

Prenatal Care Education in an Urban Underserved Population

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She has no known conflict of interest to disclose.

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Background and Purpose: Across the United States, there are low adherence rates of prenatal care visits, primarily among the low-income and ethnic populations. Inadequate prenatal care education contributes to low appointment adherence and missed prenatal care during their first trimester. The project aim is to assess the current use of paper-based prenatal education in a Federally Qualified Health Center (FQHC) in southwestern Arizona and inquire if patients would elect to engage in a phone application for prenatal education with appointment reminders.

Approach/Methods: The Theory of Planned Behavior was the theoretical framework utilized to guide this project. The Quality Improvement (QI) project gathered information regarding patient technology use and accessibility as well as utilization of FQHC prenatal booklet, collected with a 13-question survey. A non-identifying demographic questionnaire was also distributed during the prenatal visit.

Results: Survey responses indicated that patients find utility in prenatal education and appointment reminders provided through a phone application. Out of the total participants (n=23), only 18 had received the prenatal care booklet and completed the entire survey. 80% of participants expressed they would use the phone application while 84% find prenatal education on the phone helpful. In comparison, less than 28% of respondents planned to continue to use the prenatal booklet they were provided at the clinic during their pregnancy.

Outcomes: There is potential in utilizing digital platform and appointment reminders at FQHC to improve appointment adherence and early entry to prenatal care. The results will be used to inform FQHC on decisions regarding continuing prenatal booklet use and integration of tech-based education formatting.

Keywords: prenatal, education, underserved, appointment adherence, early entry to prenatal care, phone application, FQHC.

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Obtaining early and regular prenatal care is paramount to a healthy pregnancy.

Consistent/recurring obstetric (OB) visits allow for early detection of any health-related issues that may harm the baby or mother. Unfortunately, there are significant financial, cultural, and educational barriers that decrease adequate prenatal supervision and early entry prenatal care. Adverse patient outcomes such as low birth weight, preterm births, conditions associated with prematurity, and mortality have been linked with delayed entry into prenatal care, highlighting how important establishing care early into a pregnancy is (Boerledier et al., 2015; Shah et al., 2018).

Problem Statement

According to the Centers for Disease Control and Prevention (CDC), (2018), only 77.1% of women who gave birth in 2016 initiated prenatal care in the first trimester of pregnancy, which is defined as the first 12 weeks starting from day of conception. Prenatal care is vital to prevent complications and inform women about important steps they can take to keep themselves and their baby healthy. Research indicates that women who do not receive prenatal care in the first three months are less likely to ever receive care during their pregnancy (Frayne et al., 2016; Kingston et al., 2017).

There are several barriers to accessing prenatal care, such as socioeconomic disadvantages, pregnancy-related stress, and limited health education, which can result in women obtaining late prenatal care or not seeing a physician until they deliver. This is disastrous as women without prenatal care are more likely to give birth to premature babies. A number of peer-reviewed studies conclude that early and ongoing prenatal care is an accepted strategy to improve health outcomes of pregnancy for mothers and infants (CDC, 2018; Osterman & Martin,

2018; Vitner et al., 2020). There are numerous benefits of early and regular prenatal care, which include decreased risk of preterm delivery, lower risk of adverse maternal outcomes, and improved birth weight.

The American College of Obstetricians and Gynecologists (ACOG), (2019) reports that inadequate prenatal care is associated with adverse pregnancy outcomes; factors related to late prenatal care include unintended pregnancy, rural residence, maternal age, and socioeconomic background. According to the most recent data from ACOG (2019), approximately 45% of the pregnancies in the United States are unintended. Women of child-bearing age who do not intend to become pregnant are less likely to receive preconception education and schedule prenatal care in the first trimester (ACOG, 2019). Therefore, the National Preconception Healthcare Initiative (NPHI) recommends that health care systems adopt nine preconception wellness measures to drive improvements in birth outcomes along with initiatives for early prenatal care (CDC, 2018).

Additionally, although prenatal care use has increased in recent years, significant disparities continue to exist, especially among African American, Hispanic, and American Indian/Alaska Native women (Selchau et al., 2017; Wyst et al., 2019). Hispanic women living along or close to the U.S.-Mexico border have a lower first trimester prenatal care initiation (FTPCI) than non-border or non-Hispanic women (Selchau et al., 2017). This inequality highlights the need for preconception care and early entry into prenatal care, particularly among the nulliparous population, defined as women who have never had a live birth.

Purpose and Rationale

Inadequate or absent prenatal care is not only a risk factor for poor pregnancy and poor infant outcomes, it also significantly impacts the newborn's best chance at a healthy start in life and the woman's transition into motherhood (Peahl et al., 2020; Selchau et al., 2017).

Considering new challenges to accessing early prenatal care, such as the recent global pandemic, there is a demand to address the FTPCI rates in the United States, specifically in the southwest region.

There is an increasing need for new methods and strategies to improve maternal and newborn health outcomes through preconception and prenatal education. The purpose of this literature review is to identify barriers to early prenatal care and promising strategies for getting OB patients into pregnancy care sooner. Guidelines from ACOG (2019) emphasize that the first visit for prenatal care typically occurs in the first trimester, with earlier entry and preconception counseling resulting in positive maternal and infant outcomes regarding first and subsequent pregnancies.

Background and Significance

Female Obstetric Patients

The problem that most southwest region prenatal care facilities are experiencing with OB patients are low numbers of early entry prenatal care and a lack of consistency in patient visits across the pregnancy timeline. The populations affected by this problem are the female OB patients, their infants if proper screening and prenatal visits are not incorporated, their providers who may miss important details of pregnancy due to missed appointments or late entry into prenatal care, and the agencies overall from lack of adherence to prenatal visits and follow-up (Oliveira et al., 2017). The ethnic, immigrant, and young adult OB populations are most at risk for late entry pregnancy care (Warri & George, 2019; Wyst et al., 2019).

In regard to current literature available related to this problem, there are several studies recently done on the barriers of early entry prenatal care that help shed some light on this particular facility's gap, most of them reporting on underserved and rural populations. The

findings illustrate that the financial, cultural, and educational elements are the most common and reliable predictors of early prenatal care numbers on a global level (Boerledier et al., 2015; Heaman et al., 2015). The literature highlights the importance of timely intervention and development of strategies that will address barriers women may face in obtaining early prenatal care and continuing this care throughout their pregnancy and postpartum (Shah et al., 2018; Warri & George, 2020).

Social Media Interventions

The approach to the presentation of information to OB patients is just as important as the information itself. Adults, especially soon-to-be mothers, have shown high levels of participation in social media interventions related to health behaviors and education, emphasizing the value of technology in future patient education (Chatwin et al., 2021; Heaman et al., 2015; Marko et al., 2019). The utilization of technology and social media in providing early prenatal awareness to the target population is promising. Literature suggests that social media appears to have the potential to reach high-risk women (Wyst et al., 2019).

Furthermore, a strength of utilizing the technology model to provide preconception and prenatal education is its adaptability with current unprecedented challenges (Chatwin et al., 2021). Technology has the ability to reach, educate, and inform large portions of women, especially those who have significant barriers in accessing quality prenatal care. Women of child-bearing age report high satisfaction with the accessibility and platform by which maternal education through social media is presented (Chen et al., 2020; Kingston et al., 2017). A strength of prenatal social media utilization in this arena is the ability to reach multiparous women, mothers with full-time jobs, and pregnant patients residing in rural areas. There is evidence to suggest that even in the upcoming post-pandemic years, the supplemental antenatal care

provided through technology and social media will continue to support women who are pregnant or will become pregnant (Marko et al., 2019).

Current Practices

Current practices consist of in-office paper pamphlets produced with the goal of providing prenatal education at the visit and as a resource for the patient to take home (Chen et al., 2020). Additionally, annual well women appointments and prenatal visits are considered the most appropriate time to provide information to pregnant patients and those who may become pregnant (Desta et al., 2019). This current process of providing preconception and prenatal education excludes patients who cannot meet in-person for their prenatal appointments or women who have yet to schedule an introductory first trimester prenatal appointment (Robbins & Martocci, 2020).

Desired or Future State (DoFS)

There are compelling reasons to ensure timely and quality prenatal care. It is also imperative to improve performance to optimize the health outcomes of pregnancy for expecting mothers (Desta et al., 2019; Warri & George, 2020). The expected outcomes of this project are increased adherence to prenatal and postnatal care visits, increased early entry prenatal care numbers at the facility, and improved pregnancy and postpartum education to facilitate further communication between provider and patient.

The ideal situation if the problem is solved would be all OB patients receiving early prenatal care, which would have the potential to decrease complications in later trimesters. Early entry into prenatal care is defined as establishing care within thirteen weeks of the mother's last menstrual period, and this would be the targeted early enter date (Robbins & Martocci, 2020; Shah et al., 2018). If the first visit is done early, the patient will not only be established for

prenatal care and more likely to adhere to scheduled appointments throughout the pregnancy, but also more educated and empowered in their current or future pregnancy status.

Internal Data

The agency is a federally qualified health center (FQHC) providing full prenatal care, including postpartum visits, to the underserved obstetric population in the southwest region of the United States. According to the family nurse practitioner who sees the discussed population, 70% of this agency's patients are uninsured, and can count on services regardless of their Medicaid or private insurance status (L. Maurer, personal communication, November 24, 2020). This particular patient population has low FTPCI rates; therefore, the FQHC is looking to promote preconception counseling and early prenatal care.

In recent communications with the family nurse practitioner in this practice, OB patients reported, through surveys and word of mouth, not understanding the need for so many prenatal appointments, feelings of having missed vital pregnancy information in the first trimester, and a sense of regret for not establishing prenatal care earlier in the pregnancy (L. Maurer, personal communication, November 24, 2020). The hard data consists of deidentified reports discussed during a zoom call with the site's family nurse practitioner, showing missed appointments in between of trimesters and a significantly lower number of early entry prenatal care patients compared to late entry prenatal care (L. Maurer, personal communication, November 24, 2020).

