and

tools, oral health education is more often provided to patients during pregnancy.

Theory/Conceptual Framework Application

The Ecological Model of Health Promotion was the conceptual framework followed for

the design of an intervention to increase prenatal oral health screening and dental care referral in

community health centers (McLeroy et al., 1988; Appendix B, Figure 1). There are five levels of

analysis within this model that describes patterns that are determinants of behavioral change (McLeroy et al., 1988). This project focuses on the interpersonal processes and primary groups and the institutional factors to create a practice change (McLeroy et al., 1988). The intrapersonal level describes the collaboration of care between prenatal and dental providers. The institutional factor is the implementation of a standardized screening tool into the EHR and a referral process and tracking system that is streamlined between the prenatal and dental departments. These two constructs of the Ecological Model were used to guide the design of a clinical practice change to increase the likelihood that the proposed intervention would result in increased interprofessional collaboration, oral health screening, and referral for oral health care during pregnancy.

Evidence-Based Practice Model/Quality Improvement Model

The Oral Health Delivery Framework aligns with the aim to improve access to oral health care for pregnant women. Although this model was designed for primary care providers it can be applied to prenatal practice as well. When a prenatal clinician provides a broad spectrum of care such as providing general health promotion recommendations and interval care, routine and preventative screenings, and treating acute, uncomplicated illnesses, they are also practicing withing the realm of primary care (Hummel et al., 2015). For that reason, this model is appropriate to use as a guide to plan, implement, and evaluate a practice change intended to increase access to oral health care in a sample of pregnant women. The components of the model are easily implemented by asking, recognizing the need for oral health care, deciding if dental care is appropriate, referring to a dental provider, and documenting the screenings and referrals (Rayburn, 2016). The efficacy of the intervention can be evaluated by measuring the number of pregnant women who were screened, and number of women who screened positive that were referred for dental care.

Methods

After receipt of expedited approval from the Arizona State University (ASU) Institutional

Review Board (IRB) the MOS tool was added to the prenatal provider's EHR. The setting was

an FQHC in the Southwest United States that provides both prenatal and dental services. Prenatal

staff participants, including physicians, nurse practitioners, medical assistants, and referral

specialists, were provided a participation letter and PowerPoint presentation with voiceover.

Staff attendance to a training meeting in which the PowerPoint was delivered and acceptance of

a participation letter implied consent to participate. The presentation provided an overview of the

project aim, the impact, national recommendations, an explanation of the MOS tool how to use it

within the EHR and who will be using it, participant roles and responsibilities, and a detailed list

of the data to be collected. Medical assistants used the MOS tool to screen each patient during

their initial prenatal visit (new OB). The screening was completed for new OB patients who were

26 weeks of gestation and under (Lieff et al., 2004).

The evidence based MOS tool was developed by George et al. (2015). Permission was

obtained via email correspondence from George to use the instrument. The MOS contains two

questions:

1. Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your

   teeth, broken teeth, toothache or any other problems in your mouth?

2. Have you seen a dentist in the last 12 months?

The questions were placed in the physical exam section of the prenatal provider's EHR with drop

down boxes to document the patient's answer to each question. The medical assistants were

responsible for screening every new OB patient $\leq$ 26 weeks gestation and documenting the

answers into the EHR. If the response is "yes" to the first question and/or "no" to the second question, it was considered a positive screen and a dental referral was indicated.

The authors completed a psychometric evaluation to document the sensitivity and specificity of the tool (George et al., 2016a). The MOS tool demonstrated high sensitivity—88-94% of women were correctly identified as at risk for poor oral health (George et al., 2016a). According to the authors, the low specificity (14-21%) is not as concerning because that level of accuracy is common in oral health screening tools. The main purpose of the MOS tool is identification of those at risk and not for diagnosis of the existence of a health condition (George et al., 2016a). The positive predictive value indicates that about 50% of those referred for dental services will actually need dental care (George et al., 2016a).

Data was collected to determine the number of eligible patients screened, how many were screened, number of positive screens, and the number of referrals generated from those positive screens. Data was collected over eight weeks. The de-identified data was provided to the project manager in the form of an aggregate report, which was then analyzed using descriptive statistics.

Results

Based on the data provided, a total of 125 (N=125) new OB patients were seen over the eight-week data collection period. Further, 125 (100%) of eligible patients were screened using the MOS tool. Of the 125 screened, 118 (94.3%) screened positive based on their responses to the MOS tool questions. Of the 118 new OB patients that met the criteria, 48 (40.7%) were referred for dental care.

The results of the project are clinically significant because it led to a practice change with the addition of the MOS tool into the EHR, 100% compliance among medical assistants with the

use of the screening tool with each eligible new OB patient, and led to a substantial number of referrals for dental care for those pregnant people who met the referral criteria.

