Improving Oral Health in Pregnancy

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Abstract

Maintaining good oral health during pregnancy is a significant contributor to healthy pregnancy outcomes. The physiological changes that happen during pregnancy can adversely affect women's oral health and place her at risk for pregnancy outcomes such as miscarriage and preeclampsia. The unborn child's health can also be affected by premature birth and low birth weight. Although professional organizations have evidence-based practice guidelines for both prenatal and dental providers, the evidence shows a gap between recommendations and practice. An oral health promotion project for pregnant women was implemented in a federally qualified community health center where there was a lack of adherence to the guidelines. The purpose of this project was to implement established oral health screening guidelines for pregnant women and to increase dental visits among pregnant women. For this project, a two-item maternal oral health-screening tool (MOS) for the prenatal providers was added into the electronic health record to standardize and document oral health screening for pregnant women at their first prenatal visit. After three months of implementation, there was a significant increase in maternal oral health screening and referral. This project may be replicated at any prenatal setting to improve oral health during pregnancy.

Keywords: Oral health assessment, pregnancy, and dental visits

Improving Oral Health in Pregnancy

Oral health is a pivotal element of general health and wellbeing. According to the World Health Organization (WHO), oral health is a "state of being free from chronic mouth and facial pain, oral and throat cancer, oral sores, birth defects such as cleft lip and palate, periodontal disease, tooth decay and tooth loss, and other diseases and disorders that affect the oral cavity" (WHO, 2016). In the United States, 27.4% of adults aged 20-44 years have dental carries (National Center for Health Statistics, 2015). The 7th oral health objective of Healthy People 2020 is to increase the proportion of children, adolescents, and adults who used the oral health care system in the past year. The baseline for this objective in the year 2007 was 44.5% and the target is 49% by the year 2020. Unfortunately, from 2007 to 2011 this rate decreased to 41.8% (U.S Department of Health and Human Services, 2014). Thus, promoting oral health is a significant unmet need across the lifespan.

Pregnancy is an opportune time for health promotion and maintenance and may be the only time low income women with poor oral health seek medical care. It has been demonstrated that mothers who obtain dental care are more likely to take children to the oral health provider. Besides these advantages, oral health care in pregnancy is indispensible for many reasons. Therefore, a proactive approach is necessary to eliminate the barriers and include this type of care during pregnancy. This project focused on the importance of oral health in pregnancy and effective oral health promotion interventions during pregnancy.

Background and Significance

Undetected and untreated infections and inflammatory conditions in the oral cavity of the mother can have serious consequences for both the mother and fetus. The presence of

periodontal pathogens in the feto-placental compartment can produce IgM antibodies that in turn may result in premature birth or miscarriage. This can occur through direct dissemination or indirectly as a result of cytokine and mediator production. In addition, the placental structural changes from infection or inflammation can lead to preeclampsia in the mother and nutritional deficiency in the fetus (Madianos, Bobetsis, & Offenbacher, 2013). Hyperemesis gravidarum and increased estrogen levels are the other significant contributing factors for oral problems during pregnancy. Although pregnancy itself does not cause periodontal disease or gingivitis, the normal physiologic changes that occur with pregnancy may exacerbate any pre-existing oral conditions (Hemelatha, Manigandan, Sarumathi, Aarthi, & Amudhan, 2013).

Between the years of 1999-2004, only 58.3% of pregnant women had a dental visit; 61.4% of those encounters were for preventive care (Azofeifa, Yeung, Alverson, & Beltran-Aguila, 2014). Although there is no data available for Arizona, it is helpful to look at information from other comparable states. The Pregnancy Risk Assessment Monitoring System (PRAMS) 2011 survey results from ten States estimates that only 49% women visited a dentist during the last pregnancy (Centers for Disease Control and Prevention, 2011). According to Washington State PRAMS, 58% of the surveyed women reported no dental care (Lydon-Rochelle, Krakowiak, Hujoel, & Peters, 2004). Recently the Cigna Corporation did a small national study on this topic that discloses some interesting facts. Among 801 participants, 76% reported having oral health problems whereas only 47% had dental checkups (Cigna Corporation, 2015).