Factors that contribute to this problem identified in the literature are socioeconomic and sociocultural status, age, number of pregnancies, educational level, and poor obstetric and gynecological history (Boerledier et al., 2015; Desta et al., 2019; Heaman et al., 2015; Shah et al., 2018). Preliminary interest in this problem led to an inquiry of current evidence to determine the best strategies for establishing early prenatal care visits. This literature review has led to the

clinically relevant PICOT question, “In women of child-bearing age, how does prenatal education presented through technology compare with the current prenatal educational format improve early entry to prenatal care?”

Search Strategy

An extensive search for the most current evidence was performed in the electronic databases PubMed, EBSCOhost, and PsycINFO. These databases were selected for their relevancy to the topics of early entry to prenatal care and technologically based prenatal education and peer review. Keywords included: *pregnant women, prenatal, early, care, female, underserved, childbearing age, obstetric-gynecologic, technological, education, social media, online application, virtual learning, current methods, and standard of care*. Search limits were set to include publication dates between 2015-2021 and English language. Exclusion criteria included articles prior to 2015, articles that were not peer-reviewed, articles addressing gynecologic patients who have never been pregnant, and articles only addressing paper and presentation-based prenatal education. Studies included data from multiple countries such as United Kingdom, Ethiopia, China, United States, and Mexico. Inclusion and exclusion criteria were the same for all databases. The initial search of *female OR obstetric-gynecologic AND underserved AND early prenatal care AND social media OR technological education* yielded a total of 1096 results in PubMed, 751 results in EBSCOhost, and 347 in PsycINFO.

To further narrow the search, a combination of the keywords was changed to include *tech-based intervention, online education, social media, first trimester prenatal care, and current practice*. After hand searching results, screening for relevance, and removing duplicates, 38 studies remained for further review; 19 of these were from PubMed, 16 from EBSCOhost, and 3 from PsycINFO database. Grey literature of government publications from the Centers for

Disease Control and Prevention (CDC) and American College of Obstetricians and Gynecologists (ACOG) were also searched. Additional applicable studies were searched for in the reference lists. Following rapid critical appraisals, 10 studies were selected for this literature review. This included four systematic reviews, three randomized controlled trials, and three cross sectional studies. The chosen studies addressed the PICO appropriately and examine the relationship between current prenatal education formats and technology-based prenatal education in relation to early entry to care.

Critical Appraisal & Synthesis of Evidence

Study quality and level of evidence was determined through rapid critical appraisal (RCA) tools (Melnik & Fineout-Overholt, 2019). Although both qualitative and quantitative studies (see Appendix A, Table A1) were found during the literature search, only quantitative studies were included in the evaluation and synthesis tables (see Appendix B, Table A2) due to the higher level of evidence and applicability. The majority of the studies had relatively large samples with heterogenous measurement tools used. The subjects within the studies had widely varying demographics in relation to socioeconomic background and education level; however, the sample characteristics were relatively homogenous as all participants were females of child-bearing age between 15 and 44 years old. There was heterogeneity observed with study settings as some were conducted in rural, underserved locations or in countries outside of the United States. At least half of the studies targeted barriers for access to early prenatal care.

Six studies focused on the barriers women have in accessing quality prenatal care and early access to prenatal care, primarily in disadvantaged and rural populations. Five of 10 studies examined the role of technological interventions, including web-based, phone application, social media, telehealth, or remote monitoring, in advancing early access to prenatal care. Two studies

investigated the role of mental health in maternal and child outcomes as well as successful strategies in providing access to support services. Most interventions resulted in positive behavioral and health outcomes and high participant satisfaction scores. Improved access to prenatal education, support, and services was noted in several studies, which are important factors in maternal empowerment and promoting health and pregnancy outcomes for both mother and child (see Theory Application).

Conclusions from Evidence

The evidence suggests that empowering pregnant women through prenatal education and providing tech-based prenatal care for physical and mental well-being addresses significant barriers related to early and consistent prenatal care. Additionally, it is abundantly clear that utilizing online and virtual interventions improves maternal and neonatal health outcomes, especially in hard-to-reach populations including disadvantaged and low-socioeconomic backgrounds. From the included studies, evidence clearly displays the importance of early entry to prenatal care. However, there is a lack of initiative in employing online, social media, and e-health strategies to build awareness around pre-conception and early pregnancy stages. Therefore, programs applying tech-based education and awareness which target women of child-bearing age and in their first trimester of pregnancy should be considered to increase early entry to prenatal care.

Theory Application

The theory of planned behavior (TPB) was instrumental for this project because it assumes that behavior is planned and thus predicts deliberate behavior. This theory assists in successfully predicting and explaining health behaviors and intentions, which can be especially helpful in guiding prenatal health promotion and disease prevention (see Appendix C, Figure 1).

Overall, the TPB has shown more utility in public health compared to the Health Belief Model; however, it is still limiting regarding environmental and economic influences of behavior (Ajzen, 1991). The TPB states that behavioral achievement depends on both intention or motivation and ability or behavioral control (Ajzen, 1991).

This model demonstrates exceptional utility in effectively preventing high-risk behaviors among pregnant women and introducing more perceived power and behavioral control over prenatal care visits. Additionally, it is often used in healthcare settings to understand behavioral intent and thereby influence the likelihood of a behavior. This theoretical framework is appropriate for the planned intervention as it will aid in generating positive and impactful prenatal behavior and perception change. With the project purpose in mind, the TPB is an excellent framework for helping patients believe the necessity for change and taking the appropriate cues to action as a result. To ensure success with this model, it is critical to identify intentions and behaviors that are appropriate and meaningful to women looking to become pregnant or in early stages of pregnancy.

Implementation Framework

The Iowa Model (IM), which serves as a guide for nurses to use research findings to improve patient care, is an essential pathway to evidence-based practice (Iowa Model Collaborative, 2017). The model was used in the execution of this project because it focuses on the emergence of implementation science with an emphasis on patient engagement, a central focus of the project purpose (see Appendix D, Figure 2). The IM helps identify issues, research solutions, and implement changes (IMC, 2017)

This model will be fitting for this project as it provides ample time in which to reassess and adjust the change based on patient population and organizational structure (IMC, 2017) the gap was identified by a clinician at the project site and continues to be an organizational initiative. The question or purpose is then stated, which has been finalized for implementation (IMC, 2017). The consideration of the topic being a priority is the next step, which it is for the clinic. Furthermore, a team has been formed and during this time a synthesized body of evidence formulated. After concluding that there is sufficient evidence, which in this case there is, the following step on the IM is to design a way to gather useful information for whether the intervention is needed or not. through engagement with patients (IMC, 2017). This is the current protocol in place. Once the change is deemed appropriate for adoption in practice by clinic higher-ups, it can begin to be piloted, integrated and sustained as a practice change. Finally, results are disseminated on the EBP tool to promote excellence in health care (IMC, 2017).

Methods

Ethical Considerations

Human subjects' protection was thoroughly considered for this project with minimal direct patient contact, thereby limiting risk of HIPPA violations. No identifiable information was collected from patients during the consenting and survey process. Therefore, completed surveys were not linked to participants in any way. The project meets duties set forth by the American Nurses Association Code of Ethics which calls for nurses to work to reduce health disparities among vulnerable populations in provision 8 (2015).

Population and Setting

The FQHC has two locations in Southwestern United States with both locations included in the project. This FQHC sees both uninsured and undocumented patients. The prenatal

population that attends this center is primarily Hispanic/Latino and Spanish-speaking. Most patients have limited health literacy in either Spanish or English. The inclusion criteria for the project consisted of prenatal patients ages 18-40, English and Spanish-speaking, and must have had at least one prenatal visit prior. Exclusion criteria for the project included postpartum and preconception patients.

Project Description, Instrument, and Timeline

This project aimed to assess current state of paper-based prenatal education and if patient population are good candidates for digital platforms of prenatal education at a FQHC in Phoenix, AZ. There are barriers with patients at this facility including the lack of knowledge for needing multiple appointments resulting in missed appointments and missing vital pregnancy information. The QI project gathered information regarding patient technology use and accessibility as well as utilization of FQHC prenatal booklet, collected with a 13-question survey (see Appendix M, Figure 11). The prenatal care education survey also has a Spanish version on the second side (see Appendix N, Figure 12). A non-identifying demographic questionnaire was also distributed during the prenatal visit which collected information such as age, insurance status, number of pregnancies, number of living children, and educational background to assess this for barriers to prenatal care (see Appendix G, Figure 5). This demographics survey was also provided in Spanish (see Appendix H, Figure 6).

For recruitment, a list of prenatal patients meeting inclusion criteria was presented to co-investigator and the site champion at the start of the day. Eligible individuals received a project flyer during check-in by office staff with project information, both in English and Spanish (see Appendix I, Figure 7; see Appendix J, Figure 8). They were recruited prior to their prenatal appointment at the clinic or during their wait for a clinician. Recruitment included 2-3 sentence

explanation of project goal and its relation to clinic, a prompt was provided to the staff and providers in English and Spanish (see Appendix K, Figure 9; see Appendix L, Figure 10).

Recruitment and distributing consent form took approximately 2-5 minutes. The consent form was reviewed/provided to each participant to keep in both English and Spanish (see Appendix E, Figure 3; see Appendix F, Figure 4).

Participants completed a 13-question survey at their prenatal visit in order to collect this information. Assessing what format of prenatal care education will be best utilized by the patient population helps to identify the clinic's next steps regarding their prenatal education. The survey was reviewed by 3 experts consisting of three DNP faculty, one of which works at a FQHC. Surveys and demographic information were stored in a locked drawer at the clinic. They have since been shredded along with the demographic information collected.

Literature search and project design was initiated in summer of 2021. IRB ASU exempt status approval was obtained on November 22, 2021. Data collection at the two FQHC sites took place over 8 weeks starting in February 2022 and ending in April 2022. Spring of 2022 is when data analysis and dissemination took place, with 2 weeks in April 2022 used to organize data in Excel and analyze through Intellectus Software using descriptive statistics. Dissemination wrapped by May 2022 with final reports, results, poster, executive summary, and presentation provided to stakeholders of the clinic and Arizona State University. No funding was received for this project. Printing costs associated with paper materials and translation services were paid for by project site and co-investigator.