The impact of this project for the patients is relevant in that it standardized the inclusion of screening for oral health status of pregnant women in the first half of pregnancy. This reflects a critical positive practice change that can be beneficial to patients. There is a greater possibility that the conversation about oral health in pregnancy will occur with patients concerned about their oral health status. In addition, those pregnant women who could be in need of dental care based on their responses to the screening questions can be referred for dental services. For the prenatal care clinicians and staff, an unmet need for education about the safety and need for oral healthcare evaluation was met through the presentation of information about the existence of a health problem and expert endorsement of a practice to address the problem in a way that could produce positive outcomes for mothers and their children. The tool was easily installed into the EHR and staff demonstrated the ability to administer the questions during routine new OB visits. For the overall system, it is a sustainable option that standardizes practice and could be implemented throughout all of the FQHCs. This project can also be a driving force for advocacy and policy changes around comprehensive dental health insurance coverage for pregnant women through Medicaid.

Discussion

Strengths and Limitations

Strengths and facilitators of the project include the MOS tool embedded into the EHR and 100% compliance among medical assistants with use of the tool. Site champions were helpful with facilitating the practice change, making it a sustainable intervention. The tool can easily be used for in-person and virtual visits, although for this project, it was only used during

in-person visits. Limitations included less referrals generated compared to the number of positive

screens. This could be because generating referrals is a separate task for the staff and could be

forgotten, missed, or not submitted properly. Also, it was a new practice change and there is

always a learning curve. Finally, the limited data collection period prevented the ability to track

dental appointments made after receipt of the referral and to document the increase in

interprofessional collaboration.

Recommendations

Recommendations for future quality improvement projects include development and

installation of programming within the EHR that would facilitate accessing data to track

appointments made and kept for dental care, document interprofessional collaboration, and

comparison of outcomes for pregnancy and child dental health in women who obtain treatment

for periodontal disease in this FQHC. The adherence over time to screening with the MOS and

referral for dental care as indicated would reveal sustained practice change. Any cost/benefit

analysis related to the intervention could provide information that would persuade policy makers

to consider requiring health insurance vendors to include dental health care for pregnant women

as one of the criteria to be included as a Qualified Insurance Plan in the state Medicaid program.

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Conclusion

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The results of this quality improvement project align with the outcomes of research

about effective strategies to increase oral health screening for pregnant women in the first half of

their pregnancy The MOS tool was effectively used by the staff at the project site to support a

recommended practice change   The MOS was easily incorporated into the project site EHR

system. Further, oral health screening did lead to an increase of referrals for dental services and

professional guidelines to screen and recommend dental care during pregnancy were

standardized into prenatal care practice. Dental care is safe and recommended during pregnancy

to reduce the risk of adverse birth outcomes and poor oral health in children. The MOS tool

embedded into the EHR is an evidence-based strategy to identify and activate a referral to a

dental professional for pregnant persons in need of dental services.

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Appendix A
Evaluation and Synthesis Tables

Table A1

Evaluation Table

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Adams et al. (2017). Integrating a nurse-midwife-led oral health intervention into centering pregnancy prenatal care: Results of a pilot study. **Conflicts/Bias:** State no conflict of interest **Funding:** National Institute of Dental & Craniofacial	Group Prenatal Care Model Inferred Physiologic Model	**Design:** Non-randomized controlled pilot trial **Purpose:** to determine if receiving OH education during pregnancy would have improved OH compared to women receiving standard education	**n**= 101 IG=49 CG=52 **Demo:** Pregnant women of similar GA, M age- 28.7 yrs., primarily Hispanic, 50% annual income < $20,000, 52% > high school degree **Setting: 4** CP prenatal care sites in San Francisco, English and Spanish speaking	**IV:** CP OH promotion program **DV1:** PI **DV2:** SBP **DV3:** SPD **Definitions:** CP OH promotion program included learning modules and dental exams given by certified nurse-midwives and	Questionnaires and dental exam	Chi-Square tests, t-tests, linear regression, logistic regression SAS 9.4	**DV1:** IG Baseline: 0.93 F/U: 0.77 CG Baseline: 0.93 F/U: 0.96 F^a/t^b=27.95^a *p=<0.0001* **DV2:** IG Baseline: 20.5 F/U: 14.5 CG Baseline: 16.7 F/U: 17.0 F^a/t^b= 8.88^a *p=0.01* **DV3:**	**LOE:** III **Strengths:** Demonstrated low-cost OH education, results support development of RCT **Weaknesses:** Preliminary study, would be useful to perform larger RCT **Disclosure:** Participants