Anecdotal evidence collected from local women's health providers show that oral health screening is not routinely included in the prenatal care bundle of services. Although there is a dental grant to provide dental care funding for pregnant women without dental insurance available in this health center, eligible women are usually unaware of the program. This

knowledge deficit contributes to low utilization of the funds. Despite the understanding of the relationship between periodontal disease and adverse pregnancy outcome, most women's health providers are not familiar with any guidelines on oral health in pregnancy. In addition, more than one third of obstetricians never advised women to get prophylactic dental care and 80% have never even thought about it (George et al., 2012). Similarly, in a survey done among Australian dentists, 95.7% of dentists requested more information on oral care in pregnancy regardless of their knowledge (George et al., 2017). In an Oregon study, more than 50% of dental providers were reluctant to provide even routine dental care during pregnancy (Rainchuso, 2013). The Association of State and Territorial Dental Directors (ASTDD) (2012) found insufficient knowledge, lack of experience, and outdated guideline usage as the reasons dentists offer for being uncomfortable in treating pregnant women. The financial constraints and lack of insurance for low-income women also may reduce access to dental care. The Patient Protection and Affordable Care Act does not require states to provide dental coverage during pregnancy (Affordable Care Act, 2010). The Arizona Health Care Cost Containment System (AHCCCS) will cover up to $1000 in emergency dental services per year for enrollees over 21 years of age (Arizona Public Health Association, 2017).

Government agencies, policy makers, and professional organizations have begun to recognize the importance and value of perinatal oral health care (Hartnett et al., 2016). There is national consensus statement guidance available for the professionals who provide prenatal care, dentistry, and other healthcare on how to improve oral health during pregnancy (National Maternal and Child Oral Health Resource Center, 2012). ASTDD recommends many strategies for improving perinatal oral health (ASTDD, 2012). California Dental Association Foundation (CDA) in association with American College of Obstetrics and Gynecology (ACOG), District IX

provides evidence-based guidelines (CDA, 2010). In addition, ACOG Committee Opinion number 569 emphasizes the significance of oral health during pregnancy and recommends maternal oral health screening at the first prenatal visit (ACOG, 2013).

The most updated best evidence based practice approach for the organizations is from the National Maternal and Child Bureau (2016). It recommends the partnership with state programs, professional organizations, and the state agency implementing perinatal and infant oral health quality improvement grant. Organizations should promote the updated oral health guidelines. In addition, assure that all pregnant women get oral health screening, referral if needed, identify the dentist (dental home), and cleaning before giving birth. Moreover, education and training the prenatal healthcare professionals about the importance of oral health during pregnancy and how to incorporate it into practice also should be incorporated. Furthermore, it proposes to offer incentives for having at least one dental visit during pregnancy (National Maternal and Child Oral Health Resource Center, 2016).

Problem Statement and PICOT Question

Despite women's increased receptiveness during pregnancy and the benefits of oral care, evidence shows that pregnant women seldom seek dental care and confirms the need to promote oral care in prenatal programs. This analysis has lead to a clinically relevant PICOT question: In women's health providers, how does implementing oral health promotion compared to standard of care, affect the rates of dental visits among pregnant women over a three month time period?

Search Strategy

Identification and creation of a list of key words with the consideration of synonyms as the first step in this search technique. Studies were abstracted from three databases: PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), and The Cochrane

Library. In addition, Google Scholar search was done to extract articles about barriers to dental care and insurance coverage for dental care during pregnancy with the key words *oral health care, pregnancy, insurance coverage, and barriers* with 5-year time limit. Further, the Centers of Disease Control and Prevention website was explored to find national and local data related to the problem. Ancestor search was done for the articles from year 2016 and 2017 with the criteria of 5-year limit. The final yield retained for review from the database search was 41 articles. The exclusion criteria applied for the final search was non-pregnant population, articles before 2007, and non-English language. The inclusion criteria were the outcomes oral health behavior, dental visits during pregnancy, oral health knowledge and attitude, and studies delivered in prenatal settings. Finally, 10 studies were selected for the critical evaluation based on the inclusion and exclusion criteria. All these studies were targeted to oral health promotion in pregnancy.

