EVALUATION OF POSTPARTUM FOLLOW-UP COMMUNICATION ON EARLY IDENTIFICATION OF MATERNAL COMPLICATIONS

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ABSTRACT

Maternal mortality is at record high rates in the United States with marked disparities between races. Postpartum complications are a leading cause of maternal mortality accounting for nearly half of all maternal deaths. Postpartum deaths are most likely to occur between week one and six postpartum, however women have little healthcare surveillance during that time frame. Discharge follow-up communication has been proven effective in reducing readmission rates and complications in a variety of other settings, but is not commonly utilized with postpartum patients. The advancement of technology has also allowed for alternative communication methods including phone calls, text messages, and emails. The purpose of this study is to evaluate a change in existing policy of one follow up phone call in identifying postpartum complications within the first six weeks, therefore, reducing postpartum emergency room visits and readmissions. *Keywords:* Maternal mortality, postpartum complications, follow-up phone call, text messaging, early identification, readmission, emergency room visits

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Evaluation of Postpartum Follow-Up Communication on Early Identification of Maternal Complications

Chapter 1: Background

Maternal mortality is defined as death in one year of pregnancy and refers to causes being pregnancy-associated, pregnancy-associated but not related, or pregnancy-related (Tikkanen et al., 2020). Despite global maternal mortality rates declining by nearly one-third since 2000, maternal mortality still costs an estimated 810 women's lives a day globally, with the majority of deaths occurring in low- and middle-income countries (World Health Organization (WHO), 2021). Global maternal mortality causes have been identified as postpartum hemorrhage, infection, pre-eclampsia and eclampsia, birth complications during delivery, and unsafe abortion (WHO, 2021). A comparison between similar high-income countries showed that the leading causes of death were postpartum hemorrhage and hypertensive disorders with factors influencing deaths being provider-related, delay in diagnosis or treatment, and failure in the identification of high-risk individuals (Geller et al., 2018). In low- and middle-income countries, postpartum hemorrhage and hypertensive disorders remained the leading causes of death, however, preventable factors included access to an optimal level of care and a lack of evidence-based practices to prevent or treat complications (Geller et al., 2018).

While global maternal mortality rates have shown a decline in the last 20 years, the United States maternal mortality rate has continued to rise with the rate per 100,000 live births more than doubling from 9.8 in 2000 to 23.8 in 2020 (Hoyert, 2022; Lu, 2018). More than half of all pregnancy-related deaths in the United States occur in the postpartum period between week one and six postpartum (Centers for Disease Control and Prevention (CDC), 2022; Tikkanen et al., 2020). In the United States, the leading causes of pregnancy-related deaths are mental health

conditions, postpartum hemorrhage, cardiac conditions and cardiomyopathies, infection, thrombotic or pulmonary embolus, and hypertensive disorders of pregnancy (CDC, 2022). In comparison to other developed and high-income nations, the United States had the worst maternal mortality rates in 2020, with especially marked racial disparities between White and non-Hispanic Black women (Gunja et al., 2022; Tikkanen et al., 2020). In 2020, the United States maternal mortality rates among Hispanic, White, and non-Hispanic Black women were 18.2, 19.1, and 55.3 deaths per 100,000 live births respectively, a three-fold increase in maternal mortality rates among non-Hispanic Black women, indicating a significant discrepancy between races (Hoyert, 2022; Lu, 2018).

In comparison to the United States maternal mortality rates, New Jersey surpasses the national average at 26.7 per every 100,000 births for all races, ranking 47th in maternal mortality among other states (United Health Foundation, 2022). The New Jersey Department of Health suggests that 80% of maternal deaths in the state occur in the one-year postpartum period with 80% of those deaths being preventable (Nantwi et al., 2022). Furthermore. Non-Hispanic Black women in New Jersey are more than six times more likely to die from pregnancy-related complications than White women (New Jersey Department of Health, 2021; New Jersey State Health Assessment Data, n.d.).

A factor in determining causality is the role implicit bias plays in patient care. Implicit bias is an unconscious bias that develops in early life after repeated stereotypes are reinforced and has been correlated to lower quality of care for patients (Saluja & Bryant, 2021). The incidence of implicit bias is more prevalent in stressful working conditions such as emergency departments and labor and delivery settings that rely on the unconscious processing of information in medical decision-making (Saluja & Bryant, 2021). Nearly 70% of pregnancy-

related deaths occur in the postpartum period up to six weeks after birth (Tikkanen et al., 2020). The emergency room and labor and delivery are the two areas where implicit bias can play a critical role in care outcomes for women, especially in emergency departments that do not routinely service obstetrical patients (Kilfoyle et al., 2017; Kozhimannil et al., 2018; Saluja & Bryant, 2021). One in five non-Hispanic Black women reported experiencing mistreatment from hospital-based care providers because of their race, ethnicity, cultural background, or language, feeling that their personal health concerns related to pregnancy and pain were often dismissed or overlooked (Saluja & Bryant, 2021).

To address the maternal mortality rate and the large disparity among races, weekly postpartum follow-up communication offers an opportunity for nurses to identify potential complications and reduce postpartum emergency room visits and readmissions (Steube et al., 2021; Wouk et al., 2022). Routine communication also supports assisting patients with the most appropriate services or resources needed and if any immediate interventions are required (Steube et al., 2021). It has also been found that routine communication with a healthcare professional following a hospital discharge assists in providing more mindful and enriching patient-provider interactions (Steube et al., 2021; Wouk et al., 2022).

Purpose

The purpose of the proposed project is to evaluate a change in existing policy in identifying postpartum complications within the first six weeks, therefore, reducing postpartum emergency room visits and readmissions.

Research Question

With the preliminary background research performed on the topic of maternal mortality, the PICO question developed for continued research and analysis was: Do postpartum women

who receive weekly text messages in the first six weeks postpartum show an increased awareness of identifying postpartum complications in comparison to the existing standard of care of one phone call in the first week postpartum?

Concepts and Operational Definitions

In evaluating the effectiveness of follow-up communication with postpartum women to identify postpartum complications earlier, conceptual, and operational definitions outline key elements that relate to this population. Postpartum complications are any pregnancy-related illness, disease, or complication in the immediate first year following birth (Tikkanen et al., 2020). Those complications may include postpartum hemorrhage, infection, postpartum depression, mental illness, hypertensive and cardiovascular complications, and thrombotic and pulmonary emboli (CDC, 2022). Complications can be further conceptualized as any problem that can be related to pregnancy that potentially increases maternal mortality (CDC, 2022).

To operationalize these definitions, postpartum can be measured in weeks following birth, up to 52 weeks after delivery. Furthermore, postpartum complications can be measured in diagnoses rate based on standards of care. For example, postpartum hemorrhage is measured on total blood loss following delivery and can be further evaluated with laboratory results including a complete blood count, hemoglobin, and hematocrit value (Anger et al., 2019). Postpartum depression and mental illness are measured utilizing the Edinburgh Postpartum Screening Scale given to all mothers before discharge, and infection, hypertensive, cardiovascular, and embolus diagnoses rely on laboratory diagnostics, objective assessment data, and subjective reports and assessments gathered between patient and provider (Gonzalo-Carballes et al., 2020; Park & Kim, 2022). Maternal mortality is the measurement of how many maternal deaths in the first year following delivery for every birth, measured in case per 100,000 (Hoyert, 2022; Lu, 2018).

Significance of the Study to Nursing and Healthcare

Evaluating the effectiveness of weekly follow-up communication in postpartum women has the potential to identify risks for postpartum complications earlier in the postpartum period, therefore reducing maternal mortality rates. With as many as 42% of women utilizing Medicaid during their pregnancies and up to 84% of women receiving unpaid maternity leave in the first six weeks postpartum, the access and affordability of attending an in-person care visit can be burdensome (Bellerose et al., 2022; Van Niel et al., 2020). Integrating a communication method that is convenient and cost-effective in identifying potential complications for the postpartum woman can be an easily implemented tool for reducing maternal mortality rates (Mohammed et al., 2020).

While the utilization of a survey tool allows for significant healthcare benefits, continued communication also allows women the opportunity to develop a trusting and understanding relationship with the healthcare provider during a period when up to 23% of women do not attend a scheduled postpartum visit between day 21 and 56 postpartum (Steube et al., 2021). The continued communication in the postpartum period also lends itself to developing a supportive trend in prioritizing the care of the woman during the postpartum period as much as is focused on the prenatal period (Kleppel et al., 2016). On average, a low-risk pregnant woman meets with a healthcare provider in the outpatient setting 17 times in a 40-week duration, however, in the postpartum period they may only be seen one or two times in the 52-week postpartum period depending on the type of delivery (Kleppel et al., 2016). This lack of surveillance during this period has had grave consequences for maternal mortality rates (Kassebaum et al., 2014).

Implementing continued communication standards in the postpartum period plays a significant role in a specialty that only sees a patient in the immediate postpartum state (Kleppel

et al., 2016; Steube et al., 2021). Integrating a continuum of care between hospital and provider allows the nurse to be a change agent in decreasing complications and allows for the assignment of new community-based roles as a women's health educator and coordinator (Steube et al., 2021). Furthermore, Shroder et al. (2018) found that women of childbearing age preferred electronic communication from their providers via text messaging or emails and found phone calls more time-consuming when compared to other methods. With the added intervention of nurses communicating with patients to determine if a higher level of care is needed, emergency room visits are decreased in a field that is often unfamiliar with obstetric complications (Association of Women's Health, Obstetrics and Neonatal Nurses (AWHONN), 2020). This study also allows for the field of nursing to take the lead in transforming the social determinants of health that persist in women's healthcare.