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Research award & Dental Trade Alliance Foundation **Country:** USA			**Inclusion Criteria:** females >18yrs old **Exclusion Criteria:** Unspecified	licensed dental examiners			IG Baseline: 23.2 F/U: 20.4 CG Baseline: 20.6 F/U: 21.1 $F^a/t^b= 23.95^a$ $p=<0.0001$	were paid $20/ questionnaire **Feasibility:** Could easily be adapted and tested in other group care settings or traditional prenatal care
Da Silva Bastos et al. (2015). Mother-to-child transmission of Streptococcus mutans: A systematic review and meta-analysis. **Conflicts/Bias:** none	Inferred Physiologic Model	**Design:** SR and MA **Purpose:** determine scientific evidence of maternal to fetal vertical transmission of *Streptococcus mutans*	N= 36 n= 1,026 **Demo:** Mother and child pairs **Setting:** hospitals, schools, special preventative centers	**IV:** Contamination of *S. mutans* **DV:** vertical transmission of S. *mutans* **Definitions:** vertical transmission from mother to	Systematic searches	t-test, ANOVA, cumulative MA SPSS Inx, IL, USA Comprehensive MA software version 3.2, USA	Metal-analysis demonstrates vertical transmission from mother to child *p<0.001* Transmission was similar despite changes in microbiological	**LOE: I** **Strengths:** Two authors used to review studies, internal validity of mother-to-child transmission, used well-designed studies

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Funding: Consello Nacional de Desenvolvimento Científico e Tecnológico (CNPq) & Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro (FAPERJ) **Country:** Brazil, China, Turkey, Sweden			**Inclusion Criteria:** observational human studies, contamination with *S. mutans*, comparisons, molecular analysis to identify transmission, bacteriocin typing **Exclusion Criteria:** duplicate papers, case reports, case series, descriptive studies, review articles, opinion articles, children w/ ongoing preventative/ Restorative tx, mothers who used	child from poor oral health			methods p=0.57; t-test No significant difference in transmission rate related to genetic technique p=0.39; ANOVA test	**Weaknesses:** did not include longitudinal studies, none of the studies included blind tests, 16 of the studies did not perform statistical analysis **Feasibility:** Encourages the need for providers to emphasize need to improve oral health of mothers

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
			antimicrobial substances					
George et al., (2016a). Measuring oral health during pregnancy: Sensitivity and specificity of a maternal oral screening (MOS) tool. **Conflicts/Bias:** Authors declare no competing interests **Funding:** Australian National Health and Medical Research	Inferred Physiological Model	**Design:** RCT **Purpose:** To determine sensitivity and specificity of the MOS tool	**n**= 207 **Demo:** PW low risk, single pregnancy; Australian born; multiparous M age: 29yrs **Setting:** Three large antenatal clinics in Sydney, Australia **Inclusion Criteria:** GA >12wks, < 20wks **Exclusion Criteria:** Not specified	**IV:** MOS tool **DV1:** OHIP-14 **DV2:** OH assessment **Definitions:** MOS is a 2-item OH screening tool. OHIP-14 is 14-item OH screening tool	Questionnaires, OH assessment	SPSS v22 Descriptive statistics; chi-squared analysis; conditional probability based on two-way table; central limit theorem formulation	(95% CI) **DV1:** Sensitivity: 93.3 (88.2-97.9) Specificity: 20.5 (13.2-27.8) PPV: 47.5 (40.1-54.8) NPV: 80.0 (65.7-94.3) **DV2:** Sensitivity: 87.8 (80.4-96.3)	**LOE:** II **Strengths:** High sensitivity; reliable tool; MOS tool easily administered by midwives; **Weaknesses:** Specificity was low even w/ large sample size; focused on only one aspect of psychometric assessment of the tool, construct

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Council Project Grant **Country:** Australia							Specificity: 14.0 (5.0-23.1) PPV: 57.0 (47.9-66.1) NPV: 47.1 (23.3-70.8)	validity was not included **Harm:** Ethical approval was obtained **Feasibility:** Can easily be used by other antenatal providers; high level of transference of tool
George et al., (2016b). The evaluation of an oral health education program for midwives in Australia.	Inferred Cognitive Learning Theory	**Design:** Pre-post-test design **Purpose:** Evaluate the effectiveness of the MIOH	n= 50 **Demo:** Midwives M age: 44.29 yrs M exp: 15.33 yrs Education-Undergrad: 17	**IV:** MIOH edu. program **DV1:** OH knowledge **DV2:** confidence level to promote maternal OH	Questionnaires	t-test and analysis of covariance analyzed with IBM SPSS 21.0	**DV1:** M score (SD) Pre: 14.82 (2.62) Post: 19.98 (2.47) *p-value* <0.001	**LOE:** IV **Strengths:** 0% attrition rate; MIOH program is transferable, evidence-based, systematically