Evidence Synthesis

Selected studies were conducted in different countries: ten in North America, two in Asia, and three in Europe. All were found to be free of significant bias. Eight out of ten articles are written within last three years. Only one study chosen is a systematic review with level I evidence. However, there are four randomized controlled trials with level II evidence, two experimental studies with level III evidence, and one cross sectional study and two cohort studies with level IV evidence. All of them used appropriate methods to analyze the data with programs like SPSS and Microsoft excel. A questionnaire is the most common tool used and all instruments were tested and confirmed with pilot studies for reliability and validity. Cibulka, Forney, Goodwin, Lazaroff, & Sarabia, (2011) used Cronbach's alpha to measure the reliability and expert panel critique to establish content validity of a KAP questionnaire. Seven out of ten

studies had more than one intervention and all ten studies included education, either to the providers or to pregnant women, as one of the interventions.

Because all the studies were done in prenatal settings, most studies had small samples and the samples were either pregnant women or providers in homogenous characteristics. Interestingly, two of the studies' populations were medical students; of those two studies one included dental providers because the researchers were investigating the need for collaboration between the dental and prenatal clinics. Half of the studies focused on the improvement of knowledge, attitude, and behavioral changes as their dependent variables where as one study only looked at the influence of good oral health in pregnancy outcomes in terms of preterm birth and low birth weight. The evidence concerning oral health in pregnancy confirms the need to promote oral care in prenatal programs. Although not all the studies measured the improvement in number of dental visits, all of them indirectly included that goal.

Purpose Statement

Purpose of this project is to increase adherence to the ACOG practice guidelines for oral health care in pregnancy at a federally qualified health center and thereby increase the number of dental visits among pregnant women.

Conceptual/Theoretical Model and Evidence Based Practice Model

The Theory of Reasoned Action proposes that a behavioral action is an outcome of behavioral intentions, which are based on the subjective norms and the attitude toward a particular action (Fishbein & Azjen, 1975). A person's attitude to the behavior develops from the belief about the outcome of the behavior and the evaluation of the outcome (Appendix A). The subjective norms are the perception of the society's belief on this particular action and the commitment to do the social standards (Fishbein & Azjen). For example, if the provider has a

commitment to practice according to the guidelines and realizes that the guidelines recommend oral health promotion in pregnancy, that realization can transform oral health promotion into a behavior norm for that provider. Similarly, when the provider believes that the oral health promotion increases the dental visits among pregnant women and that dental care in pregnancy can reduce the risk for preterm labor and low birth weight, a positive attitude towards oral health promotion may develop. This positive attitude towards the norm of oral health promotion leads to the practice change decision and includes oral health promotion during the prenatal care.

OTTAWA Model of Research offers a comprehensive and interdisciplinary framework for evidence-based practice. Each element of the model influences the other elements (Appendix B). According to this model there is a process of assessing, monitoring, and evaluating each component before, during, and after the implementation of any innovative intervention. Assessment of barriers, potential adopters, and the practice environment must be completed to identify the factors that can affect the intervention uptake. Through the application of the model, the intervention can be modified as needed to get the maximum benefit. The monitoring is ongoing and the outcome is evaluated to determine intended or unintended effects (Rycroft-Malone & Bucknall, 2010). For example, the current practice guidelines, evidence, possible barriers, and current practice behavior regarding oral health care during pregnancy are assessed and documented as the first steps to the development of the potential project. At the implementation stage, utilization of the federal grant provided for dental care in pregnant women can be the financial barrier management. Close monitoring of the practice environment and the outcome will help the innovator to make necessary changes in the project to improve the possibility of achieving the expected outcome.

Project Methods

Internal evidence disclosed a gap between professional guidelines and current practice in a federally qualified community health center with 20 women's health providers. An evidence based maternal oral health screening tool (George et al., 2015) was identified with 2 questions as follows: 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?