Doctor of Nursing Practice Objectives

Integrating the Doctor of Nursing Practice (DNP) objectives into the study includes incorporating Essentials II, VI, and VII into the study directly with remaining Essentials I, III, V, and VIII being addressed indirectly (American Association of Colleges of Nursing, 2006). This study aligns with the objective of Essential II (Organizational and Systems Leadership for Quality Improvement and Systems Thinking) by implementing a policy change to the existing standard of care to improve patient outcomes. Sherod and Goda (2016) suggest that the DNP-prepared nurse and advanced degree nurses play a pivotal role in implementing change at the policy level to further transform healthcare. The current standard of practice includes a one follow-up phone call in the first week following discharge, however implementing new practice standards with text surveys in the first six weeks allows for the opportunity to change existing policy to improve patient outcomes.

Essential VI (Interprofessional Collaboration for Improving Patient and Population Health Outcomes) is addressed by communicating potential patient complications to advanced care providers and clinicians responsible for future intervention, thus improving patient and population health across all races and ethnicities in the postpartum state. The continued communication between patient and healthcare provider for the first six weeks postpartum allows for an improved patient-provider relationship built on principles of trust and knowledge that aim in reducing complications among postpartum women. This continuum of care between healthcare providers and patients also allows for collaboration between team members in guiding next-level care with available and relevant resources to the patient. Finally, follow-up text message communication has the potential to reach many populations and demographics with an aim to minimize racial disparities in maternal mortality.

Essential VII (Clinical Prevention and Population Health for Improving the Nation's Health) is supported by the aim of this study to address disparities in postpartum complications with a weekly communication standard. Furthermore, this study lends itself to clinical prevention by providing an increased opportunity in the early identification of postpartum complications that can in turn improve population health. Follow-up communication is one of the most cost-effective strategies for improving patient outcomes and has shown great success in minimizing readmissions and complications in patients with congestive heart failure and a history of stroke. This study can be easily implemented in many different locations and settings that service women allowing for an improved health model for women's health.

Summary

When considering maternal mortality globally, nationally, and locally, many different factors can be identified, however, a common theme is the continuity and quality of adequate

postpartum care. Global statistics suggest that access to quality care is a leading factor in maternal deaths, however, this same issue exists on a national and local level with many mothers unable to attend follow-up visits for a variety of reasons or mothers whose health concerns are met with dismissal or bias from a healthcare provider. With national rates of maternal mortality showing marked disparities among races, identifying methods that can fill the postpartum care gap without implicit bias can help in potentially reducing the severity of complications and ultimately maternal deaths. Utilizing an automated patient survey sent weekly via text message not only increases accessibility to the patient but also improves patient self-efficacy in health behaviors and attitudes toward the postpartum state.

In Chapter 1, the background surrounding maternal mortality and postpartum care was discussed with discrepancies outlined, and a purpose and research question were developed. In addition, key concepts and operational definitions were identified and discussed as it relates to the postpartum population. The significance this project has on nursing practice and healthcare included many benefits to improving existing maternal morbidity and mortality as well as how ongoing follow-up communication is a cost-effective method in improving outcomes. Finally, the integration of the DNP essentials was also discussed with Essentials II, VI, and VII having direct significance to the proposed project. Chapter 2 will contain an in-depth literature review with identified themes and conceptual framework.

Chapter 2: Literature Review

The purpose of the proposed project is to evaluate a change in existing policy in identifying postpartum complications within the first six weeks, therefore, reducing postpartum emergency room visits and readmissions. To ascertain the significance of the problem, a thorough analysis of available and current research must be performed. The field of women's health specifically in the pregnant and postpartum state has been studied extensively, however with rising and persistent maternal mortality rates in the United States, distinguishing evidence-based practices that can help in reducing complications can have profound benefits for maternal mortality rates. This literature review aids in examining the gaps in existing evidence as well as identifying themes and concepts consistent with early identification of complications following discharge.

Search Strategy

A systematic search was conducted using The Cumulative Index to Nursing and Allied Health Literature (CINAHL) and Medline (Proquest) databases. Keywords used reflected the patient population and included mothers, first six weeks postpartum, postpartum, and discharged patients. Keywords isolating the intervention and the outcome were weekly phone calls, follow-up phone calls, postpartum complications, readmission, early identification, and emergency room visits. These keywords were used in combination with a Boolean search in both search databases (Appendix A). Inclusion and exclusion criteria were clearly defined before the search (Table 1).

Table 1

Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
English Language	Abstract/poster presentation
Publication after 2017	Duplicates
Peer-Reviewed Articles	Non-Nursing Based

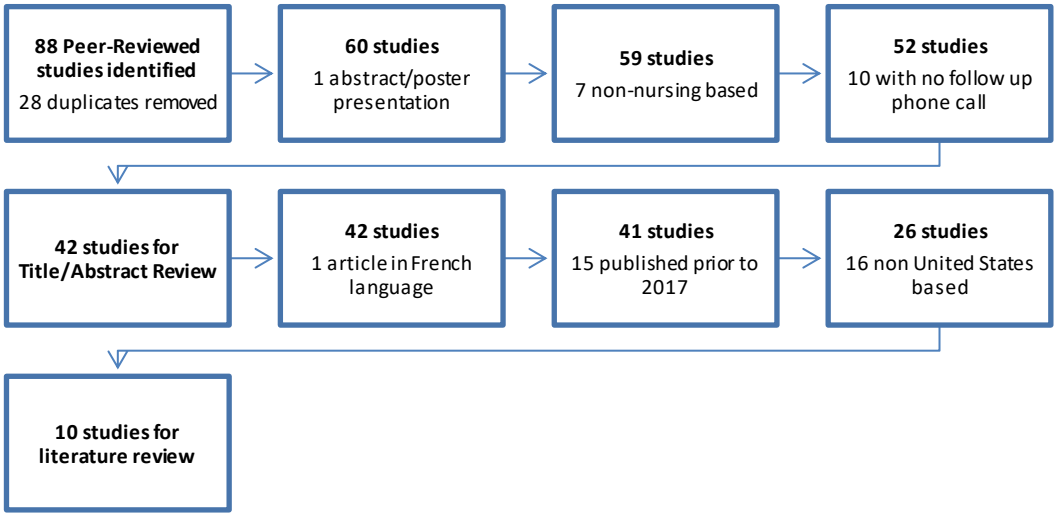
Studied within the United States	No follow-up phone call
Full-text available	

Study Selection

Searches yielded results of 88 peer-reviewed articles between CINAHL and Medline search databases. Ineligible studies were excluded including 28 duplicates, one abstract/poster presentation, seven that were not nursing based, and 10 that had no follow-up phone call. Of the remaining 42 studies, title and abstract screening revealed one article that was in a language other than English, 15 that were published before 2017, and 16 that were not studied within the United States, therefore not meeting inclusion criteria (Table 4). The ten remaining studies were selected for a full-text review and analysis of findings.

Table 2

Selection of Articles



Goal and Purpose of Literature Review

Non-Hispanic Black women are dying at more than three times the faster rate than White women during pregnancy, childbirth, and the 1-year postpartum period (Hoyert, 2022; Lu, 2018). While consistent and frequent monitoring exists during pregnancy and childbirth, the 1-year

postpartum period has significantly lower rates of follow-up care with only one to three visits with a healthcare provider after discharge (Tikkanen et al., 2020). This presents a vast discrepancy in health surveillance as more than 70% of pregnancy-related deaths occur in the first six weeks postpartum (Tikkanen et al., 2020). In addition, Non-Hispanic Black women experience more episodes of implicit bias during pregnancy and postpartum leading to more adverse health outcomes (Saluja & Bryant, 2021). It is hypothesized that more frequent contact with a healthcare provider in the first six weeks postpartum can help in the earlier identification of postpartum complications. The hypothesis helped in guiding the following research question: *Do postpartum women who receive weekly phone calls and text messages in the first six weeks postpartum show earlier identification of postpartum complications in comparison to the existing standard of care of one phone call in the first week postpartum?* The goal of the literature review conducted is to identify gaps in existing evidence related to postpartum follow-up care, as well as to identify the effectiveness of follow-up phone calls and text messages in reducing post-discharge complications, emergency room visits, and readmissions.

Conceptual Framework

The Health Belief Model suggests that the health behavior a person engages in is determined by two distinct variables of the individual which are the value a health goal has been assigned by the individual and the estimated actions required by the individual to achieve that goal (Janz & Becker, 1984). These variables were described further and include six domains that influence an individual's health behavior; perceived susceptibility, perceived severity, perceived benefit, perceived barrier, cue to action, and self-efficacy (Orji et al., 2012).

For postpartum women, the health behavior goal is often to remain healthy and free from postpartum complications including death, where the actions to achieve that goal include regular

prenatal and postnatal care (Loke et al., 2015). The perceived susceptibility includes the likelihood a woman experiences postpartum complications such as postpartum depression, postpartum hemorrhage, infection, cardiomyopathies, thrombotic events, and hypertensive disorders related to pregnancy (Hazavehie et al., 2018). The women's perception that hospitalization or death may occur from one of those complications is the perceived severity (Loke et al., 2015). It is suggested that a woman's perception of susceptibility and severity largely determine health behavior in the one-year postpartum period (Obasanya et al., 2022).