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Conflicts/Bias: authors declare no competing interests **Funding:** National Health and Medical Research Council, the State Government of Victoria for the Dental Health Services Victoria, Health Families Healthy Smiles Initiative **Country:** Australia		program to assess oral health knowledge of midwives and assess their confidence in promoting maternal OH following program completion	Postgrad: 32 **Setting:** Maternity services in metropolitan & regional hospitals in New South Wales & Victoria & rural hospitals, community health centers and Koori Maternity Services **Inclusion Criteria:** maternity services w/ a high no. of births/yr. >2000 births/met. hsp; >1000 births/regional hsp.	**Definitions** MIOH program: 3 self-paced modules that focused on aspects of perinatal OH-skills assessment for OH screening and referral process. Knowledge and confidence assessed w/ post-questionnaires.			**DV2:** Post scores only. 82% confident w/ OH in antenatal first visit 77.6% confident w/ referrals 46% confident conducting visual mouth check on pregnant women	developed & included theoretical & practical knowledge. **Weaknesses:** Larger Victorian sample—more post-grad midwives; no pre-test score for confidence level; only immediate knowledge was assessed. **Harm:** Privacy and confidentiality were maintained,

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
			Midwives involved w/ first antenatal visit. **Exclusion Criteria:** Not specified					participation was voluntary, consent for participation & publication was obtained. **Feasibility:** OH knowledge improved after the MIOH program along w/ level of confidence. This type of program could be successful for other providers who provide prenatal care. The main concern is changing

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								policies to improve access to dental care.
George et al., (2018). Evaluation of a midwifery initiated oral health-dental service program to improve oral health and birth outcomes for pregnant women: A multi-centre randomised controlled trial. **Conflicts/Bias:** none **Funding:** National Health and Medical	Inferred Physiological Model	**Design:** Multi-center RCT **Purpose:** Assess the effectiveness of the MIOH program in improving dental services uptake, OH knowledge, quality of OH, OH status, & birth outcomes	**n=** 639 **Demo:** PW M age: 29 yrs. **Setting:** 3 large Met. public hospitals in Sydney, Australia **Inclusion Criteria:** GA: between 12 and 20 wks., over 18 yrs. of age, PW presenting for first antenatal appt. **Exclusion Criteria:** any	**IV-** MIOH and DS **DV1-** uptake of dental services **DV2-** OH knowledge **DV3-** quality of OH **DV4-** OH status **DV5-** birth outcomes **Definitions:** DS is dentists providing PWs with free dental services in one of the public dental clinics.	Questionnaires, OH assessments, birth weight and gestational age	Conventional descriptive statistics, Pearson's chi-squared analysis, one-way analysis of variance (ANOVA), Kruskal-Wallis analysis SPSS 21	**DV1:** IG1 vs CG=1.73, 95% CI: 1.02-2.91 IG2 vs CG=29.72, 95% CI: 15.02-58.83 IG2 vs IG1=17.20, 95% CI: 8.99-32.90 X^2=0.54, p= 0.46 **DV2:** CG: 12.28 IG1: 15.23 IG2: 13.27	**LOE:** II **Strengths:** MIOH-DS effective in improving dental services use, OH, OH knowledge, and quality of OH **Weaknesses:** Didn't include an IG that received dental intervention only **Harm:** Approved by Human

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Research Council **Country:** Australia			known fetal anomalies or risk factors that would make pregnancy higher risk, unable to attend dental tx regularly from practical issues or transportation				*p*-value <0.001 **DV3:** CG: 3.80 IG1: 3.77 IG2: 9.70 *p*-value <0.001 **DV4:** Post intervention in IG2 significantly less sulcus bleeding, less plaque, greater clinical attachment compared to CG and IG1 **DV5:** M weeks at delivery-	Research Ethics Committees of Sydney Local Health District and Western Sydney University **Feasibility:** Compelling evidence, effective in health systems in which priority access to dental care is available to PW

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							CG: 39.3 (1.39) IG1: 39.3 (1.41) IG2: 39.3 (1.75) Preterm- X^2=0.56 p-value=0.76 BW under 2500kg- X^2=0.07 p-value=0.97	
Gold et al., (2018). Interdisciplinary community-based oral health program for women and children at WIC. **Conflicts/Bias:** selection bias	Inferred Cognitive Learning Theory	**Design:** Retrospective study/Cohort study **Purpose:** to evaluate the WIC OH program and assess needs for dental care, increase	n= 756 576 children 180 women **Demo:** Children—male and female, 28% black, 24% white between the ages of <1 to 5 yrs.	**IV:** WIC OH program **DV1:** caries prevalence in children **DV2:** Medicaid coverage identification	Dental screenings, referrals, Medicaid coverage status, dental caries measurement	Descriptive analysis, Logistic regressions, Tukey-Kramer, odds ratios SAS version 9.4	**DV1:** 1 yrs:28.7% 5yrs-81.1% Linear relationship between age & caries p=.01 Odds ratio 1.18 (95% CI 1.04-1.34)	**LOE:** IV **Strengths:** made aware the lack of dental coverage & the need for more coverage **Weaknesses:** Limited recall visits,