Results

Demographic Results

The population are prenatal patients (n=23) being seen in a primary care setting. The most frequently observed category of Age Range was 25-35 [8(35%)]. The most frequently observed category of Number_of_living_children was 2 [6(26%)]. The most frequently observed category of Insurance Status was AHCCCS [10(43%)]. The most frequently observed category of Level_of_Education was High School [15(65%)]. Frequencies and percentages are presented in Appendix O, Table 1.

Phone Application Survey Results

The following results reflect data collected from answers to questions 1-9 on the Prenatal Care Education Survey. Frequencies and percentages were calculated for Use_Portal, Have_SmartPhone, Internet_Access_on_Phone, Would_use_Phone_App, Missed_Visit, X24_hour_reminder, X2_hour_reminder, App_Helpful, and Received_Prenatal_Booklet. Most of the sample reported that they do not use the patient portal [13(57%)]. The most frequently observed category of Have_SmartPhone was Yes ($n = 20, 86.96\%$). The most frequently observed category of Internet_Access_on_Phone was Yes [18(78%)]. The most frequently observed category of Would_use_Phone_App was Yes [20(87%)]. The most frequently observed category of Missed_Visit was No [17(74%)]. The most frequently observed category of X24_hour_reminder was Yes [17(74%)]. The most frequently observed category of X2_hour_reminder was Yes [15(65%)]. The most frequently observed category of App_Helpful was Yes [21(91%)]. The most frequently observed category of Received_Prenatal_Booklet was Yes [18(78%)]. Frequencies and percentages are presented in Appendix P, Table 2.

Prenatal Booklet Survey Results

The following results reflect data collected from answers to questions 10-13 on the Prenatal Care Education Survey. If at question 9, the participant answered no, they would not

continue to question 10-13 of the survey. 18 participants finished the survey (question 10-13).

Frequencies and percentages were calculated for Read_Booklet, Booklet_Helpful,

Booklet_Easy_to_read_and_understand, and Plan_to_use_booklet. The most frequently observed

category of Read_Booklet was No [(10, 56%)]. The most frequently observed category of

Booklet_Helpful was No [11(61%)]. The most frequently observed category of

Booklet_Easy_to_read_and_understand was No [11(61%)]. The most frequently observed

category of Plan_to_use_booklet was No [13(72%)]. Frequencies and percentages are presented

in Appendix Q, Table 3.

Impact of Project

For FQHCs, a program such as this may not only be cost-effective, but also supplemental in reaching young women in the pre-conception stage or first trimester despite identified barriers in access to prenatal care. Providing empowerment and education to women early in their pregnancy can significantly improve continuity of prenatal care, postpartum follow-up attendance, access to resources, and adherence to positive pregnancy health behaviors. This also has the potential to decrease pregnancy, maternal, and infant complications and pregnancy-related stress and anxiety.

The design and implementation of this project adapts to the recent health and societal state of the world, providing the ability to reach women regardless of rural location, socioeconomic background, and education level. Lastly, the technology-based intervention can be used to provide education and awareness in other arenas of women's health in FQHCs. The outcomes will now inform FQHC on decisions regarding continuing prenatal booklet use and integration of tech-based education formatting. Since the patient population are good candidates

for this technology-based education, the facility may plan to adopt the phone application and implement it into practice in the future.

Discussion

Summary, Facilitators, and Limitations

Following data analysis, there is clear potential in utilizing digital platforming and appointment reminders with the prenatal patient population at the FQHC to improve appointment adherence and early entry to prenatal care (see Appendix R, Graph 1). Out of 10 total participants, 18 received the prenatal care booklet and completed the entire survey. 87% of participants reported that they would use the phone application at the site for prenatal care education and appointment reminders. 91% of participants reported that they would find prenatal education on the phone helpful. 87% of participants have smart phone with application capability and 78% of participants have internet access on their phone. Lastly, out of 18 participants who received the prenatal booklet and continued past question 9, 44% reported reading the booklet, 39% found it helpful, easy to read and understand, and only 29% plan to use the booklet during the rest of their pregnancy.

The demographics results highlighted that 81% of participants were 35 years or younger, 44% were insured under AHCCCS and 39% were uninsured, and only 72% completed High School with 11% never finishing High School (see Appendix S, Graph 2). These demographic results indicate the need to assess the prenatal booklet for appropriateness to patient literacy and health literacy.

The strengths of this project include a cost-effective, reliable, and versatile survey. Another strength noted were that participants were receptive to data collection and Spanish-speaking patients were included. Furthermore, the demographic questions provided perspective

to any potential barriers in prenatal education and appointment adherence, which showed significant findings in analysis. Alternatively, the barriers of the project included small sample size and time constraint in data collection between IRB approval and project deadline.

Recommendations

Assessment of prenatal care education is completed at the FQHC site. The next steps include continued research with a prototype phone application or existing phone application that meets the qualifications of the education necessary for patients and appointment reminders. There are several applications currently on the market which can be utilized for an ongoing project. However, these applications, such as myJourney Pregnancy App and Glow Nurture are limited in the educational content they provide, and it is not to the extent of the prenatal booklet currently being utilized by the facility (Coughlin, 2021). Additionally, the applications do not contain an appointment reminder feature and the only application which does is iPregnancy Tracker, created solely for this purpose (Coughlin, 2021). The ongoing research may be conducted by DNP students as a legacy project with the site.

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Appendix A
Evaluation Tables

Table A1
Evaluation Table Quantitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/ Evidence; Decision for practice/ application to practice
<p>Desta et al. (2019). Adherence of iron and folic acid supplementation and determinants among pregnant women in Ethiopia: A systematic review and meta-analysis.</p> <p>Country: Ethiopia</p>	<p>NS; inferred Health Belief Model</p>	<p>Design: systematic review and meta-analysis</p> <p>Purpose: estimate the pooled national level adherence to iron & folic acid supplements and its determinants among PW in Ethiopia</p>	<p>NA=1350 NPA= 1345 NUA= 5 FNA =20</p> <p>Demographics: PW who have received IFA supplementation during their ANC visit.</p> <p>Setting: The university repositories Addis Abeba and Haramya</p>	<p>IV1: PW IV2: knowledge related factors & hx of anemia IV3: timing of ANC visit IV4: frequency of ANC visit</p> <p>DV1- Adherence to IFA supplements DV2 – barriers to IFA adherence</p>	<p>Online literature review in several databases, Newcastle-Ottawa Scale QAT</p>	<p>Meta-regression model, random effect model, forest plot and OR.</p>	<p>DV1 – Adherence by region: Addis Abeba (60%), Tigray (58.9%) Pooled national level IFA adherence (46.15%) p-value = <0.05 95% CI</p> <p>IV1: PW with 4 or more ANC visits were 2.59 times more likely to adhere to recommended IFA supplementation. P=<0.001</p> <p>DV2- FOS: 46.4% (95%)</p>	<p>Level of Evidence: LOE I</p> <p>Strengths: High level evidence, strong analysis tools, moderate sample.</p> <p>Weaknesses: Homogeneity (limits generalizability)</p> <p>Conclusions: Receiving supplemental</p>

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<p>Funding: No funding sources for this review.</p> <p>Bias: No evidence of bias (Egger’s tests used).</p>			<p>University of studies in primary care in Ethiopia.</p> <p>Inclusion: Studies that reported the adherence of IFA supplementation or the determinants of IFA supplementation or the barriers of adherence among PW in Ethiopia, high quality studies, studies from 2015-2019.</p> <p>Exclusion: studies conducted within the study populations other than PW, case reports, surveillance data (DHS), conference</p>				<p>CI) Forgetfulness: 30.74% (95% CI)</p>	<p>counseling, knowledge of the supplement; early registration and frequent ANC visit were significantly associated with adherence of the IFA supplementation.</p> <p>Feasibility: provision of strengthened supplemental counselling service, antenatal care services, and improving the knowledge of the supplementation are crucial strategies to increase</p>

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			abstracts, and articles without full access.					adherence among PW in Ethiopia.
Ashford et al. (2016). Computer-or web-based interventions for perinatal mental health: A systematic review. Country: United Kingdom Funding: No funding sources stated for this review. Bias: Possible sampling bias from use of self-	Cognitive Behavioral Theory	Design: systematic review Purpose: provide a first overview of computer- or web-based interventions for women’s perinatal MH issues	TNR – 9,008 TSI – 11 Demographics: women in the perinatal period Setting: twelve electronic databases systematically searched at CMCHR Inclusion: programs that (a) targeted women in pregnancy – 1 year postpartum; (b) were designed to prevent/improve MH issues; (c) delivered via	IV1: intervention format IV2: targeted MH issue IV3: intervention characteristics IV4: origin and languages DV1 – Depression DV2 – Anxiety DV3 – Other MH outcomes	Online literature review in twelve databases supplemented by hand searching, 14-item checklist for assessing QQS, PRISMA	Forest plot, QA scores,	DV1 – Medium ($d=0.55$, 95% CI 0.33-0.76) to large ($d=1.03$, 95% CI 0.35-1.67)($Mdn=0.46$) DV2 – ($d=0.61$, 95% CI 1.20-0.01 to $d=0.51$, 95% CI 0.01-1.02; $Mdn=0.02$) DV3 – ($d=0.98$, 95% CI 0.30-1.61)	Level of Evidence: LOE I Strengths: High level evidence, methodological quality of studies assessed by two independent assessors Weaknesses: Meta-analysis could not be completed; strength of evidence limited by small recruitment strategies, small sample size, and high attrition

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referral recruitment strategies			computer- or web- based; (d) included self-help component. Exclusion: studies that investigated (a) online support groups only; (b) e- counseling, and were (c) qualitative, case studies, systematic reviews, or study protocols					rates; heterogeneity (limits generalizability) Conclusions: Systematic review is first synthesis of its kind and provides preliminary support this could be promising form of treatment. Feasibility: Further research needed in current evidence-base before implementation, gaps in well designed and large RCT studies exist and