After obtaining permission from the author to use the Maternal Oral Health Screening tool (MOS), the management of the health center welcomed the proposed innovative project. The Arizona State University Institutional Review Board approved the project with an expedited review. In collaboration with the health center informative technology staff the 2-point MOS was embeded into the electronic health reord (EHR) as a part of the assessment at first prenatal visit (new OB visit). Women's health providers were informed about the project and the new EHR fields that were added to the system. Based on the patients' responses to the MOS questions, providers were asked to document dental referral using the same process as the current workflow. Moreover, dental providers at the same health center collaborated in the project by scheduling the appointments for pregnant women who were referred for dental care. In addition, a dental grant available at this facility covers the cost of dental care for144 non-insured pregnant women per year. At the end of three months intervention period, post intervention data was collected and compared to data from the same three-month period one year prior to the initiation of the practice change intervention.

Chart audits are commonly used technique in primary health care research (Hogg et al., 2010). The Agency for Healthcare Research and Quality (AHRQ) recommends using chart

audits as a tool to collect data in the primary care setting (AHRQ, n.d). A chart audit form was used to record the patient's age, ethnicity, type of provider that completed the visit, and dental insurance status. In addition, the outcome variables of responses to the oral health screening questions, referral generation and kept dental clinic visit were also recorded in the audit. Each data point was assigned a number that was not connected to any participant, patient, or other personal identifying information. SPSS®23 was used to store, manage, and analyze the data.

Results

A chart audit was performed on all new OB patients of 20 women's health providers: 545 charts from pre-intervention period and 350 charts from post-intervention period were included. The average age of the patients audited during pre-intervention period was 27 years (SD=6.5) and the ages ranged from 15 to 47 years. Most of the women (n=409; 75%) were Hispanic (Appendix C), 17(3%) of the women had no dental insurance, 28(5%) had dental insurance. For 500 women (92%) dental insurance status was not documented; that information is not recorded because no dental care is provided at this facility. Nurse practitioners performed the new OB visit for 416 (76%) patients and physicians completed the new OB visit for 129 (24%) patients included in the pre-intervention chart review.

The average age of the patients whose records were audited during post-intervention period was also 27 (SD=6.88) and the ages ranged from 15 to 44 years. Most of the women (n=266; 76%) were Hispanic (Appendix C), 20 (6%) of the women had no dental insurance, 12 (3%) had dental insurance. For 318 women (91%), their dental insurance status was not available because dental care was not available at this facility. Nurse practitioners cared for 300 of the women (86%) and physicians cared for 50 (14%) of the new OB patients in the post-intervention chart audit period.

Chi-Square test of independence was calculated comparing the frequency of outcome variables in pre and post interventional groups. Phi Coefficient was used to assess the impact of MOS tool on outcome variables. A significant improvement was noted on maternal oral health screening and dental referral in the post-intervention group. There was a notable increase in the number of scheduled visits. However, because quite a few of the scheduled visits were not kept, there was no statistically significant change in the number of actual visits.

Screening: A significant interaction was found between frequency of maternal oral health screening in pre and post intervention group ($\chi 2$ (2)=296.48, $p < .001$). Post-intervention group was more likely to screen (n=157) than pre-intervention group (n=0) (Appendix D). A weak positive association was found (φ=0.58) between MOS tool and maternal oral health screening.

Referral: A significant interaction was found between dental referral in pre and post intervention group ($\chi 2$ (2)=62.69, $p < .001$). Post-intervention group is more likely to refer (n=90) than pre-intervention group (n=37) (Appendix D). A weak positive association was found (φ= .3) between MOS tool and the number of pregnant women who were provided with a dental referral.

In addition to the 277 women who had complete oral health screening, 59 (10.6%) women had a partial oral health screening at their first prenatal visit. Although only 32 out of 277 screened women visited the dentist, considering the number of women who scheduled for a dental visit (n=24) who did not need to see a dentist, and appointment cancellation number suggests a clinical significance of the efficacy of the MOS tool for increasing dental visit among pregnant women. Moreover, the fact that 75% of the women who visited the dentist were screened by the women's health provider is also indicates the positive influence of screening in pregnant women. Among the post-intervention group, 132 out of 277 screened women were

categorized as “visit not applicable” to see a dentist either because of early miscarriage, intra-uterine fetal death, history of dental visit in last year, or the first prenatal visit was at full term pregnancy stage (Appendix D).