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Funding: For the OH program- Medicaid reimbursement, grant funding, institutional support such as community- based programs **Country:** USA		awareness of dental care needs for low- income families	Women—31.1 % black, 29.3% white, 10.6% Hispanic, between 21 and 29 yrs. of age, pregnant and nonpregnant **Setting:** WIC offices in a Florida county **Inclusion Criteria:** Low income families enrolled in WIC **Exclusion Criteria:** not specified	**Definitions:** WIC OH program is interdisciplinary and evidence-based			**DV2:** 4.5% of PW < 21yrs. old and eligible for Medicaid W/Medicaid odds of caries for non-PW: 2.26 (95% CI 0.88-5.82) times PW *p=.09* No Medicaid odds of caries for non-PW 0.98 (95% CI 0.41-2.36) times PW *p=.97*	participation was voluntary, long wait times at WIC, dental screenings were visual & didn't include x-rays or probes **Harm:** Approved by local institutional board, performed in accordance to ethical standards, participation was voluntary **Feasibility:** the program encourages

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								collaboration to prevent dental disease & can be integrated into other WIC programs
Iheozor-Ejiofor et al. (2017). Treating periodontal disease for preventing adverse birth outcomes in pregnant women (review). **Conflicts/Bias:** none **Funding:** NIHR via Cochrane	Inferred Physiologic Model	**Design:** SR of RCTs **Purpose:** evaluate the tx of PD in PW to prevent or reduce perinatal morbidity and mortality	N= 15 n= 7161 **Demo:** PW w/ PD after dental exam **Setting:** hospitals and antenatal clinics **Inclusion Criteria:** RCTs comparing tx of PD during pregnancy control	**IV:** PD tx **DV1:** PTB **DV2:** LBW **DV3:** PH **Definitions:** PD interventions: counseling, antiseptic agents, topical or systemic therapy, debridement, polishing, surgery	Cochrane Review, systematic searches, meta-synthesis	Chi-squared test, random-effects model, fixed-effect model, meta-analysis	**DV1:** No clear difference between PTB & PD tx versus no tx <37wks GA (RR 0.87; 95% CI 0.70 to 1.10; $I^2 = 66\%$) <35wks GA (RR 1.19; 95% CI 0.81 to 1.76; $I^2 = 0\%$) <32wks GA (RR 1.35; 95% CI 0.78 to 2.32; $I^2 = 0\%$)	**LOE:** I **Strengths:** Two review authors, bias evaluated for each study, minimal reporting biases, studies assessed for homogeneity **Weaknesses:** All of the studies were high risk for bias, variation

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Infrastructure funding **Country:** USA, Australia, Columbia, Chile, Brazil, Northern Ireland, Hungary, Iran, India			tx, alternatives, or no tx **Exclusion Criteria:** Studies w/out prenatal outcomes, non-randomized	PTB: < 37wks GA or <35wks GA LBW: <1500g to <2500g			**DV2:** PD tx may reduce incidence of LBW <2500g (RR 0.67; 95% CI 0.48 to 0.95; I^2 = 59%) <1500g (RR 0.80; 95% CI 0.38 to 1.70; I^2 = 45%) **DV3:** PD tx improved PH with no adverse effects of PD tx	in diagnosis, measurement, tx and reporting across all the trials, unclear consensus of definition of periodontitis & methods for reporting periodontal & perinatal outcomes **Feasibility:** To improve OH and reduce PD, PD tx can be applied to practice
Jiang et al., (2015). Use of mouth rinse during	Inferred Physiologic Model	**Design:** RCT pilot study	**n**= 468 **Demo:** PW <20wks GA	**IV:** MRI **DV1:** M BW	Periodontal Screening and Recording tool,	t-tests, chi-squared	Results not yet reported because article	**LOE:** II **Strengths:**

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pregnancy to improve birth and neonatal outcomes: A randomized controlled trial. **Conflicts/Bias:** state no conflicts of interest **Funding:** UBS Optimal Foundation & grant from Shanghai Municipal Health Bureau **Country:** China		**Purpose:** to develop and test MRI w/ PW to prevent progression of PD during pregnancy and reduce adverse birth outcomes & neonatal outcomes	**Setting:** Maternal and Child Health Care Hospital in Leping, Jiangxi Province, China. Have prenatal care and dental clinic **Inclusion Criteria:** PW <20wks GA; ≥ 18yrs of age; planning to deliver at recruiting hospital; dx w/ PD; at least 20 teeth; w/out moderate to severe caries; w/out systemic disease; w/out reproductive	DV2: M GA **Definitions:** MRI: alcohol-free antimicrobial mouth rinse containing 0.7% CPC BW	diary of MRI use, birth outcomes		published before F/U	0.05 significance level w/ 99.9% power **Weaknesses:** limited research funding & study period— sample size was small. **Harm:** Ethical approval granted by IRB of Public Health in China & IRB in New Orleans, Louisiana, USA; safety monitoring through Data