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								therefore require review before pursuing further.
Ngo et al. (2020). Use of decision support tools to empower pregnant women: Systematic review Country: Norway Funding: Funded by Foundation Dam through Norwegian Women’s Public Health Association	NS; inferred Health Belief Model	Design: systematic review Purpose: provide overview of studies investigating the effect of patient-centered DST for PW	TNR – 10,726 TSI – 25 Demographics: Pregnant women who used one or several PCDST Setting: online search of 5 databases at University of Oslo Inclusion: RCT, cohort studies, register-based studies, case-control studies; full-texts in English, Norwegian, Swedish, or	IV1: PCDST DV1 – Prenatal Screening DV2 – GD and WG DV3 – Lifestyle DV4 – BP and Preeclampsia DV5 – Depression DV6 – Asthma DV7 – psychological well-being	Literature search of 5 online databases, PRISMA, Data extraction form	Excel spreadsheet	DV1 – (n=10) (digital:32%; paper-based:15%; P= 0.87) DV2 – (n=7) FBG (web-chat and feedback: 4.3; control: 5.3, P<.001) 2-hr postprandial BG (web-chat and feedback: 5.8; control: 6.9, P<.001) DV3 – (n=3) decreased alcohol consumption in pregnancy (SMS text messages: 3.5%; standard maternity care: 1.1%, P<.098) DV4 – (n=2) knowledge	Level of Evidence: LOE I Strengths: High level evidence, moderate sample Weaknesses: Few PCDST within each topic, higher sociodemographic female status overrepresented, possible selection bias. Conclusions: opportunities created by digitalization and

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Bias: Possible selection bias (motivation to participate/low # of participants)			Danish. Exclusion: full-text not available, foreign language, wrong publication type, wrong study design, does not investigate DST, study does not include pregnant women or irrelevant outcome				scores higher for app users (app user:78.1; control:15.8; P<.001) DV5 – (n=1) Referral rate using app: (P=.03) Referral rate check-ups: (P=.02) DV6 – (n=1) IG Better control of symptoms (ACQ: -0.30 vs. 0.06, P=.02) Quality of life (AQQ:0.51 vs -0.22, P=.002) DV7 – (n=1) lower anxiety scores (2.8 vs 4.9, P=.002) and higher confidence scores (8.9 vs 7.8, P=.001)	technology should be used to develop innovative PCDST tailored to support PW Feasibility: effect of tools on clinical outcomes to be tested before recommending or implementing to supplement maternity care.
Oliveira et al. (2017). Meta-analysis of the	Joanna Briggs Institute Model	Design: systematic review and	TNR – 7201 TSI – 11	IV1: Educational BF interventions	Three stage search strategy; Tool adapted from JBI-	Stata version 13, fixed effects	(P<0.001) and I ² (93.4%) 95% CI 5 out of 12	Level of Evidence: LOE I

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<p>effectiveness of educational interventions for breastfeeding promotion directed to the woman and her social network</p> <p>Country: Brazil</p> <p>Funding: No funding sources for this review.</p> <p>Bias: No evidence of bias (Cochrane Collaboration risk of bias tool used)</p>		<p>meta-analysis</p> <p>Purpose: Determine effectiveness of educational interventions focusing on women and their SN for promotion of exclusive BF first 6 months.</p>	<p>Demographics: Pregnant and/or nursing mother who have received some guidance from health services on breastfeeding.</p> <p>Setting: three step online search of six databases at Federal University of Pernambuco</p> <p>Inclusion: RCTs, studies with appropriate CG and IG, interventions promoting BF.</p> <p>Exclusion: studies developed exclusively with</p>	<p>IV2: Routine BF interventions</p> <p>DV – exclusive BF at 6 months old.</p>	<p>MAStARI software was used. Two reviewers performed data extraction.</p>	<p>model, random effects model</p>	<p>interventions effective in promoting exclusive BF at 6 months compared with CG.</p>	<p>Strengths: High level evidence, no bias identified, current data.</p> <p>Weaknesses: Few studies contemplated SN of nursing mother, high heterogeneity among RCTs identified.</p> <p>Conclusions: Perceived need to develop new strategies including SN of pregnant women. Important to offer five types of support (informative,</p>

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			premature newborns & mothers and/or children with diseases/physical characteristics preventing BF; manuals, book chapters, monographs and editorials excluded.					emotional, face-to-face, instructional, and self-support). Feasibility: Strategies of holistic support can be used to promote maternal BF in clinical setting.
Kingston et al. (2017). Pregnant women’s perceptions of the risks and benefits of disclosure during web-based MH ES versus PB screening: Randomized controlled trial.	Health Belief Model	Design: RCT Purpose: to compare the perceptions of PW randomized to a Web-based screening intervention group and a PB screening CG on the level of	N=636 IG=305 CG=331 Demographics: 100% of N female and pregnant age – <25 (13.9%), 25-34 (72.2%), 35+ (13.6%) Edu: HS or less (15.8%), PS or more (84.2%)	IV1: ES IV2: PB screening IV3: MHS DV1- perceived risk of screening DV2 – perceived benefit of screening DV3-	8-item DES with 5-point Likert scale.	Chi-square tests, independent <i>t</i> tests, multivariable model, multiple linear regression	DV1- paper, mean (SD) = 8.57 (3.73); ES, mean (SD) = 8.51(3.59); <i>p</i> value DV2 -paper, mean (SD) = 14.17(4.03); ES, mean 14.11(4.05); <i>p</i> value – 0.85 DV3- NS	Level of Evidence: LOE II Strengths: Strong methodology, reliable instruments, double-blind, large N Weaknesses:

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<p>Country: Canada</p> <p>Funding: Provided by Canadian Institutes of Health Research and authors of study contributed to final grant.</p> <p>Bias: None</p>		<p>risk and benefit they perceive in disclosing MH concerns to their prenatal care provider.</p>	<p>Setting: maternity clinics and an inpatient, high-risk antenatal unit in a tertiary care hospital in Edmonton, Alberta</p> <p>Inclusion: female, currently pregnant, ability to speak and write English, willing to be randomized to e- screening, willing to</p> <p>Exclusion: women not currently pregnant, men, pts residing outside of Alberta.</p>	<p>perceived benefits of MHS</p>				<p>sample demographically homogeneous, f/u info NS.</p> <p>Conclusions: MH assessment is generally perceived as beneficial. However, some participants felt vulnerable during the SP for MH issues. Future research is required to explore women’s views of MHS.</p> <p>Feasibility: Recommended for use by clinicians and women’s health</p>

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								clinics that are deciding between PB and ES.
Tobah et al. (2019). Randomized comparison of a reduced-visit prenatal care model enhanced with remote monitoring Country: United States Funding: No funding sources for this review. Bias: None	Digital Health Interventions Framework	Design: RCT Purpose: to evaluate acceptability and effectiveness of OBN (RDPCM) enhance with remote home monitoring devices & nursing support.	N=300 CG=150 IG=150 Demographics: Pregnant women aged 18-36 years; majority Caucasian, 97% married, and mostly educated. Setting: Single-center outpatient obstetric tertiary academic center in the Midwest United States. Inclusion: English-speaking pregnant women,	IV1: OBN IV2: UC DV1- satisfaction rate DV2 – maternal/fetal complications DV3- pregnancy-related stress	Modified validated 30-item Prenatal Interpersonal Processes of Care scale; 9-item PreNatal Maternal Stress survey; modified Littlefield and Adams 16-item self-reported; Satisfaction subscale survey, evaluated on 5-point Likert-type scale.	Fisher exact test statistic for categorical outcomes and <i>t</i> test for continuous outcomes (SAS software version 9.4 used)	DV1- OBN=93.90 vs UC=78.89; MD 15.01, 95% CI, 13.38-16.64 DV2 – no differences with exception of gestational diabetes (OBN=6 [4.5%] vs UC=0 [0.0%], P<.01) DV3- 14 weeks (OBN=0.32 vs UC=0.41; MD=-0.09, 95% CI, -0.14 to -0.04) and 36 weeks (OBN=0.34 vs UC=0.40; MD=-0.06, 95% CI, -0.11 to -0.01)	Level of Evidence: LOE II Strengths: Rigorous randomized trial design with optimal allocation concealment, high survey completion rates. Weaknesses: does not examine RDPCM in socio-demographically diverse population

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			<p>between 18 and 36 years old, at <13 weeks of gestation, without concurrent medical or OB complications, with ability to provide informed consent.</p> <p>Exclusion: diagnoses of any chronic medical conditions or OB judgement pregnancy is high risk for complications.</p>					<p>Conclusions: PW randomized to RDPCM had significantly higher satisfaction with care, lower prenatal-related stress, & saved average of 2.8 OB clinician appointments per patient compared to UC model.</p> <p>Feasibility: RDPCM with remote monitoring as effective as standard 12-14 traditional visits model.</p>
Catherine et al. (2019). The	NS; inferred Social	Design: RCT	N=739 14-19 years=361	IV1: low income	Home interviews & verbally	Chi-square test, Fisher's	DV1- Primary healthcare (past	Level of Evidence: LOE

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<p>British Columbia healthy connections project: Findings on socioeconomic disadvantage in early pregnancy</p> <p>Country: Canada</p> <p>Funding: BC Ministry of Health with support from the BC Ministry of Children and Family Development, additional funding support from Djavad Mowafaghian and Stern family</p>	Disadvantage Framework	<p>Purpose: to inform early intervention planning by describing health & social adversities experienced by a cohort of girls and young women in early pregnancy in BC, Canada.</p>	<p>20-24 years=378</p> <p>Demographics: young females in early pregnancy from disadvantaged & low socioeconomic backgrounds; 91% single, 84% low-income, 52% limited education</p> <p>Setting: public health units at four regional BC Health Authorities. Nurse-led home visits in BC</p> <p>Inclusion: women less than 28 weeks pregnant & experiencing socioeconomic</p>	<p>IV2: limited education IV3: preparing to parent while single IV4: Age IV5: psychological resources IV6: cognitive functioning IV7: executive functioning IV8: maltreatment experiences DV1- health services for physical health DV2 – social services received</p>	administered questionnaires and cognitive tests in-person; sensitive items prone to bias administered using audiotaped questions with responses written in sealed envelopes for later processing.	exact test for cell sizes <5, Student's <i>t</i> -test (for continuous variables)	<p>month) N: 76.7% (567/739) 14-19 years: 289/361 (80.1%) 20-24 years: 278/378 (73.5%) <i>p</i>-value = 0.045</p> <p>Prenatal classes (past month) N: 28.4% (210/739) 14-19 years: 116/361 (32.1%) 20-24 years: 94/378 (24.9%) <i>p</i>-value = 0.035 DV2 – Income assistance (past month) – N: 28.7% (212/739) 14-19 years: 71/361(19.7%) 20-24 year: 141/378 (37.3%) <i>p</i>-value<0.001</p>	<p>II</p> <p>Strengths: Randomized trial design with reliable instruments, large N</p> <p>Weaknesses: 2/3 of eligible young women not reached through recruitment efforts, data on education levels does not account for HS.</p> <p>Conclusions: Young women in the study are not adequately being reached by social services; study</p>

