

TRANSLATING PRENATAL ORAL HEALTH GUIDELINES
INTO OBSTETRIC PRACTICE,
A PRACTICE CHANGE PROJECT

by

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DEDICATION

This professional project is dedicated to my husband, Josh Daniel Martin whose love, prayers, unfailing support, patience, encouragement, reassurances, and much time spent diverting our young daughter's attention while I labored away, has made the process of this professional project a joy. This professional project is also dedicated to our young daughter, Bryndlee Jo Martin, whose blessed presence in our household began while I was in the midst of this project. I have many great hopes and aspirations for you my sweet dear, but all of which pales to my fervent desire that you have a deep and abiding relationship with Christ and walk always in His ways.

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ABSTRACT

Early childhood caries (ECC) is prevalent and burdensome to a child's quality of life and development, albeit preventable. ECC prevention strategies implemented in the prenatal period are well supported by evidence to reduce ECC incidence and dictated in numerous prenatal oral health guidelines. However, obstetric (OB) providers do not often practice this evidence. The purpose of this project was to assess, plan, implement, and evaluate the introduction of prenatal oral health practices, that coincide with current prenatal oral health guidelines, to OB providers at one OB clinic. To do so, current prenatal oral health guidelines were evaluated and coalesced to form of a prenatal oral health protocol (POHP). Two OB provider and medical assistant (MA) pairs implemented the POHP over a 90-day implementation period in one OB clinic. Lewin's Change Theory guided the practice change process. To determine if, by implementing the POHP, the prenatal oral health practices of participating OB providers were significantly improved, before and after patient's charts were reviewed and data measuring provision of oral health practices were compared using a permutation test. It was also planned to measure dental attendance. A written survey was given to participating OB providers and MAs at the end of the project to gain their perspective on the practice change process and likelihood of sustainability. The results show that significantly more patients had documentation of prenatal oral health education ($p < .0002$, 95% CI 0.476-0.857), oral screening questions ($p < .0002$, 95% CI 0.857-1), and an oral screening exam ($p < .0002$, 95% CI 0.619-0.952) after the POHP was implemented than before. A dental referral was not made, thus it is unknown how many patients, in receiving a dental referral, would have attended the dentist at some point during pregnancy. Four out of 17 patients, correctly screened, should have received a dental referral based on the POHP, but did not. The survey showed favorable views of the practice change process and likelihood of sustainability. In conclusion, prenatal oral health practices can be incorporated into the practice of OB providers using a POHP, an appropriate implementation period, and a practice change process guided by Lewin's Change Theory

CHAPTER ONE - INTRODUCTION AND BACKGROUND

Project Purpose

The purpose of this professional project was to assess, plan, implement, and evaluate the introduction of prenatal oral health practices, that coincide with current prenatal oral health guidelines, to OB providers and staff in one local OB clinic.

Prevalence and Burden of Early Childhood Caries (ECC)

Early childhood caries (ECC) is defined as the presence of one or more decayed (non-cavitated or cavitated lesions), missing (due to caries) or filled tooth surfaces in any primary tooth in a child between birth and 71 months of age (6 years old) [1]. Severe early childhood caries (S-ECC) is defined as any sign of dental decay in a child younger than three years of age [2]. In 2000, the U.S. Surgeon General published a report on oral health in America. Through this report, the medical, dental, and public communities gained a heightened awareness of dental and oral diseases as a ‘silent epidemic’ in the U.S. because of high prevalence, poor treatment rates, missed preventative opportunities, and intermittent symptoms [3]. This ‘silent epidemic’ begins at an alarmingly early age. The U.S. Centers for Disease Control and Prevention reports that in 2011, almost one in four (23%) of U.S. children experience ECC [4]. This is far from the Healthy People 2020 ECC goal of about one in ten (11%) children [5].

It is well recognized that well being and quality of life during early childhood is crucial for children’s further development. While it is not possible to eliminate all disease

states that diminish a child's quality of life, efforts should be made to prevent those disease states that are preventable. ECC is one of those disease states that affect a child's quality of life [6, 7] and is indeed preventable [7]. Consequences of early childhood caries that impact a young child's quality of life includes physical pain [8, 9], poor self-image [8], poor sleeping [9], poor weight gain [10], eating difficulties [9, 11], compromised smile [8], restriction of communication [11], impaired speech development [11], delayed growth and development [10, 12], fear and aversion secondary to dental treatments [13], decreased school performance [9], and embarrassment [9]. Furthermore, the negative impact of early childhood caries continues with age. There is strong evidence that children who experience ECC are very likely to develop further dental problems with age [14-16], even after ECC restoration [16].

ECC is one of the most costly health conditions among young children because the monetary cost for restoration is considerable [7]. The Medical Expenditures Survey found that in 2006, ten years ago, 19.4% of U.S. children less than 5 years of age had a dental expenditure, for a total cost of \$729 million. The fraction of cost attributed to ECC restoration was not reported, but even if a fraction of the expenditure was due to ECC restoration, the cost is sizable [17].

ECC restoration is very costly to the U.S. Medicaid system. In the U.S. in 2013, 359 million Medicaid dollars were spent on children ages 0-5 on dental care [18]. Since the Medicaid population in this age group follows an urgent care type of dental utilization [19], it can be inferred that much of this high monetary cost is for restorative care rather than prevention. The high cost for restoration can be attributed to the required general

anesthesia and hospitalization due to the young developmental age of the child who is affected by ECC. Across six states in 2011, there were 26,373 children enrolled in Medicaid who underwent surgical care for child caries restoration, costing \$68 million Medicaid dollars, with an average of \$2,581 per case. Two-thirds of these cases were for ECC restoration. It's estimated that in 2011, \$450 million U.S. Medicaid dollars were spent on surgical pediatric caries restoration, the majority of which was for ECC (*). A study of Iowa's Medicaid-enrolled children less than six years of age, found that very few (less than 2%) children receive restoration for ECC under anesthesia, but those that do consume one quarter (25%) of all Medicaid dollars spent in Iowa on dental care for children in that age group [20]. ECC restoration is particularly costly considering the repetitive restorative cycle of ECC [21] and the association between ECC restoration and increased caries lesions with age [16, 22].

Additionally, the high incidence of Emergency Department (ED) visits for ECC-related conditions is costly, as seen by several studies of ED visits for nontraumatic dental treatment. In Washington State between the years 1995 and 2003, 84% of the 1079 patients presenting to the ED for caries were for primary teeth and Medicaid was most often the payer type [23]. In California, the rate of preventable dental ED visits for children ages 0-5 was 189-222 per 100,000 between 2005 to 2007 [24]. Similarly, In New York state, in the years 2004 through 2008, there were 25,622 ED visits for ECC, costing 31.3 million dollars in 2008 alone [25]. Considering that the rate of ECC-related ED visits in U.S. states are rising [25] and inflation of ED costs, we can assume the cost

burden of ECC related ED visits today is much higher. All of these studies emphasize the importance of early ECC prevention for dental cost savings.

Oral Health Interventions during Pregnancy Prevent ECC

ECC is a chronic infectious disease. *Mutans Streptococcus* (*MS*) is an oral bacterial flora that contributes largely to the pathologic process that leads to ECC in the mouths of young children [26, 27]. Although several cariogenic bacteria species associated with ECC exists in the mouths of children with caries [28-30], demonstrating the complexity of the microflora [31] and spurring the current thought that they act collectively and possibly synergistically in ECC etiology [32], *MS* is implicated as one of the most virulent and principal oral bacteria responsible for ECC [33]. *MS* adheres to the host's tooth surface in a biofilm, called plaque, and emit acid while digesting carbohydrates consumed by the host. This acid de-mineralizes the enamel on the tooth surface, especially when further perpetuated by a high sugar environment that lowers oral pH, causing cavitation and initiating the caries process [34, 35]. The presence of *MS* in a child's mouth is a strong risk indicator for ECC [26, 36] and the higher the levels of *MS* in the child's mouth, the higher the risk is of developing ECC [37-40]. *MS* can colonize the oral cavity as early as 3 months of age [38], even before primary teeth begin to erupt [37, 38, 41]. Earlier age at *MS* acquisition in the child's mouth is significantly associated with higher number of cavities in early childhood [38, 39, 42]. In fact, children who have detectable levels of *MS* at 12 months of age have a 13-fold risk of developing caries [38].

Evidence has demonstrated the persistence of *MS* colonization in the child [38, 43], thus the chronic nature of this infectious disease.

ECC is transmittable. The young child acquires caries causing bacteria primarily through direct salivary transmission from their mothers [37]. Although it has been shown that horizontal transmission, from child to child [37, 44], and vertical transmission by other caregivers is possible [45], the mother is the main source of *MS* transmission to the young child [37, 43, 46-50] and also the most common mode of initial *MS* acquisition [42, 46].

There are many maternal factors that researchers have found to increase the risk of maternal transmission of *MS* to her infant in just the first year of life. There is a significant association between high maternal *MS* levels (10^5 cfu/ml or greater) in the infant's first year of life and both the acquisition of *MS* in the child [51-53] and early childhood caries [37, 52]. In fact, the risk of early child caries incidence doubles when the mother has high levels of salivary *MS* within the infant's first year of life [52]. There is also a significant association between higher *MS* levels in the mother's mouth in the infant's first year of life and the earlier age at which *MS* acquisition occurs in the child [47]. When interventions reduce the mother's *MS* levels during the prenatal period or the infant's first year of life, it is found that her child's level of *MS* is significantly lower in early childhood [51, 54, 55], the child acquires *MS* at a later age [54], the child has statistically less incidence of ECC [56], and the child has a long-term caries risk benefit overall [57, 58]. Additionally, maternal periodontal disease [53, 59], poor oral hygiene practices [59], plaque in greater than 50% dentition [53], and caries [59] in the first year

of the infant's life are significantly associated with MS transmission to her infant. There is a significant association between a mother's caries score by the WHO definition during the infant's first year of life, and the age at which the infant acquires *MS* [47]. One study showed that when the mother had an untreated decayed tooth within the child's first three years of life, the child's caries prevalence was 22.5 times higher by age 3 [60].

The frequency of the mother introducing MS, via her saliva, to the baby's mouth is also an important factor in MS transmission. Maternal saliva sharing behaviors, such as sharing the baby's eating utensils and pre-tasting the infant's food within the first year of life [41, 53, 59], is significantly associated with MS transmission to her infant. The role of the mother's oral health status and early timing in MS transmission to the infant highlights the importance of early timing of both maternal dental attendance and provision of anticipatory guidance to mothers on preventing MS transmission. It is preferable that maternal dental attendance and education on MS transmission be initiated with the mother in the prenatal period, well before the infant's first year of life.

Diet and oral health behaviors during the first year of the infant's life are important ECC etiological factors and are modifiable by parents. There are several dietary behaviors within the first year of life that are significantly associated with ECC, including high frequency of sugar consumption [61-63] or snacks [62, 64], high total sugar intake [64, 65], night time feedings past 12 months of age [61, 65], consumption of sweetened beverages [61, 62, 65, 66], breastfeeding greater than six times per day at 12 months of age [64], and consuming a bottle containing a liquid other than milk [64]. Furthermore, the earlier the infant is introduced to high sugar content items, the higher

the incidence of S-ECC [67]. Additionally, there are several early oral health behaviors, optimally initiated in the child's first year of life, which serve as preventive factors for ECC. Tooth brushing at 12 months of age is associated with decreased ECC incidence [66]. The use of toothpaste with standard fluoride concentrations (1000-1500ppm) has well established efficacy for preventing caries in both the permanent [68] [69] and primary teeth of children [70]. So too, early preschool preventive dental visits reduce the incidence of ECC [71, 72]. The first dental visit is recommended by the American Academy of Pediatric Dentistry and American Academy of Pediatrics to be before every child's first birthday [73, 74]. Although there is some evidence to support the one year dental visit in high risk children [71, 75], there is inadequate research to support its efficacy for ECC prevention in low-risk children [76]. It is suggested that children at high risk should be given priority for a preventive dental visit at 12 months of age [19]. There is proven efficacy of professionally applied topical fluoride to reduce the incidence of caries in the permanent and primary teeth of children [77]. Professionally applied topical fluoride not only prevents, but re-mineralizes and arrests caries in the primary and permanent teeth of children [78]. Dental sealants have clear caries prevention efficacy in the permanent teeth of children [79], but aren't typically used as decay prevention for primary teeth.

Very early preventive dietary and oral health behaviors, once established, are resistant to change. Parents who establish brushing a child's teeth twice daily at one year maintain the behavior through preschool years [66]. Snacking habits and sugar intake at one year of age are similarly maintained through the child's first ten years of life [80].

Infant feeding practices may be established as early as 6 months of age, with food and drink consumption frequency differing little at 6, 12, and 18 months of age [81]. So too, children that receive early preventive dental visits are more likely to have subsequent preschool aged preventive visits [71]. Furthermore, parents having established one favorable oral health behavior at 12 months, tend to establish several [82]. The early timing of initiation of preventive dietary and oral health behaviors, the resiliency of preventive oral health behaviors established during a child's first year of life, and the tendency of the accompaniment of more favorable early oral health behaviors with a single one, further potentiate the necessity of educating parents on oral health preventative behaviors well before the infant's first year of life. It is preferable that ECC prevention programs be initiated with the mother in the prenatal period so that prevention begins well before the infant's teeth erupt or early oral health behavioral patterns are well established.

There are only two oral health intervention studies beginning in the prenatal period that report on ECC outcomes. In a randomized control trial (RCT) of 414 mother and infant pairs in Australia, it was demonstrated that repeated anticipatory guidance on maternal and infant diet and oral health behaviors initiated in pregnancy and continued through early infancy, reduce the incidence of S-ECC five fold [83] and significantly reduce the use of dental treatments through the preschool years [84]. Although the reduction of ECC incidence was insignificant, the severity of caries in childhood was significantly reduced [85]. In a RCT of 310 mother and infant pairs on a Chilean naval base, it was demonstrated that professional dental care during pregnancy and maternal

and infant oral health education beginning in pregnancy and continuing during preschool wellness visits, significantly decrease incidence of both S-ECC [86] and ECC [87]. These outcomes suggest that prenatal dental attendance and infant and maternal oral health education beginning in pregnancy prevent S-ECC and at least minimize ECC severity.

Prenatal Oral Health Interventions May Mitigate Adverse Obstetric Outcomes

Periodontitis is defined as “a bacterially induced chronic inflammation of the periodontal tissues that results in loss of attachment and alveolar bone destruction” that is irreversible. Management of periodontitis focuses on prevention of progression [88]. Gingivitis is seen as a precursor to periodontitis and is defined as “bacterially induced inflammation that is confined to the gingival tissues” that is reversible with improved self-care and professional plaque removal [88]. Periodontitis is fairly common among pregnant woman; among one cohort of U.S. pregnant women, 54% had mild periodontal disease and 19.5% had moderate or severe periodontal disease [89]. There are many research publications that suggests an association between maternal periodontal disease during pregnancy and adverse obstetric outcomes including preterm birth (PTB) [90, 91] and low birth weight (LBW) [90]. Thus a casual relationship between periodontitis and adverse pregnancy outcomes has been suggested. However, the existing studies on the effect of periodontal treatment with scaling and root planning on the incidence of preterm birth are conflicting. Meta-analyses and large RCTs have not demonstrated that periodontal therapy during pregnancy reduces PTB [92-97] or LBW [92, 93, 96]. In addition, there are conflicting results as to whether periodontal disease in pregnancy is

associated with preeclampsia [98, 99]. Despite the lack of research evidence to support the notion that there is a casual relationship between periodontal disease and adverse obstetric outcomes, research has demonstrated the safety of periodontal therapy during pregnancy and its association with improved maternal oral health [93, 95, 97].

The Effects of Normal Physiologic Changes of Pregnancy on Oral Health

The normal physiologic changes of pregnancy, including alterations in the immune system, particularly inhibition of neutrophils [100], hormonal changes, including increased estrogen and progesterone, and increased vasculature and blood flow to oral tissues [101], have significant effects on gingival tissues which is manifested by pregnancy gingivitis [101]. The term ‘pregnancy gingivitis’ refers to dark, red, swollen, and easily bleeding gums that occurs in up to 100% of pregnancies and in and of itself not pathologic [100]. Although pregnancy gingivitis is considered non-pathologic, it does increase gingival irritants, like oral bacterial flora and plaque accumulation, which predispose the woman to pathologic gingivitis and even periodontitis. This also explains the exacerbation of pre-existing gingivitis and periodontal disease that occurs in pregnancy without positive changes in oral hygiene [100, 102]. The hormones estrogen and progesterone increase many times over as the pregnancy progresses. So too, the severity of pathologic gingivitis and periodontitis tends to gradually increase without intervention as the pregnancy progresses [89, 100, 103].

Pathologic gingival issues are prevalent among pregnant women in the U.S. At least 50% of U.S. pregnant women experience pathologic gingivitis during pregnancy

[104], compared to 38.4% of women in the general population [105]. In 2013 in the Western rural state in which this project takes place, half (48.1%) of pregnant women reported bleeding gums when brushing, one-fourth (22.6%) reported swollen, puffy gums, and a small portion reported loose teeth (2.9%), receding gums or longer appearing teeth (8.7%), and spaces between teeth that weren't there before pregnancy (3.5%), all signs of gingival alteration and possible periodontal disease [106].

Frequent vomiting, a common phenomenon in pregnancy, poses a further oral health risk. The majority (70-85%) of women across the U.S. experience nausea and vomiting during pregnancy and a minority (0.3-2%) experience unrelenting nausea and vomiting during pregnancy, called hyperemesis gravidarum [107]. Repeated vomiting can lead to acid-erosion of the tooth surface and enamel loss, predisposing the teeth to dental caries [101].

Underutilization of Oral Health Services During Pregnancy

There is strong quality evidence to support the notion that regular professional teeth cleaning to remove plaque is both a preventative and treatment measure for periodontal and gingival disease [88], as well as a method to suppress caries-causing bacteria, although not permanently [108-110]. As a general rule, the average individual should seek prophylactic and screening dental care every six months and the American Dental Association recommends the frequency to be more or less depending on oral health status and dentist designation [111]. Pregnancy is no reason to forgo recommended regular and frequent dental visits. The most recent guidelines are clear that routine dental

visits, prophylaxis, and treatments should be encouraged during pregnancy and can be safely performed during any trimester [112]. However, across 10 U.S. States in 2004-2006, the majority of women (56%) didn't actually seek dental care during pregnancy and two-thirds (60%) did not have a professional teeth cleaning during pregnancy [113]. According to a 2013 surveillance program, half (48%) of pregnant women in one of the counties served by the OB clinic did not receive dental care during pregnancy [106].