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			disease; w/out immunodeficiency disease; willing to F/U until baby's 42 postnatal days **Exclusion Criteria:** < 18yrs; fewer than 20 teeth; contraindication for dental probing (heart disorder); unwilling or unable to sign informed consent; receiving periodontal tx w/in past 6 mo					Safety Monitoring Plan and DSMB **Feasibility:** Simple and cost-effective intervention to be implemented into routine care
Marchi et al., (2019). Medical provider promotion of oral health and		**Design:** Population-based postpartum survey	N= 2 n= 2009: 3105 2012: 6810	**IV:** MIHA **DV1:** provider OH promotion	Questionnaires	Rao Scott Chi-square SAS 9.4 ProcSurvey	**DV1:** 2009 (PR = 1.33; 95% CI 1.19, 1.48) $p < 0.0001$	**LOE:** II **Strengths:** **Weaknesses:**

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women's receipt of dental care during pregnancy. **Conflicts/Bias:** no conflicts of interest **Funding:** **Country:** USA		**Purpose:** examine if promotion of OH by providers during pregnancy and pregnant women's receipt of dental care improved between 2009 and 2012 in California	**Demo:** mostly white or Latina, some college education, between ages 25 & 34yrs, married, > than 1 live birth, 60% were poor or near poor, 90% began prenatal care in first trimester & did not smoke **Setting:** recruitment from California birth records **Inclusion Criteria:** residents 15yrs or older w/ singleton,	counseling referral **DV2:** Women's use of dental care **Definitions:** MIHA mailed to stratified random women statewide		methods, SAS callable SUDAAN 11.1	2012 (PR = 1.19; 95% CI 1.10, 1.29) $p < 0.0001$ **DV2:** Prevalence of any type of dental visit was higher in 2012 compared to 2009 (PR + 1.12; 95% CI 1.05, 1.21) $P<0.0001$	MIHA is a retrospective postpartum survey, participants may have had higher burden of OH conditions that prompted providers to discuss OH, OH messages by providers unknown, no prior knowledge of OH education **Harm:** Approved by IRB of California Health and

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			twin or triplet live birth **Exclusion Criteria:** Women w/out prenatal care					Human Services Agency and University of California, San Francisco **Feasibility:** Positive relationship between OH promotion and maternal receipt of dental care
Radochova et al., (2019). Association between periodontal disease and preterm prelabor rupture of membranes.	Inferred Physiological Model	**Design:** non-interventional study, cohort study **Purpose:** compare PS of women w/ PPROM and	**n=155** **Demo:** M age: 31 PW Caucasian **Setting:**	**IV-** Dental Exam **DV1-** GI **DV2-** PI **Definitions:** GI: scale of 0-3 from normal gingiva to	Full-mouth recording to describe PS and OH	Test of power: 80% and alpha 5% Mann-Whitney U test, Fisher's exact test, Spearman	**DV1-** CG: 0.2 (0.1-0.4) IG: 0.8 (0.4-1.9) p-value= <0.0001 **DV2-**	**LOE:** IV **Strengths:** Use of full-mouth recording to describe PS, exams were performed at

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Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
Conflicts/Bias: none **Funding:** Faculty Hospital in Hradec Kralove and institutional grant PROGRES Q40 **Country:** central Europe		women w/ uncomplicated singleton pregnancies	Admissions to the Department of Obstetrics and Gynecology, University Hospital Hradec Kralove, Czech Republic between Dec. 2014 and April 2016 Healthy women receiving outpatient antenatal care in the Department of Obstetrics and Gynecology, University Hospital Hradec Kralove, Czech Republic between Jan and June 2017	severe inflammation PI: scale of 0-3 from no plaque in gingiva area to heavy accumulation		partial correlation test GraphPad Prism version 6.0h software for Mac OSX	CG:0.1 (0.1-0.3) IG: 0.8 (0.5-1.3) p-value= <0.0001 **CAL**: CG: 1.8 (1.6-2.1) IG: 2.3 (2.0-2.8) p-value= <0.0001 **PPD:** CG:1.8 (1.5-2.1) IG: 2.3 (1.9-2.8) p-value= <0.0001	the same time in pregnancy between CG and IG **Weaknesses:** Women with PTB w/out PPROM were not included small cohort of women **Harm:** reviewed by institutional review board and approved by local ethics committee; women provided with informed consent **Feasibility:**