The benefits of increased communication with a healthcare provider in the first six weeks postpartum allow for increased health surveillance in the potential identification of postpartum complications (Gatwood et al., 2016). With the potential for increased communication in the postpartum period, the perceived barriers may include the availability of text message communication for vulnerable women, as well as access to care in the event a complication arises (Gatwood et al., 2016). Cues to action arise in the instance a problem is identified requiring the individual to go to the nearest emergency room, and self-efficacy is the individual's ability to fulfill medical recommendations provided in the event of a complication (Stanhope et al., 2022).

Social, environmental, and biological domains have had an influential role in how women recover and progress into the new role as mothers following birth (Carmichael et al., 2022; Krieger, 2020). Breastfeeding rates, postpartum depression, and response to pain following birth have all been found to be heavily influenced by community, race, culture, and social influence (Agnafors et al., 2019; Kozhimannil et al., 2021; Lok et al., 2017). Systemic and structural gender inequality and racism have also been influential in how health disparities related to women's health have persisted in the United States (Bailey et al., 2017; Bravemann et al., 2022;

Cooper Owens & Fett, 2019; Taylor, 2020). With maternal mortality rates and postpartum complications higher in non-Hispanic Black women, it suggests that increased communication in the postpartum period has the potential to decrease the perceived susceptibility and severity of postpartum complications has on these women (Crear-Perry et al., 2021; Janz & Becker, 1984; Taylor, 2020). Utilizing surveys and questions that incorporate the six domains of the Health Belief Model can also help in recognizing potential barriers any postpartum woman may experience in the first six weeks following delivery (Stanhope et al., 2022).

Reduction in Readmission

Hwang (2022) performed a quality improvement project evaluating the impact nurse practitioners have when participating in follow-up phone calls for stroke patients on reducing 30-day readmissions. A sample size of 173 patients from a Comprehensive Stroke Center in south-central Pennsylvania was used during the 3-month period where patients would receive follow-up phone calls from the nurse practitioner at 7, 10, and 30 days after discharge. Findings showed a reduction in 30-day readmissions as well as reduced emergency room visits in stroke patients who received phone calls in the post-implementation group (Hwang, 2022).

In a retrospective program evaluation of a telephonic outreach program, Hall et al. (2021) evaluated the impact a series of phone calls over 27 days to heart failure patients has on readmission rates as well self-management behaviors. The goal of the study was for patients to be able to better manage heart failure, therefore reducing readmission within 30 days. The study included 12 hospitals in Virginia and Eastern North Carolina with a sample of 6271 adult patients from January 2015 to June 2017. Researchers used a series of four automated phone calls at 2, 9, 14, and 27 days post-discharge to survey patients with heart failure maintenance

questions. It was found that patients who completed all four phone calls had 11 times lower odds of heart failure-related readmission (Hall et al., 2021).

Hoyos et al. (2021) performed a retrospective analysis of discharged trauma patients and the effect follow-up phone calls had on emergency room readmission rates. The sample included 1328 trauma patients from UCI Medical Center from 2019 to 2020. The initial hypothesis predicted that there would be higher readmission rates to the emergency room with follow-up phone calls in trauma patients, however, the results of the study showed that readmission rates were lower in trauma patients who received follow-up phone calls (Hoyos et al., 2021).

Hwang (2022), Hall et al. (2021), and Hoyos et al. (2021) all saw a reduction in readmission rates when interventions of follow-up phone calls were utilized. In addition, Hall et al. (2021) found improved self-management scores in patients who completed all four automated phone calls. Hwang (2022) discussed how providing phone calls earlier than 7 days by a nurse practitioner would be beneficial as the readmissions occurred before the first phone call had taken place post-discharge. Hoyos et al. (2021) did see a reduction in readmission rate; however, the study was limited in that it was a pilot study. Also, the script was altered throughout the study process, and it was dependent on the patient answering and did not account for readmissions to other emergency rooms or hospitals.

Early Identification of Complications

Emanuel et al. (2019) performed a pilot study of follow-up phone calls on 52 patients discharged from a burn center over the course of four months. The follow-up phone calls included questions on general well-being, dressing and wound care, medication, and follow-up appointments. Among the 52 patients within the sample, phone calls identified 21 patients who required additional interventions such as home care visits, nine patients who needed medication

or dressing assistance, and 10 who required additional or expedited wound care visits due to pain or risk for infection (Emanuel et al., 2019).

In a prospective, comparative, randomized design, Johnson et al. (2019) evaluated the effect of an enhanced recovery after surgery bundle on improving patient education and patient satisfaction and reducing the length of stay and 30-day readmission in gynecological surgery patients. A sample size of 50 hysterectomy patients from a 28-bed medical-surgical unit was included from October 2017 to March 2018. For the bundle group, follow-up phone calls were provided and included scripted patient education bundles on mobility, pain, appetite, and bowel status as well as a patient satisfaction survey. Findings showed that there were no readmissions and fewer complications identified in the bundle group, whereas the standard education group found no readmissions and more post-surgical complications identified.

Seward et al. (2018) performed a qualitative pilot study examining the effectiveness of frequent telephonic health coaching for overweight pregnant women in the reduction of weight-related pregnancy complications. A sample of 30 overweight pregnant women in the first trimester was used at a northeastern US clinic from July 2015 to January 2016. Health coaching phone calls were provided every two to three weeks until 36 weeks gestation and included goal-setting and attainment discussions. Health coaches also sent emails or text messages based on participant preference to check in with progress and goals and relayed information to the healthcare provider weekly to ensure consistent communication at appointments. Results showed high participant satisfaction, improved self-efficacy, and improved motivation and attainment of patient goals.

Emanuel et al. (2019) and Seward et al. (2018) both saw an earlier identification of complications with more frequent communication. In comparison, Johnson et al. (2019) saw

patients in the standard education group with no follow-up phone call with more post-surgical complications; whereas the bundle group was found to have no post-surgical complications before discharge. Emanuel et al. (2019) found that follow-up phone calls helped in identifying a substantial number of complications following discharge for the burn patient, suggesting that detailed and written discharge instructions can be beneficial however, patients often require more assistance to receive optimal care outcomes. Johnson et al. (2019) and Seward et al. (2018) both reported higher rates of patient satisfaction in participants that received more follow-up phone calls, suggesting a more trusting relationship between patient and provider.

Cost-Analysis of Follow-up Communication

Liu et al. (2020) performed a quality improvement study that examined the cost-effectiveness of a post-discharge nurse call center in the reduction of emergency room readmissions. The study took place from July 2018 to March 2019 in a large urban, quaternary care, academic, Level 1 trauma center and included a post-discharge nurse call center that was staffed seven days a week with one full-time equivalent registered nurse. Interventions included seven-day return rates to the emergency room, post-discharge calls, and completions of calls as well as other patient demographics. Cost analysis was performed with the national median registered nurse salary, cost of equipment and space for call center, as well as the hospital, provider, and insurance costs of emergency room returns. Findings concluded that the mean cost for a post-discharge phone call was anywhere from $1.20 to $4.69 depending on the length of the call anywhere from 1.1 to 4.3 minutes based on whether the patient was reached. Other findings revealed that the intervention produced an overall savings of $134.89 per patient in reducing readmission.

In another quality improvement pilot project, Hamilton et al. (2021) looked at increasing transitional care management (TCM) to reduce annual readmissions as well as increased healthcare reimbursement rates from 13% to 50% by using a TCM billing code. The study was performed over 3 months in 2018 in an integrated health system with a total of 2,374 eligible participants. The intervention included TCM phone calls within 48 hours of discharge by the nurse case manager, a post-discharge appointment with the primary care provider within 7 to 14 days, and an improved process of medication reconciliation. Results showed a 30-day readmission rate reduction of 1.1%, and a 50% increase in TCM billing codes showing an increase in reimbursement by $5,601 a month without utilizing any additional staff.

Johnson et al. (2018) performed a pragmatic, cluster-randomized trial evaluating hospital recruitment strategies for the implementation of the COMPASS post-acute stroke care model in improving patient functional status, reducing readmissions, mortality, healthcare utilization, medication non-adherence, and caregiver role strain. Interventions of the COMPASS study include early discharge planning with TCM, nurse-led follow-up phone calls at 2, 30, and 60 days post-discharge, and a follow-up visit at 7 to 14 days. The study took place in 41 eligible North Carolina hospitals from September 2015 to September 2016 and found that barriers to hospital recruitment in the COMPASS study were lack of staff and financial resources, healthcare market competition, and lack of understanding of the added clinical value to the patient population. Strategies to address these barriers included tailoring the COMPASS trial to the unique needs and demands of the hospital and engaging in solution and research-based conversations with healthcare administrators.

In evaluating the cost-analysis of follow-up patient communication, Liu et al. (2020) and Hamilton et al. (2021) both found that the use of follow-up phone calls staffed by a nurse or

nurse case manager, decreased healthcare costs while also increasing healthcare reimbursements. Liu et al. (2020) also discussed how readmission rates significantly decreased during the call center implementation supporting the cost-effective strategy of follow-up communication in improving outcomes. Hamilton et al. (2021) also found that follow-up communication by a registered nurse helped develop a more supportive and caring relationship between patient and provider with more patients attending follow-up appointments where corrective interventions were needed. Johnson et al. (2018) found inconclusive results on the impact a widely used follow-up care protocol could have on multiple institutions, with hospital recruitment being the largest barrier to overcome. Building relationships with healthcare stakeholders and having diverse representation with varying skill mixes was suggested as a solution to improve recruitment of hospitals for future project implementation (Johnson et al., 2018).