Patient Barriers to Oral Health Services During Pregnancy

It is well known across the U.S. that the main reason for not seeking professional dental care is insurance status and personal finances. This is also the case for pregnant women in the western state in which this project takes place, as finances and dental insurance status was the most often (43%) stated reason for not receiving dental care during pregnancy in 2013 [106]. However, despite Medicaid or Dental insurance, pregnant women still underutilize dental care during pregnancy. In this Western rural state, those enrolled in Medicaid's Pregnant Woman Program are eligible for a dental program that pays for preventative and treatment services until the end of the same month of delivery. Considering the high rates of Medicaid enrolled pregnant women in the local county (52%) and the high rates of missed dental care during pregnancy (48%)[106], it seems likely that Medicaid covered dental benefits are going unused. Information on use of Medicaid dental benefits during pregnancy is not readily available for this state. However, California has a very similar plan and in 2007, one in seven pregnant woman eligible for dental benefits by Medicaid actually sought dental care [114]. Medicaid

dental benefits for pregnant women in New York were also vastly underutilized; only half of pregnant women enrolled in Medicaid made use of dental benefits during pregnancy [115]. Ineffective use of available dental benefits by pregnant women is also evident among women with private dental insurance [116].

Another reason a small portion of pregnant women in this state (9%) cite for not seeking professional dental care during pregnancy, is the belief that it is unsafe for the baby [106]. This is a detrimental misunderstanding that impacts access to professional dental care during pregnancy. The remaining reasons women in this state profess for not seeking dental care during pregnancy is too many other things going on (28%), didn't feel it necessary to go to the dentist (25%), and had seen a dentist within last one year (19%)[106].

Primary care and obstetric providers are in an ideal position to address all of these reasons women state for not seeking dental care during pregnancy. Providers can educate pregnant women of the importance of prioritizing frequent and regular professional dental care during pregnancy, inform Medicaid paying women of their dental benefits, and reassure women of the safety of professional dental care during pregnancy.

In the state in which the project takes place, there are certainly disparities and cultural barriers for women to receive dental care during pregnancy. In the state in 2013, women who were younger, Hispanic, unmarried, of lower income, and lower education were less likely to receive dental care during pregnancy [106]. In 2013, 12% of pregnant women in the state were of Hispanic origin, 6.9% had less than a high school education, and 35.8% had less than a 25,000 yearly family income [106]. The large Hispanic

population in the state presents a dental access problem related to language barriers. One-tenth (12%) of the pregnant population in the state is of Hispanic decent [106] and in one county served by the participating obstetric clinic, one in four (25%) are of Hispanic decent [117]. In the state, the most common language spoken at home is English (90%) followed by Spanish (8%) [118]. A language barrier between the dental provider and patient may lead the patient to be hesitant to seek dental care.

Provider Barriers to Oral Health Services During Pregnancy

Dentists can be a barrier for women getting professional dental care in the prenatal period. In surveys, almost all (97%) dentists believe dental treatment should be a part of pregnancy [119]. However, many obstetricians (77%) have indicated a lack of dentists willing to treat pregnant women and even report patient verbalizations of being declined dental services because of pregnancy [120]. The hesitancy of dentists to treat pregnant women stems from a concern about the safety of dental procedures and medications during pregnancy, even though the most recent guidelines across medical and dental professions are clear that routine dental visits, prophylaxis, and treatments can be safely performed at any time in pregnancy [112].

So too the obstetric provider can be a barrier. Although there is sufficient evidence in the literature and clear practice guidelines to support prenatal oral health education and prophylactic oral health treatment during pregnancy, obstetric providers are infrequently putting this evidence into practice. In surveys, most obstetricians (84%) recognize the importance of routine dental care during pregnancy [120], but very few

(22%) actually looked into the mouths of their prenatal patients for an oral screening exam [121], and only half (51-62%) advise pregnant patients to see a dentist for routine prophylaxis [120, 121]. A survey of Ohio obstetricians has shown that those who refer obstetric patients to a dentist are by far the minority (6%) [119]. Furthermore, even though the majority (82%) [119] of Obstetricians agree that there is lack of understanding on the part of the patient about the importance of oral health during pregnancy, counseling about oral health during pregnancy isn't happening, as reported by 59% of postpartum patients [113]. In fact, only one-third (31%) of Obstetricians report providing perinatal oral health information [120].

Communication between dental and obstetric providers needs improvement. One study mapping journal article citation ties, demonstrates that there is limited scholarly communication between prenatal and oral health provider disciplines regarding oral health and pregnancy [122]. The disconnect between dental and OB providers extends beyond research into the practice community too. In an Ohio survey of dentists and obstetricians, only 38% of dentists and 39% of obstetricians thought there was good communication between healthcare professionals with regard to dental care during pregnancy [119]. In one survey of Connecticut general dentists, all agreed that an oral health evaluation and referral by an OB provider would be ideal, but less than one in three (30%) have ever received such a referral [123].

System Barriers to Oral Health Services During Pregnancy

Access to professional dental care, in this state in which this project takes place, is a barrier to professional dental care in general. As of 2012, 42 of the state's 44 Counties were designated as a dental Health Professional Shortage Area, based on geographics or population [118].

Access to dental care for Medicaid enrollees in the state is even harder to come by, because it is hard to find a dentist to treat Medicaid-paying patients [124]. This poses a barrier to the 52% of pregnant women enrolled in Medicaid served by the OB clinic in which the project takes place. There are fewer than 500 dentists in the state who accept Medicaid at all, but only 200 of those are specified as accepting new Medicaid patients. Additionally, many dentists in the state specify that they accept only Medicaid patients younger than twenty-one, making it even more difficult for pregnant women to find access. Dentists' stated reasons for not accepting Medicaid as payment include primarily low payment rates, although administrative requirements and patient issues like missed appointments and low compliance with treatment plan are also commonly stated [124]. The current Medicaid reimbursement for pediatric dental services in the state, and likely similar for pregnant women, is 44.8% of commercial dental insurance reimbursement rates, which is down 23.8% since 2003 [125]. Local dentists verbalize that for many dental services, they are paying more for the service provided in supplies and staff salary than they receive in payment for the service from Medicaid. It's no wonder that few dentists accept Medicaid and there is low dental care access for Medicaid paying patients.

Long wait times for a dentist appointment also pose a systems barrier to professional dental care in pregnancy. Since much of the state is designated a dental health provider shortage area by the Health Resources and Services Administration [126], dentists are in high demand which inflates wait times for an appointment. Although a survey conducted by the American Dental Association reports that wait times for an initial new patient appointment at a *private* dental clinic is on average 6.9 days [127], that is reportedly not the case for public access dental clinics, who provide dental care to Medicaid-paying patients. At one public access dental clinic in the local area, the wait for an appointment for new Medicaid patients is three months. In a 2013 survey, time is the second most common reason (27.5%) after money (43.3%) that women in this state report for not going to the dentist during pregnancy [106]. A long wait time for an appointment contributes to this time constraint.

CHAPTER TWO - LITERATURE REVIEW

The literature was searched for guidelines on perinatal oral health. An electronic search was conducted using PubMed, Web of Science, National Guideline Clearinghouse, CINHAL, Cochrane, grey literature, and guidelines from references within selected guidelines. The following terms were used in the search: “perinatal oral health”, “oral health pregnant women”, “oral health care pregnancy”, “prenatal oral health”. Literature included were guidelines or recommendations by authoritative medical or government sources, on oral health and the pregnant population, written within the past 10 years, written in English, and relevant for medical professionals in clinical practice. Literature that was excluded were guidelines that were not endorsed by a medical organization or government health department, the intent of use was for national or state programs or policy makers, the intend of use was for dental or pediatric medical professionals only, or written to apply to a specific subpopulation within the pregnant population. Seven prenatal oral health guidelines were identified, two of which were summaries of the other guidelines. See Appendix A ‘Literature Review Matrix’.

There were three elements of oral health provision to pregnant women consist across all the guidelines, including patient education, oral screening, and referral based on that screening. The specifics in content and method of each of the three elements differ slightly among the guidelines.

In regards to patient education, it was uniform across all seven guidelines that content included both prenatal oral health education and anticipatory guidance for the infant. Some guidelines didn’t specify anticipatory guidance content recommendations

[128, 129], others were sparse in content recommendations [130], but most guidelines were specific and explicit, recommending pregnant women receive anticipatory guidance for the infant on timing of first dental visit, avoiding saliva-sharing behaviors, importance of parental dental care, diet, oral hygiene habits, and fluoride intake [131-134]. Two anticipatory guidance content items that were recommended by one or two guidelines, but not all, included wiping infant's gums after bottle or breastfeeding [132, 134] and how to visually inspect infant's mouth for white or brown spots on dentition [132].

The recommended method of anticipatory guidance counseling and prenatal oral health education to the pregnant patient by the OB provider was not explicitly specified in any of the guidelines, but two guidelines provided written material, both for anticipatory guidance and prenatal oral health education [133, 134]. A few guidelines recommended prenatal oral health education be integrated into prenatal classes [128, 129, 133].

The content of prenatal oral health education varied very little between guidelines, as all recommended that pregnant women receive education on oral hygiene behaviors, use of fluoridated toothpaste, diet, the importance and safety of professional dental care during pregnancy, use of xylitol gum, and oral hygiene practices that reduce oral health risk with frequent vomiting [128-134]. Additionally, a few guidelines recommended including the use of chlorhexidine and fluoridated mouth rinse in prenatal oral health education [130, 132, 133].

All guidelines recommended the timing of the oral health assessment and needed referral to occur at an early prenatal visit. Several guidelines specified the timing of that

oral health assessment and needed referral to occur at the very first prenatal visit [130, 133, 134]. Reasons for an early assessment and referral are commonly cited as the woman's limited Medicaid dental benefits only through pregnancy and to ensure needed treatment occurs before the infant is born.

The recommended method of oral screening differed among the guidelines. One guideline did not specify the type of screening [131], while two recommended screening questions and exam [132, 133] and several recommended screening questions only [128-130, 134].

Several guidelines specify recommended screening questions. Three guidelines recommended the following two screening questions: "do you have bleeding gums, toothache, cavities, loose teeth, teeth that do not look right or other problems in your mouth" and "have you had a dental visit in the last 6 months [128, 129, 134]?" The first question recommended to be used for referral making decisions and the second question to be used as an opportunity to encourage routine dental care during pregnancy. One guideline recommended the use of following four screening questions to be used for referral decisions and patient education: "do you have swollen or bleeding gums, a toothache (pain), problems eating or chewing food, or other problems in your mouth", "since becoming pregnant have you been vomiting, if so how often", "do you have any questions or concerns about getting oral health care while you are pregnant", and "when was your last dental visit, do you need help finding a dentist [133]?" Another guideline recommended the following three screening questions to be used for referral decision making: "Do you have swollen or bleeding gums, a toothache, problems eating or

chewing food, or problems in your mouth”, ”when was your last dental visit”, and “do you need help finding a dentist [130]?”

As far as the method for the screening exam, one guideline recommended the screening exam include visualization and evaluation of teeth, gums, tongue, palate, and mucosa [132], while another does not specify the content of the oral screening exam [133].

There was very little discrepancy between guidelines in regards to oral health referral practices. One guideline did not specify the method of the referral [131]. Otherwise, it is clear among all other guidelines that dental referrals should occur like any other formal medical referral. Clinically relevant information should be included in the referral and a list of referring dentists should be kept on hand [128-130, 132-134]. Several guidelines include example written referral and consultation forms for OB providers’ use [128, 129, 132, 134].

There was consensus among all guidelines that professional prophylactic and treatment dental care is safe during any trimester, although ideal in the second trimester, and delaying urgent treatment may result in more complex problems and risks [128-134]. There is unanimous agreement between guidelines that diagnostic xray with shielding, dental prophylaxis such as cleanings, periodontal scaling and root planning treatment, restoration material removal and replacement using a rubber dam and high speed evacuation, and use of local anesthetics such as lidocaine and prilocane with or without epinephrine are all safe during pregnancy [128-130, 132-134] [131]. The safety of use of nitrous oxide during pregnancy was unspecified in four guidelines [128-131], but its

safety explicit in remaining guidelines[132-134]. Albeit, the safety of nitrous oxide in pregnancy was contingent that it was given in collaboration with the OB provider [133, 134] or at lower doses [134] in a couple guidelines.

CHAPTER THREE - THEORETICAL UNDERPINNINGS

A Description of Lewin's Theory of Change

Kurt Lewin's Theory of Change was used as a guiding framework for the scholarly project. Lewin's Change Theory is categorized primarily as a psychology and group behavioral theory, but is a model used very frequently to translate evidence into healthcare practice. The theory was fitting to the project, considering the aim of the project was to assess, plan, implement, and evaluate the introduction of prenatal oral health practices, that coincide with current prenatal oral health guidelines, to OB providers and staff in one local OB clinic.

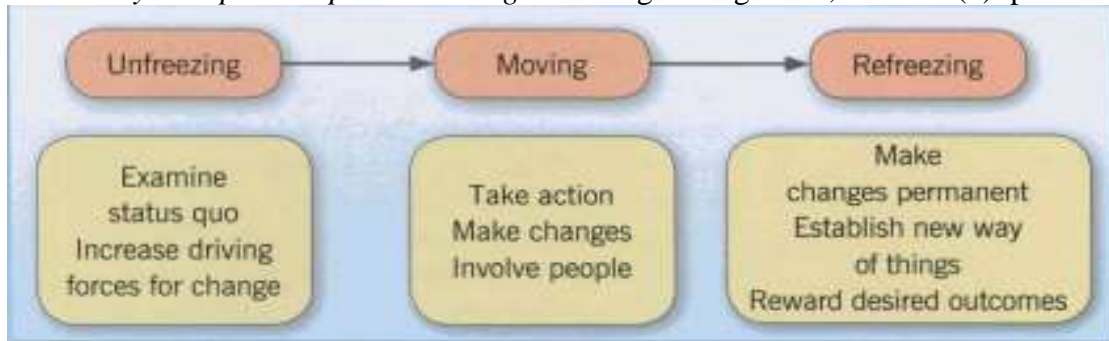
Further, Lewin's Change Theory is used for organizational change, which is precisely what was needed in order for this particular project to succeed. Lewin uses three concepts within his Change Theory together, the three phases of change, the force field analysis, and the concept of equilibrium, in order to analyze, understand, and bring about change in a group setting [135].

The Three Phases of Lewin's Change Theory

Lewin's Theory of Change includes three phases: (1) Unfreezing, (2) Moving, (3) Refreezing. The first phase involves engaging stakeholders so they are aware of the need for change, identifying the problem, and collaboratively constructing possible solutions. The second phase involves coming up with a detailed plan of change, implementing and testing the innovative solution, and solving any problems along the way. The third phase

involves implementing strategies to maintain the new practices and prevent a return to previous practices [136]. Figure 1 depicts Lewin's three phases required to make a change permanent in a system.

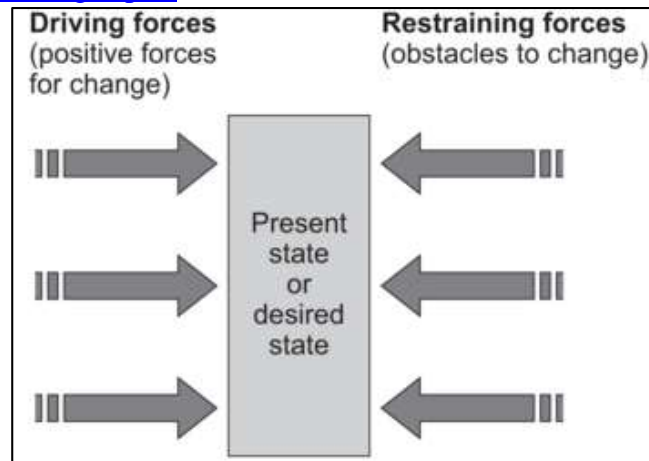
Figure 1. The three phases of Lewin's Change Theory. Source: Mitchell, G., *Selecting the best theory to implement planned change*. Nursing Management, 2013. 20(1): p. 32-37.



Force Field Analysis and the Concept of Equilibrium

Lewin's Theory of Change includes the view that change is a dynamic balance of two forces, restraining forces, or factors that inhibit change, and driving forces, or factors that contribute to the success of the change. Equilibrium is the notion wherein the restraining and driving forces are essentially equal and no change occurs. A Force Field Analysis is a tool used to identify the restraining and driving forces, as well as actions to minimize the restraining forces and actions to maximize the driving forces [135]. See figure 2 for a visual depiction of a Force Field Analysis.

Figure 2. Lewin's Force Field Analysis, a tool for change. Source: AQA. *Teaching topics*. 2016 [cited 2016 August 16]; Available from: <http://www.aqa.org.uk/resources/business-subjects/as-and-a-level/business-7131-7132/teach/teaching-topics>.



The Force Field Analysis tool is also used to take the whole field into account, rather than isolated facts, which can distort the reality of an organization. Lewin's view is that by identifying and plotting the strength of driving and restraining forces, one can understand both the group's current behaviors and what actions need to take place to bring about the change of those particular group behaviors [137].

The Force Field Analysis is used in each of the three phases of Lewin's Change Theory. During the first phase of change, the unfreezing phase, the leader works towards unfreezing the current set of circumstances with actions that minimize the restraining forces and maximize the driving forces so that change can occur. During the moving phase, the leader works towards establishing a new equilibrium of driving and restraining forces so that the practice change is a success. During the third and final phase, the refreezing phase, the leader works towards sustaining the practice change by

manipulating the restraining and driving forces to maintain the new equilibrium required to cement the change as part of routine clinical practice in the organization [135].

CHAPTER FOUR - METHODS

Ethical Issues

Montana State University Institutional Review Board approved the intervention and all subject consents via exemption review. Participation for patients, OB providers, dental providers, and medical assistants (MAs) were voluntary. The only foreseen risk to participating patients were a loss of confidentiality of the medical information retrieved from their medical record for the purpose of this project. Similarly, foreseen risks to the participating OB and dental providers and MAs included loss of confidentiality of their own oral health documentation and referral practices and answers to a survey. To mitigate this risk, numbers were assigned in place of participating patients' and professionals' names during data collection and any paperwork with identifiable information did not leave the clinic premise. Further, OB providers and MAs received information about their own oral health documentation and referral practices, but no one else beside themselves and the author was privy to this information. Additional risks to the OB and dental providers and MAs were no different than those risks that accompany providing standard medical or dental care during everyday practice at their OB or dental clinic.

Sample, Sampling Technique, and Settings

Twenty-nine pregnant patients from one participating OB clinic participated in the project. The patients were patients of participating OB providers. Convenient sampling

was used for ease and time. There were 8 patients in the control group and 21 patients in the experimental group. Patients who had their first prenatal visit before initial implementation of the prenatal oral health protocol represent the control or before group, while patients that had their first prenatal visit after the initial implementation of the prenatal oral health protocol represent the experimental or after group. Patients that were part of the before group, consented to participate during their 35-week obstetric visit. Simultaneously, patients that were part of the after group consented to participate during their first obstetric visit.