Key: **appt**- appointment; **BW**- birth weight; **CAL**- clinical attachment loss; **CI**-confidence interval; **CG**- control group; **CPC**- cetylpyridinium chloride; **CP**-Centering Pregnancy; **Demo**-Demographics; **DSMB**- Data Safety Monitoring Board; **DS**- dental intervention; **DV**-dependent variable; **dx**- diagnosed; **Edu**- education; **ES**- effect size; **Exp**- experience; **F/U**-follow-up; **GA**-gestational age; **GDM**- gestational diabetes mellitus; **GI**- gingival index; **hsp**- hospital; **IG**- intervention group; **IRB**- Institutional Review Board; **IV**- independent variable; **LBW**- low birth weight; **LOE**- level of evidence; **MA**-meta-analysis; **M**- mean; **Met.**- Metropolitan; **MIHA**- Maternal and Infant Health Assessment; **MIOH**-Midwifery-Initiated Oral Health; **mo**- months; **MOS**-Maternal Oral Screening; **MRI**- Mouth Rinse Intervention; **N**-number of studies; **n**- number of participants; **no.**-number; **OH**- Oral health/hygiene; **OHIP-14**- Oral Health Impact Profile; **NPV**- negative predictive value; **PD**-periodontal disease; **PH**- periodontal health; **PI**- plaque index; **PPD**- probing pocket depth; **PPV**- positive predictive value; **PPROM**- preterm prelabor rupture of membranes; **PR**- prevalence ratio; **PS**-periodontal status; **PTB**-preterm birth; **Pt**- participant; **PW**- pregnant women; **RCT**-randomized controlled trial; **SBP**-sites bleeding on probing; **SPD**-sites pocket depth; **SR**- systematic review; **tx**- treatment; **USA**- United States of America; **WIC**-women, infants and children; **wks**- weeks; **yrs.**-years

Citation	Theory/ Conceptual Framework	Design/ Method	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/Quality of Evidence; Decision for practice/ application to practice
			Inclusion Criteria: women with PPROM at GA between 24+0 wks. and 36+6 wks., healthy women w/ uncomplicated pregnancies, matching GA at sampling w/out PTB **Exclusion Criteria:** fetal growth restriction, GDM, placental abruption w/ bleeding, preeclampsia, pre-GDM					PS in PW should be assessed and considered a risk factor for PPROM

Key: **appt**- appointment; **BW**- birth weight; **CAL**- clinical attachment loss; **CI**-confidence interval; **CG**- control group; **CPC**- cetylpyridinium chloride; **CP**-Centering Pregnancy; **Demo**-Demographics; **DSMB**- Data Safety Monitoring Board; **DS**- dental intervention; **DV**-dependent variable; **dx**- diagnosed; **Edu**- education; **ES**- effect size; **Exp**- experience; **F/U**-follow-up; **GA**-gestational age; **GDM**- gestational diabetes mellitus; **GI**- gingival index; **hsp**- hospital; **IG**- intervention group; **IRB**- Institutional Review Board; **IV**- independent variable; **LBW**- low birth weight; **LOE**- level of evidence; **MA**-meta-analysis; **M**- mean; **Met.**- Metropolitan; **MIHA**- Maternal and Infant Health Assessment; **MIOH**-Midwifery-Initiated Oral Health; **mo**- months; **MOS**-Maternal Oral Screening; **MRI**- Mouth Rinse Intervention; **N**-number of studies; **n**- number of participants; **no.**-number; **OH**- Oral health/hygiene; **OHIP-14**- Oral Health Impact Profile; **NPV**- negative predictive value; **PD**-periodontal disease; **PH**- periodontal health; **PI**- plaque index; **PPD**- probing pocket depth; **PPV**- positive predictive value; **PPROM**- preterm prelabor rupture of membranes; **PR**- prevalence ratio; **PS**-periodontal status; **PTB**-preterm birth; **Pt**- participant; **PW**- pregnant women; **RCT**-randomized controlled trial; **SBP**-sites bleeding on probing; **SPD**-sites pocket depth; **SR**- systematic review; **tx**- treatment; **USA**- United States of America; **WIC**-women, infants and children; **wks**- weeks; **yrs.**-years

Table A2

Synthesis Table

	Adams et al.	Da Silva Bastos et al.	George et al.	George et al.	George et al.	Gold et al.	Iheozor-Ejiofor et al.	Jiang et al.	Marchi et al.	Radochova et al.
Study Characteristics										
Year	2017	2015	2016a	2016b	2018	2018	2017	2015	2019	2019
Design	Non-RCT pilot	SR & MA	RCT	Pre-post-test	RCT	Retrospective/ Cohort study	SR of RCTs	RCT pilot study	Population-based PP survey	Cohort
LOE	III	I	II	IV	II	IV	I	II	II	IV
Demographics										
Mean age (yrs.)	28.7yrs	Not stated	29yrs	44.29yrs	29yrs	<1 to 5yrs 21-29yrs	Not stated	Not stated	25-34yrs	31
PW	X	X	X		X	X	X	X	X	X
Midwives				X						
Children		X				X				
Independent Variables										
Dental exam						X				X
MOS tool			X							
MIOH-DS				X	X					
MIHA									X	
Periodontal tx							X	X		
OH edu.	X					X				
S. Mutans		X								
Outcomes										
PTB					*o*		*o*			
SS			Δ↑							
LBW							Δ↑/*o*			
OH status	Δ↑				Δ↑	Δ↑/*o*	Δ↑	I		