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Bias: None			disadvantage. Exclusion: Women in later pregnancy, over the age of 24 years, high-income households, second-time mothers.					suggests unacceptably high levels of socioeconomic disadvantages exist for young and pregnant BCs. Feasibility: Information can be used for greater health and social supports & services for young mothers and their children
Selchau (2017). First trimester prenatal care initiation among Hispanic women along the U.S.-Mexico Border	Quality of Care Framework	Design: cross-sectional Purpose: identify demographic, knowledge and care-seeking	N=403 CA=65 AZ=56 NM-1=134 NM-2=96 TX=52 Demographics: Hispanic women	IV1: Race IV2: Age IV3: # pregnancies IV4: location of PNC DV1- FTPNC	12-question survey to assess key factors related to PNC	Chi square analyses, logistic regression model	DV1- multiparity associated with FTPNC, living in Texas negatively associated with FTPNC ($R^2 = 0.066$, $F(9,340) = 2.662$, $p = .005$)	Level of Evidence: LOE IV Strengths: Well-designed selection process, sample

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Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/ Evidence; Decision for practice/ application to practice
<p>Country: United States</p> <p>Funding: U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau, Division of Healthy Start</p> <p>Bias: None</p>		<p>factors influencing FTPNC among Hispanic women in border counties and what FTPNC barriers may be unique to this target population.</p>	<p>of reproductive age (15-44 years) residing along the U.S.-Mexico border</p> <p>Setting: five Healthy Start clinical project sites along southwest border towns in United States.</p> <p>Inclusion: Hispanic female, reproductive age, living in counties on border areas.</p> <p>Exclusion: Outside of reproductive age, not meeting border residency or Hispanic ethnicity requirements</p>				<p>Primiparous women less likely to start FTPNC than Multiparous women ($\chi^2 = 6.8372, p = 0.0089$)</p>	<p>representative of study population</p> <p>Weaknesses: generalizability limited, not all potential risk factors identified</p> <p>Conclusions: First-time pregnancies have lower FTPNC, strong association between delayed PNC and late pregnancy recognition.</p> <p>Feasibility: Strengthened investments in preconception planning could</p>

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Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/ Evidence; Decision for practice/ application to practice
								improve FTPNC in this population.
Chen et al. (2020). Characteristics of online medical care consultation for pregnant women during the COVID-19 outbreak: Cross-sectional study. Country: China Funding: Provided by National Natural Science Foundation of China and the National Key Research and	NS, inferred Cognitive Behavioral Model	Design: cross-sectional Purpose: to assess the needs of PW regarding online obstetric consultation in representative areas with various severity of the epidemic.	N=2599 NSS=957 NMEA=164 NmodEA=644 NSEA=149 Demographics: 100% of female and pregnant, residing in a province of China. Setting: YTT throughout provinces in China Inclusion: All PW residing in a province of China who submitted their online obstetric evaluation were	IV1 : PW IV2 : ANC DV1- PWS DV2- distribution of OOC in different areas DV3- distribution of OOC in different trimesters	E-health questionnaires, online surveys, ANC consultations	Chi-squared test, logistic regression.	DV1- e-health saves time: 79.94% e-health reduces ROC: 82.45% e-health is comfortable: 39.81% e-health can save money: 41.17% DV2 – MEA: 448 (17.24%) ModEA: 1332 (51.25%) SEA: 819 (31.51%) <i>p</i> <0.001 DV3 – FT: 417 (16.04%) ST: 1054 (40.55%) TT: 1128 (43.40%) <i>p</i> <0.001	Level of Evidence: LOE IV Strengths: Multiple centers involved in design, current evidence, and discusses prenatal e-health recent events. Weaknesses: short duration of data collection, collection possibly hindered by outbreak in China, low LOE. Conclusions:

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Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/ Evidence; Decision for practice/ application to practice
<p>Development Program of China.</p> <p>Bias: Possible due to self-reporting and a questionnaire not commonly structured.</p>			<p>eligible.</p> <p>Exclusion: women not currently pregnant, women with impossible GA, women who recently gave birth, pts residing outside provinces of China.</p>					<p>OOC is highly accepted and satisfied PW during the COVID-19 outbreak. Study indicates that e-health played an important role in ANC during PHE.</p> <p>Feasibility: The novel model of ANC plan can make notable contributions not only in China but emerging epidemic centers worldwide and future PHEs.</p>

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Citation	Theory/ Conceptual Framework	Design/ Method/ Purpose	Sample/ Setting	Major Variables & Definitions	Measurement/ Instrumentation	Data Analysis (stats used)	Findings/ Results	Level/ Evidence; Decision for practice/ application to practice
<p>Shah et al. (2018) Improving rates of early prenatal care in an underserved population</p> <p>Country: United States</p> <p>Funding: No funding sources for this review.</p> <p>Bias: None</p>	<p>NS; inferred Danaher framework</p>	<p>Design: cross-sectional</p> <p>Purpose: increase percentage of patients receiving early PNC</p>	<p>N=428 PNC FT=306 PNC after FT=122</p> <p>Demographics: all PW seeking care at the FQHC location in Houston.</p> <p>Setting: FQHC in Houston, TX</p> <p>Inclusion: systematic random sample of 100 OB patient charts selected from FQHC, every 5th chart selected.</p> <p>Exclusion: No exclusion criteria stated.</p>	<p>IV1 : Age IV2 : Gravidity IV3 : Parity IV4: GA at first visit IV5: GA at delivery IV6: Vaginal delivery</p> <p>DV1- Obstetrical complications DV2-Neonatal complications different areas</p>	<p>Patient surveys, focus groups, stakeholder feedback</p>	<p>Chi-square, Student's <i>t</i>-test, and Mann-Whitney U test.</p>	<p>DV1- PNC FT: 22(7.0) PNC after FT: 12(10.1) <i>p</i> value = 0.29</p> <p>DV2- PNC FT: 29(9.3) PNC after FT: 18(9.7) <i>p</i> value = 0.08</p>	<p>Level of Evidence: LOE IV</p> <p>Strengths: Practical approach, detailed improvement strategies, proven significant change over just three months.</p> <p>Weaknesses: High patient population of single ethnicity & single community clinical setting.</p> <p>Conclusions: Patients with early prenatal</p>

Key: **ACQ** – asthma control questionnaire; **ANC** – antenatal care; **AQQ** – asthma quality of life questionnaire; **AZ** – Arizona; **BC** – British Columbia; **BF** – breastfeeding; **BG** – blood glucose; **BP** – blood pressure; **BS** – benefit score; **CA** – California; **CI** – confidence interval; **CG** – control group; **CMCHR** – center for maternal and child health research; **DHS** – demographic health survey; **DST** – decision support tool; **DV** – dependent variable; **FNA** – final number of articles; **FSE** – fear of side effects; **FT** – first trimester; **FTPNC** – first trimester prenatal care; **f/u** – follow up; **GA** – gestational age; **GD** – gestational diabetes; **HS** – high school; **IFA** – iron and folic acid; **IV** – independent variable; **MD** – mean group difference; **MEA** – mild epidemic area; **MH** – mental health; **MHS** – mental health screening; **ModEA** – moderate epidemic area; **N** – number of participants; **NA** – number of articles; **NM-1** – Dona Ana County; **NM-2** – Four County area; **NMEA** – sample from mild epidemic area; **NModEA** – sample from moderate epidemic area; **NPA** – number of published articles; **NS** – not stated; **NSEA** – sample from severe epidemic area; **NSS** – number of participants who completed satisfaction survey; **NUA** – number of unpublished articles; **OB** – obstetric; **OBN** – OB nest; **OOC** – online obstetric consultation; **OR** – odds ratio; **PB** – paper-based; **PCDST** – patient-centered decision support tool; **PHE** – preventative health exam; **PNC** – prenatal care; **PRISMA** – preferred reporting items for systematic review and meta-analysis; **PS** – post-secondary; **PW** – pregnant women; **PWA** – pregnant women’s satisfaction; **QA** – quality assessment; **QAT** – quality assessment tool; **QI** – quality improvement; **QQS** – quality of quantitative studies; **RCT** – randomized controlled trial; **RDPCM** – reduced-frequency prenatal care model; **ROC** – risk of coronavirus; **RS** – risk score; **SEA** – severe epidemic area; **SN** – social network; **SP** – screening process; **ST** – second trimester; **TT** – third trimester; **TNR** – total number of records; **TSI** – total studies included; **TX** – Texas; **UC** – usual care; **WG** – weight gain; **YTT** – Yue Yi Tong

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								<p>care had better obstetrical and neonatal outcomes; however, the results were not statistically significant likely due to the small sample size</p> <p>Feasibility: This QI project provides various strategies & resources for other community-based clinics to consider when seeking improvement in their rates of early PNC.</p>