Discussion

As pre-intervention period screening data shows, maternal oral health screening during pregnancy was a missing component at this facility. Any health screening provides a platform for both the provider and the patient to discuss and offer a recommended preventive care service (Center for Substance Abuse Treatment, 2009).

All the insured women in this project were enrolled in AHCCCS, the Arizona version of Medicaid, which currently covers only emergency dental care for 21 years of age and above. This means that during the pre-intervention period, 62% of women (n=26) who saw the dentist had dental symptoms. Less utilization of dental grant money through this period also illustrated adherence to the minimum standard for preventive care. On the other hand, even though the grant money was not available for the first month of this project, maternal oral health screening was associated with an increase in referral for and completion of preventive dental care. Of the women in post-intervention group who had a dental visit 63% (n=20) were uninsured and their care was paid by grant funds. Among those who had oral health screening with MOS tool (n=277), 25% of women (n=70) had oral health symptoms, only 12 women (17%) had dental insurance including AHCCCS. However, the beneficiaries of AHCCCS are now looking forward to a current Arizona Senate Bill (SB1445) that addresses this issue and proposes dental coverage for all pregnant women regardless of their symptoms (Arizona Legislative Information System, 2018). If this bill becomes the law, financial hurdle of dental care during pregnancy will resolve in the future in Arizona for women on publicly funded insurance plans.

Collaboration between dentistry and the women's clinic also plays an important role in facilitating adherence to the preventive care standards. A successful implementation of dental care element into prenatal service requires a multidisciplinary approach and a collaborative relationship between women's health and dental providers (Jackson et al., 2015). In the beginning of this project, dental providers' chief concern in this facility was the lack of timely dental referrals from the women's health providers. Implementation of a standardized maternal oral health screening tool into the new obstetrical patient registration process increased the referral rate among the women who visited the dentist from 76% to 88%. In addition to all the above impact and benefits, the organization adapted the MOS tool and decided to continue maternal oral health screening at NOB visit.

The length of the project limited the accuracy of the findings. Most of the patients who are in post-intervention group are just started their pregnancy and have months to visit a dentist. Unexpected closure of one of the dental office in the organization also affected the outcome of the project. In addition, the dental grant was not available for the first month of the project and the women's health providers misunderstood that no dental referral can be provided at that month. Hence, a 9-month long project is recommended for the future.

Conclusion

Increased use of dental service is a national goal. Pregnancy is the perfect time to encourage preventive care and pregnant women are more receptive to health messages. The literature concerning oral health in pregnancy stresses the need to focus oral care in prenatal programs for healthy pregnancy outcomes. According to the professional and national organizational, maternal oral health screening and dental care are standard of care. Two-point MOS tool increase screening rate, referral rate, and dental visits among pregnant women.

References

Agency for Healthcare Research and Quality. (n.d). *Improving your office testing process.* Retrieved from https://archive.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/office-testing-toolkit/officetesting-toolkit9.html

American College of Obstetricians and Gynecologists. (2013). *Oral health care during pregnancy and through the lifespan.* Retrieved from http://www.acog.org/~/media/Committee%20Opinions/Committee%20on%20Health%20Care%20for%20Underserved%20Women/co569.pdf?dmc=1

Arizona Legislative Information System. (2018). Senate Bill 1445. Retrieved from https://apps.azleg.gov/BillStatus/GetDocumentPdf/459412

Arizona Public Health Association. (2017). *Adult AHCCCS members now have access to emergency dental services!* Retrieved from http://www.azpha.org/wills-blog/2017/10/3/adult-ahcccs-members-now-have-access-to-emergency-dental-services#

Association of State and Territorial Dental Directors. (2012). *Best practice approach: Perinatal oral health*. Retrieved from http://www.astdd.org/bestpractices/BPAPernatalOralHhealth.pdf

Azofeifa, A., Yeung, L. F., Alverson, C. J., & Beltran-Aguila, E. (2014). *Oral health conditions and dental visits among pregnant and non-pregnant women of childbearing age in the United States, national health and nutrition examination survey, 1999–2004*. Retrieved from http://dx.doi.org/10.5888/pcd11.140212

California Dental Association. (2010). *Oral health during pregnancy and early childhood: Evidence-based guidelines for health professionals*. Retrieved from http://www.cdafoundation.org/Portals/0/pdfs/poh_guidelines.pdf