Key: Δ↑-improved outcome; + - positive correlation; *o*-no significant change; **DS**- dental intervention; **edu**-education; **I**-inconclusive; **LBW**- low birth weight; **LOE**- level of evidence; **MA**-meta-analysis; **M**- mean; **MIHA**- Maternal and Infant Health Assessment; **MIOH**- Midwifery-Initiated Oral Health; **MOS**-Maternal Oral Screening; **OH**- Oral health/hygiene; **PD**-periodontal disease; **PP**-Postpartum; **PPROM**- preterm prelabor rupture of membranes; **PTB**-preterm birth; **PW**- pregnant women; **RCT**-randomized controlled trial; **SR**- systematic review; **SS**-sensitivity & specificity; **tx**- treatment; **VT**- vertical transmission; **yrs.**-years

|										
OH knowledge				Δ↑	Δ↑					
PPROM										Δ↑
Receipt of OH edu.					Δ↑				Δ↑	
VT		+								

Key: Δ↑-improved outcome; + - positive correlation; *o*-no significant change; **DS**- dental intervention; **edu**-education; **I**-inconclusive; **LBW**- low birth weight; **LOE**- level of evidence; **MA**-meta-analysis; **M**- mean; **MIHA**- Maternal and Infant Health Assessment; **MIOH**- Midwifery-Initiated Oral Health; **MOS**-Maternal Oral Screening; **OH**- Oral health/hygiene; **PD**-periodontal disease; **PP**-Postpartum; **PPROM**- preterm prelabor rupture of membranes; **PTB**-preterm birth; **PW**- pregnant women; **RCT**-randomized controlled trial; **SR**- systematic review; **SS**-sensitivity & specificity; **tx**- treatment; **VT**- vertical transmission; **yrs.**-years

Appendix B

Models and Frameworks

Figure 1

The Ecological Model of Health Promotion
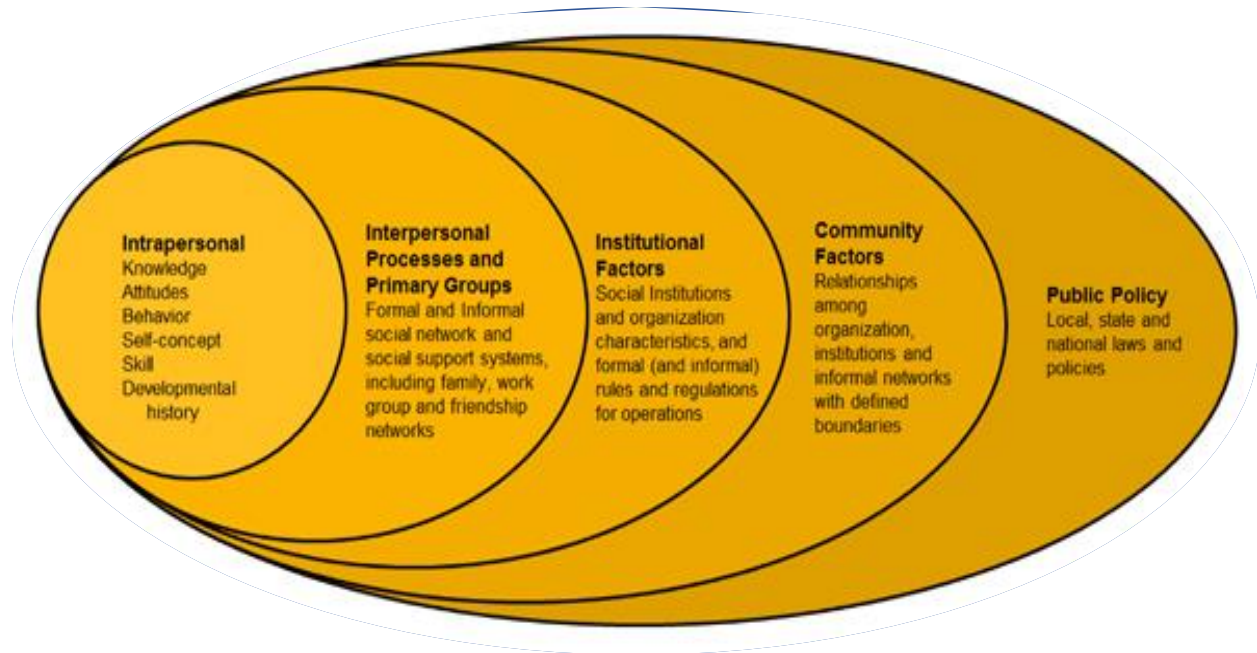
Figure 2

The Oral Health Delivery Framework