The volunteering MAs approached pregnant patients at their OB appointments to participate in the project by consenting to the author accessing their medical records for specific oral health related data, the specifics of which were listed on the consent. Gaining patient consents, to retrieve both before and after data from the patient's EHR, continued indefinitely until 30 consenting patients were obtained for each of the before and after groups, or three months had passed since the prenatal oral health protocol was initially implemented. Because consents for the before group were simultaneously being collected with the consents for the after group, there was a chance that a woman seeking prenatal care at the clinic later in her pregnancy would be asked to be in both groups, once at her first prenatal visit and then at her 35 week visit. In this case, the woman was excluded from the before group. The only other patient exclusion criterion was a patient age of less than 18 years.

Three OB providers and their MA's, thus three OB provider and MA pairs, volunteered to participate in the project. All OB provider and MA pairs worked at the

participating OB clinic. The author initially approached one OB provider to participate, who after agreeing to participate, approached every provider at the OB clinic to volunteer. The volunteering OB providers approached their MAs to participate in the project. The author approached volunteering OB providers and MAs to consent to both project and survey participation using a consent form.

Purposive sampling was used for the survey, choosing the participating OB and dental providers and MAs specifically, because their perspectives on the practice change process was sought. Convenient sampling was used for OB provider and MA project participation, choosing only volunteering OB providers and MAs, as this was the stipulation of the OB clinic hosting the project. One OB provider left the practice immediately before the intervention was implemented. Thus, two volunteering OB provider and MA pairs ultimately participated in the project. One of the participating OB providers was a certified nurse midwife and had fifteen years of experience as a provider at the OB clinic. The other participating OB provider was an obstetrician with four years experience of OB practice, all of which was at the participating clinic. One of the participating MAs had fifteen years experience as an MA at the clinic and the other seven years.

Two dental directors agreed to have their clinic sites and providers participate in the project as dental referral sources. The author was able to gain the acquaintance of the dental directors of the two clinics through other dentists' introductions, beginning with a dentist on the project committee. The author approached the dental directors via email. Additionally, it was planned that in the case that patients wanted to be referred to their

established dental home, the author would approach that particular dental provider to participate in the project.

The author approached dental providers, whom had received a patient referral during the project, to consent to completing a survey. Participation in the survey was voluntary and consent attained using a consent form. Purposive sampling was used, choosing the participating dentists who received a dental referral to complete the survey, because their perspectives on the dental referral process were sought.

The OB clinic, wherein the project took place, was jointly owned by the clinic obstetricians and had three locations in a valley in a western rural state. For simplicity, the project was implemented at the largest of the three clinics only. Ten providers rotated through each of the three clinics weekly, two Nurse Practitioners (NP), one certified nurse midwife (CNM) and seven Obstetricians, whom provided obstetric, gynecological, and well-woman primary care. The providers saw an average of 44 OB patients daily. The obstetricians delivered 876 babies in 2015, all of which were delivered at the hospital within walking distance of the largest of the three clinics. The clinic used a shared patient model, wherein it was easy for OB patients to move fluidly from one provider to the next throughout their pregnancy visits. A fair number of OB and gynecologic patients paid for medical services with Medicaid (17%).

Of the two participating dental clinics, one dental clinic had a single dentist who spoke both English and Spanish fluently. The other was a university dental center with several licensed resident dentists and overseeing faculty dentists. Both dental clinics were public access and accepted new Medicaid patients and a wide variety of dental

insurances. Both dental clinics offered a sliding fee scale discount based on income. The sliding fee scale and policy that both dental clinics used was from the National Health Service Corps and U.S. Department of Health Resources and Services Administration [138]. See Appendix B Sliding Fee Scale and Appendix C 2016 Federal Poverty Level Chart. The wait time for the initial dental appointment for one dental clinic was within 1 week and within 3 weeks for the other dental clinic. Both dental directors assured the author that dental providers at their clinics followed current prenatal oral health guidelines and treated dental problems at any time in pregnancy, except where clinical judgment deemed otherwise.

Intervention: The Prenatal Oral Health Protocol

Participating OB provider and MA pairs implemented a prenatal oral health protocol (POHP) over a 90-day period. A POHP was the tool chosen to provide a vehicle to standardize the way the participating OB provider and MA pairs integrated the most current prenatal oral health guidelines into their OB practice. The content of the POHP was surmised from the literature review and assessment of the OB clinic.

The literature review identified three irreducible oral health elements for the provider to include in obstetric care including patient education, oral screening, and referral based on that screening. These are the irreducible elements of the POHP. There was not a consensus in the specifics, as far as method and content, of each of the irreducible elements among the guidelines. Thus, the author took liberty in devising the

specifics of the three irreducible elements based on further literature review and from her perception of what was most suiting to the OB clinic based on the clinic assessment.

The POHP formatting and approximate time for each step was adopted from a protocol used by Allied Health Professionals to implement pediatric oral health guidelines [139]. Table 1 is the POHP that was implemented during the project at the OB clinic.

Table 1. The prenatal oral health protocol. Protocol steps and approximated times are adopted from: Taylor, E., Marino, D., Thacker, S., DiMarco, M., Huff, M., & Biordi, D. (2014). Expanding Oral Health Preventative Services for Young Children A Successful Interprofessional Model. *Journal of Allied Health*, 43(1), p. 5-9.

| Practice Protocol Steps | Practice Tools and Materials Approximate Time | Role | Time |
|--|---|------|-----------|
| 1. Provide oral health minutes education | Two Healthy Smiles Brochure Idaho Smiles Information Sheet 3 Key Messages | MA | 1-4 |
| 2. Ask oral health seconds screening questions | Prenatal Screening Questionnaire Prenatal Oral Health Screening Tool | MA | <30 |
| 3. Perform oral health screening exam | Gloves and light source | OB | 3 minutes |
| 4. Refer to dentist as appropriate | List of Referral Dentists Prenatal Oral Health Referral Form Idaho Smiles Information Sheet | Both | 1 minute |
| 5. Document POHP steps 1-4 | Document in EHR | Both | 1 minute |

The OB provider and MA executed the POHP during every new OB visit. The new OB visit was the very first obstetric physical, typically at about eight weeks

gestation, but occurred at any time of transfer of care or the woman's initiation of prenatal care. This timing was chosen for several reasons. First, all prenatal oral health guidelines identified in the literature review, recommended the timing of the oral health assessment and needed referral to occur at an early prenatal visit and several guidelines specified the timing to be the very first prenatal visit [130, 133, 134]. Secondly, the timing of the needed dental referral was to be at the first prenatal visit to ensure participating patients received professional dental care during pregnancy, especially women enrolled in Medicaid whose benefits would expire soon after delivery, and despite long wait times for dental appointments and women's reported time constraints [106]. Thirdly, linking the POHP to occur at the new OB visit, a routine task within the established clinical pathway at the OB clinic, served as a reminder for the staff and providers to execute the POHP tasks.

POHP Step One: Education

After the MA showed the patient to the exam room, the patient was given the New OB Packet, which was a folder given to every new OB patient at the OB clinic. The folder contained a variety of OB patient educational materials. Within the New OB Packet, was a Two Healthy Smiles brochure from the National Maternal and Child Oral Health Resource Center [140]. This patient resource was chosen to educate participating patients on prenatal and infant oral health because of the presence of all recommended content on prenatal oral health and anticipatory guidance from the literature review of prenatal oral health guidelines. The only exception was that the brochure did not instruct how to visually inspect infant's mouth for white or brown spots on dentition, but this was

recommended by only one of the guidelines identified in the literature review [132]. The Two Healthy Smiles brochure was also chosen because the content had plain language consistent with the U.S. National Archives and Records Administration recommendations [141].

The MA referred to the ‘Two Healthy Smiles’ and verbalized three key messages: (1) If your mouth is healthy, your baby’s mouth will be healthy. So, it’s important to brush, floss, and go to the dentist during your pregnancy. Dental x-rays, cleanings, and treatment are safe at any point in your pregnancy; (2) Start brushing baby’s teeth once the first tooth comes in using a rice-sized amount of fluoridated toothpaste; (3.) Cavities start very early and are preventable, so take your baby to the dentist by one year of age. These verbal messages were chosen because of their prominence in guideline recommendations for prenatal oral health education and infant oral health education. The author also chose these messages in consultation with a dentist on the project committee.

Patients were also provided with written information on the state dental benefits for pregnant women enrolled in Medicaid, which included a hot-line phone number for the Medicaid pregnant woman’s program in the state. This written material was placed inside the patient brochure ‘Two Healthy Smiles’. The MA provided verbal reference to the written material and hot line number to all patients. The written material was provided to patients at the OB clinic in order that pregnant patients enrolled in Medicaid were aware of their dental benefits. The hot-line number was on the written material so pregnant women enrolled in Medicaid could have their questions about their dental benefits addressed. These interventions were the same tactics undertaken by the

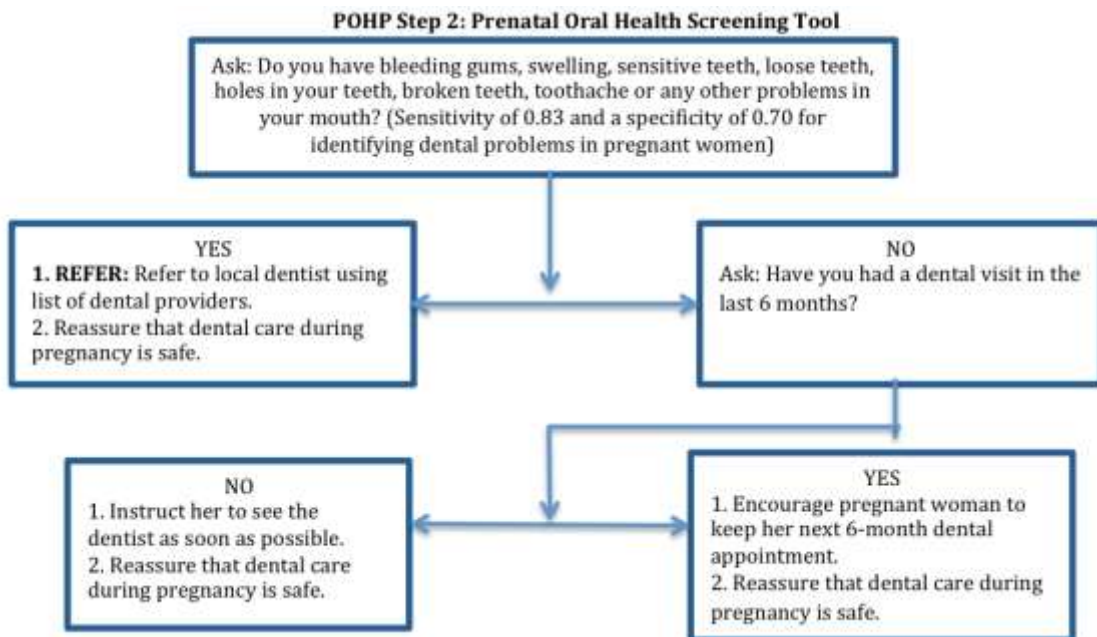
Department of Health Services in several states, to help women become aware and understand their Medicaid benefits [142]. This is necessary because at least one half and up to six in seven pregnant women enrolled in Medicaid don't utilize their dental benefits, likely, because they aren't aware or lack understanding [114, 115].

POHP Step Two: Screening Questions

The MA had the patient answer a two-question written screening questionnaire while waiting to see the OB provider (See Appendix D 'Prenatal Screening Questionnaire'). The OB provider retrieved the completed questionnaire from the patient before patient exam and noted the patient's answers. The first question was used for subjective screening for the need for a dental referral: 'Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your teeth, broken teeth, toothache or any other problems in your mouth?' If this question was answered positively, then the OB provider referred the woman to a professional dentist in step four of the POHP. This question was used in a study of 300 pregnant women to develop an oral screening tool for midwives and was found to have a sensitivity of 0.83 and a specificity of 0.70 for dental problems [143]. The second question, 'did you see a dentist in the last 6 months', was not used to aid in dental referral decisions. Rather, the OB provider used the question as an opportunity to encourage routine preventive dental care during pregnancy and reassure the woman that dental care is safe in pregnancy during any trimester. The second question and the same manner of use, was recommended by the New York State Department of Health [134] and the American College of Obstetricians and Gynecologists [130] practice guidelines on prenatal oral health.

An additional justification for the use of a six month time frame in the question is that the American Dental Association recommends that the average individual seek dental screening and prophylactic cleaning generally every six months, but the frequency to be more or less depending on oral health status and dentist designation [111]. The need for dental cleaning is generally every six months because dental cleaning immediately suppress cariogenic bacteria levels, although not permanently [108-110]. See figure 3 prenatal oral health screening tool for a flow diagram of the two screening questions and the rehearsed OB provider responses to patient answers.

Figure 3. Prenatal oral health screening tool. Format and first screening question adopted from: George, A., et al. (2014). Developing and testing of an oral health screening tool for midwives to assess pregnant woman. *Journal of Health Care for Women International*, 36(1), p.1159-1174. Concepts used from: New York Department of Health, *Oral Health Care during Pregnancy and Early Childhood Practice Guidelines New York State Department of Health*. New York State Department of Health, 2006.



POHP Step Three: Oral Screening Exam

During the routine exam, the OB provider examined the patient's oral cavity, including lips, teeth, gingiva, tongue, buccal mucosa, salivary glands, and breath odor, while looking closely for bleeding gums, loose teeth, soft tissue lesions/mass, broken teeth, indications of dental caries, or abscessed teeth. There are currently no studies on the sensitivity and specificity of an oral screening exam performed by a group of OB providers in identifying an oral health problem in a pregnant woman necessitating a dental referral.

However, in one study, 12 primary care pediatric providers, who examined 258 preschool children, collectively achieved a sensitivity of 0.76 and specificity of 0.95 for identifying children with carious lesions and a sensitivity of 0.63 and specificity of 0.98 for identifying children who had an oral health problem [144].

Providers in the study received two hours of education on oral screening exams and appropriateness of a dental referral, which is very similar to what participating providers received in the way of education for this project. Although the specialties and populations are different, it can be inferred that with limited oral screening exam training, providers can achieve an adequate level of accuracy in identifying patients in need of a dental referral.

POHP Step Four: Dental Referral

The OB provider decided upon the need to refer the pregnant patient to professional dental care based on the answers to the first oral health screening question, the oral screening exam, and professional judgment. If the OB provider discerned a need

for a dental referral, the OB provider determined the patient's preference from the list of participating referral dental clinics and verbalized the need and preference to the MA.

Then the MA made the referral arrangements for the preferred clinic using the written referral form and dental referral process instructions, specific for each clinic, listed on the list of referral dental clinics. See Appendix E 'Prenatal Oral Health Referral Form' for the referral form. It was planned that if patients needed a dental referral but already had an established dental home, the MA would inform the author, who would then make the arrangements for the patient to be referred to her dental home and approach the dentist to participate in the project.

The dental referral form served as a tool to arrange the dental referral and encouraged interprofessional collaboration between the dentist and OB provider for the provision of the pregnant patient's oral health care [134]. The content of the dental referral form was a conglomeration of content from all example written referral forms from prenatal oral health guidelines found in the literature review [128, 129, 132, 134]. The content of the referral form was also decided upon during a collaborative process over email correspondence between the author, the dentist on the project committee, and participating dental directors of the participating dental clinics.

POHP Step Five: Documentation

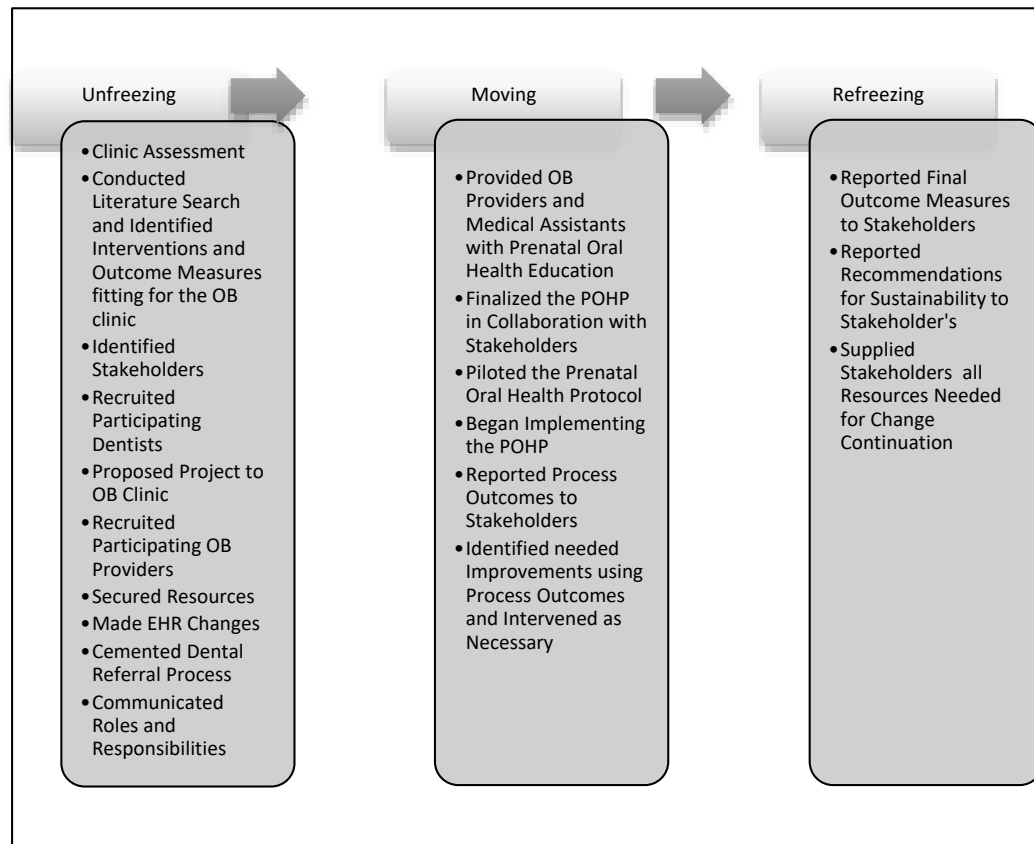
The MA documented the completion of the first step of the POHP, provision of oral health education, in the electronic healthcare record (EHR) under 'patient education' and 'other'. See Appendix F 'Patient Oral Health Education Documentation' for a visual. The MA documented the completion of the second step of the POHP, asking oral health

screening questions, by scanning the completed questionnaire into the patient's EHR in the 'Obstetrics' file. The OB provider documented the third step of the POHP, the oral screening exam, in the EHR under 'dental exam'. See Appendix G 'Documentation of the Obstetric Provider's Oral Exam'. The MA documented the fourth step of the POHP, dental referral, if the patient was referred to a dentist, by scanning the Prenatal Oral Health Referral Form into the EHR in the 'obstetrics' file.