Evidence-Based Practice Standards

The American College of Obstetricians and Gynecologists (ACOG) performed an evidence-based review on the pandemic-adjusted modifications in obstetric care focusing on telehealth strategies and modalities in light of the coronavirus pandemic (Duzyj et al., 2020). Suggested modifications throughout pregnancy include the use of telephone intake calls, virtual parent education classes, and text messaging updates. Integrating the use of healthcare applications to monitor blood pressure, weight, blood glucose, and diet logs for gestational diabetic and pre-eclamptic patients was also suggested. Modifications in the postpartum state included expanded screening and communication of postpartum depression and mental health disorders with the infant's pediatrician as well as follow-up in-person or telemedicine visits at 3 and 12 weeks postpartum. There are currently no recommendations for expanded healthcare surveillance past 12 weeks postpartum with ACOG endorsing a decreased length of inpatient

hospital stay for obstetric services using enhanced recovery methods to reduce the use of hospital resources during a pandemic.

Discussion

The literature review performed was able to detect common themes among eligible studies, which include a reduction in readmissions and early identification of complications. Hall et al. (2021), Hoyos et al. (2021), and Hwang (2022) all found a reduction in readmission rates with the introduction of follow-up phone calls post-discharge for heart failure, trauma, and stroke patients, respectively. Emanuel et al. (2019) found follow-up phone calls effective in identifying post-discharge complications for the burn patient, whereas Johnson et al. (2019) found that patients discharged without an education bundle or follow-up phone call showed higher rates of complications. Seward et al. (2018) also stressed the value of follow-up phone calls about health coaching during pregnancy showing better self-management, goal attainment, and more trusting relationships with providers in relaying concerns.

Liu et al. (2020) and Hamilton et al. (2021) included the cost-analysis of follow-up patient communication as fiscally beneficial to the healthcare system; however, Johnson et al. (2018) included barriers met with the recruitment of hospitals for such programs on a larger scale. Furthermore, Duzyj et al. (2020) suggested an enhanced recovery and postpartum health surveillance up until 12 weeks postpartum, citing the need for healthcare resources in other areas during a pandemic. While these findings are significant and demonstrate the value of post-discharge phone calls, there were no studies meeting inclusion criteria that discussed the direct impact of post-discharge communication during the postpartum period. Further research is needed on the impact of post-discharge follow-up calls in the postpartum period, as well as frequency and mode of communication. Information on patient questions that would assist in the

early identification of complications should also be further researched to better understand the types of assessments, findings, and statements that may be observed or experienced in the postpartum period.

Summary

In Chapter 1 the background of the problem was discussed with the development of a purpose and research question and the significance to nursing the research would address. In Chapter 2, a hypothesis was formed using the research question and a more thorough literature review was performed to reflect current and available research. A systematic search approach was utilized and helped identify relevant studies that are pertinent to the early identification of postpartum complications using follow-up communication. The integration of the Health Belief Model as a conceptual framework has also been discussed as to how it will relate to this project. With this available research, a more feasible method of study has been established. Chapter 3 will present the design and methodology of how best to implement this project for the best results.

Chapter 3: Methods

This project aimed to address the impact follow-up communication in the first six weeks postpartum had on earlier identification of postpartum complications. Further discussion will go on to identify the design, setting, sample, and procedure for the data collection. The instrument utilized for the survey, as well as the reliability and validity of the survey, will be discussed. A proposed analysis of the data is also included. A request was made and permission was granted to utilize the survey tools included.

Identification of Study Design

To address the purpose of the proposed study, a quasi-experimental two-group retrospective study was used to evaluate pre- and post-implementation findings in a northwest New Jersey community hospital from May 2023 to October 2023. The quasi-experimental study allowed for baseline data to be obtained without randomization in a controlled group before intervention while utilizing a time series design provided an extended ability to evaluate change related to the intervention (Polit & Beck, 2021).

Population Sample & Setting

The population sample included women from one to six weeks postpartum delivering between May 2023 and October 2023. The recruitment of subjects was performed upon admission to the postpartum unit with a preferred phone number for text messaging identified and passive consent obtained at the time of survey administration. Inclusion criteria for participation was any woman who had delivered any infant, alive, stillborn, premature, or miscarried during the May 2023 to October 2023 period and was at the sixth week postpartum by October 31, 2023. Participants had the opportunity to opt out of the follow-up communication; however, evaluating postpartum complications in women experiencing loss could also be

beneficial in predicting outcomes. Exclusion criteria included women who were not admitted to the postpartum unit, such as those experiencing ectopic pregnancies and being treated in the emergency room, or mothers who were transferred to an advanced level of care due to underlying factors such as extreme premature labor. Exclusion criteria also included mothers 18 years or younger and those with a primary language other than English or Spanish.

The setting of the study was a 23-bed postpartum unit in a Northwestern New Jersey community hospital that averages 1,181 live births per year. It was estimated that 590 babies would be delivered in the 6-month duration of the study. A confidence interval of 95% was used with a standard deviation of 0.5 since the sample size will be unknown, with a z-score conversion of 1.96 (Corty, 2013; Polit & Beck, 2021). For the study to be clinically significant, a sample size of at least 385 participants was required.

Procedure for Data Collection

Current practice within the unit includes a standard follow-up phone call within one week of discharge going through a pre-designed series of survey-style questions. The suggested change in practice included sending a text message with a link to an online follow-up survey up until the sixth week postpartum. The survey included two parts consisting of demographical information and postpartum information. In the demographic portion, survey questions included date of birth, race/ethnicity, as well as marital, educational, employment, and insurance status. Questions in the demographic survey also included pregnancy and delivery history such as type of delivery, history of complications during pregnancy or delivery, how many babies delivered, and if a neonatal intensive care unit admission occurred. This portion of the survey was only asked once upon first starting the survey.

The postpartum portion of the survey was given weekly up until week six postpartum and included questions on hospital inpatient or emergency room visits, outpatient visits, and mental health visits, as well as an identification of symptoms that could implicate potential complications. The survey was also provided in English and Spanish to ensure comfortable accessibility as the patient population is diverse. Upon entering the survey platform, a choice was provided for the preferred language and the same survey was presented in English or Spanish. A chart review was not needed for this survey as all applicable information was self-reported by the respondent. The survey is available in Appendix B for a more detailed review of questions.

Pre-intervention data from the existing phone call survey was reviewed using an electronic chart review from May 2023 to August 2023. Post-intervention data from the proposed practice change was evaluated from August 2023 to October 2023. Paper forms including consent, printouts, or tracking sheets that contain personal identifying information was stored securely in a locked file cabinet within a locked office. Only the researcher and advisor had access when actively performing data analysis and research. Electronic data was secured with protected password documents in Microsoft Excel. Log in to the computer included a 2-step verification DUO authentication service expiring every 12 hours. All data interpretation was performed on secure servers and private Wi-Fi. Once the study was completed, all identifiers were removed from stored files.

Instruments

Data was collected using Qualtrics, which is a HIPAA-compliant text messaging survey platform. The survey instrument included a 29-question two-part survey adapted from McGovern et al. (2006). Permission was received from McGovern et al. (2006) to utilize and

adapt the survey as needed for the project. The reliability and validity of the survey instrument were provided for the McGovern et al. (2006) survey and are available in Appendix C.

Protection of Human Subjects

The anonymity of subjects was maintained in surveys by utilizing Qualtrics, which is a HIPAA-compliant text messaging survey platform. The identification of the subjects was randomized and was separated from the medical record number. All personal health information was stripped in aggregate data. Subjects' responses were kept confidential and resources to the mental health hotline, lactation warmline, and local emergency room and provider were included in each survey (See Appendix B). The application for International Review Board (IRB) approval from William Paterson University and the intended hospital were submitted and data analysis began once approval was received (See Appendix D & E).

Data Analysis

A descriptive comparative analysis was used to evaluate findings in the pre-and post-intervention groups. Demographics included in data analysis were the date and type of delivery, and postpartum day at the time of surveys. Demographics also included race, age, education, employment, and insurance status, as well as if the respondent had a regular primary care provider.

Independent variables within the study included the week postpartum when a text message contact is made. Dependent variables included emergency room visits, readmission to the hospital, provider visits outside the norm of standard care (two and eight weeks postpartum for c-section, six weeks postpartum for vaginal), and the presence of postpartum complications including but not limited to bleeding, pain, breastfeeding difficulties, postpartum depression, infection, headache, and difficulty breathing. Dependent variables were quantified with

quantitative values with a scale or nominal level of measurement. Independent variables were quantified with a nominal level of measurement. Emergency room visits, readmission to the hospital, provider visits and the presence of postpartum complications were quantitative and were gathered based on survey respondents' answers.

Summary

Utilizing the background information and literature review, this chapter identified the methodology used in evaluating the outcomes centered around the research question. A research design was established, as well as the setting, sample size, and procedure for data collection. The instrument validation and reliability were tested, and permission was granted from all parties. The International Review Board (IRB) application was reviewed and approved, and the proposed data analysis was discussed. The results of the data collection will be discussed further in Chapter 4.