Center for Substance Abuse Treatment. (2009). Screening and assessment. In *Substance abuse treatment: Addressing the specific needs of women*. Retrieved from https://www.ncbi.nlm.nih.gov/books/NBK83253/

Centers of Disease Control and Prevention. (2011). *Pregnancy Risk Assessment Monitoring System*. Retrieved from http://nccd.cdc.gov/PRAMStat/rdPage.aspx?rdReport=DRH_PRAMS.ExploreByTopic&islClassId=CLA9&islTopicId=TOP33&islYear=2011

Cibulka, N. J., Forney, S., Goodwin, K., Lazaroff, P., & Sarabia, R. (2011). Improving oral health in low-income pregnant women with a nurse practitioner-directed oral care program. *Journal of the American Academy of Nurse Practitioners, 23*, 249-257. http://dx.doi.org/10.1111/j.1745-7599.2011.00606.x

Cigna Corporation. (2015). *Healthy smiles for mom and baby: Insights into expecting and new mother's oral health habits*. Retrieved from http://www.cigna.com/assets/docs/newsroom/cigna-study-healthy-smiles-for-mom-and-baby-2015.pdf

Fishbein, M. & Azjen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research.* Reading, MA: Addison-Wesley.

George, A., Ajwani, S., Bhole, S., Dahlen, H., Reath, J., Korda, A., ... Johnson, M. (2017). Knowledge, attitude and practices of dentists towards oral health care during pregnancy: A cross-sectional survey in New South Wales, Australia. *Australian Dental Journal*. http://dx.doi.org/10.1111/adj.12505

George, A., Ajwani, S., Johnson, M., Dahlen, H., Blinkhorn, A., Bhole, S., ... Dawes, W. (2015). Developing and testing of an oral health screening tool for midwives to assess pregnant

women. *Health Care for Women International*, *36*(10), 1160-1174. http://dx.doi.org/10.1080/07399332.2014.959170

George, A., Shamim, S., Johnson, M., Dahlen, H., Ajwani, S., Bhole, S., & Yeo, A. E. (2012). How do dental and prenatal care practitioners perceive dental care during pregnancy? Current evidence and implications. *Birth Issues in Prenatal Care*, *39*(3), 238-247. Retrieved from

Hartnett, E., Haber, J., Krainovich-Miller, B., Bella, A., Vasilyeva, A., & Kessler, J. L. (2016). Oral health in pregnancy. *Journal of Obstetric, Gynecologic, & Neonatal Nursing*, *45*(4), 565-573. http://dx.doi.org/10.1016/j.jogn.2016.04.005

Hemelatha, V. T., Manigandan, T., Sarumathi, T., Aarthi, N., & Amudhan, A. (2013). Dental considerations in pregnancy: A critical review of oral care. *Journal of Clinical and Diagnostic Research*, *7*(5), 948-953. http://dx.doi.org/10.7860/JCDR/2013/5405.2986

Hogg, W., Gyorfi-Dyke, E., Johnston, S., Dahrouge, S., Liddy, C., Russell, G., & Kristjansson, E. (2010). Conducting chart audits in practice-based primary care research. *Canadian Family Physician*, *56*(5), 495-496. Retrieved from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2868621/

Jackson, J. T., Quinonez, R. B., Kerns, A. K., Chuang, A., Eidson, R. S., Boggess, K. A., & Weintraub, J. A. (2015). Implementing a prenatal oral health program through interprofessional collaboration. *Journal of Dental Education*, *79*(3), 241-248. Retrieved from http://www.jdentaled.org/content/79/3/241.full.pdf

Lydon-Rochelle, M. T., Krakowiak, P., Hujoel, P. P., & Peters, R. M. (2004). Dental care use and self-reported dental problems in relation to pregnancy. *American Journal of Public Health*, *94*(5), 765-771.