Implementation: The Practice Change Process

The author planned the sequence of actions necessary for the practice change process to change the oral health practices at the OB clinic to include the POHP. The actions of the practice change process were guided by the three phases of Lewin's Change Theory or indicated by the Force Field Analysis constructed before each phase. Figure 4 is a summative illustration of the practice change process.

Figure 4. The practice change process in terms of Lewin's three phases



Force Field Analysis for Each Phase

A new Force Field Analysis was constructed when transitioning to each of Lewin's phases. By constructing a new Force Field Analysis with each phase, the author identified actions to minimize current restraining forces and maximize current driving forces, as well as ways to involve individuals in the organization in the manner and degree needed for the success of each phase. To visualize the Force Field Analysis for the unfreezing, moving, and refreezing phase, see Appendix H Force Field Analysis For Unfreezing Phase, Appendix I Force Field Analysis for the Moving Phase, and Appendix J Force Field Analysis for the Refreezing Phase. Practical steps used to create the Force

Field Analyses on paper are as follows: (1) State the desired change, (2) Brainstorm the driving and restraining forces related to the achievement of the desired change in two separate columns, (3) Prioritize the forces by their relative strengths, (4) Develop a list of actions designed to reduce, eliminate, or reverse the effect of the restraining forces by taking advantage of the driving forces [145].

Unfreezing Phase

Actions undertaken by the author during the unfreezing phase included: (1) OB clinic assessment, (2) Identifying the interventions and outcome measures, (3) Proposing the project to the OB clinic, (4) Gaining buy in from participating OB and dental providers and MAs, (5) Making necessary changes to the EHR, (6) Cementing the dental referral process, (7) Collaborating to determine the roles and responsibilities of all stakeholders.

The assessment of the participating OB clinic was done using a 5 P's assessment tool. See Appendix K 5 P's Microsystem Assessment. The 5 P's assessment tool is a structured and tested method used to assess a microsystem that focuses on purpose, patients, professionals, processes, and patterns [146]. The 5 P's illustrated the current prenatal oral health practices and needs. The deeper knowledge gained from the 5 P's findings gave insight into what the practice valued and thus how the POHP needed to be designed to be feasible as well as acceptable and even exciting to administration, providers, and staff at the OB clinic. Once the intervention and outcomes were developed from literature review, the author proposed the project to clinic administration and providers during a monthly evidenced based practice meeting. The evidence,

intervention, project vision, and discussion of the participating local dental clinics were the focus of the proposal. To gain buy in from participating OB and dental providers and MAs, the author provided evidence to support each POHP step, state and national oral health data, state pregnant woman Medicaid dental benefit information, typical barriers for pregnant women getting prenatal dental care, and how the project was designed to address those barriers.

As far as planning changes to the EHR, the author worked with the information technology specialist at the OB clinic to make changes to the EHR needed to support the POHP as best as possible. The dental referral process was collaboratively decided upon for each dental clinic with the author and one dental provider and ancillary staff.

Decisions regarding the following were decided upon: (1) Referral form content and the process for receiving the referral form, (2) Making an initial dental appointment for the referred patient, (3) Completing the referral form with visit information, (4) Sending the referral form back to the referring OB provider. The author used a RACI chart as a tool to communicate roles and responsibilities both during the unfreezing phase and throughout the practice change process. See Appendix L Summary of Stakeholder's Roles. These roles were established collaboratively between the author and stakeholders.

Moving Phase

Actions undertaken by the author during the moving phase included: (1) Providing participating OB providers and medical assistants with prenatal oral health education, (2) Finalizing the POHP, (3) Piloting and implementing the POHP, (4) Reporting process outcomes to participating OB providers and MAs, (5) Using process

outcome data to assess OB provider and MA's POHP performance and intervene as necessary.

The participating OB providers and MAs were provided with prenatal and infant oral health education. The OB providers participated in two different oral health education interventions, two online oral health modules and an oral health seminar. The two online modules were from the Smiles for Life curriculum created for primary care non-dental clinicians by the Society of Teachers of Family Medicine and endorsed by numerous healthcare organizations. When all modules were used as a comprehensive oral health education program for medical students, the Smiles for Life curriculum was shown to be both engaging and significantly improve students' oral health knowledge [147]. The modules that were used were 'The Pregnant Patient' [148] and 'The Oral Exam' [149]. Upon completion of each module, one continuing medical education credit was awarded. The OB providers completed the modules together as a group during one lunch meeting that took approximately fifty minutes. OB providers also attended one 45-minute seminar.

A local dentist, whom was also one of the dental referral sources for the project, provided the seminar. The seminar consisted of verbal instruction with written handouts and several case studies that focused on how to perform an oral screening exam. The seminar not only provided education, but the opportunity for participating dental and OB providers to meet face-to-face and establish familiarity.

The MAs received prenatal oral health education by completing one online Smiles for Life curriculum module, The Pregnant Patient [148]. The MAs completed it as a group along with the OB providers during the lunch meeting.

The process of finalizing the POHP was collaborative. The author finalized the POHP with participating OB providers and MAs over several email correspondences and discussions. Before initial implementation, the author piloted the POHP with each participating OB provider and MA pair to ensure feasibility and ease.

During initial implementation of the POHP, the author provided face-to-face individual verbal, written, and demonstrative instruction to each OB provider and MA pair regarding the POHP steps, overall purpose, shared responsibilities, and individual roles. During instruction, the author was sure to communicate regular, consistent repetitious messages with key words and phrases that did not contradict and frequently asked for understanding. The author ensured each OB provider and MA pair executed the POHP correctly by shadowing and instructing them during new OB visits until they executed the POHP without error. After the initial POHP implementation, the OB provider and MA pair implemented the POHP over a 90-day time period.

When approximately one third, two thirds, and three thirds of the 90 day allotted time for the implementation period had passed, the author collected and analyzed the data from patients' EHRs, reported the data to participating OB providers and MAs, and intervened based on the data. The data represented the OB provider and MA's performance in completing steps one, two, three, and four of the POHP. Step one, education, and two, asking screening questions, were the MA's role. Thus, data

pertaining to steps one and two represented the MA's performance. Step three, oral screening exam, was the OB provider's role. Thus, data pertaining to step three represented the OB provider's performance. Step four, correctly providing a dental referral based on screening results, was the shared responsibility of the OB provider and MA pair. The performance data was communicated to the participating OB providers and MAs in the form of a progress report.

The progress report communicated group performance data as a whole as well as individual performance. Individual performance was communicated to the individual only, not the whole group. The progress reports were communicated via email, because this was the method preferred by the practice change team.

The progress reports primarily served as a communication strategy and a pat on the back for a job well done so far. But audit and feedback have been shown to lead to small improvements in professional practice and adherence to guidelines, especially if given more than once [150]. Additionally, the progress reports were an initiative to make patient benefits of the POHP more visible, as visibility of benefits have been shown to make a healthcare innovation more easily adopted [151].

The author also used the progress reports to assess each professional's performance and intervene to improve that performance as necessary. The author intervened on two POHP performance issues. Whenever a patient's screening indicated the need for a dental referral and one was not provided, the author intervened by informing the OB provider and MA pair and asking for remediation with the patient's

next visit. The author also intervened to improve the MA's performance on oral health education and documentation, with face-to-face verbal instruction on an individual basis.

Refreezing Phase

Actions undertaken by the author during the refreezing phase included 1.) reporting final outcome measures and recommendations for sustainability to stakeholders, and 2.) supplying stakeholders with all needed resources for change continuation.

The author reported final outcomes and recommendations for sustainability to the OB providers and MAs at an OB clinic evidenced based practice meeting using a storyboard. It was also ensured at this time that the clinic providers had all they needed to continue implementing the POHP. The outcomes were reported to the dentists via email for convenience to the dentists.

Data Analysis

Volunteering patients were put into two groups based on the timing of their first prenatal visit at the clinic, in relation to when the POHP was initially implemented. Patients who had their first prenatal visit before the initial implementation of the POHP represent the control or before group, while patients that had their first prenatal visit after the initial implementation of the POHP represent the experimental or after group.

The data used in data analysis were gathered from the before and after patients' charts. A chart review is an effective way to gather retrospective quantitative data and, in this case, identify if steps within the POHP were completed and documented. The author gleaned the following items from consenting patient's electronic healthcare record

(EHR): (1) Date of first obstetric visit, (2) OB provider who provided care at the first prenatal visit, (3) If oral health education was provided, (4) Answers to oral screening questions, (5) Oral screening exam results, (6) Dental referral information, (7) Medicaid enrollment status, (8) Date of delivery, (9) Date, (10) Results of the referring dental visit if a dental referral was provided. Items one and two were used to place patients in either the before or after group. Items three through six were used to determine if POHP activities were completed. Items six through ten were used to determine dental attendance after the provision of a dental referral. An excel spreadsheet was used to record and manage the data.

Measuring OB Providers and MAs' POHP Performance over Time

To determine if the OB provider and MA's POHP performance improved over the 90-day implementation period, a visual run chart was created. The run chart shows the rate at which steps one through four of the POHP were correctly completed over the 90-day POHP implementation period in increments of 10 days. The data for the run chart was collected from after patients' EHRs and ordered in time sequence of their first prenatal visit during the implementation period. The following four questions were answered with a yes or no during the chart review: (1) Was oral education provided (POHP steps 1), (2) Were oral screening questions asked (POHP step 2), (3) Was an oral screening exam, including at least teeth and gingiva, completed (POHP step 3),

(4) Was the patient correctly referred or not referred to the dentist based on answers to oral screening questions, results of the oral screening exam, and OB provider clinical judgment (POHP step 4)?

For each of the first three questions, an independent proportion was made, where the proportion was the number of “yes” responses to the question over the total sample population in 10-day increments of time. The fourth question was answered with a proportion, which was made of the number of “yes” responses over the number of patients who answered the screening questions and had an oral screening exam in 10-day increments. These Proportions reflect the numerical rate at which the OB provider and MA pair correctly completed and documented POHP steps one through four throughout the implementation period in 10-day increments. A run chart was created in excel from a pivot table of the observed proportions for each question, over the 90-day POHP implementation period. The run chart also serves as a method of statistical process control.

Measuring Dental Attendance

To determine dental attendance after a dental referral, a proportion was calculated. The following question was answered with yes or no during the chart review: For after patients who were referred to a dentist, did the patient visit a dental provider anytime during her pregnancy (POHP step 4)? The proportion was made of the number of “yes” responses over the number of patients that received a dental referral. This quantitative data will reflect the numerical rate at which the patients referred to a dentist

by the OB provider saw a dentist during pregnancy. This measurement provides visibility of the direct benefits of the POHP for the pregnant patient.

Measuring the Improvement of OB Provider's Prenatal Oral Health Practices

Two statistical masters students at Montana State University provided analytical counseling to help the author determine if by implementing the POHP, the prenatal oral health practices of participating OB providers were significantly improved. The counseling was provided before the data was collected in the form of a written statistical consulting report. Two methods of statistical analysis suiting to the project's planned data were recommended and analysis demonstrated using simulated data. The report served as the students' assignment for a statistical consulting seminar at Montana State University Spring of 2016. The seminar's faculty reviewed and approved the consultation report.

To determine if, by implementing the POHP, the prenatal oral health practices of participating OB providers were significantly improved, three questions were answered during the chart review of both the before and after patients: (1) Was oral education provided (POHP steps 1), (2) Were oral screening questions asked (POHP step 2), (3) Was an oral screening exam, including at least teeth and gingiva, completed (POHP step 3)?

Answers to questions one through three reflect the occurrence of three important prenatal oral health practices, patient education, asking oral screening questions, and an oral screening exam, steps one through three of the POHP. To determine if these prenatal oral health practices were significantly different after the project then before the project,

the answers to questions one through three for the before group and after group are compared. To do so, for each of the three questions, two independent proportions, the before and after patient groups, where the proportion is the number of “yes” responses to the question over the sample population, are compared. Bar graphs of these initial observed proportions for each question were created in excel from pivot tables of the original observed data.

The statistical significance in the difference of before and after proportions for each question one through three, were determined using a non-parametric test called the permutation test. The permutation test is a statistical significance test that creates a sample distribution of the test statistic under the null hypothesis by calculating all possible values of the test statistic by “shuffling” the observed data when labels on the observed data points are scrambled. The permutation technique used to make the simulated sample distribution draws thousands of “shuffles” from the original sample data, by sampling without replacement. For this study, the simulated sample distribution is made of proportions by calculating the difference in sampled proportions for each respective simulated sample. Using the sampling distribution, it is possible to perform the hypothesis test. If the hypothesis are

Eqn. 1: $H_0 : p_A - p_B = 0$

Eqn. 2: $H_a : p_A - p_B > 0$

then the alternative is a one-tailed and, in this case, right-tailed test because of the belief that the proportion of the after group will be greater than the proportion of the before

group for each of the questions one through three. For data analysis, the level of significance was set at $p < 0.05$ at the outset of data collection.

Confidence intervals were estimated for each P value generated above, using a similar sample distribution and a “bootstrap resampling” method. The bootstrap method of resampling draws thousands of “resamples” from the original sample data, just like the permutation test, but re-samples with replacement.

A website was used to calculate both the permutation test for significance and the confidence intervals [152]. The website was created by Dr. Jim Robison-Cox, a retired Associate Professor of Statistics at Montana State University (MSU), and was used in the Introductory Statistics course at MSU. The website performed all the necessary “shuffling” and “resampling” simulation from the observed data from the project and generates the P-value, confidence intervals, and a nice graphical display that aided in interpretation and comprehension of the process and data analysis.

Measuring Participant’s Perspective on the Practice Change Process

To determine the dental provider, OB provider, MA’s perspective on the practice change process, surveys were administered at the close of the moving phase of the project. See Appendix M ‘Provider and Medical Assistant Survey’. Also see Appendix N ‘Dental Provider Survey’. Surveys had ten open-ended questions focusing on Lewin’s unfreezing, moving, and refreezing phases and the particular roles of the participants. The aim of the survey was to generate descriptive qualitative data in word themes that spoke to the experiences and perspectives of the participants regarding the practice change

process, feasibility, and sustainability. The qualitative data was used to evaluate the project and generate ideas for recommendations and future planning. The depth of understanding participant experiences and perspectives would be missed with numerical summaries but were well captured in word summaries. Questions were asked in a survey format instead of a focus group because the participating providers and MAs preferred written email correspondence to group gatherings, mainly for the sake of time.

Close reading of the text was the data analysis method used to interpret the qualitative data gathered from the 10 question surveys. This method involved meshing all participant's answers to each question together, reviewing the context of the answers several times as a whole by reading and re-reading, taking notes, reflecting and immersing in the data, and formulating interpretations of the data. Accuracy of the inferences made from the answers on the surveys was validated with the participants via email correspondence.

The Expected Outcomes

One expected outcome was that there was general improvement in percentage of patients provided with oral health education, oral screening questions, an oral screening exam (at least teeth and gums), and a needed dental referral based on screenings and clinical judgment, over the course of the 90-day POHP implementation period. This outcome measured the improvement in participating OB providers and MAs' POHP performance correctly completing steps one, two, three, four, and five of the POHP, over the course of the 90 day POHP implementation period. It was also expected that the

occurrence of steps one, two, three, and four of the POHP were at 100% during the last 30 days of the 90-day implementation period. Participating OB provider and MA pair improvement and perfection of the POHP performance over the 90-day implementation period, reflects the success of the practice change process.

A second expected outcome was that all patients who received a dental referral, during the POHP step four, visited the dental provider at some point during their pregnancy. This outcome measured the success of the dental referral process and provided a visualization of direct benefit of the POHP to the pregnant patient.

A third expected outcome was that there was a significant improvement, after the project in comparison to before the project, in the occurrence that participating patients had documentation that they: (1) Received oral health education, (2) Answered oral health screening questions, (3) Received an oral screening exam. This outcome reflects the improvement, after the project in comparison to before the project, of three important prenatal oral health practices of participating OB providers: patient education, asking oral screening questions, and an oral screening exam, which are steps 1-3 of the POHP.

A fourth expected outcome was that the OB and MAs felt that the practice change process went well and sustainability of the change was likely. This outcome measured the success of the practice change process as perceived by participating OB providers and MAs. It was also expected that the participating Dentists felt that the dental referral process went well and sustainability of the referral relationship would continue indefinitely with the OB practice after the project was closed. This outcome measured the success of the dental referral process as perceived by the participating dentists.

CHAPTER FIVE - PROJECT FINDINGS

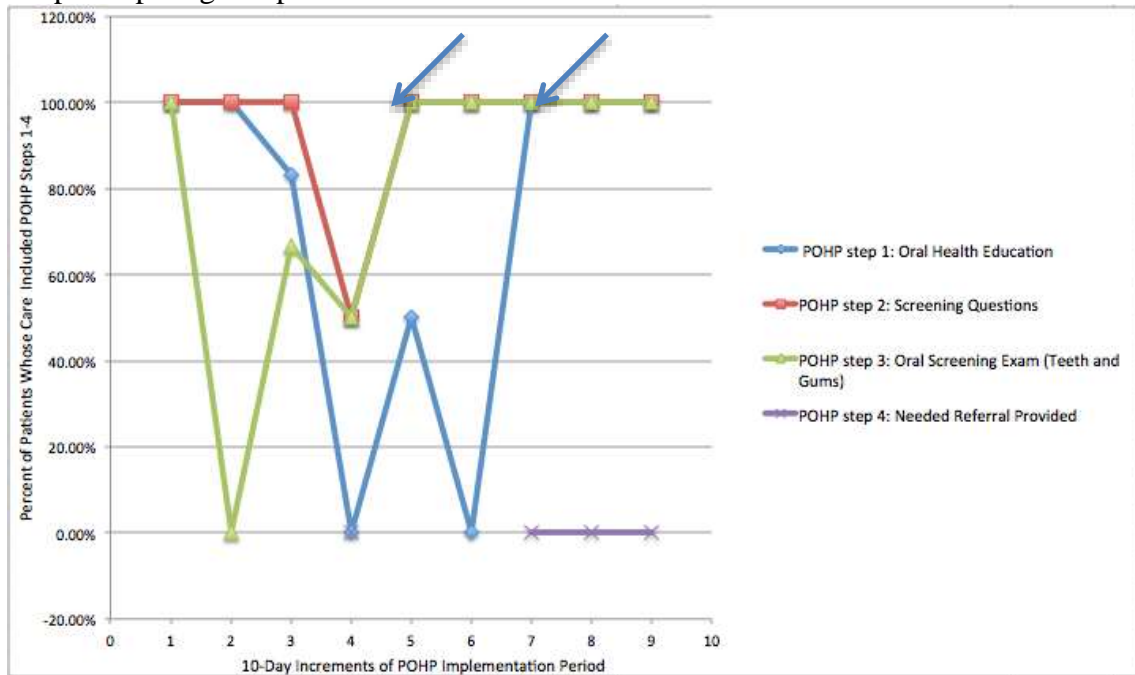
Sample

Eight patients over the course of three months were recruited to participate as control or before patients. The data from these patients' EHR served as control or before POHP implementation data. Twenty-one patients over the course of the three months were recruited to participate as experimental or after patients. The data from these patients' EHR served as experimental or after POHP implementation data.