Chapter 4: Results

Introduction

Chapter 4 presents data reflective of the archived data collected between April and June 2023 as well as the post-intervention data collected between August and October 2023. The retrospective data reflects a pre-intervention follow up phone call tool that is received within seven to 10 days following discharge. The post-intervention includes a one week follow up phone call and the Postpartum Follow-Up Survey that is disbursed over the course of six consecutive postpartum weeks following discharge. A comparison of the response rate in mother's receiving one phone call or one phone call and six text messages will also be presented.

Research Question

This study aimed to address the impact follow-up communication has on earlier identification of postpartum complications in the first six weeks postpartum. The research question developed was: Do postpartum women who receive weekly text messages in the first six weeks postpartum show an increased awareness of identifying postpartum complications in comparison to the existing standard of care of one phone call in the first week postpartum?

Demographics

The project included data from 418 postpartum women who delivered babies between April 2023 and September 2023. The sample included a pre- and post-intervention group. The pre-intervention group consisted of 261 postpartum women who delivered between April 1, 2023 and June 30, 2023. The pre-intervention group received follow-up phone calls between seven and 10 days postpartum. The post-intervention group consisted of 157 postpartum women who delivered babies between August 1, 2023 and September 16, 2023. Those that met inclusion criteria received weekly text messages with a linked survey up until week six postpartum

(n=157). The study took place at a 23-bed postpartum unit in a Northwestern New Jersey hospital that averages 1,181 live births per year.

Pre-Intervention Demographics

The pre-intervention group (n=261) included relevant demographic data on maternal date of birth, delivery date, discharge date, type of delivery, and a free text area labeled "other info". The free text area may have included number of pregnancies, complications, preferred language and if the patient received care in the prenatal clinic. The pre-intervention group also received a phone call from the lactation consultant or childbirth educator with a series of open-ended questions focusing on health of mom and baby. Open-ended questions were only answered when phone calls were answered, otherwise documentation of a message left or no answer was provided on the survey. Demographic characteristics of the pre-intervention group are reflected in Table 5.

A majority of the pre-intervention group were age 31 to 35 years (n=97, 37.2%), followed by 36-40 years (n=63, 24.1%), 26-30 years (n=53, 20.3%), and 18-25 years (n=30, 11.5%). A total of 65.9% of participants delivered vaginally (n=172), followed by 32.9% delivering via cesarean section (n=86), and 0.7% have incomplete or unspecified date upon follow-up (n=2). English was identified as a preferred language in 91.2% of participants (n=238), while Spanish was the preferred language in 8.4% (n=22), and one (0.3%) participant identified Turkish as a primary language. Patients receiving care through a private practice or group represented 82.4% of participants (n=215) with clinic patients representing 17.6% of participants (n=46). Participants responding to the follow-up phone call represented 45.6% (n=119) with 54.4% of participants not answering or receiving a message (n=142). Those reporting a scheduled follow up appointment were 59.7% (n=71) with 40.3% (n=48) not

scheduling a follow up appointment. Data revealed that 54.4% (n=261) did not answer so reporting of a follow up appointment could not be made.

Table 5

Pre-Intervention Group Demographics

	Frequency	n=	Percent
Maternal Age			
-18-25 years	30	261	11.5 %
-26-30 years	53	261	20.3 %
-31-35 years	97	261	37.2 %
-36-40 years	63	261	24.1 %
-41+ years	9	261	3.4 %
-Not specified	1	261	0.3 %
Type of Delivery			
-Vaginal Delivery	172	261	65.9%
-Cesarean Section	86	261	32.9%
-Not specified	2	261	0.7%
Preferred Language			
-English	238	261	91.2%
-Spanish	22	261	8.4%
-Other (Turkish)	1	261	0.3%
Prenatal Clinic Patient			
-Yes	46	261	17.6%
-No	215	261	82.4%
Response			
-No Answer or Left Message	142	261	54.4%
-Responded	119	261	45.6%
Follow Up Appointment			
-Appointment Made	71	119	59.7%
-No Appointment Made	48	119	40.3%
-No Answer	142	261	54.4%

Post-Intervention Demographics

The post-intervention demographics (n=157) were obtained during the initial week of survey disbursement. Participant demographics were self-reported for those that responded to the survey text message and are shown in Table 6. Participant demographics included age, race, primary language, education level, insurance, marital, and employment status, and type of

delivery. Additional demographic information also included number of adults and children in the household receiving financial support and if the mother had a primary care provider. Pregnancy demographics included the number of pregnancies, number of babies delivered, infant age, delivery prior to due date, neonatal intensive care admission, and if there was a documented birth defect or disability after birth.

Follow up postpartum information was gathered weeks one through six in the text message survey and reflected information on a variety of symptoms consistent with potential complications as well as number of health care encounters during that time frame and is shown in Table 7 and Figure 1. Relevant postpartum information retrieved from the phone call survey included if a follow up appointment was made. Response rate of the text message and phone call survey was also captured. Subsequent follow up surveys from week two to week six reflected postpartum follow-up questions and demographics included preferred language and date of birth. Post-intervention group response rate from all six weeks are shown in Table 8.

Table 6

Post-Intervention Group Demographics

	Frequency n=157	Percent
Maternal Age		
-18-25 years	24	15.3%
-26-30 years	42	26.8%
-31-35 years	53	33.8%
-36-40 years	37	23.6%
-41+ years	1	0.6%
Primary Language		
-English	129	82.2%
-Spanish	28	17.8%
Race		
White	22	64.7%
Black, Non-Hispanic	0	0%
Black, Hispanic	2	5.9%
Hispanic	8	23.5%

Indigenous American	0	0%
Asian	0	0%
Asian-Indian	1	2.9%
Other	1	2.9%
Highest Level of Education		
-Less than high school	1	2.9%
-High school graduate	11	32.4%
Associate Degree	4	11.8%
Bachelor's Degree	8	23.5%
Master's Degree	7	20.6%
Doctoral Degree	2	5.9%
Other	1	2.9%
Marital Status		
Widowed	0	0%
Divorced	0	0%
Separated	1	2.9%
Never Married	1	2.9%
Married	21	61.8%
In a relationship/partnership	10	29.4%
Single	1	2.9%
Insurance Status		
Insured, public insurance (Medicare/Medicaid)	6	17.6%
Insured, private insurance	26	76.5%
Uninsured	2	5.9%
Employment Status		
Work, full time (40+ hours/week)	20	58.8%
Work, part time (less than 40 hours/week)	5	14.7%
Unemployed	9	26.5%
Regular Primary Care Provider		
Yes	25	73.5%
No	9	26.5%
Adults in Household (non-spouse/partner)		
Yes	11	32.4%
No	23	67.6%
Type of Birth/Delivery		
Vaginal	24	75%
Cesarean section	8	25%
Children Financially Supporting		
1	20	66.6%
2	9	30%
3	1	3,3%
Number of Pregnancies		
1	13	40.6%
2	12	37.5%
3	5	15.6%

5	1	3.1%
7	1	3.1%
Number of Babies Delivered		
1	31	96.9%
2	1	3.1%
Delivery Prior to Due Date		
Yes	15	46.9%
No	17	53.2%
NICU Admission		
Yes	6	18.8%
No	26	81.3%
Any Birth Defect or Disability		
Yes	0	0%
No	32	100%

Table 7

Post-Intervention Group: Postpartum Complications & Health Encounters

	Frequency n=52	Percent
Pre-Existing Pregnancy Conditions		
-Diabetes	3	5.8%
-High Blood Pressure	9	17.3%
Labor and Delivery Complications		
-Seizures, pre-eclampsia, toxemia, eclampsia	3	5.8%
-Tearing (vagina or rectum)	18	34.6%
-Severe bleeding	1	1.9%
-C-section delivery	13	25%
-Other	3	5.8%
Mood, Depression, or Anxiety Problems		
-Yes	16	30.8%
-No	36	69.2%
Doctor/Clinic Visit After Discharge		
-Yes	23	53.1%
-No	26	46.9%
ER Visit After Discharge		
-Yes	5	10.2%
-No	44	89.8%
Mental Health Visit After Discharge		
-Yes	4	8.2%%
-No	45	91.8%
Follow Up Appointment Made (Phone Call)		
-Yes	29	18.5%
-No	128	81.5%