Madianos, P. N., Bobetsis, Y. A., & Offenbacher, S. (2013). Adverse pregnancy outcomes (APOs) and periodontal disease: Pathogenic mechanisms. *Journal of Clinical Periodontology*, *40*(S14), S170-S180. http://dx.doi.org/10.1111/jcpe.12082

National Center for Health Statistics. (2015). *Health, United States, 2015: With a special feature on racial and ethnic health disparities*. Retrieved from Centers for Disease Control and Prevention: http://www.cdc.gov/nchs/data/hus/hus15.pdf#060

National Maternal and Child Oral Health Resource Center. (2012). *Oral health care during pregnancy: A national consensus statement.* Retrieved from http://mchoralhealth.org/PDFs/OralHealthPregnancyConsensus.pdf

National Maternal and Child Oral Health Resource Center. (2016). *Promoting oral health during pregnancy: Update on activities.* Retrieved from http://mchoralhealth.org/PDFs/OralHealthPregnancyUpdate_2_2016.pdf

Rainchuso, L. (2013). Improving oral health outcomes from pregnancy through infancy. *Journal of Dental Hygiene*, *87*(6), 330-336.

Rycroft-Malone, J., & Bucknall, T. (2010). *Models and frameworks for implementing evidence-based practice: Linking evidence to action*. Chichester, England: Wiley-Blackwell.

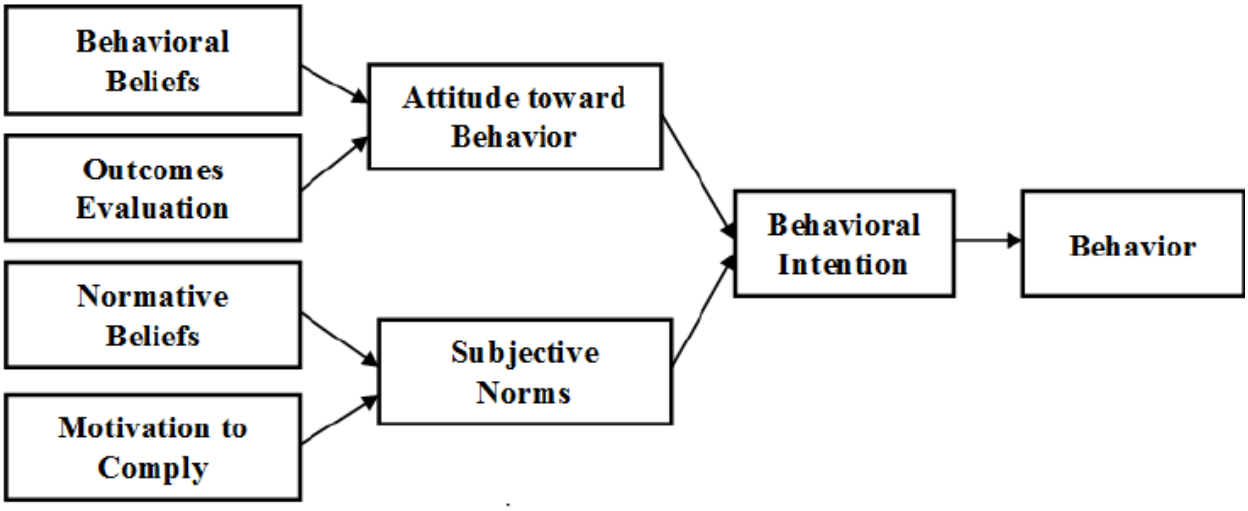
The Affordable Care Act. (2010). Retrieved from http://www.hhs.gov/healthcare/rights/law/index.html

U.S Department of Health and Human Services. (2014). *Healthy People 2020 Leading Health Indicators: Oral health*. Retrieved from https://www.healthypeople.gov/sites/default/files/HP2020_LHI_Oral_Health_0.pdf

World Health Organization. (2016). *Oral Health*. Retrieved from http://www.who.int/topics/oral_health/en/