OB Provider's and MAs' POHP Performance Over Time

The run chart illustrates that the percentage of patients provided with oral health education, oral screening questions, and an oral screening exam (at least teeth and gums) improved over the course of the 90 day implementation period and were all 100% for the last 30 days. The percentage of patients who correctly received a dental referral based on screenings and the clinical judgment of the OB provider, did not improve over the course of the 90 day implementation period and was not at 100% for the last 30 days. See Figure 5.

Figure 5. Run chart of the percentage of patients receiving oral health education, subjective screening, an oral screening exam, and a dental referral based on screenings over the course of the 90-day POHP implementation period. These are steps 1, 2, 3, and 4 of the POHP in order. The arrows illustrate when the author dispensed progress reports to the participating OB providers and MAs.



POHP Step 4 Performance, Correct Referral

Of the seventeen patients who were asked oral screening questions and were provided with an oral screening exam, thirteen did not need a dental referral based on screenings or clinical judgment and did not receive one. One of these thirteen patients answered positively to the screening question, but had documentation of a professional judgment deeming a referral unnecessary. Of the seventeen patients who were asked oral screening questions and were provided with an oral screening exam, four needed a dental referral based on screenings but did not receive a referral. The four patients in need of a referral, answered positively to the oral screening question, “Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your teeth, broken teeth, toothache or any

other problems in your mouth”? None of the patients necessitated a dental referral based on oral screening exam results.

Dental Attendance

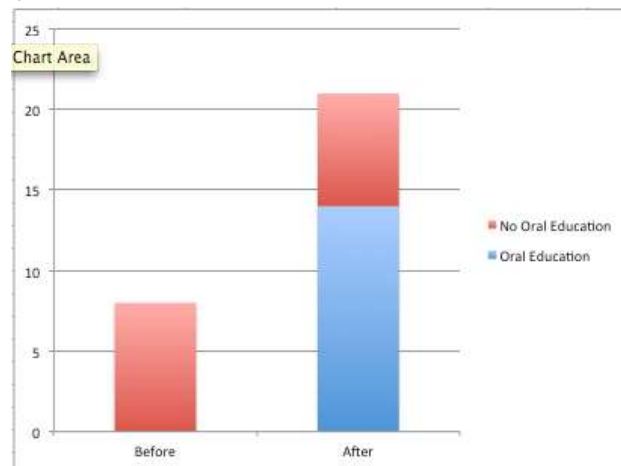
A prenatal professional dental referral was not made. Four patients should have received a professional dental referral based on screenings and clinical judgment.

Improvement of OB Provider’s Prenatal Oral Health Practices

Provision of Prenatal Oral Health Education

None (0%) of the before patients received prenatal oral health education before the POHP was initially implemented, whereas fourteen out of twenty-one (67%) after patients received prenatal oral health education after the POHP was initially implemented. These proportions are depicted in Figure 6.

Figure 6. Proportions of before and after patients who did and did not receive prenatal oral health education.

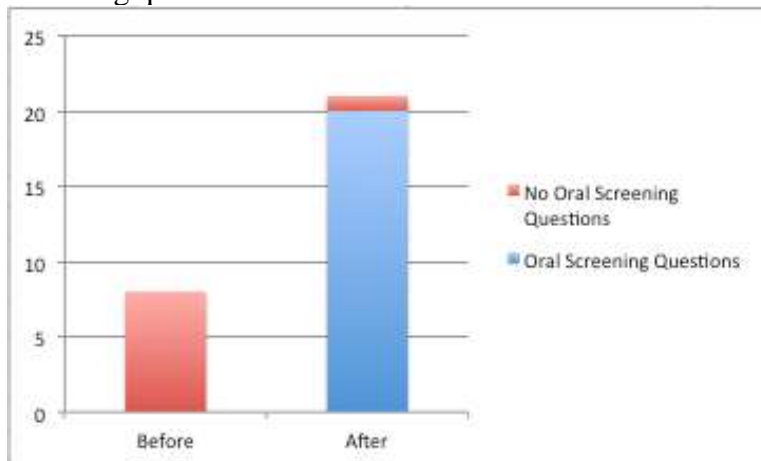


Significantly more patients received prenatal oral health education after the POHP was initially implemented than before ($p < .0002$, 95% CI 0.476-0.857).

Asking Oral Screening Questions

None (0%) of the before patients were asked oral screening questions before the POHP was initially implemented, whereas twenty of twenty-one (95%) after patients were asked oral screening questions after the POHP was initially implemented. These proportions are depicted in Figure 7.

Figure 7. Proportions of before and after patients who were and were not asked oral screening questions.



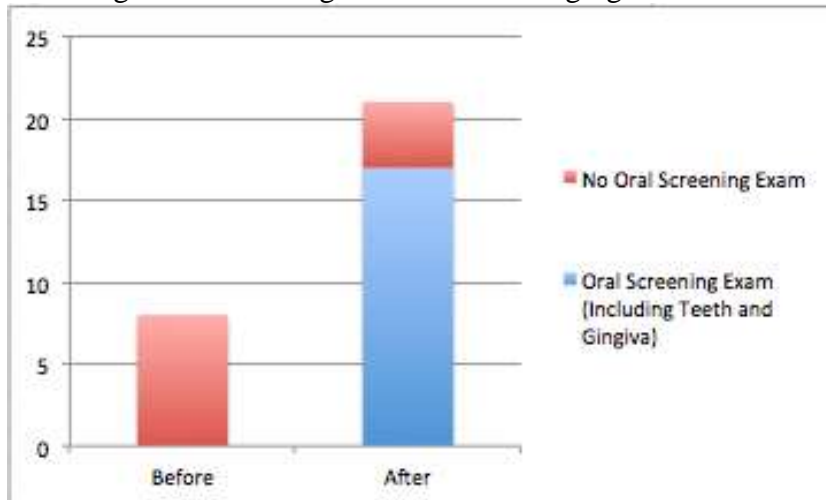
Significantly more patients were asked oral screening questions after the POHP was initially implemented than before ($p < .0002$, 95% CI 0.857-1).

Provision of Oral Screening Exam

None (0%) of the before patients received an oral screening exam including at least teeth and gingiva before the POHP was initially implemented, whereas seventeen out of twenty-one (81%) after patients received an oral screening exam including at least

teeth and gingiva after the POHP was initially implemented. These proportions are depicted in Figure 8.

Figure 8. Proportions of before and after patients who did and did not receive an oral screening exam including at least teeth and gingiva.



Significantly more patients received an oral screening exam, including at least teeth and gingiva, after the POHP was initially implemented than before ($p < .0002$, 95% CI 0.619-0.952).

Participant's Perspective on the Practice Change Process

Both participating OB Providers and participating MAs completed the 10 question survey. None of the participating dental providers were asked to complete the survey, since no prenatal dental referrals were made. However, both dental directors verbally agreed to sustain the referral relationship with the OB practice at the conclusion of the project.

From the perspective of the OB providers and MA, many things went well throughout the practice change. In the unfreezing phase, the author did well motivating the OB providers and MAs to participate by clearly communicating the benefits of the POHP to the patient. Also, the author did well facilitating the establishment of relationships between the participating OB and dental providers. One MA felt that the opportunity to share her ideas on best practice to assess and document prenatal oral health helped give her a sense of ownership of the POHP. In the moving phase, the author did well educating, communicating, and supporting the MAs throughout. Additionally, participants perceived that the progress reports helped the project stay on track.

From the perspective of the OB providers and MAs, there were a few things that went poorly throughout the practice change. During the unfreezing phase, the OB providers and one MA didn't feel that they had ownership of the POHP, although one MA did. Additionally, many felt not having all providers in the clinic participate in the project hindered the practice change effort. During the moving phase, the process of documenting each of the POHP steps was not all done using typical areas in the EHR, which caused feelings of angst among the MAs.

All OB providers and MAs plan to continue to use the POHP in some capacity. One motivating factor that was consistent for all OB providers and MAs to continue using the POHP, was the perceived benefit to their patients. Particularly, the POHP helped patients enrolled in Medicaid to learn about their dental benefits and all patients to know that dental care was safe during pregnancy. The OB providers and MAs had differing thoughts regarding to what capacity they plan to continue the use of the POHP

in practice. One OB provider and MA planned to continue to implement the POHP in its entirety. The other OB provider and MA pair planned to continue with patient education only. One MA planned to continue to use the POHP on the contingency that it was required of her by the clinic or the OB provider she works with.

From the perspective of the OB providers and MA, there were several things that could be done to increase the likelihood of sustaining the use of the POHP. First, the inclusion of specific, appropriate, and routine places in the EHR for POHP step documentation in the EHR. Secondly, making the POHP formal throughout the entirety of OGA. Thirdly, maintaining the relationship between the OB and dental providers used for referrals. Fourthly, ensuring OB providers and MAs have access to POHP materials.

CHAPTER SIX - DISCUSSION AND RECOMMENDATIONS

Discussion of the Results

Did implementation of the project introduce OB providers and staff at one local OB clinic to prenatal oral health practices consistent with current prenatal oral health guidelines? A discussion of the results will demonstrate that the answer is both yes and no.

The literature review on prenatal oral health guidelines identified three irreducible oral health elements for the provider to include in the provision of obstetric care: patient education, oral screening, and referral based on that screening. Results from the permutation test demonstrated that significantly more patients received prenatal oral health education ($p < .0002$, 95% CI 0.476-0.857) and screening by both questions ($p < .0002$, 95% CI 0.857-1) and exam ($p < .0002$, 95% CI 0.619-0.952) after the POHP was initially implemented than before.

However, none of the four pregnant patients identified to need a dental referral, received one. Thus, the POHP and practice change process significantly changed the practice of OB providers to include both patient education and identification of pregnant women in need of professional dental care, but failed to change the practice of OB providers to refer those pregnant women in need of professional dental care to a dentist.

Why didn't the POHP change the practice of the OB providers to refer pregnant women in need of professional dental care to a dentist? The run chart demonstrated that during the implementation period, the percentage of patients provided with oral health

education and screening with questions and exam, generally improved over time and were all 100% for the last 30 days of the 90-day POHP implementation period. The percentage of patients who received a needed dental referral remained at 0% throughout the course of the 90-day implementation period. Thus, the first three steps of the POHP, patient education, screening questions, and screening exam, were successfully implemented. However, the fourth POHP step, providing a needed dental referral to pregnant women based on screenings and clinical judgment, was not successfully implemented. Thus, the failure to impact the OB provider's practice of referring pregnant women in need of dental care is the fault of the practice change process, not the POHP itself.

There are a couple inferences that can be made as far as why the fourth step of the POHP, providing a referral to pregnant women in need of professional dental, was not successfully implemented during the 90-day implementation period. First, it was planned that whenever a patient's screening indicated the need for a dental referral and one was not provided, as part of the progress report, the author intervened by informing the OB provider and MA pair that a needed referral was missed and providing additional guidance and instruction on the referral process. The progress reports were sent to participating OB providers and MAs when approximately one third, two thirds, and three thirds of the 90-day allotted implementation period had passed. All but one of the four patients not provided with a needed dental referral received OB care during the last 30 days of the implementation period. Thus, the author was only able to intervene with additional referral guidance and instruction on one occasion. The subsequent patients that

did not receive a needed dental referral were provided OB care by the other OB provider and MA pair than received intervention previously. With a longer implementation period, it is likely the OB provider and MA pairs' performance on completing POHP step four, a needed dental referral, would have improved and become perfected like the other three POHP steps.

A second inference as to why the fourth step of the POHP was not successfully implemented during the 90 day period was the infrequency of the need to refer a patient to professional dental care and long lapse of time since the OB provider and MA pairs' initial instruction on POHP step four. Thus, the referral process was not routinized and it is likely that the OB provider and MA pair forgot the specifics of the referral process. Again, it can be inferred that this would have been remedied with a longer implementation period.

Four out of seventeen (24%) participating patients answered positively to the screening question "Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your teeth, broken teeth, toothache or any other problems in your mouth", necessitating a dental referral. While two thirds (66%) of 300 patients answered positively to the same question during a study to test oral health screening questions for pregnant women [143]. One explanation is the population differences, the study being conducted in a large metropolitan hospital in Sydney Australia. Another explanation is the sample size difference.

It was unexpected that of the four pregnant patients identified to need a referral (24%), none received one. Since no dental referrals were provided, the dental referral

process went untried. It is unknown how many patients, in receiving a dental referral, would have attended the dentist at some point during their pregnancy. It was unfortunate that without this measurement there was no visibility of the direct benefits of the POHP for the pregnant patient. A 44% dental referral attendance was seen with a similar intervention, the Prenatal Oral Health Program (pOHP). The pOHP was implemented as a collaborative effort between the Chapel Hill School of Medicine (SOM) and University of North Carolina School of Dentistry (SOD) [153]. The pOHP used a similar prenatal oral health protocol that included patient education, screening, and referral by medical students and their attending physicians. Patients were referred to the SOD based on subjective screening only, namely if the patient was without a dental home or had not been to a dentist in the last 12 months. Of the 126 women who were referred over a one-year time period, 44% attended the initial dental appointment.

Like this project, initial implementation evaluation data for the Rochester Adolescent Maternity Program (RAMP) oral health intervention, was too limited to demonstrate a sustained impact [154]. RAMP is a prenatal practice with seven OB providers serving pregnant adolescence. RAMP implemented a very similar oral health intervention providing patients with prenatal and infant oral health education, a dental referral, and oral health follow-up. The need for dental care was assessed solely on screening questions. Two very similar screening questions were asked of RAMP patients, a basic question about perceived oral problems in the mouth and use of professional dental care within the past six months. However, patients were referred to a dental professional when patients responded positively to either question, not just a positive

answer to perceived oral problems. Like this project, RAMP referred pregnant women in need of dental care to a public access university dental center. Unlike this project, RAMP ensured that at a later OB visit the provider evaluated dental attendance after a dental referral and reinforced oral health education. An oral health tracking form was used for this purpose.

Although, follow-up was not initially included in the POHP in order to minimize OB provider time constraint, it is a missing piece that likely would have improved both the rate at which patients in need of a dental referral received one, as well as dental attendance thereafter. During follow-up, the OB providers would likely have remedied the lack of provision of a dental referral for patients in need and seen to dental attendance thereafter.

Of great interest to this project, is the outcome of a RCT underway in Sydney Australia, testing the efficacy of a Midwifery Initiated Oral Health-Dental Service (MIOH-DS) program in improving women's oral health and dental service access [155]. The MIOH-DS trial is a three arm comparison of an oral health program wherein pregnant patients receive (1) Oral health education alone, (2) Oral health education and a dental referral to existing dental services, or (3) Oral health education and a dental referral to free dental intervention.

In the MIOH-DS program, the need for a dental referral is determined using a two question screening tool and a visual oral screening exam. The screening questions include, "Do you have bleeding gums, swelling, sensitive teeth, loose teeth, holes in your teeth, broken teeth, toothache or any other problems in your mouth", and "have you seen

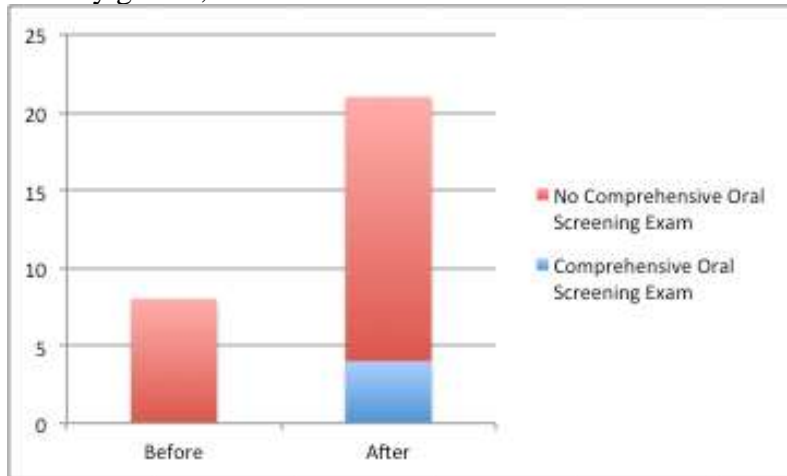
a dentist in the last 12 months”. Positive answers to either of these questions necessitate a referral. The MIOH-DS trial will measure dental attendance after referral, women’s oral health knowledge, oral health status, sensitivity and specificity of the midwives’ oral screening exam, and birth outcomes. These outcomes will certainly be of interest and pertain to this project.

Project Limitations

There are several limitations that may affect the internal validity of the findings of the project. The first limitation affecting internal validity is the possible inadequacies in the method used to determine if an oral screening exam was provided. Five check boxes were available to the OB provider when documenting the oral screening exam: (1) Lips, teeth, gums, (2) buccal mucosa, (3) Tongue, (4) salivary glands, and (5) breath odor. See Appendix G Documentation of the Obstetric Provider’s Oral Exam. For the project, provision of an oral exam was measured by documentation of at least teeth and gums.

However, if the method to determine the provision of an oral exam were a comprehensive oral exam, including the documentation of all of the items, the outcome would be different. None (0%) of the before patients received a comprehensive oral screening exam (including lips, gingiva, teeth, tongue, buccal mucosa, salivary glands, and breath odor) before the project, whereas four out of twenty-one (19%) after patients received a comprehensive oral screening exam after the POHP was initially implemented. These proportions are depicted in Figure 9.

Figure 9. Proportions of before and after patients who did and did not receive a comprehensive oral screening exam including lips, gingiva, teeth, tongue, buccal mucosa, salivary glands, and breath odor.



There was not a significant difference in the proportion of patients who received a comprehensive oral exam (including lips, gingiva, teeth, tongue, buccal mucosa, salivary glands, and breath odor) after than before the initial implementation of the POHP ($p=0.249$, 95% CI 0.048-0.381). One likely precipitating factor for insignificance was that this was not used as the exam occurrence measurement, thus not reported in this manner on the project progress reports to OB providers.