Figure 1

Postpartum Complications

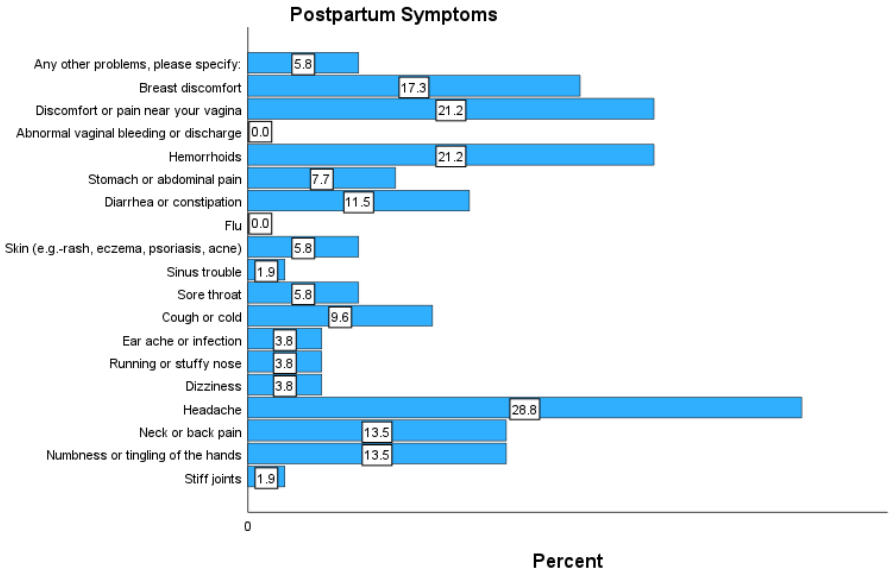


Table 8

Post-Intervention Group Response Rate: Week 1-6

	Frequency N=157	Percent
Response		
-Responded to Week 1 text message survey	36	22.9%
-Responded to Week 2 text message survey	17	10.8%
-Responded to Week 3 text message survey	8	5.1%
-Responded to Week 4 text message survey	9	5.7%
-Responded to Week 5 text message survey	4	2.5%
-Responded to Week 6 text message survey	11	7%
-Responded to any text message	47	29.9%
-Responded to phone call follow up	46	29.3%
-Response to both text message and phone call	15	9.6%
-Response to text message only	32	20.4%
-Response to phone call only	31	19.8%
-No response to text message and phone call	64	40.8%

For the post-intervention group, a majority were age 31 to 35 years (n=53, 33.8%), followed by 26 to 30 years (n=42, 26.8%), 36-40 years (n=37, 23.6%), 18 to 25 years (n=24,

15.3%), and 41 and over years (n=1, 0.6%). White race accounted for 64.7% of respondents (n=22), followed by Hispanic (n=8, 23.5%), Black, non-Hispanic (n=2, 5.9%), Asian-Indian (n=1, 2.9%), and other, not specified (n=1, 2.9%). English was the primary language spoken at 82.2% (n=129), with Spanish speaking language accounting for 17.8% (n=28). High school graduates accounted for 32.4% (n=11), with 76.5% (n=26) being insured with private insurance, and 58.8% (n=20) working full time (40 or more hours per week). A majority of respondents were married (61.8%, n=21) and were not living with other adults in their household aside from their partner or spouse (67.6%, n=23). It was shown that 66.6% (n=20) were only supporting one child financially, and 73.5% (n=25) identified as having a regular primary care provider.

A pregnancy and delivery demographic was also obtained with 75.0% (n=24) delivering vaginally and 25.0% (n=8) delivering via cesarean section. A majority of respondents indicated being pregnant 1 time (40.6%, n=13) and 3.1% (n=1) delivered twins during current pregnancy. Respondents delivering prior to due date accounted for 46.9% (n=15), 18.8% (n=6) of infants were admitted to the neonatal intensive care unit, and 100% (n=32) did not have a documented birth defect or disability.

The text message follow up survey provided postpartum information during weeks one through six and reflected information on a variety of symptoms as well as number of health care encounters during that time frame. The most common pre-existing conditions prior to pregnancy reported were high blood pressure (17.3%, n=9) and diabetes (5.8%, n=3). The most common complications during pregnancy or delivery included vaginal or rectal tearing (34.6%, n=18), problems with mood, depression or anxiety (30.8%, n=16), and a cesarean delivery (25%, n=13). In relation to potential postpartum complications following discharge, headache was the most frequently reported weeks one through six (28.8%, n= 15), followed by hemorrhoids (21.2%,

n=11) and vaginal discomfort (21.2%, n=11). Breast discomfort (17.3%, n=9), numbness and tingling (13.5%, n=7), neck or back pain (13.5%, n=7), and diarrhea (11.5%, n=6) were also commonly reported. Postpartum preeclampsia was reported by 3.8% of respondents (n=2).

Healthcare encounters reported included doctor or clinic visits, emergency room visits, or mental health or counseling visits after discharge. Data revealed that 53.1% of respondents (n=23) reported seeing their doctor or clinic in person within six weeks of discharge. Emergency room visits after discharge in the first six weeks accounted for 10.2% (n=5) and those seeking mental health or counseling visits in the first six weeks were 8.2% (n=4). The follow up phone call survey asks if a follow up appointment is made and 18.5% of respondents (n=29) reported making a follow up appointment with their provider.

Response rate reflected that 59.2% (n=93) of mothers delivering during the study period either responded to the follow up phone call or one of the weekly text message survey. It was found that 29.3% (n=46) of mothers that delivered during the study period responded to the follow up phone call in the initial week, with 29.9% (n=47) responding to the text message survey during the same period. Mothers responding to both the text message survey and the follow up phone call were 9.6% (n=15). It was found that 19.8% (n=31) of mothers responded to the phone call only, with 20.4% (n=32) of mothers responding to the text message only. Mothers not responding to the initial text message survey or follow-up phone call reflected 40.8% (n=64). Response rate for subsequent weeks showed that 10.8% (n=17), 5.1% (n=8), 5.7% (n=9), 2.5% (n=4), and 7% (n=11) responded to the week two, three, four, five, and six text message respectively.

Correlations

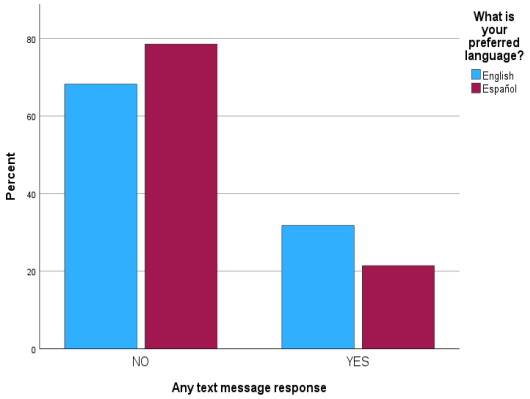
The purpose of this project was to identify if follow up communication via text message was effective in earlier identification of postpartum complications, therefore reducing emergency room visits and hospital admissions. The analysis was done in two parts examining response rate and response rate patterns among text messages and phone calls. The presence of postpartum complications and frequency of healthcare provider encounters were also examined.

Response Rate

A comparison of means was utilized to examine patterns of response between phone call follow up and text message follow up. A comparison of age and language was made between likelihood of responding to phone call surveys versus text message surveys. It was found that the mean age for those responding to phone calls or text messages was 30 years old. Response rate comparisons between English and Spanish showed that Spanish speaking participants responded 18.5% (n=5) to the text message while 0% (n=0) responded to the follow up phone calls (Figure 2). Surveys distributed at week one, two, and six had the highest response rates (22.9%, 10.8%, 7%) with weeks three, four, and five (5.1%, 5.7%, 2.5%) having significantly lower response rates. Data revealed that individuals were most likely to report attendance at doctor or clinics in week two ($p=.033$), week four ($p=.040$), and week five ($p= .026$). No significant correlation was made between week postpartum and attendance at emergency room. Independent sample T-tests revealed that those with more complications were less likely to respond to text message surveys, however those with more complications were more likely to respond to follow up phone calls (Figures 3, 4).

Figure 2

Text Message/Phone Call Response and Preferred Language



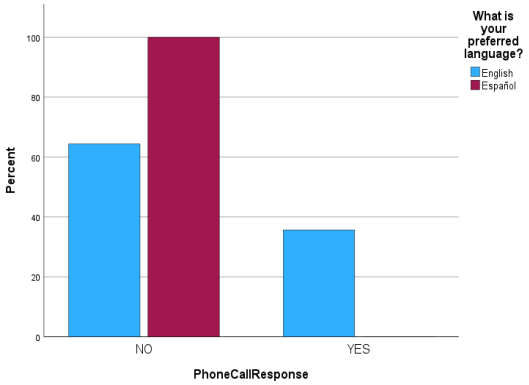


Figure 3

Relationship of Text Message Response and Number of Complications

Group Statistics

	Any text message response	N	Mean	Std. Deviation
Range from 0 to 19	YES	45	1.76	1.836
	NO	4	3.25	2.630

Independent Samples Test

		t-test for Equality of Means				
				Significance		Mean
		t	df	One-Sided p	Two-Sided p	Difference
Range from 0 to 19	Equal variances assumed	-1.510	47	.069	.138	-1.494
	Equal variances not assumed	-1.113	3.265	.171	.341	-1.494

Figure 4

Relationship of Follow Up Phone Call Response and Number of Complications

Group Statistics

	PhoneCallResponse	N	Mean	Std. Deviation
Range from 0 to 19	YES	15	2.87	2.264
	NO	34	1.44	1.599

Independent Samples Test

		t-test for Equality of Means				
				Significance		
		t	df	One-Sided p	Two-Sided p	Mean Difference
Range from 0 to 19	Equal variances assumed	2.523	47	.008	.015	1.425
	Equal variances not assumed	2.208	20.423	.019	.039	1.425

Postpartum Complication

Descriptive statistics were used to identify the frequency of complications that could lead to worsening postpartum issues. In addition, a crosstabs analysis of healthcare encounters in doctor's office or clinic, emergency room, or mental health providers was also examined to identify patterns between those reporting symptoms and those seeking care. Significant findings included that those with a labor history of pre-eclampsia ($p<.001$) or postpartum pre-eclampsia ($p<.001$) were more likely to visit the emergency room in the first six weeks following discharge. Respondents reporting between one and six different complications were more likely to attend a mental health or counseling visit in the first six week following discharge ($p=.018$). With those having a cesarean delivery ($p=.011$) or high blood pressure prior to pregnancy ($p=.026$) being more likely to visit a doctor or clinic for care following discharge.