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Appendix B
Synthesis Table

Table A2

Study (Author, year)	Ashford, 2016	Catherine, 2019	Chen, 2020	Dest, 2019	Kingston, 2017	Ngo, 2020	Oliveira, 2017	Selchau, 2017	Shah, 2018	Tobah, 2019
SR/ I	•			•		•	•			
RCT/ II		•			•					•
CSS/ IV			•					•	•	
Sample	11 studies	739	957	20 articles	636	25 studies	11 studies	403	428	300
Country	United Kingdom	Canada	China	Ethiopia	Canada	Norway	Brazil	United States	United States	United States
Framework	CBT	SDF	CBT	HBM	HBM	HBM	JBIM	QCF	DF	DHIF
Demographics										
<i>Pre-pregnancy</i>								•		
<i>1st trimester</i>	•	•	•	•	•	•	•	•	•	
<i>2nd trimester</i>	•	•	•	•	•	•	•	•	•	•
<i>3rd trimester</i>	•		•	•	•	•	•	•	•	•
<i>PP and BF</i>	•						•	•		
<i>Mean Age</i>	28	20	31	23	27	26	30	29	24	33
<i>LSEB</i>		•				•		•	•	
<i>Limited Education</i>		•	•			•		•	•	
<i>Low Income</i>		•				•		•	•	
Applicable Measurement Tools	ODLR	Interviews	Online survey, PNC consult	ODLR	DES with Likert scale.	ODLR, DE tool	ODLR, DE tool	Survey	Survey focus groups,	Survey, Likert scale

Key: **BF** – breastfeeding; **CBE** – computer-based education; **CBT**– cognitive behavioral theory; **CSS** – cross-sectional study; **DE** – data extraction; **DF** – Danaher framework; **DHIF** – digital health intervention framework; **EEPC** – early entry to prenatal care; **ES** – electronic screening; **HBM** – health belief model; **JBIM** – Joanna Briggs Institute Model; **LSEB** – low socioeconomic background; **MH** – mental health; **ODLR** – online database literature review; **OOC** – online obstetric counseling; **PNC** – prenatal care; **PP** – postpartum; **PPHB** – positive prenatal health behaviors; **PRS** – pregnancy related stress; **QCF** – quality of care framework; **RCT** – randomized controlled trial; **SDF** – social disadvantage framework; **SMI** – social media intervention; **SR** – systematic review

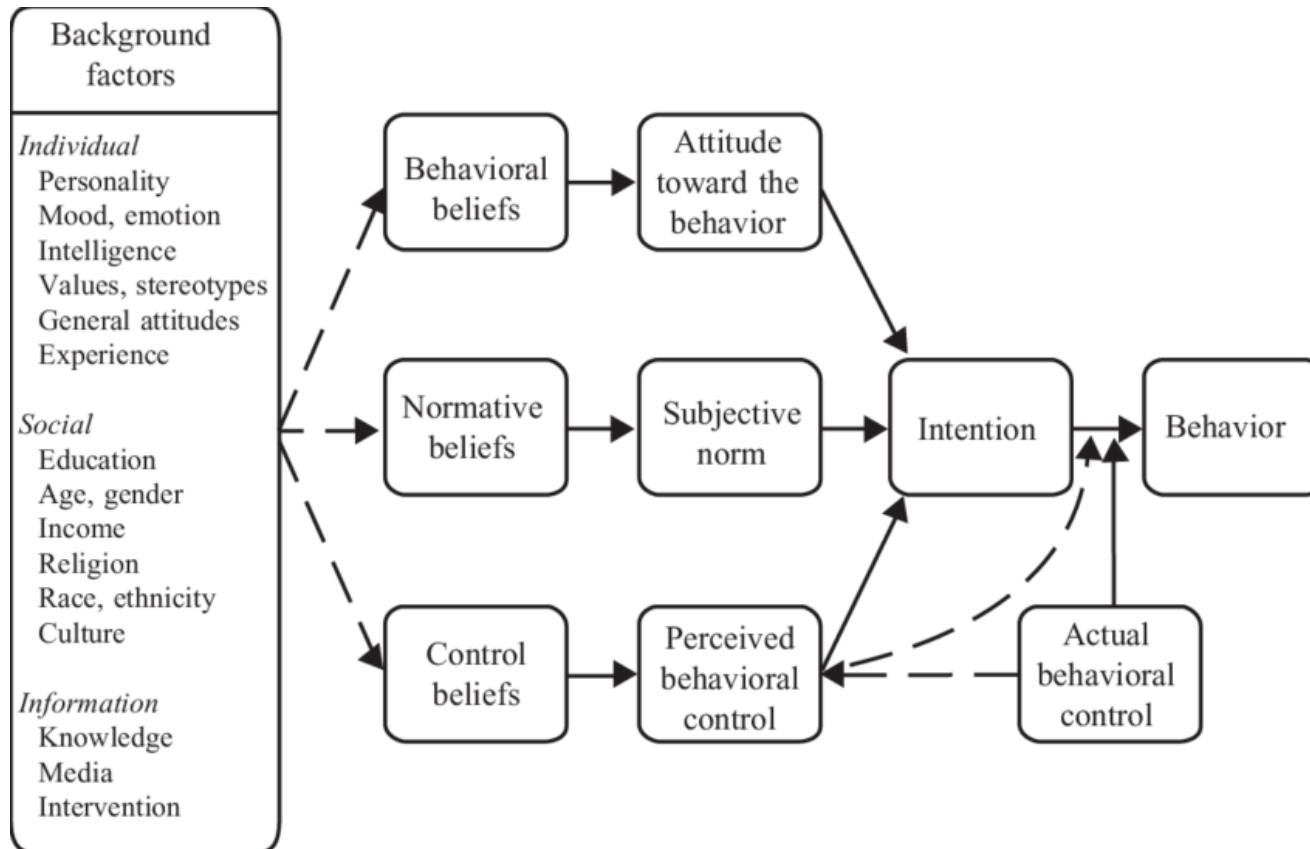
Independent Variables										
<i>PNC frequency</i>	•			•	•	•		•	•	•
<i>Health Resources</i>	•	•				•		•		•
<i>MH Resources</i>	•	•								
<i>OOC</i>			•							•
<i>Social Media</i>			•				•			
<i>CBE</i>	•						•			
<i>E-screening</i>			•		•					•
<i>PCDST</i>		•		•		•				
<i>Remote Monitoring</i>										•
Dependent Variables										
<i>EEPC</i>		•		•	•	•		•	•	•
<i>Access to Services - LSEB</i>	•	•	•			•		•	•	
<i>Adherence to PPHB</i>		•	•	•	•		•	•		
<i>Maternal Depression & Anxiety, PRS</i>	•				•	•	•			•
<i>Maternal Complications</i>			•			•				•
<i>Neonatal/Fetal Complications</i>			•				•			•
Findings										
<i>Improved access to resources/care</i>	•	•		•			•		•	
<i>Improved patient satisfaction</i>			•		•	•			•	•
<i>Improved prenatal education</i>		•		•		•	•	•	•	
<i>Improved maternal outcomes</i>		•	•					•		
<i>Improved neonatal outcomes</i>		•	•							
<i>Improved MH outcomes</i>	•				•	•	•			•
<i>Increased PNC</i>				•	•	•		•	•	•

Key: **BF** – breastfeeding; **CBE** – computer-based education; **CBT**– cognitive behavioral theory; **CSS** – cross-sectional study; **DE** – data extraction; **DF** – Danaher framework; **DHIF** – digital health intervention framework; **EEPC** – early entry to prenatal care; **ES** – electronic screening; **HBM** – health belief model; **JBIM** – Joanna Briggs Institute Model; **LSEB** – low socioeconomic background; **MH** – mental health; **ODLR** – online database literature review; **OOC** – online obstetric counseling; **PNC** – prenatal care; **PP** – postpartum; **PPHB** – positive prenatal health behaviors; **PRS** – pregnancy related stress; **QCF** – quality of care framework; **RCT** – randomized controlled trial; **SDF** – social disadvantage framework; **SMI** – social media intervention; **SR** – systematic review

Appendix C

Theory of Planned Behavior

Figure 1

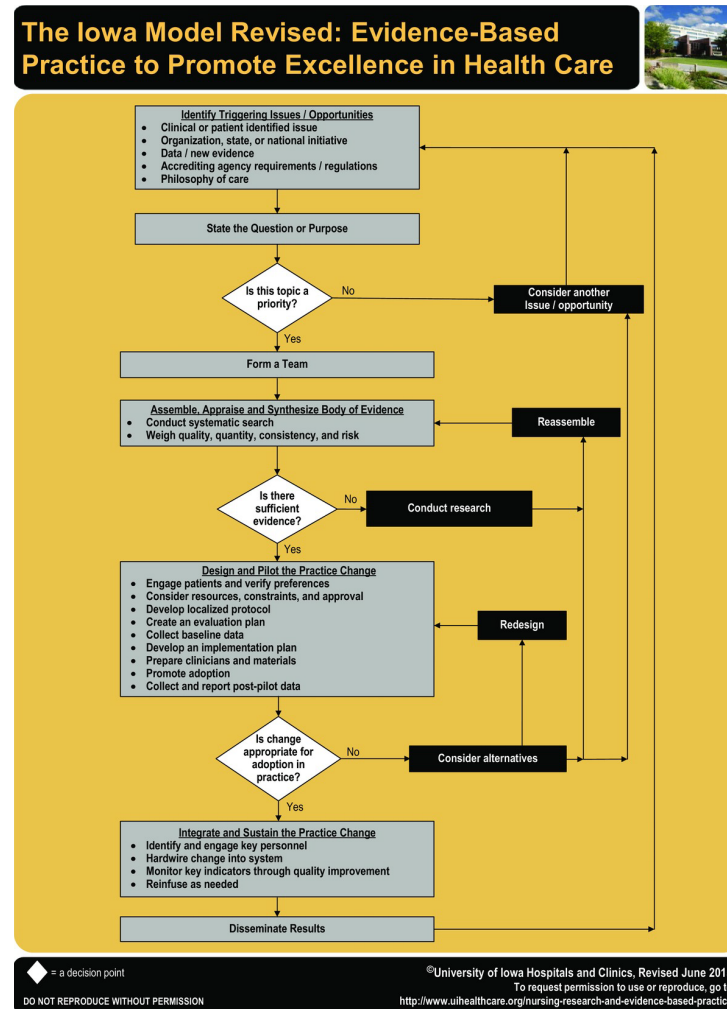


Ajzen (1991)

Appendix D

The Iowa Model for Evidence-Based Practice

Figure 2



Iowa Model Collaborative (2017)

Appendix E

Consent Form English Version

Figure 3

Assessing Prenatal Care Education in a Federally Qualified Health Center

You are being invited to participate in a project to help improve prenatal care at Wesley. This project is being conducted by Yana Alexander RN, BSN. I am a graduate student in the Family Nurse Practitioner program at the Arizona State University College of Nursing. This project is being conducted under the supervision of Dr. Patricia Janicek.