A related and second possible limitation affecting internal validity is the unknown sensitivity and specificity of an OB provider to detect a necessary dental referral with the oral screening exam in the literature. Of the seventeen patients who received an oral screening exam, none necessitated a dental referral based on OB provider's findings, which leaves the sensitivity of the OB provider's visual screening exam in question. Compounding the issue is the inconsistencies of what the OB providers included in the oral screening exam and the rare occurrence (19%) that a comprehensive screening exam

was provided to participating patients, as discussed above. This is due to the author's lack of clarity on the oral screening exam components and desired documentation before and during the 90-day implementation period.

A third limitation affecting internal validity was that bias may have occurred because the OB providers and MAs knew they were participating in the project and knew how the project was being evaluated. None of the providers or staff were blinded to the project. However, during a practice change process there would be the same open communication in regards to participation and evaluation.

A fourth potential limitation affecting internal validity is that the MAs approached patients to participate and thus knew whom the participating patients were. The MAs could have either chosen specific patients or performed patient tasks differently, knowing the participants. However, during a practice change process providers and MAs know all their patients are participating.

A fifth limitation affecting internal validity lies in the data analysis method to calculate confidence intervals for the p-values in the difference in OB provider's oral health practice before and after the initial POHP implementation. The bootstrap test is not exact.

A final limitation affecting internal validity pertains to the method of gaining qualitative data from participating OB providers and MAs. The answers to questions would have best been gained in a focus group method, because clarification and deeper issues could likely have been drawn from answers. However, the stakeholders preferred a

survey for the sake of time, thus, a written survey was the method that answers were gained.

There are several limitations that affect the external validity of the project so that the results do not necessarily apply to other OB providers and medical assistants within and without of the OB clinic wherein the project took place. The first limitation affecting the external validity is the small sample size of patients. Small sample sizes certainly increase uncertainty of the results. Smaller patient sample sizes were a foreseen concern. The author adjusted for this expected limitation with what was perceived to be an appropriate period of time for implementation.

The second limitation affecting external validity is both the unequal sizes of the before and after patient sample and not having at least 5 successes and 5 failures in both the before and after patient groups. This means that the strict assumption of a parametric test would not be met. These were expected before the project began. In order to account for these expected limitations, a non-parametric test, the permutation test, was used for data analysis. Additionally, confidence intervals were calculated to estimate the certainty of the observed differences.

The third and final limitation affecting external validity is that the project did not use random assignment design for selecting patients. Although this was a foreseen limitation, the author did not attempt to account for every confounding patient variable, as this is beyond the scope of the scholarly project. Although, not using a random assignment design does greatly limit the ability to infer causality to any observed differences in the before and after patients. Similarly, OB providers and MAs were not

randomly assigned to participate but volunteered, likely because of affinity in prenatal oral health, so the results cannot be held true for any OB providers or MAs that do not volunteer for the practice change.

Although the scope of inference is limited, positive results are still encouraging measures of the success of changing the prenatal oral health practices of OB providers and staff in one OB office to coincide with current prenatal oral health guidelines using a POHP synthesized of prenatal oral health guidelines. It is likely that this project can be transferred into the practice of any OB provider or OB clinic when the POHP specifics are tailored to maximize feasibility, simplicity, and value to the OB clinic system.

Project Strengths

There are several strengths of the project. First, the project intervention, both the POHP and practice change process, addressed all patient, provider, and system barriers to oral health services during pregnancy discussed in the background of this paper.

Although the project outcomes don't directly measure the effect addressing these barriers had on patient outcomes, the strength of the project certainly lies in the intervention addressing the barriers. Table 2 demonstrates the barriers to women receiving dental care found in the literature review and how the intervention compensated for those barriers.

Table 2. Barriers to professional dental care during pregnancy and compensation provided by project interventions.

| BARRIERS | PROJECT INTERVENTION |
|--|---|
| Women's financial status | Both dental referrals offered a sliding fee scale based on income |
| Women enrolled in Medicaid unaware of Medicaid dental benefits | MA provided written material on Medicaid dental benefits |
| Women's thought that dental care is unsafe during pregnancy | OB provider and MA assured women that dental care is safe during pregnancy |
| Language barrier between patient and dentist (Spanish) | One dental referral provider spoke fluent Spanish |
| Long wait time for dental appointments | Dental referral sites had a wait time of no longer than 1-3 weeks. |
| Low access to dentist | Dental referral |
| Dentists not accepting new Medicaid patients | Both dental referrals accepted new Medicaid patients |
| Low interprofessional collaboration between OB and dental provider | Dental referral form and referral dentist provided OB provider prenatal oral health education |

A second strength of the project lies in connecting and sustaining the relationship of the OB and referring dental providers. The participating dental clinics have agreed to continue to be available as dental referral sources for the OB clinic. A third strength of the project are the positive results, which are encouraging measures of the success of project changing the prenatal oral health practices of participating OB providers and MAs. A fourth strength of the project is the survey results indicating likely sustainability of the POHP by the participating OB providers and MAs.

Successes and Difficulties Implementing the POHP

Several difficulties were encountered when implementing the POHP, as expected during any practice change project. First, the author did not manage to breach the private sector of local dentists to participate in the project, although a dentist on the project

committee did help the author breach the medical-dental barrier with introductions to local dental stakeholders in the public sector. It was anticipated that the author would approach dentists in the private dental sector of dentistry when patients in need of a dental referral sought to have the referral sent to their pre-established private dental home. However, no dental referrals were sent.

A second implementation difficulty was that only a smaller fraction of the OB providers at the clinic volunteered to participate. Without full or majority participation of the whole organization, it was difficult to make changes to the organization infrastructure to support the POHP, because the changes were not important for all providers. Namely, not all EHR modification requests were approved since it did not pertain to all users.

A third implementation difficulty was that much of the documentation on POHP activities was done outside of typical places in the EHR, which caused feelings of angst among the participating MAs and was a hindrance to the implementation process. Little could have been done to modify the EHR more during or before implementation, seeing as how the EHR modification requests had already been denied. All the author could do is recommend EHR modifications as recommendations when presenting project findings to the OB clinic.

A fourth implementation difficulty was that one of three volunteering OB providers left the practice directly before the implementation of the POHP. Although difficult, turnover is not unexpected when implementing health care changes.

A fifth implementation difficulty was that since no dental referrals were made, the dental attendance after a referral could not be included in progress reports to the OB

provider and MA pairs. Thus, the patient benefit of the POHP, dental attendance after a referral, although theoretically understood, wasn't readily visible to the participating OB providers and MAs doing the hard work of implementing the POHP. Without visibility of patient benefit from the change, the change is less easily adopted [151].

A last implementation difficulty was that the POHP activity delegation lay heavily on the MA role. The MAs were doing education, screening questions, and making the arrangements for the patient's dental referral, all but step three of the POHP. A practice change is more adoptable when activities are delegated in such a way that they are spread throughout the entirety of the team and not lay heavily on one or two roles [151]. To do so, it would have been preferable to delegate the dental referral arrangements to the dental referral management team. Little could have been done to rectify this during or before implementation, seeing as how the request to have the referral management team arrange the dental referral had already been denied. All the author could do was to recommend the referral management team arrange the dental referral when project findings were presented to the OB clinic.

Several successes were encountered when implementing the POHP. First, the participating OB providers and MAs perceived the POHP as both simple to use and adopt according to the survey. This was a great success, as perceived simplicity of a health care innovation does much to make it more readily adoptable [151]. Secondly, the relationship between the OB providers and referral dentist was well forged through face-to-face interaction during the prenatal oral health education seminar, as per the survey. Thirdly, according to the survey, participating OB providers and MAs felt they were well

supported during the implementation of the POHP. Fourthly, according to the survey, the progress reports did much to help stay the course of the project for the participating OB providers and MAs.

What Could Have Been Done Differently?

In light of limitations and results, there are two things the author would have preferred to do differently. First, the author would have established the timeframe for the implementation period contingent on a pre-established number of patients correctly referred to a dentist. This contingency would have allowed the author enough time to intervene and guide OB provider and MA pairs on providing a needed dental referral if it wasn't provided, and then time enough to see if dental referral performance improved. Secondly, the author would like to have rectified the lack of clarity provided to the participating OB providers on the oral screening exam components and desired documentation before and during the 90-day implementation period. All other limitations and difficulties encountered during the project are part of a practice change process.

Future Plans: Recommendations to the OB Clinic

The next step would be to integrate the POHP into the entire OB clinic. There are several recommendations for doing so. It is recommended that the POHP be simplified further by excluding the oral screening exam. There are several reasons as to why this is advisable. First, by excluding the oral screening exam, the three irreducible core elements of the POHP identified in literature review of the project would still remain intact within

the POHP. Secondly, the participating OB providers did not identify a need for a referral based on the oral screening exam alone. Thirdly, the sensitivity and specificity of an OB provider to detect the need for a dental referral with an oral screening exam is unstudied and therefore unknown. Fourthly, there was not a consensus among all prenatal oral health guidelines that an oral screening exam was needed for screening. In fact, of the prenatal oral health guidelines for OB providers, only two recommended screening by both questions and exam [132, 133], while the majority recommended oral screening by questions only [128-130, 134]. Fifth, the oral screening exam is the most difficult, time consuming, and costly POHP step to implement and evaluate besides the referral itself. Thus removing it would ease the POHP implementation process. Sixth, excluding the oral exam would tailor the POHP to maximize feasibility, simplicity, and value to the OB clinic, which propels innovation system fit. Innovation-system fit is of utmost importance for implementation success and the perceived simplicity of a health care innovation does much to make it more readily adoptable [151]. Seventh, the United States Preventive Service Task Force (USPSTF) found insufficient evidence for routine screening exam by primary care providers for early childhood caries among preschool children [156]. The evidence to support a routine screening exam for pregnant women is even more lacking. Finally, some may argue that an oral screening exam is warranted since the OB providers can screen for oral cancer at the same time. However, it is clear that the USPSTF does not recommend the primary care provider provide a cancer screening of the oral cavity for asymptomatic patients [157, 158].

It would be important to have participating OB providers and MAs serve as change champions and transformational leaders in the prenatal oral health practice changes of the whole OB clinic. Change champions make the successful adoption of a healthcare organization change much more likely and the participating OB providers and MAs are ideal candidates, having implemented the POHP, being knowledgeable and excited about prenatal oral health, and being key individuals in the organization [151].

It would be ideal to close the prenatal oral health knowledge gap for all OB providers and MAs at the clinic with the same two Smiles for Life modules used in this project, 'The Pregnant Patient' [148] and 'The Oral Exam' [149]. The curriculum was created for primary care non-dental clinicians by the Society of Teachers of Family Medicine and endorsed by numerous healthcare organizations and shown to significantly improve oral health knowledge [147]. Each module takes less than one hour to complete, is worth one CME upon completion, and can be done at the convenience of the learner.

It is important to maximize the use of the existing OB clinic infrastructure and processes to provide a fulcrum for the POHP. One vital way of doing so is to integrate the dental referral process into the existing referral management team. In doing so, the already established process is used, making implementation easier and sustainability much more likely [151].

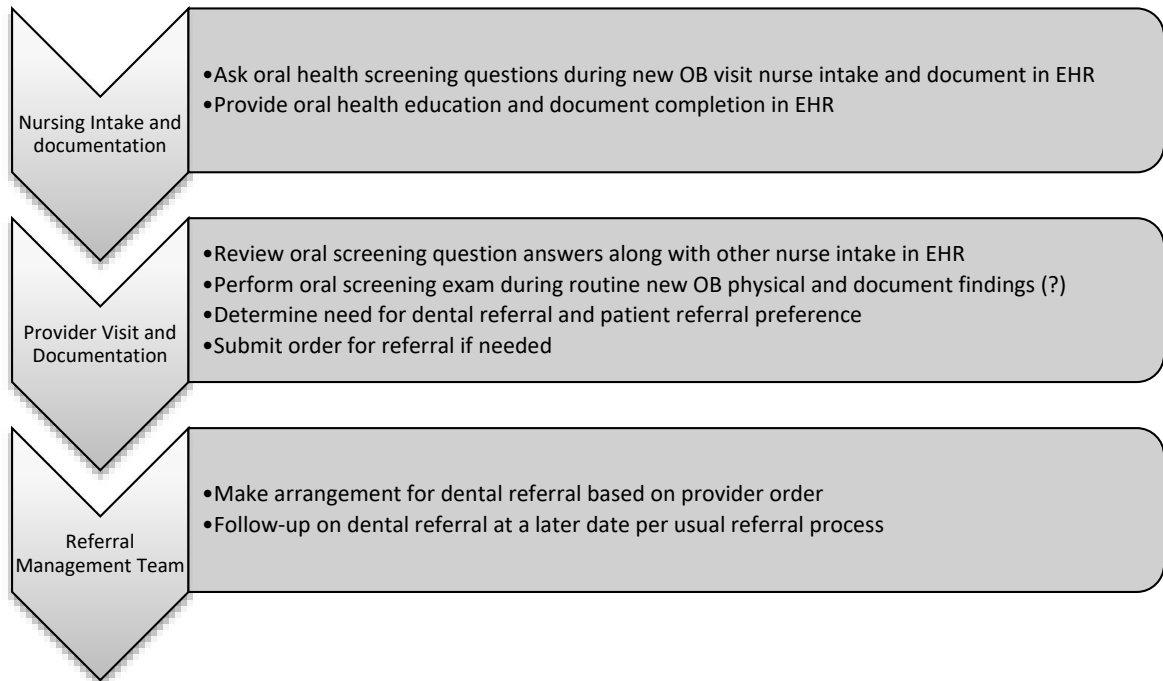
Of utmost importance to augment the EHR to fully support and document every POHP step and activity. By adding oral health activities to the EHR, workflow can be efficient and consistent across the clinic and EHR-generated outcomes reports are readily made available for easy continued POHP evaluation; both are drivers for successful oral

health activity implementation [159]. Three meaningful EHR changes under new OB visit documentation are recommended: (1) Include the screening questions in the nurse intake questions or as a separate screening, (2) Include a spot in the 'education' section specifically for oral health education completion documentation, (3) Provide check boxes for whether the oral referral was needed or not needed.

It is advised to consider including oral health follow up as a sixth and final step of the POHP. An oral health follow-up at a later OB visit, allows the OB provider to remedy any missed POHP steps, evaluate and encourage dental attendance, and reinforce important oral health education. An EHR prompt and OB provider utilization of the problem list when a dental referral is made would greatly assist in the task. The other option is to defer the dental referral follow-up to the referral team, which is the process for other referrals.

It is paramount that formal integration of the POHP activities occur in such a way that evenly delegates oral health activities throughout the OB clinic team, a driver of successful implementation [151]. See figure 10 for suggested workflow and POHP activity delegation to occur at the New OB visit only.

Figure 10. Suggested workflow and POHP activity at the new OB visit.



Finally, it is important to be aware of the budgetary considerations to implement the POHP throughout the entirety of the OB clinic, which is small. These include staff and provider paid time to complete the two Smiles for Life modules, referral team pay to receive training on referral process, information technologist pay to make changes to the EHR to suit the needs of POHP, and the cost to print the ‘Two Healthy Smiles’ brochure, the written information on Idaho Smiles, the two-question ‘Prenatal Oral Health Screening Tool’, and the ‘Prenatal Oral Health Referral Form’. Budgetary savings would be achieved if the two question screening tool and referral form could be completed electronically.