There was no correlation found between number of or presence of complications and doctor or emergency room visits. In addition, no correlation was shown between mood, depression, or anxiety diagnosis and attendance of a mental health or counseling visit. No

correlation could be made between demographics and attendance of doctor, emergency room or mental health visits. A crosstabs analysis was used to compare the frequency of healthcare encounters between those responding to the phone call follow up and those responding to the text message survey. Significant correlations included that those answering the follow up phone call were more likely to have made a follow up visit with their physician ($p<.001$).

Summary

The results of the analysis in Chapter 4 identified equivalencies and differences between pre- and post-intervention demographics as well as statistical differences between follow up phone call surveys and text message surveys. Presentation of data from both pre- and post-intervention groups was made with significant correlations between response rate, presence of postpartum complications, and healthcare encounters. The response patterns of text message surveys shows a small increase in responses in the week six survey results, however week one showed highest response rates. Of statistical significance is that Spanish speaking participants were 100% more likely to respond to text message surveys in Spanish than they were to answer a follow up phone call.

Postpartum complication analysis showed that those with a history of pre-eclampsia or postpartum pre-eclampsia were more likely to visit the emergency room and a doctor or clinic in the first six weeks following discharge. Another significant finding was that those responding to a phone call in the post-intervention group were more likely to have made a follow up appointment with their provider. In addition, it was of significance that respondents reporting more complications were more likely to respond to a follow up phone call in comparison to text message responses. Based on the data collected, the hypothesis that women receiving both

weekly phone calls and text messages in the first six weeks show an earlier identification of postpartum complications can be supported.

Chapter 5: Discussion

Introduction

This study aimed to address how weekly follow-up communication in the first six weeks postpartum had on an earlier identification of postpartum complications. It was hypothesized that weekly follow-up text messages and phone calls would show an earlier identification of postpartum complications in comparison to the existing standard of care of only one phone call in the first week postpartum. The purpose of the proposed project is to evaluate a change in existing policy in identifying postpartum complications within the first six weeks, therefore, reducing postpartum emergency room visits and readmissions.

Discussion

The results of this study showed that response rates in the post-intervention group were higher than the pre-intervention group when utilizing both follow up phone call and text message surveys over a six week period. When comparing the response rate of phone calls between the pre- and post-intervention group, the pre-intervention group had higher response rates when a follow up phone call was made. However, the post-intervention group showed that more individuals responded to any follow up communication when both text message and phone call were offered. It was found that slightly more individuals responded to text messaging and that Spanish speaking respondents would answer the text message survey over the phone call. In addition, it was found that those with more complications were more likely to respond to the follow up phone call in comparison to the text message. This may indicate that the conversation between individuals on a follow up phone call provided more guidance on potential complications as well as an increased self-efficacy and self-awareness.

Another important aspect of the text message survey was the continued surveillance over the period of six weeks. This provided the opportunity to identify periods where women were more likely to respond to a text message. An incidental finding was that individuals did not always respond to the first week text message which included demographics, but would respond to a text message later on throughout the six weeks. Seward et al. (2018) also found that when offering health coaching via phone call or text message, participants had higher rates of satisfaction, self-efficacy and motivation towards goals.

It was also shown that when examining follow up appointments with healthcare providers, those receiving a phone call in the pre- (59.7%, n=71) and post-intervention (63%, n=29) group reported scheduling a follow up appointment with a healthcare provider. In comparison, text message survey responses showed 50% (n=26) of respondents having attended a follow-up appointment. It is to be considered that the phone call survey is a series of open ended and yes/no questions that can become leading to the recipient upon responding. The text message survey was anonymous allowing individuals the opportunity to answer questions honestly without judgment.

In addition to follow up appointments, the text message survey offered additional insight into self-reported emergency room visits and mental health provider visits. This offered additional information not provided in the follow up phone call. It was found that of those responding to the text message survey, 9.6% (n=5) visited the emergency room after discharge and 7.6% (n=4) saw a mental health provider one or more times. Hall et al. (2021), Hoyos et al. (2021), and Hwang (2022) all found similar findings where those responding to phone calls showed improved self-management behaviors as well as decreased emergency room visits and

readmissions, however prior literature did not identify whether discharged patients attended follow up appointments.

The goal of the text message survey series was to aid in earlier identification of postpartum complications. In examining those results, it was found that complications consistent with leading causes of maternal mortality such as headache, numbness or tingling, or postpartum pre-eclampsia were identified in the text message survey and not in the follow up phone call. In those reporting such symptoms, it was found that those with leading causes of maternal mortality including pre-eclampsia and postpartum pre-eclampsia were more likely to have received medical care from a healthcare provider or the emergency room.

In addition, it was found that those reporting more complications were more likely to attend a mental health or counseling visit. This may suggest that while those with complications were not likely to respond to text message, the individuals that are willing to discuss complications are also more willing to attend mental health visits. These findings are supported by Emanuel et al. (2019) who found that discharged burn patients receiving phone calls were able to be early identified in needing additional interventions. Johnson et al. (2019) also found that patients not receiving a phone call reported more complications than those receiving a follow up phone call after discharge.

Conclusions

With supporting literature and data it can be found that follow up communication can be effective in an earlier identification of postpartum complications. Providing more than one form of communication was a key factor in capturing more responses and improving continued healthcare surveillance during the postpartum period. While data analysis did not show any correlation with age and method of response, it is significant to note that providing follow up

surveys in an individual's preferred language provides more responses. This is substantial when considering maternal mortality rates among minority women in the United States. In addition, it can be shown that those with complications are more likely to engage in a phone call conversation providing an improved self-management behavior and advocacy for one's maternal health.

Summary

Postpartum complications are a leading cause of maternal mortality, especially in the first six weeks postpartum. Identifying practice methods that can help prevent or intervene earlier is integral in improving maternal mortality rates. This DNP project aimed to examine how six weeks of text message follow up communication could assist in the earlier identification of postpartum complications and the reduction of emergency room visits and readmissions. When analyzing the data reflected in the pre- and post-intervention group, it was identified that providing different communication options allows the opportunity to capture more discharged patients in the evaluation of potential complications. Furthermore, those with complications are more likely to respond to phone call, but do report in text message attendance.

Limitations

The limitations in this research study were identified in potentially having a causal relationship on results. One limitation identified is the use of a cell phone to disburse initial and follow-up text message surveys. Licensing agreements limited the use of an automated text message survey distribution through Qualtrics, which if used may have improved efficiency as well as avoided potential cellular service and technology issues.

Another limitation to this study was that the follow-up phone call survey used in both the pre- and post-intervention group was a different survey tool than the text message survey. The

phone call survey tool did not offer as much insight into demographics or complications and questions focused more on the health of the infant than the mother. In addition, questions were asked in an open-ended format which could cause the surveyor to lead responses.

Technical issues related to phone and cellular service were also identified as an issue and may have negatively impacted the number of participants receiving text messages. An incidental finding in that text messages thought to be received were in fact not transferring through. This issue was addressed within days of identifying the problem, however it may have impacted the response or receipt of text message links. The phone number was also reported as junk by some message recipients, impacting all recipients being able to receive text message surveys on iPhone devices. This issue persisted over time and proved difficult to resolve.

In addition, discrepancies in the transcription of contact information by clerical and administrative staff may have also impacted the ability to reach mothers at the most appropriate cellular number. It was also found that staff awareness and a discussion of the research study with patients prior to discharge was inconsistent despite best efforts to inform all staff on the purpose of the study. Finally, a limit in a minority perspective is evident based on the patient demographics delivering at the facility which shows a majority of White race patients.

Implications for Practice

This project aimed to improve maternal mortality through an earlier identification of postpartum complications with follow up communication. The results of this study offered insight into the use of technology in an effort to increase postpartum surveillance between hospital discharge and the usual six week follow up visit. It was found that in the presence of complications such as high blood pressure or post-partum pre-eclampsia, individuals were more likely to follow up with a healthcare provider prior to six weeks. The results also showed that

when provided a preference for follow-up communication methods, text messaging is preferred, but more complications are reported in phone calls.

For future practice, improving discharge education to encompass all aspects of physical and mental postpartum complications will be beneficial in increasing patient awareness and self-efficacy. In addition, availing resources to postpartum mothers on potential complications can help improve self-awareness and self-efficacy in health promotion. Of importance is also providing follow up surveys in an individual's preferred language to increase responses of non-English speaking women. This is of significance in considering future practice in reducing racial disparities in maternal health. Finally, despite increased resources and education, improving postpartum health surveillance between discharge and the six week follow up visit is instrumental in the early identification of complications. Recommendations include that each encounter with a health care provider (i.e-Pediatrician, Psychologist, Dentist, Primary Care Provider, Urgent Care, etc.) should include a general well-being assessment or survey in the postpartum period.

Future Research

The aim of the project was to identify postpartum complications earlier with follow-up communication, specifically text messaging over a six week period. There is currently limited research on the use of text messaging as a form of follow up communication, further research on alternative methods of communication following discharge can prove both beneficial to the patient as well as cost-effective for the healthcare system. A limitation of this study was the lack of racial diversity, therefore a replicated study with a large sample size would be beneficial in identifying complications earlier for at risk populations. In addition, there is also limited evidence of postpartum follow up communication as a way to identify complications. Future

studies should focus on methods that assist in the identification of complications earlier, therefore improve maternal mortality.