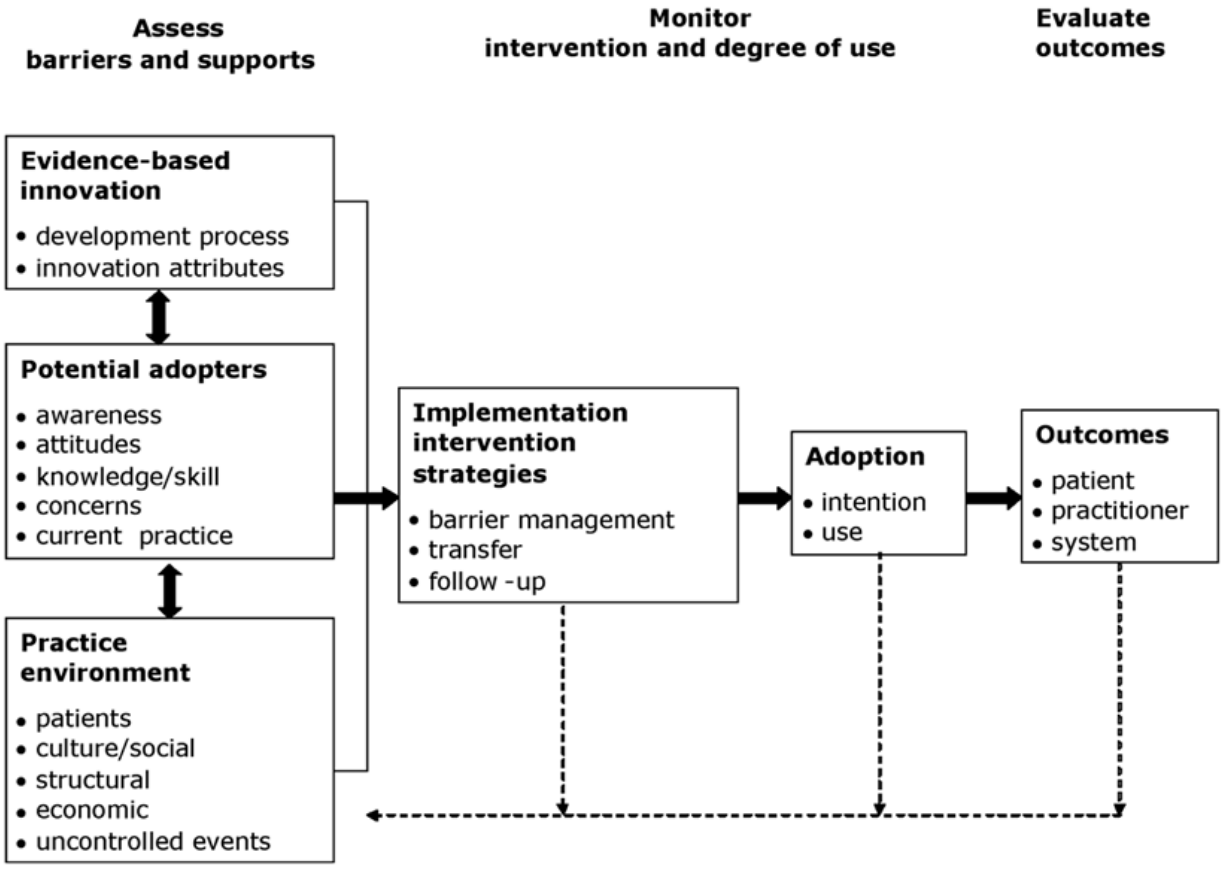
Appendix A

Theory of Reasoned Action



Appendix B

OTTAWA Model of Research Use



Appendix C

Table 1 *Ethnicity: Pre-intervention group*

Ethnicity	**N**	**Percent**
Caucasian	37	6.8
Hispanic	409	75.0
Asian	9	1.7
African American	75	13.8
Other	15	2.8

Table 2 *Ethnicity: Post-intervention group*

Ethnicity	**N**	**Percent**
Caucasian	25	7.1
Hispanic	266	76.0
Asian	3	0.9
African American	44	12.6
Other	12	3.4

Appendix D

Table 1 *Screening*

	Pre-intervention	**Post-intervention**
Screening done	0	157
Screening not done	545	193

Table 2 *Referral*

	Pre-intervention	**Post-intervention**
Referred	37	90
Not referred	508	260

Table 3 *Dental visit: Post-intervention*

	N	**Percent**
No	339	60.9
Yes	32	5.7
Scheduled	24	4.3
Cancelled	30	5.4
Not applicable	132	23.7