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APPENDICES

APPENDIX A

LITERATURE REVIEW MATRIX

LITERATURE REVIEW MATRIX

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
|--|---|--|--|--|---|
| <p>American Academy of Pediatric Dentistry. (2011). Guideline on Perinatal Oral Health. <i>American Academy of Pediatric Dentistry Reference Manual</i>, 36(6), 135-139.</p> | <p>ORGANIZATION: American Academy of Pediatric Dentistry. INTENT OF USE: APRNs, allied health personnel, dentist, PAs, MDs in clinical practice. LIT REVIEW: PubMed® with the following parameters: Terms: "early childhood caries", "perinatal", "perinatal oral health", and "early childhood caries prevention"; Fields: all; Limits: within the last 10 years, humans, English, and clinical trials. Papers for review were chosen from the resultant list of 113 articles and from references within selected articles. LOE: none for specific recommendations. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians. Credibility: methods to create guidelines explicit and systematic. expert team. Applicability: relevant to clinical practice. Measureable outcomes to standards of care. No deviations from other guidelines. Limitations: none</p> | <p>METHOD: unspecified other than counseling CONTENT: dental home, oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester and optimal during 2nd trimester, xylitol gum use, vomiting practices to reduce oral health risk.</p> | <p>METHOD: unspecified CONTENT: first dental visit before twelve months of age, avoid saliva-sharing behaviors, importance of parental dental care, diet, oral hygiene habits, and fluoride intake.</p> | <p>METHOD: unspecified- refer for preventive and therapeutic care. SCREENING QUESTIONS: SCREENING EXAM SPECIFICS: TIMING: unspecified</p> | <p>METHOD: unspecified CONTENT: SAFETY: all trimesters, ideal 2nd trim. Xray with shielding, dental prophylaxis, periodontal scaling and root planning treatment, restoration material removal and replacement using a rubber dam and high speed evacuation, use of local anesthetics like lidocaine or prilocane with epi. are all safe. Nitrous oxide</p> |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
|---|--|---|--|---|---|
| | | | | | use unspecified. |
| <p>American College of Obstetricians and Gynecologists. (2015). Committee opinion No. 569: oral health care during pregnancy and through the lifespan. <i>Journal of the American College of Obstetricians and Gynecologists</i>, 122(2 pt 1), 417-422. doi:10.1097/01.AOG.0000433007.16843.10.</p> | <p>WHO: American College of Obstetrics and Gynecologists. INTENT OF USE: OB providers in clinical practice LIT REVIEW: thorough although process not explicit LOE: none for specific recommendations CREDIBILITY: Advisory committee comprised of representatives from: ACOG, ADA, Health Resources and Services Administration's Maternal and Child Bureau , and National Maternal and Child Oral Health Resources Center. Panel expert and interdisciplinary. Process not explicit. APPLICABILITY: clinically relevant Limitations: none</p> | <p>METHOD: verbal discussion CONTENT: oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester and optimal during 2nd trimester, xylitol gum and chlorhexidine/fluoridated mouth rinse use, vomiting practices to reduce oral health risk.</p> | <p>METHOD: verbal discussion CONTENT: importance of parental dental care to reduce MS transmission.</p> | <p>METHOD: 3 screening questions. Encourage all women to see dentist if not in past 6 months or if they have any oral health problems. SCREENING QUESTIONS: "Do you have swollen or bleeding gums, a toothache, problems eating or chewing food, or problems in your mouth?", "when was your last dental visit?", "do you need help finding a dentist?" SCREENING EXAM SPECIFICS: TIMING: 1st prenatal visit</p> | <p>METHOD: Written note or phone call. Have dental referral network list of providers. Done like any other medical referral. CONTENT: SAFETY: all trimesters. Xray with shielding, dental prophylaxis, periodontal scaling and root planning treatment, restoration material removal and replacement using a rubber dam and high speed evacuation,</p> |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
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| | | | | | use of local anesthetics like lidocaine or prilocane with epi. are all safe. Nitrous oxide use unspecified. |
| <p>California Dental Association. (2010). Oral health during pregnancy and early childhood: evidenced-based guidelines for health professionals. <i>Journal of the California Dental Association</i>, 38(6), 405-440.</p> | <p>WHO: California Dental Association USE: assist health care professionals in private, public, and community-based practices in delivering oral health services to pregnant women and their children. Public policy change recommendations addressed in document accompanying these guidelines. LITERATURE REVIEW: comprehensive, although process not explicit. LOE: none accompany recommendations. CREDIBILITY: developed by state and national medical, dental and public health experts organized by CDA and ACOG. Expert and interdisciplinary workgroup. Process systematic. APPLICABILITY: clinically relevant guidelines accompanied by public policy change recommendations. LIMITATIONS: none</p> | <p>METHOD: unspecified other than verbal reassurance safety CONTENT: oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester although optimal during 2nd trimester, provider to urge early prenatal dental care to ensure treatment, xylitol gum and chlorhexidine/fluoridated mouth rinse use, vomiting practices to reduce oral health risk.</p> | <p>METHOD: unspecified CONTENT: first dental visit before twelve months of age, avoid saliva-sharing behaviors, importance of parental dental care, diet, oral hygiene habits, wipe infant gums after bottle/breast, how to check child's mouth for white/brown spots on teeth,</p> | <p>METHOD: screening and referral part of routine prenatal care. Screening exam. SCREENING QUESTIONS: none specified SCREENING EXAM SPECIFICS: teeth, gums, tongue, palate, mucosa. TIMING: unspecified</p> | <p>METHOD: written consultation form example provided. Dental referral network list of providers. CONTENT: Share pertinent clinical information and answer any dentists' questions. SAFETY: all trimesters, ideal 2nd trim. Xray with shielding, dental prophylaxis, periodontal</p> |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
|--|---|--|---|--|---|
| | | | and fluoride intake. | | scaling and root planning treatment, restoration material removal and replacement using a rubber dam and high speed evacuation, use of local anesthetics like lidocaine or prilocane with epi, and Nitrous oxide use all safe |
| Kumar, J. and Iida, Hiroko. Oral health care during pregnancy a summary of practice guidelines. National Maternal and Child Oral Health Resource Center. Retrieved September 9, 2016 from: http://mchoralhealth.org/PDFs/Summary_PracticeGuidelines.pdf | WHO: written by authors from the NY state Department of Health, coordinated by Children's Dental Health Project, and produced by National Maternal and Child Oral Health Resource Center. Use: Medical and oral health professionals LIT REVIEW: summary of other guidelines LOE: no individual recommendations Credibility: Applicability: clinically relevant Limitations: summary of previous guidelines | METHOD: suggest oral content integrated into prenatal class and written material and verbal reassurance of safety of professional dental care CONTENT: oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester. | METHOD: not explicit CONTENT: not explicit | METHOD: 2 screening questions. Use first question for referral and second for education (go to dentist if not past 6 months). SCREENING QUESTIONS: "do you have bleeding gums, toothache, cavities, loose | METHOD: written consultation form example provided. Have dental referral network list of providers. CONTENT: share pertinent information and answer questions |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
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| | | | | teeth, teeth that do not look right or other problems in your mouth?" "Have you had a dental visit in the last 6 months"? SCREENING EXAM SPECIFICS: TIMING: unspecified | SAFETY: all trimesters, ideal 2 nd trim. Xray with shielding, dental prophylaxis, periodontal scaling and root planning treatment, restoration material removal and replacement using a rubber dam and high speed evacuation, use of local anesthetics like lidocaine or prilocane with epi are all safe. Nitrous oxide use unspecified. |
| National Maternal and Child Oral Health Resources Center. (2012). Oral health care during pregnancy: a | WHO: National Maternal and Child Oral Health Resource Center. Expert workgroup: HRSA;s MCHB, AAP, AAPD, ACOG, ADA, American Dental Hygienists' Association, Association of | METHOD: written material provided and in prenatal classes | METHOD: written material provided | METHOD: 4 Q's and exam SCREENING QUESTIONS: "Do you have swollen | METHOD: Encourage women to see dentist if longer than 6 |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
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| <p>national consensus statement summary of an expert workgroup meeting. Oral health care during pregnancy expert workgroup: Washington, DC. Retrieved September 9, 2016 from: https://www.cdph.ca.gov/programs/MCAHOralHealth/Documents/MCAH-OHP-OralHealthPregnancyConsensus2011.pdf</p> | <p>State and Territorial Dental Directors, Medicaid-CHIP State Dental Association INTENT OF USE: developed to help health professionals, program administrators, policy makers, advocates, other stakeholders respond to the need for improvements in provision of oral health services to pregnant women and improve overall standards of care. LIT REVIEW: throughout although not explicit LOE: none reported for recommendations CREDIBILITY: expert and interdisciplinary team. Peer reviewed. APPLICABILITY: clinical relevancy. LIMITATIONS: none</p> | <p>CONTENT: oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester and optimal during 2nd trimester, xylitol gum and chlorhexidine/fluoridated mouth rinse use, vomiting practices to reduce oral health risk.</p> | <p>CONTENT: importance of parental dental care, first dental visit by age one, breastfeeding, diet.</p> | <p>or bleeding gums, a toothache (pain), problems eating or chewing food, or other problems in your mouth?”, “since becoming pregnant have you been vomiting, if so how often?”, “do you have any questions or concerns about getting oral health care while you are pregnant?”, “When was your last dental visit, do you need help finding a dentist?” SCREENING EXAM SPECIFICS: visual exam and document TIMING: 1st prenatal visit</p> | <p>months since last visit. If urgent problems refer using formal referral process. Have dental referral network list of providers. CONTENT: share pertinent information SAFETY: all trimesters, ideal 2nd trim. Xray with shielding, dental prophylaxis, restoration material removal and replacement, use of local anesthetics like lidocaine or prilocane with epi are all safe. Nitrous oxide</p> |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
|--|--|--|---|--|---|
| | | | | | use with OB provider collaboration and lower dose. periodontal treatment safety unspecified. |
| <p>New York Department of Health. (2006). Oral health care during pregnancy and early childhood practice guidelines. Retrieved September 9, 2016 from: https://www.health.ny.gov/publications/0824.pdf</p> | <p>WHO: New York State Department of Health INTENT OF USE: prenatal, oral health, and child professionals in clinical practice. LIT REVIEW: throughout although not explicit LOE: none for specific recommendations. relied on expert consensus when controlled studies were not available CREDIBILITY: expert and interdisciplinary panel. Systematic and reliable process for synthesis of guidelines. APPLICABILITY: clinically relevant and applicable. Outcomes measureable by standards of care. LIMITATIONS: none</p> | <p>METHOD: written patient education material provided CONTENT: oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester and optimal during 2nd trimester, xylitol gum use.</p> | <p>METHOD: written patient education material provided CONTENT: first dental visit between six and twelve months of age, avoid saliva-sharing behaviors, importance of parental dental care, diet, oral hygiene habits, wipe infant gums after bottle/breast, and fluoride intake.</p> | <p>METHOD: 2 screening questions. Use first question for referral and second for education (go to dentist if not past 6 months). SCREENING QUESTIONS: “do you have bleeding gums, toothache, cavities, loose teeth, teeth that do not look right or other problems in your mouth?” “Have you had a dental visit in the last 6 months”? SCREENING EXAM SPECIFICS:</p> | <p>METHOD: written consultation form example provided. Have dental referral network list of providers. CONTENT: share pertinent information SAFETY: all trimesters, ideal 2nd trim. Xray with shielding, dental prophylaxis, periodontal treatment, restoration material removal and</p> |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
|--|--|--|--|--|--|
| | | | | TIMING: 1 st prenatal visit | replacement, use of local anesthetics like lidocaine or prilocane with epi. are all safe. Nitrous oxide use is safe in collaboration with OB provider. |
| <p>South Carolina Oral Health Advisory Council and Coalition. (2009). Oral health care for pregnant women. Retrieved from: http://www.scdhec.gov/library/cr-009437.pdf</p> | <p>WHO: south carolina oral health advisory council and coalition Use: family physicians, OB, Peds, APRN's, certified nurse Midwives, Pas, health educators, WIC nutritionists, ealy head start health coordinators, healthy start staff, outreach workers from community health centers, dentists, dental hygienists, and dental assistants. LIT REVIEW: summary of other guidelines LOE: no individual recommendations Credibility: expert and interdisciplinary panel. Applicability: clinically relevant with measureable outcomes. Limitations: summary of previous guidelines</p> | <p>METHOD: suggest oral content integrated into prenatal class and written material and verbal counseling safety and importance professional dental care CONTENT: oral hygiene behaviors, use fluoridated toothpaste, Diet, professional dental care important and safe any trimester and optimal during 2nd trimester, xylitol gum use.</p> | <p>METHOD: not explicit CONTENT: not explicit</p> | <p>METHOD: 2 screening questions. Use first question for referral and second for education (go to dentist if not past 6 months). SCREENING QUESTIONS: "do you have bleeding gums, toothache, cavities, loose teeth, teeth that do not look right or other problems in your mouth?" "Have you had a dental</p> | <p>METHOD: written consultation form example provided. Have dental referral network list of providers. CONTENT: share pertinent information and answer dentists' questions SAFETY: all trimesters, ideal 2nd trim. Xray with shielding, dental</p> |

| Citation | Guideline Appraisal | Prenatal oral health education | Anticipatory guidance | Oral Health Screening/ Assessment | Referral |
|----------|---------------------|--------------------------------|-----------------------|--|---|
| | | | | <p>visit in the last 6 months”?</p> <p>SCREENING EXAM SPECIFICS: TIMING: early or at some point during pregnancy</p> | <p>prophylaxis, periodontal treatment, restoration material removal and replacement using a rubber dam and high speed evacuation, use of local anesthetics like lidocaine or prilocane with epi. are all safe. Nitrous oxide use unspecified.</p> |

APPENDIX B

SLIDING FEE SCALE

SLIDING FEE SCALE

| Annual Income Thresholds by Sliding Fee Discount Pay Class and Percent Poverty | | | | | | |
|--|-------------------|-------------------|-------------------|-------------------|-------------------|------------|
| Poverty Level* | At or Below 100% | 125% | 150% | 175% | 200% | Above 200% |
| Family Size | Charge | | | | | |
| | Nominal Fee (\$5) | 20% pay | 40% pay | 60% pay | 80% pay | 100% pay |
| 1 | 0-\$11,880 | \$11,881-\$14,850 | \$14,851-\$17,820 | \$17,821-\$20,790 | \$20,791-\$23,760 | \$23,761+ |
| 2 | 0-\$16,020 | \$16,021-\$20,025 | \$20,026-\$24,030 | \$24,031-\$28,035 | \$28,036-\$32,040 | \$32,041+ |
| 3 | 0-\$20,160 | \$20,161-\$25,200 | \$25,201-\$30,240 | \$30,241-\$35,280 | \$35,281-\$40,320 | \$40,321+ |
| 4 | 0-\$24,300 | \$24,301-\$30,375 | \$30,376-\$36,450 | \$36,451-\$42,525 | \$42,526-\$48,600 | \$48,601+ |
| 5 | 0-\$28,440 | \$28,441-\$35,500 | \$35,501-\$42,660 | \$42,661-\$49,770 | \$49,771-\$56,880 | \$56,881+ |
| 6 | 0-\$32,580 | \$32,581-\$40,625 | \$40,626-\$48,870 | \$48,871-\$57,015 | \$57,016-\$65,160 | \$65,161+ |
| 7 | 0-\$36,730 | \$36,731-\$45,913 | \$45,914-\$55,095 | \$55,096-\$64,278 | \$64,279-\$73,460 | \$73,461+ |
| 8 | 0-\$40,890 | \$40,891-\$51,113 | \$51,114-\$61,335 | \$61,336-\$71,558 | \$71,559-\$81,780 | \$81,781+ |
| For each additional person, add | \$4,160 | \$5,200 | \$6,240 | \$7,280 | \$8,320 | \$8,320 |

APPENDIX C

2016 POVERTY LEVEL CHART

2016 POVERTY LEVEL CHART

| Household Size | 100% | 138% | 150% | 200% | 250% | 300% | 400% |
|----------------|----------|----------|----------|----------|-----------|-----------|-----------|
| 1 | \$11,770 | \$16,242 | \$17,655 | \$23,540 | \$29,425 | \$35,310 | \$47,080 |
| 2 | \$15,930 | \$21,983 | \$23,895 | \$31,860 | \$39,825 | \$47,790 | \$63,720 |
| 3 | \$20,090 | \$27,724 | \$30,135 | \$40,180 | \$50,225 | \$60,270 | \$80,360 |
| 4 | \$24,250 | \$33,465 | \$36,375 | \$48,500 | \$60,625 | \$72,750 | \$97,000 |
| 5 | \$28,410 | \$39,205 | \$42,615 | \$56,820 | \$71,025 | \$85,230 | \$113,640 |
| 6 | \$32,570 | \$44,946 | \$48,855 | \$65,140 | \$81,425 | \$97,710 | \$130,280 |
| 7 | \$36,730 | \$50,687 | \$55,095 | \$73,460 | \$91,825 | \$110,190 | \$146,920 |
| 8 | \$40,890 | \$56,428 | \$61,335 | \$81,780 | \$102,225 | \$122,670 | \$163,360 |

U.S. Department of Health and Human Services. (2015). 2016 federal poverty level chart. Retrieved April 4, 2016 from: <https://www.parkviewmc.com/app/files/public/1484/2016-Poverty-Level-Chart.pdf>

APPENDIX D

PRENATAL SCREENING QUESTIONNAIRE

PRENATAL SCREENING QUESTIONNAIRE

Patient Name: _____
Date of Birth: _____ Date: _____

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?

Yes

No

2.) Have you had a dental visit in the last 6 months?

Yes

No

APPENDIX E

PRENATAL ORAL HEALTH REFERRAL FORM

PRENATAL ORAL HEALTH REFERRAL FORM

Patient name: _____
 DOB: _____ Patient phone #'s : _____
 Best time to call: morning afternoon evening anytime
 Insurance status: Idaho Smiles True Blue SNP Private dental insurance No dental coverage
 Verified enrollment in Idaho Smiles or True Blue SNP: Yes Unable to confirm eligibility

Referred to: _____ Phone: _____ Fax: _____

Reason for dental referral: Routine oral healthcare Possible dental treatment needed

| Area(s) of concern | |
|--------------------|------------|
| Upper right | Upper left |
| Lower right | Lower left |

| Oral conditions (circle all that apply) | | |
|---|---------------|-------------------------|
| Bleeding gums | Loose tooth | Soft tissue mass/lesion |
| Broken tooth | Dental caries | Abscessed tooth |

Patient in pain: YES NO Weeks gestation: _____ Estimated delivery date: _____

Patient is cleared for comprehensive dental care during any trimester, including but not limited to:

- Dental X-rays with thyroid collar shield
- Fluoride both topical/varnish and prescription
- Chlorhexidine mouth rinse
- Periodontal therapy both non-surgical and surgical
- Root canal treatment
- Dental restorations including amalgam, composite, cast, or milled
- Extractions both simple and surgical
- Local anesthetics with epinephrine
- Analgesics such as acetaminophen including opioid combinations, meperidine, and morphine
- Antibiotics (if no known allergies) including penicillin, amoxicillin, cephalosporin, clindamycin, erythromycin, metronidazole
- Nitrous oxide (<30%) – May be used in short durations when local anesthetic is inadequate

Known Allergies: NONE YES (Specify) _____
 Any precautions: NONE YES (Specify) _____
 Drug(s)/Reaction(s): _____

Prenatal care provider (print name): _____
 Preferred method of contact: _____
 Signature: _____ Date: _____

Dentist: Please fax information back (to prenatal care provider, fax number above) after initial visit:
 Exam date: _____ Normal exam Missed Appointment Nonresponse after 2 calls
 Has or will receive: Dental Cleaning Dental treatment for _____
 Comments: _____

APPENDIX F

PATIENT ORAL HEALTH EDUCATION DOCUMENTATION

PATIENT ORAL HEALTH EDUCATION DOCUMENTATION

First Trimester Education elements:
Defined: 0
Completed: 0

Check all education for 1st Trimester Gestational age:

| | Completed: | Initials: | Need for further discussion: |
|---|------------|-----------|---|
| <input type="checkbox"/> HIV and other routine prenatal tests | // | | <input type="checkbox"/> Follow-up in 3rd trimester |
| <input type="checkbox"/> domestic violence screening | // | | |
| <input type="checkbox"/> anticipated course of prenatal care | // | | |
| <input type="checkbox"/> nutrition and weight gain counseling, special diet | // | | |
| <input type="checkbox"/> toxoplasmosis precautions (cats / raw meat) | // | | |
| <input type="checkbox"/> sexual activity | // | | |
| <input type="checkbox"/> physical activity / exercise | // | | |
| <input type="checkbox"/> indications for ultrasound | // | | |
| <input type="checkbox"/> influenza vaccine discussed | // | | |
| <input type="checkbox"/> environmental / work hazards | // | | |
| <input type="checkbox"/> travel | // | | |
| <input type="checkbox"/> tobacco (ask, advise, assess, assist and arrange) | // | | |
| <input type="checkbox"/> alcohol | // | | |
| <input type="checkbox"/> illicit / recreational drugs | // | | |
| <input type="checkbox"/> use of any medications (including supplements, vitamins, herbs, OTC drugs) | // | | |
| <input type="checkbox"/> seat belt use | // | | |
| <input type="checkbox"/> New OB packet & Welcome Baby book | // | | |
| <input type="checkbox"/> childbirth classes / hospital facilities | // | | |
| <input type="checkbox"/> Early Screen testing discussed | // | | |
| <input type="checkbox"/> cystic fibrosis testing discussed | // | | |
| <input type="checkbox"/> quad screen testing discussed | // | | |
| <input type="checkbox"/> amniocentesis discussed | // | | |
| <input type="checkbox"/> Zika education | // | | |
| Other: <input type="text"/> | // | | |
| Other: <input type="text"/> | // | | |
| <input type="checkbox"/> First trimester education documented as complete | // | | |

APPENDIX G

DOCUMENTATION OF THE OBSTETRIC PROVIDER'S ORAL EXAM

DOCUMENTATION OF THE OBSTETRIC PROVIDER'S ORAL EXAM

Ngkbn Framework Content 01/29/2016 12:50 PM : "OB Prenatal Flow - OGA 8.3.8" x Patient History