The purpose of this project is to identify prenatal care needs at Wesley related to prenatal care education and prenatal appointment support.

Who may participate?

You may participate in the project if you are a patient at Wesley, between the ages of 18-40, currently pregnant, and have had at least one prenatal care visit.

What you are being asked to do

If you agree to take part in this project, you will be asked to complete a paper survey. This survey will ask you about your use of the Wesley prenatal care booklet provided at your first visit and your thoughts on possible phone-based resources for Wesley patients. This survey will take approximately 5-10 minutes to complete.

Risks and Benefits

There is no compensation for participating in this project. You may not directly benefit from this project; however, we hope that your participation may help use improve the prenatal program at Wesley. There are no known risks or discomforts to your participation.

Withdrawing

Your participation in this project is voluntary. Your care at Wesley will not be affected in any way if you choose to or not to participate in this questionnaire. You have the right not to answer any question, and to stop participation at any time. You have the right to skip any questions you do not wish to answer. If you choose not to participate or to withdraw at any time, there will be no penalty. To withdraw, please contact Dr. Patricia Janicek at PatriciaJanicek@asu.edu.

Confidentiality

Your responses will be anonymous. The results of this project may be used in reports, presentations, or publications but your name will not be used. Results will only be shared in aggregate form. We will minimize confidentiality risks by limited access to your answers and information to the project personnel only. The anonymous data collected as a part of the project will be shared with other investigators for future research purposes. Information will be kept in a locked drawer at Wesley and discarded after the project is complete, with data being stored until April 2022.

Questions

If you have any questions concerning the study, please contact Patricia Janicek, DNP, WHNP-BC and/or Yana Alexander, RN, BSN at PatriciaJanicek@asu.edu and yshoniya@asu.edu. If you have any questions about your rights project, or if you feel you have been placed at risk, you can contact the Chair of the Human Subjects Institutional Review Board, through the ASU Office of Research Integrity and Assurance, at (480) 965-6788.

By providing your information below you are agreeing to participate in the research project described above.

Appendix F

Consent Form Spanish Version

Figure 4

Evaluación de la educación sobre el cuidado prenatal en un centro de salud calificado a nivel federal

Se le invita a participar en este proyecto para ayudar a mejorar la atención prenatal en Wesley. Este proyecto está siendo realizado por Yana Alexander, enfermera certificada y Lcda. en Enfermería. Soy una estudiante graduada del programa de Enfermería en Medicina Familiar en la Facultad de Enfermería de la Arizona State University. Este proyecto se está llevando a cabo bajo la supervisión de la Dra. Patricia Janicek.

El propósito de este proyecto es identificar las necesidades en la atención prenatal de Wesley relacionadas con la educación de la atención y el apoyo para las citas prenatales.

¿Quiénes pueden participar?

Puede participar en el proyecto si es paciente de Wesley, tiene entre 18 y 40 años, está embarazada actualmente y ha tenido al menos una consulta de atención prenatal.

¿Qué debo hacer si participo?

Si acepta participar en este proyecto, se le pedirá que complete una encuesta en papel. Esta encuesta le preguntará sobre su uso del folleto de cuidado prenatal de Wesley, el cual se le proporcionó en su primera consulta y sus pensamientos sobre posibles recursos telefónicos para los pacientes de Wesley. Esta encuesta tomará aproximadamente de 5 a 10 minutos en completarse.

Riesgos y beneficios.

No hay compensación por participar en este proyecto. Es posible que no se beneficie directamente de este proyecto; sin embargo, esperamos que su participación pueda ayudar a mejorar el programa prenatal en Wesley. No hay riesgos ni molestias conocidas por su participación.

Retiro

Su participación en este proyecto es voluntaria. Su atención en Wesley no se verá afectada de ninguna manera si decide participar o no en este cuestionario. Tiene derecho a no responder a ninguna pregunta y a dejar de participar en cualquier momento. Tiene derecho a omitir cualquier pregunta que no desee responder. Si elige no participar o retirarse en cualquier momento, no habrá sanción. Para retirarse, por favor comuníquese con la Dra. Patricia Janicek a PatriciaJanicek@asu.edu.

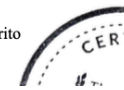
Confidencialidad

Sus respuestas serán anónimas. Los resultados de este proyecto podrán ser utilizados en informes, presentaciones o publicaciones, pero no se utilizará su nombre. Los resultados solo se compartirán en forma colectiva. Minimizaremos los riesgos de confidencialidad mediante el acceso limitado a sus respuestas e información únicamente al personal del proyecto. Los datos anónimos recopilados como parte del proyecto se compartirán con otros investigadores para futuras investigaciones. La información se guardará en un cajón cerrado con llave en Wesley y se descartará una vez que se complete el proyecto, y los datos se almacenarán hasta abril de 2022.

Preguntas

Si tiene alguna pregunta sobre el estudio, comuníquese con Patricia Janicek, Doctorado en Enfermería y enfermera certificada especializada en Salud de la Mujer y/o Yana Alexander, enfermera certificada y Lcda. en Enfermería, a PatriciaJanicek@asu.edu y yshoniya@asu.edu. Si tiene alguna pregunta sobre sus derechos en el proyecto, o si siente que ha sido puesta en riesgo, puede comunicarse con el presidente de la Junta de Revisión Institucional de Sujetos Humanos, a través de Oficina de Integridad y Aseguramiento en la Investigación de la Arizona State University, al (480) 965- 6788.

Al proporcionar su información a continuación, acepta participar en el proyecto de investigación descrito anteriormente.



Appendix G

Demographics Survey English Version

Figure 5

Age: _____

Gestational age (weeks of pregnancy): _____ # of pregnancies: _____

Living children: _____

Select all that apply:

Insurance Status

- I have insurance
- I have AHCCCS
- I do not have insurance

Education

- Less than High School High School/GED
- College Degree
- Graduate Degree

Appendix H

Demographics Survey Spanish Version

Figure 6

Edad: _____

Edad gestacional (semanas de embarazo): _____ # de embarazos: _____

Hijos vivos: _____

Seleccione todas las que correspondan:

Estado de su seguro

- Poseo seguro
- Poseo un Sistema de Contención de Costo y Cuidado de la Salud de Arizona (AHCCCS)
- No poseo un seguro

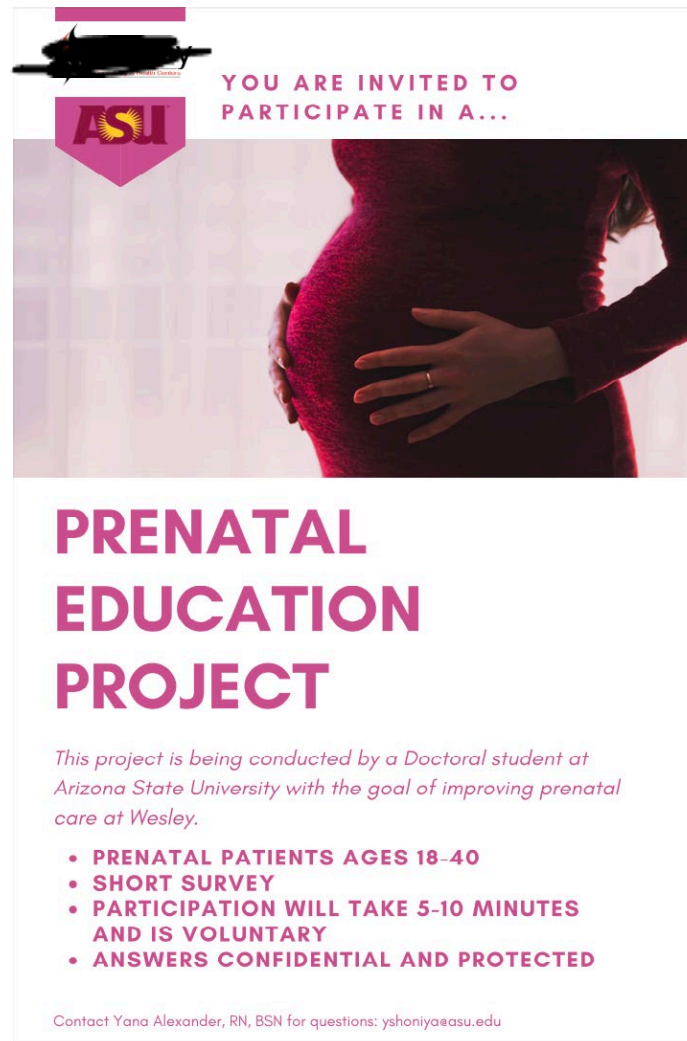
Educación

- Menos que la escuela secundaria Escuela secundaria/Diploma de Educación General
- Título universitario
- Licenciatura

Appendix I

Recruitment Flyer English Version

Figure 7



ASU YOU ARE INVITED TO PARTICIPATE IN A...

PRENATAL EDUCATION PROJECT

This project is being conducted by a Doctoral student at Arizona State University with the goal of improving prenatal care at Wesley.

- **PRENATAL PATIENTS AGES 18-40**
- **SHORT SURVEY**
- **PARTICIPATION WILL TAKE 5-10 MINUTES AND IS VOLUNTARY**
- **ANSWERS CONFIDENTIAL AND PROTECTED**

Contact Yana Alexander, RN, BSN for questions: yshoniyaeasu.edu

Appendix J

Recruitment Flyer Spanish Version

Figure 8



[Logo: ASU] ESTÁ INVITADA A PARTICIPAR EN UN...

PROYECTO DE EDUCACIÓN PRENATAL

Este proyecto será conducido por una estudiante de Doctorado de la Arizona State University con el objetivo de mejorar el cuidado prenatal en Wesley.