Specialty ▾ Obstetrics Visit Type ▾ OB Prenatal

Intake Gestational Age Medical Summary **Dental Exam**

Care Guidelines Global Days

G: P: Initial/Working EDD: Work

0 1 0 P 0 A 0 L 0

01/21/2016

Height (in.): Pre - pregnancy wt (lb): Date: Baby's fo Support pe

Last weight: 115 Date: 01/21/2016 Pediatr

Total pregnancy weight gain (lb): Planned fee

EGA Calculator (for future estimating)

As of: EGA will be: will fall on:

OB Problem List

| Priority | Date | Problem | Detail |
|----------|------|---------|--------|
| | | | |

Prenatal Visits

Patient note:

Nose Mouth Throat - Physical Exam

Select all normal

Nose:

External nose: Normal

Nares: R: Normal

L: Normal

Mucosa: Normal

Sinuses:

Septum: Normal

Sinuses: R: Normal

L: Normal

Turbinates: R: Normal

L: Normal

Adenoids: Normal

Mouth:

Lips/teeth/gums: Normal

Tongue: Normal

Buccal mucosa: Normal

Salivary glands: Normal

Breath odor: None

Throat:

Palate & uvula: Normal

Tonsils: Normal

Oropharynx: Normal

Gag reflex: Present Absent Not assessed

Larynx:

Epiglottis: Normal

Arytenoids: Normal

Vocal cords: Normal

Comments:

Save & Close Cancel

APPENDIX H

FORCE FIELD ANALYSIS FOR UNFREEZING PHASE

FORCE FIELD ANALYSIS FOR UNFREEZING PHASE

| | |
|---|--|
| Desired change: Implement and sustain a prenatal oral health protocol at OB clinic | |
| Driving forces (+) | Restraining forces (-) |
| <ul style="list-style-type: none"> • Clinic culture values evidenced based practice • Protocol has minimal cost, no harm, and easy to implement, but still impacts the health of pregnant women and their babies • Clinic culture values interprofessional collaboration | <ul style="list-style-type: none"> • Time requirement with patient • Time requirement for professional education • Perception of oral health as a low priority • Thought that a protocol means that providers lose autonomy • Some providers think that oral health is outside their scope of practice and/or feel uncomfortable doing an oral screening exam • Perception by OB providers that money is the number one reason women don't see the dentist and this will hinder dental referral follow through by patients. • Perception by OB providers that there is a lack of dental providers that accept new Medicaid patients and long wait times for appointments. • Not all providers want to participate • Nonparticipating providers do not have buy-in to the project, so are thwarting EHR changes needed. This makes the project seem less sustainable to participating providers and MAs, which may decrease their diligence in implementing the protocol. • Push back from clinic to include dental referral process as part of the referral team, which is the 'normal' referral process • Push back from clinic IT to update EHR to include a place to chart oral screening and education in EHR |
| <p>ACTIONS:</p> <ul style="list-style-type: none"> • During proposal, present evidence strongly. • Emphasize low cost and impact during proposal. • Emphasize use of local dentists for education and referrals. • During the proposal, be clear about time requirements and expectations. • During proposal and discussion, be explicit that part of the protocol can be delegated to Medical Assistants to save time for provider. • All those implementing protocol will attend a prenatal oral health education put on by local participating dentist. • Involve the provider and medical assistant in synthesizing protocol so they have ownership. • Use non-threatening and inquisitive communication when asking for EHR changes. • Provide OB providers with information about the state's dental coverage with Medicaid eligibility and statistics on pregnant women eligible for Medicaid in local area. • Reassure OB providers that there is a participating referral dentist that accepts new Medicaid patients, uses a sliding fee scale for 'near poor', and has a short wait time (one to two weeks). • Ask only providers that are interested in participating to participate. • Make recommendation at end of project for the oral health education to be included in the EHR with all other education provided at the New OB visit on the 'education' screen with a checkbox like the others. This will help immensely with sustainability. In the mean time, have the MA's document the provision verbal and written oral education by scanning in these checked box questions on the bottom of the oral screening question tool. • Make recommendation at end of project for the oral health screening to be included in the EHR with all other 'screenings' with a checkbox like the others. This will help immensely with sustainability. In the mean time, have the MA's scan in the oral screening questions. | |

APPENDIX I

FORCE FIELD ANALYSIS FOR MOVING PHASE

FORCE FIELD ANALYSIS FOR MOVING PHASE

| | |
|---|---|
| Desired change: Implement and sustain a prenatal oral health protocol at OB clinic | |
| Driving forces (+) | Restraining forces (-) |
| <ul style="list-style-type: none"> • The ease and simplicity of the prenatal oral health protocol • Clinic culture values evidenced based practice • Success in getting oral screening exam documentation in EHR • Prior established relationship between one referral dentist and OB providers • The culture values interprofessional collaboration | <ul style="list-style-type: none"> • Time requirement with patient • Time requirement for professional education • Author not confident in communicating roles in deliberate, detailed, clear manner • Author not confident in leading meetings |
| <p>ACTIONS:</p> <ul style="list-style-type: none"> • Minimize time requirements with the patient, for professional education on oral health, and any other time related to protocol implementation. • Be explicit that part of the protocol can be delegated to Medical Assistants to save time for provider. • Emphasize the ease of the protocol and simplicity as a priority. Involve the providers and MA's into helping make the protocol as simple as possible. • Incorporate, communicate, and demonstrate how the protocol was constructed with evidence. • Provide education on prenatal oral health and oral screening exam involving local participating dentist (interprofessional collaboration). • Involve the participating dentists as much as possible in the implementation phase. • Update providers on dental care of referred patients as project implementation unfolds. • Emphasize that both of the referring dentist offices have a great avail of appointments, even for Medicaid, use sliding fee scales, and are affiliated with state dental programs. • Have the MA's do the dental referral. Make the recommendation at the end of the project for the dental referrals to be carried out by the referral team, like other referrals, to • Increase sustainability. • Author to use RACI chart for roles and responsibilities of stakeholders. • Author to use a meeting agenda template for every meeting. | |

APPENDIX J

FORCE FIELD ANALYSIS FOR REFREEZING PHASE

FORCE FIELD ANALYSIS FOR REFREEZING PHASE

| | |
|--|---|
| Desired change: Implement and sustain a prenatal oral health protocol at OB clinic | |
| Driving forces (+) | Restraining forces (-) |
| <ul style="list-style-type: none"> • Results showed that the POHP could be implemented successfully with a few providers. • Clinic culture values evidenced based practice • Results show that all participating OB providers and MAs found the value in the protocol for their patients. • One OB provider and MA pair plan to continue the use of the protocol in its entirety, and the other parts of it. • Participating dental offices have agreed to continue to serve as dental referral sources for the OB office. • It is easy to ensure OB providers and MAs have access to POHP materials. • The culture values interprofessional collaboration | <ul style="list-style-type: none"> • Sustainability needs include making the POHP a formal protocol throughout the entirety of OGA. • Author not entirely sure why some OB providers don't want to participate, but imagine time, seeing oral health as low priority, and loss of autonomy with a protocol as likely reasons. • Sustainability needs include specific, appropriate, and routine places in the EHR for POHP step documentation. This consumes time and resources of clinic. |
| <p>ACTIONS DURING THE RESULT AND SUSTAINABILITY MEETING WITH THE OB CLINIC:</p> <ul style="list-style-type: none"> • Use quick and clear method of communicating the project's results. • Emphasize that all participating OB providers and MAs found the value in the protocol for their patients. • Emphasize that results showed that the POHP could be implemented successfully with a few providers. • Emphasize that participating OB providers plan to continue implementing the POHP in some capacity. • Emphasize that the participating dental offices have agreed to continue to serve as dental referral sources for the OB office. • Clearly communicate the changes that are needed to the EHR. • Emphasize the evidence, low cost, and use of local dentist for referrals. • Be clear about time requirements regarding the POHP and strategies to mitigate OB provider time such as MA delegation and removing the oral screening exam from the protocol. | |

APPENDIX K

5P'S MICROSYSTEM ASSESSMENT

5P’S MICROSYSTEM ASSESSMENT

| | |
|--|---|
| <p>Department or Clinic: OB/GYN Clinic</p> | <p>Date: 10/5/15</p> |
| <p>Location: One OB/GYN</p> | <p>Analyst: Author Terryn Martin</p> |
| <p>Purpose:</p> <p>One sentence statement of the mission or purpose of this clinical microsystem: The OB/GYN office is a collaborative, evidenced based women’s health practice that provides women a unique choice in OB/GYN services that benefit them, their families, and their communities.</p> <p>Further objectives include:</p> <ol style="list-style-type: none"> 1.) Knowledgeable. Collaborative. Independent. The OB/GYN clinic providers are experts driven by curiosity and compassion to continually improve their service to area women. 2.) Serving the person behind the patient. OB/GYN services are provided with mindfulness, transparency, and heart. 3.) Informed. Inspired. Grounded. The OB/GYN clinic is advancing the practice of women’s health through professional involvement in organizations dedicated to the improvement of care. We are giving back to local community and global village. | |
| <p>Patients:</p> <p>What are the primary subpopulations that are served? How large are they? What are their proportional sizes? Breakdown of demographics seen at the clinic including age range. What’s the daily patient load? How many patients are seen per day? Per year? Consider using a graphic to display this information, e.g., a pie chart or Pareto chart.</p> <p>The primary subpopulations that are served by the OB/GYN clinic are women at various stages in the life cycle. The OB/GYN clinic has three clinics in adjacent cities. Residents in these cities make up 12.1% of the total state population. In these cities, female occupants make up 51% of the population. Thus, the OB/GYN clinic serves 5.9% of the total state population (1,634,464).</p> <p>Providers saw an average of 44 obstetric patients daily in 2015. The Obstetricians delivered 876 babies in 2015. A fair number of obstetric and gynecologic patients paid for medical services with Medicaid (17%).</p> | |
| <p>Professionals:</p> | |

Who are the staff members who interact and care for patients and their data? Who are the staff members who support the care team(s)? What is their skill mix? How do they feel about their work environment?

There are 10 OB/GYN providers, 3 NPs and 7 Medical Doctors, one of which is the medical director. There are 14 'Nurses', 5 Registered Nurses (4 BSN and 1 ASN) and 9 Medical Assistants. One nurse and one provider speak Spanish (and are trained in medical-language). There are 2 Ultrasound technicians. There are 2 phlebotomists. There is one part time IT personnel. There are 5 receptionists. There are 3 billers/coders. There is one operations manager. There are three clinic sites in adjacent cities. The largest clinic is considered 'home base'. All three clinics are within 30 minutes of each other. Providers feel they have a collaborative and cooperative culture. Staff often feels the practice has grown faster than anticipated, thus feel stretched for time. Staff feels they are supported and have meaningful work.

As far as day-to day staffing, there is one medical assistant/RN to each provider working that day. Except there is one RN that serves as the triage nurse, taking calls during business hours. There is also one Triage RN for non-business hours too. The RNs rotate this duty. Two providers work part-time. Several nurses work part time. Providers have the same one or two nurses/medical assistants that are 'their nurse'. There is at least one MD working at the two smaller clinics every day. Most, but not all providers and their 'nurse' rotate to one or the other small clinic at least once during the week. All providers and their 'nurse' work at the largest clinic at least one day per week. The OBs are in surgery at varying times during the week. During those times, their 'nurse' is occupied with other tasks, namely committee 'projects', phone calls to patients, ect... The OBs do OB/GYN surgeries at the hospital that is walking distance from the largest of the three clinics. This is also where all patients of the office deliver their babies. One OB is always on call and on the hospital floor. There is a sleeper bed. The on-call MD does all discharges and deliveries (and all duties that entails) for the group that day. This duty is rotated. Most OBs take no patients when they are on call at the hospital, but some take limited clinic patients when they are on call during the day.

Processes:

What are the core processes? Supporting processes? What technology supports the processes?

The EHR that is used is NextGen. Core processes include new OB visit, returning OB visit, OB office visit (ill or nonroutine), pre-op visit, post-op visit, postpartum visit, and well-woman visit. The clinic used a shared patient model, wherein it was easy for obstetric patients to move fluidly from one provider to the next throughout their pregnancy visits.

Patterns:

What are the hours of operation? How often are staff meetings held? What metrics are used to monitor the clinical microsystem's quality, cost, safety and health outcomes? How is the microsystem performing according to those metrics? How often do staff meet to initiate and review improvement efforts?

Hours of operation are 8:00am to 5:00pm. There is always one M.D. on the delivery floor at the hospital where the OB/GYN office OBs deliver babies. This duty is rotated.

Metrics used for safety, quality, and health outcomes measures include the following: For surgical: adverse events and 30-day re-admittance following urogynecologic surgeries. For gynecologic oncology: rate of mammography screening, rate of cervical cancer screening, survival rate of cervical cancer patients by stage at diagnosis, survival rate breast cancer by stage at diagnosis. For maternal fetal medicine: fetal testing and genetic screening rates, percentage of mothers who receive a Tdap and influenza vaccine during pregnancy. For Obstetrics: % births by cesarean delivery, % births with labor induction, # vaginal births after cesarean, # successful trial of labor after cesarean delivery, # elective deliveries at less than 39 weeks, # episiotomies, 3rd and 4th degree vaginal lacerations with and without instrument assist, maternal in-hospital mortality. OB/GYN patient experience: outpatient office survey responses (appointment availability, waiting time/comfort, nurse, provider, responsiveness to needs and privacy, overall). For cost/Performance: RVU's are compared to MGMA medians.

Staff meetings and reviewing improvement efforts.

Staff and providers are assigned participation to various committees based on expertise and interest. There are no 'all staff' meetings. The committees are each made of 3-6 members. There is a committee for electronic health care record keeping/changes, information technology improvement, community outreach, missions trips, evidenced based practice, finance, auditing the EHR, and improving outcome measures, among others. The committees meet monthly and more often if the committee deems it necessary.

Resources for patient demographics in the state: United States Census Bureau. (2010). Eagle (city) QuickFacts from the US Census Bureau. Retrieved February 05, 2016, from <http://quickfacts.census.gov/qfd/states/16/1623410.html>; United States Census Bureau. (2010). Meridian (city) QuickFacts from the US Census Bureau. Retrieved February 05, 2016, from <http://quickfacts.census.gov/qfd/states/16/1652120.html>; United States Census Bureau. (2010). Nampa (city) QuickFacts from the US Census Bureau. Retrieved February 05, 2016, from <http://quickfacts.census.gov/qfd/states/16/1656260.html>

APPENDIX L

SUMMARY OF STAKEHOLDER'S ROLES

SUMMARY OF STAKEHOLDER'S ROLES

| Activities | Stakeholders | | | | | | |
|--|--------------|------|------------------|--------------|----------|---------------|--------|
| | OB Providers | MAs | Medical Director | IT Personnel | Dentists | Dental Clerks | Author |
| Provider prenatal OH education | I, R | I, R | | | | | |
| Prenatal OH protocol synthesis | C, A | C, | | | | | R |
| Provide patient with prenatal OH education | R | R | | | | | |
| Patient prenatal oral health education | C, A | I | | | C | | R |
| Material synthesis | | | | | | | |
| Provide patient with AG for infant OH | R | R | | | | | |
| AG for infant oral health material synthesis | C, A | I | | | C | | R |
| Performing OH screening exam on patient | R | r | | | | | |
| Synthesizing OH screening method | C | | | | | | R |
| Completing Oral Exam on patient | R | | | | | | |
| Creating referral process | C | C | | | C | C | R |
| Creating the written consultation form for the referral | C, A | C | | | C | C | R |
| Completing referral process for patient | R | r | | | R | r | |
| Charting the protocol done for each patient | R | R | | | | | |
| EHR changes for POHP documentation | C | C | | C | | | R |
| Creating patient consent form and surveys | | | A | | | | R |
| Obtaining patient consent forms | | C, R | | | | | |
| Reporting on outcome data to clinic, recommendations, and sustainability factors | C | C | C | C | C | C | R |

Note. A=need to provide Approval, R= Responsible, r=co-responsible, C=consultant, I=needs to be informed. AG=anticipatory guidance. OH=oral health Summary of Stakeholder's Roles. This figure was constructed using the following source: Smith, M., and Erwin, J. (n.d.). Role & Responsibility Charting (RACI). Retrieved February 25, 2016 from: https://pmicic.starchapter.com/images/downloads/raci_r_web3_1.pdf

APPENDIX M

OB PROVIDER AND MEDICAL ASSISTANT SURVEY

OB PROVIDER AND MEDICAL ASSISTANT SURVEY

Engagement Questions

1. Do you think that the prenatal oral health protocol is an important part of your care to your new OB patients? Why or why not?
2. What about the protocol made a difference in the oral health of your patients? Your Medicaid patients?

Exploration questions about the unfreezing phase:

3. What communications made you motivated to participate in this practice change? (ie: benefits to the patient, logic behind change)
4. During the process of finalizing the protocol, what events or communications helped you feel like you had some ownership of the final protocol? Or what additional communications were needed to have you feel you had some ownership of the final protocol?
5. Were roles and responsibilities clear before the implementation phase?

Exploration questions about the moving or changing phase:

6. Do you feel you were provided with enough education, communication, and support when the prenatal oral health protocol was first implemented?
7. After initial implementation, what events or communications helped you to maintain your efforts to continue implementing the protocol?

Exploration questions about the refreezing phase:

8. What factors have helped you or hindered you from cementing the protocol as part of your routine care of new OB patients?
9. Do you plan to continue using the protocol with each new OB patient?
10. Is there anything that you need in order to continue using the oral health protocol for each new OB patient?

APPENDIX N

DENTAL PROVIDER SURVEY

DENTAL PROVIDER SURVEY

Engagement Questions

1. Do you think that dental care during pregnancy is important for the woman and her child?
2. Do you think a prenatal referral process made a difference in the oral health of those that were referred? The referred patients that pay with Medicaid?

Exploration questions about the unfreezing phase:

3. What made you motivated to participate in this prenatal dental referral process?
4. During the process of finalizing the OGA referral process at your practice, what events or communications helped you feel like you had some ownership of the referral process? Or what additional communications were needed to have you feel you had some ownership of the final referral process?
5. Were roles and responsibilities of the referral process clear before the implementation phase?

Exploration questions about the moving or changing phase:

6. Do you feel you and your ancillary staff were provided with enough communication and support when the referral process from OGA was first implemented?
7. After initial implementation, what events or communications helped you to maintain your efforts to continue receiving referrals from OGA and participating in the project?

Exploration questions about the refreezing phase:

8. What factors have helped you or hindered you in making the OGA referral process routine at your clinic?
9. Do you plan to continue receiving OGA patient referrals even after the close of the project?
10. Is there anything that you need in order to continue receiving OGA patient referrals even after the close of the project?