- ♦ PACIENTES PRENATALES EDADES DE 18 A 40
- ♦ BREVE ENCUESTA
- ♦ LA PARTICIPACIÓN DURARÁ 5 A 10 MINUTOS Y ES VOLUNTARIA
- ♦ LAS RESPUESTAS SERÁN CONFIDENCIALES Y PROTEGIDAS

Comuníquese con Yana Alexander, enfermera certificada y Leda, en Enfermería si tiene preguntas: yshoniya@asu.edu

Appendix K**Staff Patient Prompt English Version****Figure 9****Prompt to Patient:**

There is an Arizona State University graduate nursing student here today helping us relook at the prenatal education (pregnancy information) that we give you and see if there are other resources that our patients could benefit from during their care here. We are looking to move to digital formatting (like computer or smartphone) soon with prenatal education and appointment reminders. Participation consists of a survey that takes about 5 to 10 minutes to complete to see if our patients would be interested in these services at Wesley. Participation in this project is completely voluntary and you do not have to answer any questions you do not wish to. Would you be willing to participate in her project while you wait to see a clinical/after you see a clinician?

Appendix L**Staff Patient Prompt Spanish Version****Figure 10****Indicaciones a la paciente:**

Hoy nos acompaña una estudiante graduada en enfermería de la Arizona State University que nos ayuda a revisar la educación prenatal (información sobre el embarazo) que le proporcionamos y ver si hay otros recursos de los que nuestros pacientes podrían beneficiarse durante su atención aquí. Esperamos cambiar pronto al formato digital (como computadora o teléfono inteligente) con educación prenatal y recordatorios de citas. La participación consiste en una encuesta que tarda entre 5 y 10 minutos en completarse para ver si nuestros pacientes estarían interesados en estos servicios en Wesley. La participación en este proyecto es completamente voluntaria y no tiene que responder ninguna pregunta que no desee. ¿Estaría dispuesta a participar en su proyecto mientras espera ser atendida por un médico o después de ser atendida?

Appendix M

Prenatal Care Education Survey English Version

Figure 11

Prenatal Education Survey

Directions: Circle the answer to each question.

1. I use the patient portal at Wesley .	Yes	No
2. I have a smart phone that can download and use apps.	Yes	No
3. I have the ability to use the internet on my phone.	Yes	No
4. I would use a phone app with prenatal education.	Yes	No
5. I have missed one or more of my prenatal visits at Wesley during this pregnancy due to forgetting my office visit.	Yes	No
6. I would like to receive a reminder message on my phone 24 hours before my appointment to help me remember to come to my visit.	Yes	No
7. I would like to receive an extra reminder message on my phone 2 hours before my appointment to help me remember to come to my visit.	Yes	No
8. I would find it helpful to have an app to look at what I should expect at each office visit.	Yes	No
9. I received a prenatal booklet from Wesley . If the answer is no, your survey is complete.	Yes	No
10. I have read some of the prenatal booklet.	Yes	No
11. The prenatal booklet has helpful information.	Yes	No
12. The prenatal booklet was easy to read and understand.	Yes	No
13. I plan to use the prenatal booklet during my pregnancy.	Yes	No

Appendix N

Prenatal Care Education Survey Spanish Version

Figure 12

Encuesta de Education Prenatal

Instrucciones: Encierre en un círculo la respuesta a cada pregunta.

1. Uso el portal del paciente en MyWay .	Si	No
2. Tengo un teléfono inteligente en el que puedo descargar y usar aplicaciones.	Si	No
3. Tengo la capacidad de usar internet en mi teléfono.	Si	No
4. Usaría una aplicación de educación prenatal en mi teléfono.	Si	No
5. He perdido una o más de mis consultas prenatales en el consultorio durante este embarazo debido a que olvidé mi visita al consultorio.	Si	No
6. Me gustaría recibir un recordatorio en mi teléfono 24 horas antes de mi cita para ayudarme a recordar que debo venir a mi consulta.	Si	No
7. Me gustaría recibir un recordatorio adicional en mi teléfono 2 horas antes de mi cita para no olvidar mi consulta.	Si	No
8. Me resultaría útil tener una aplicación para saber lo que sucederá en cada visita al consultorio.	Si	No
9. Recibí un folleto prenatal de MyWay . Si su respuesta es no, su encuesta está completa.	Si	No
10. He leído algunos folletos prenatales.	Si	No
11. El folleto prenatal tiene información útil.	Si	No
12. El folleto prenatal fue fácil de leer y entender.	Si	No
13. Planeo usar la información del folleto prenatal durante mi embarazo.	Si	No

Appendix O
Demographics of Prenatal Patients

Table 1*Demographics of Prenatal Patients*

Variable	<i>n</i>	<i>%</i>
Age_Range		
19-24	7	30
25-35	8	35
36-45	6	26
No Answer	2	9
Number_of_living_children		
1	5	22
0	3	13
3	2	9
2	6	26
No Answer	5	22
4	1	4
6	1	4
Insurance		
Yes	5	22
AHCCCS	10	43
No	7	30
No Answer	1	4
Level_of_Education		
Less than HS	4	17
High School	15	65
No Answer	1	4
College Degree	3	13

Appendix P

Phone Application Survey Question Results

Table 2

Frequency Table for Prenatal Phone Application Survey Questions 1-9

Variable	<i>n</i>	%
Use_Portal		
No	13	57
Yes	10	43
Have_SmartPhone		
No	3	13
Yes	20	87
Internet_Access_on_Phone		
No	5	22
Yes	18	78
Would_use_Phone_App		
No	3	13
Yes	20	87
Missed_Visit		
No	17	74
Yes	6	26
X24_hour_reminder		
Yes	17	74
No	6	26
X2_hour_reminder		
Yes	15	65
No	8	35
App_Helpful		
No	2	9
Yes	21	91
Received_Prenatal_Booklet		
Yes	18	78
No	5	22

Appendix Q

Prenatal Booklet Survey Question Results

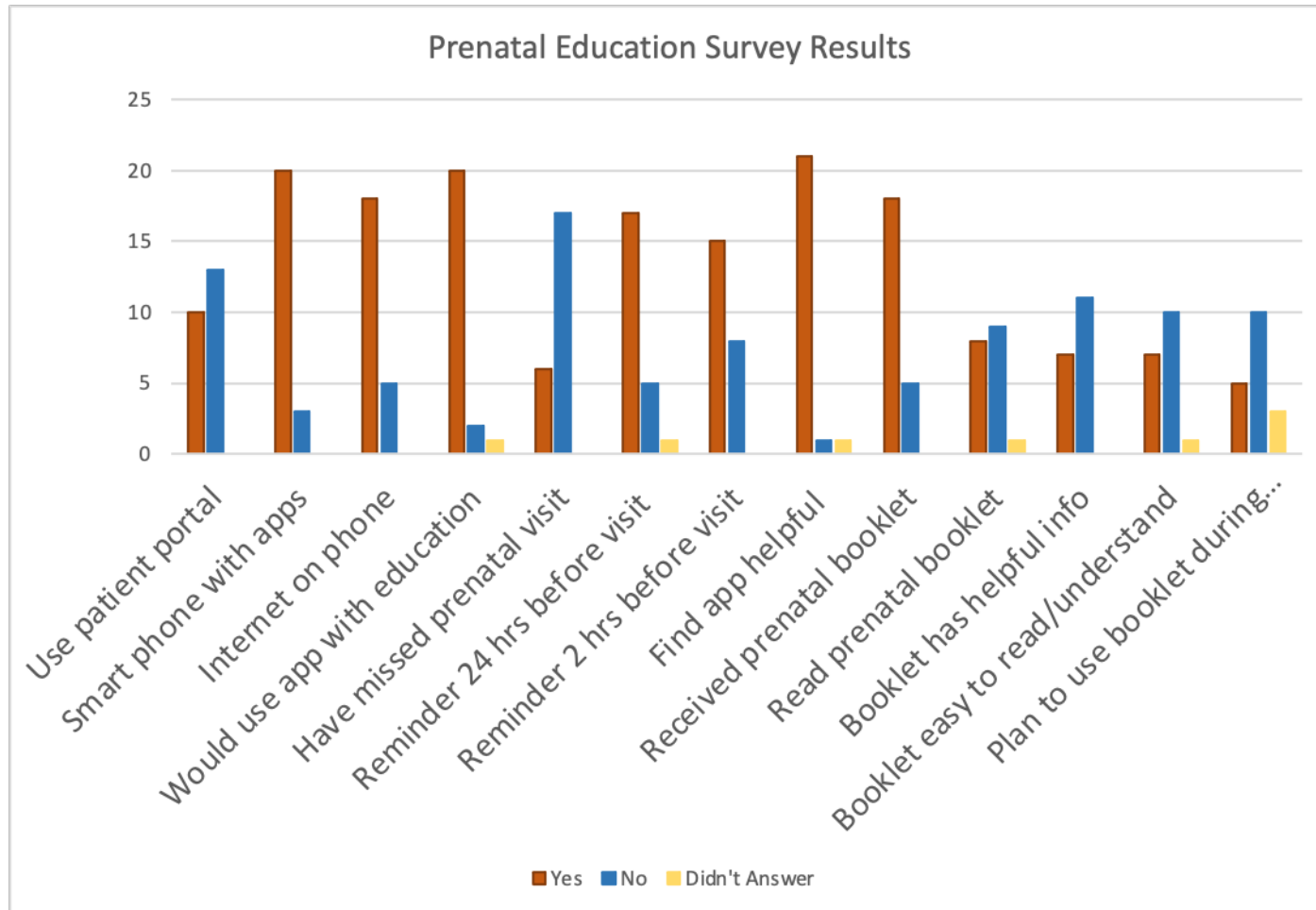
Table 3*Frequency Table for Prenatal Booklet Questions 10-13*

Variable	<i>n</i>	%
Read_Booklet		
Yes	8	44
No	10	56
Booklet_Helpful		
Yes	7	39
No	11	61
Booklet_Easy_to_read_and_understand		
Yes	7	39
No	11	61
Plan_to_use_booklet		
Yes	5	28
No	13	72

Appendix R

Prenatal Care Education Survey Results

Graph 1



Appendix S

Demographic Survey Results

Graph 2