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Appendix A

Table 3

Search Keywords

Population	Intervention	Outcome
Mothers (P)	Weekly phone calls (I)	Postpartum complications (O)
First six weeks postpartum (P)	Follow-up phone calls (I)	Readmission (O)
Postpartum (P)		Early Identification (O)
Discharged patients (P)		Emergency room visits (O)

Table 4

Search Results

Terms	Results
Mothers AND weekly phone calls AND postpartum complications	1
Mothers AND weekly phone calls AND readmission	1
Mothers AND weekly phone calls AND early identification	1
Mothers AND weekly phone calls AND emergency room visits	0
Mothers AND follow-up phone calls AND postpartum complications	7
Mothers AND follow-up phone calls AND readmission	2
Mothers AND follow-up phone calls AND early identification	2
Mothers AND follow-up phone calls AND emergency room visits	2
First six weeks postpartum AND weekly phone call AND postpartum complications	0
First six weeks postpartum AND weekly phone call AND readmission	0
First six weeks postpartum AND weekly phone call AND early identification	0
First six weeks postpartum AND weekly phone call AND emergency room visits	0
First six weeks postpartum AND follow-up phone call AND postpartum complications	0
First six weeks postpartum AND follow-up phone call AND readmission	1
First six weeks postpartum AND follow-up phone call AND early identification	0
First six weeks postpartum AND follow-up phone call AND emergency room visits	0
Postpartum AND weekly phone call AND postpartum complications	1
Postpartum AND weekly phone call AND readmission	1
Postpartum AND weekly phone call AND early identification	1
Postpartum AND weekly phone calls AND emergency room visits	0
Postpartum AND follow-up phone call AND postpartum complications	12
Postpartum AND follow-up phone call AND readmission	3
Postpartum AND follow-up phone call AND early identification	1
Postpartum AND follow-up phone call AND emergency room visits	0
Discharged patients AND weekly phone call AND postpartum complications	0
Discharged patients AND weekly phone call AND readmission	7

Discharged patients AND weekly phone call AND early identification	1
Discharged patients AND weekly phone call AND emergency room visits	1
Discharged patients AND follow-up phone call AND postpartum complications	2
Discharged patients AND follow-up phone call AND readmission	34
Discharged patients AND follow up phone call AND early identification	3
Discharged patients AND follow up phone call AND emergency room visits	4
TOTAL ARTICLES	88

Appendix B

Postpartum Follow-Up Survey

In this survey, you are providing valuable information that can help in addressing disparities in postpartum care as well as potentially identifying complications earlier in the postpartum period. The survey will consist of two parts. The first part of the survey is a demographic portion that will only be asked once during your first-week post-discharge. The second part of the survey pertains to postpartum information and will be asked for six weeks following discharge. All information in this survey is confidential and the personal health data will be removed during the interpretation of data.

Part A-Demographic Information

1. What is your date of birth?
    a. (MM/DD/YYYY)
2. What race do you best identify with?
    a. White (0)
    b. Black, Non-Hispanic (1)
    c. Black, Hispanic (2)
    d. Hispanic (3)
    e. Indigenous American (4)
    f. Asian (5)
    g. Asian-Indian (6)
3. What is your highest level of education?
    a. Less than high school (0)
    b. High school graduate (1)
    c. Associate Degree (2)
    d. Bachelor Degree (3)
    e. Master's Degree (4)
    f. Doctoral/PhD Degree (5)
4. What is your marital status?
    a. Widowed (0)
    b. Divorced (1)
    c. Separated (2)
    d. Never Married (3)
    e. Married (4)
    f. In a relationship/partnership (5)
5. What is your insurance status?

   a. Insured, public insurance (Medicare/Medicaid) (0)
   b. Insured, private insurance (1)
   c. Uninsured (2)
6. What is your employment status?
   a. Work, full time (40+ hours/week) (0)
   b. Work, part time (less than 40 hours/week) (1)
   c. Unemployed (2)
7. Do you have a regular primary care provider?
   a. Yes (0)
   b. No (1)
8. Are there any other adults (18+ years) living in your household beside your partner/spouse?
   a. Yes (0)
      i. If yes, how many? _____
   b. No (1)
9. What type of birth/delivery did you have?
   a. Vaginal (0)
   b. Cesarean Section (1)
10. What was your date of delivery?
   a. (MM/DD/YYYY)
11. How many times have you been pregnant, including this delivery (including miscarriages, any elective abortions, preterm births)?
   a. _____ (specify numerically)
12. Did you have more than one baby from this pregnancy?
   a. No (0)
   b. Yes (1)
      i. a. How many babies? ____
13. How many children, including your new baby/babies, do you financially support?
   a. ____ number of children
14. How old is your baby?
   a. ____ weeks
15. Did you deliver early?
   a. No (0)
   b. Yes (1)
      i. How many weeks early? ____weeks,
16. After birth, was your baby/babies admitted to a newborn intensive care nursery?
   a. No (0)
   b. Yes (1)
      i. a. For what reason? _____ baby #1
      ii. b. For what reason? _____baby #2
17. After birth, did a doctor tell you that your baby/babies had any significant birth defect or disability?
   a. No (0)

b. Yes (1)
    i. Please explain _____

Part B-Postpartum Information

1. During your pregnancy, delivery, or postpartum period, did a doctor ever tell you that you had problems with:
    a. Heart Disease
        i. No (0)
        ii. Yes (1)
    b. Chronic Lung Disease
        i. No (0)
        ii. Yes (1)
    c. Diabetes
        i. No (0)
        ii. Yes (1)
    d. High Blood Pressure
        i. No (0)
        ii. Yes (1)
    e. Cancer
        i. No (0)
        ii. Yes (1)
    f. Kidney Disease
        i. No (0)
        ii. Yes (1)
2. During your pregnancy, delivery, or postpartum period, did you ever have a problem with your mood, e.g., depression and anxiety?
    a. No (0)
    b. Yes (1)
3. During your labor and delivery, did a doctor ever tell you that you had complications such as:
    a. Seizures, pre-eclampsia, toxemia or eclampsia
        i. No (0)
        ii. Yes (1)
    b. Tearing (vagina or rectum)
        i. No (0)
        ii. Yes (1)
    c. Severe bleeding
        i. No (0)
        ii. Yes (1)
    d. C-Section Delivery
        i. No (0)
        ii. Yes (1)
    e. Other:

i. No (0)
ii. Yes (1)
1. If yes, specify: _____

4. Below is a list of possible health problems. Have you had any of the following problems since hospital discharge:
    a. Stiff Joints
        i. No (0)
        ii. Yes (1)
    b. Numbness or tingling of the hands
        i. No (0)
        ii. Yes (1)
    c. Neck or Back pain
        i. No (0)
        ii. Yes (1)
    d. Headache
        i. No (0)
        ii. Yes (1)
    e. Dizziness
        i. No (0)
        ii. Yes (1)
    f. Running or stuffy nose
        i. No (0)
        ii. Yes (1)
    g. Ear ache or infection
        i. No (0)
        ii. Yes (1)
    h. Cough or cold
        i. No (0)
        ii. Yes (1)
    i. Sore throat
        i. No (0)
        ii. Yes (1)
    j. Sinus trouble
        i. No (0)
        ii. Yes (1)
    k. Skin (e.g.-rash eczema, psoriasis, acne)
        i. No (0)
        ii. Yes (1)
    l. Flu
        i. No (0)
        ii. Yes (1)
    m. Diarrhea or constipation
        i. No (0)

ii. Yes (1)

n. Stomach or abdominal pain
   i. No (0)
   ii. Yes (1)

o. Hemorrhoids
   i. No (0)
   ii. Yes (1)

p. Abnormal vaginal bleeding or discharge
   i. No (0)
   ii. Yes (1)

q. Discomfort or pain near your vagina
   i. No (0)
   ii. Yes (1)

r. Breast discomfort
   i. No (0)
   ii. Yes (1)

s. Any other problems
   i. No (0)
   ii. Yes (1)
      1. If yes, specify: _____

5. Since hospital discharge, how many hospital admissions did you have involving at least one overnight stay?
   a. ____ # of admissions
      i. How many days did you spend in the hospital?
         1. ___ days,
6. Since hospital discharge, how many times did you have outpatient surgery not involving an overnight hospital stay?
   a. _____ surgeries
      i. a. What was the surgery for? _____,
7. Since hospital discharge, how many emergency room or hospital outpatient visits did you have?
   a. ___ number of visits
8. Since hospital discharge, how many doctor office or clinic visits did you have?
   a. _____ number of visits
9. Since hospital discharge, how many counseling visits, by a health care provider (e.g. psychologist, social worker, nurse) did you have?
   a. ___ number of visits

Important Resources:

Postpartum Depression/Mental Health Hotline: 1-866-626-2111

Lactation Warm Line: 973-983-5262

St. Clare's Denville/Dover Emergency Room, emergency visits

OB/GYN Provider, non-emergency care

Postpartum Follow-Up Survey

En Espanol

En esta formulario, estás brindando información que puede ayudar a abordar las disparidades en posparto y tambien la identificación potencial de complicaciones en el período posparto.

La encuesta constará de dos partes. La primera parte de la encuesta es una porción demográfica que solo se le preguntará una vez durante la primera semana despues de al alta de hospital. La segunda parte de la encuesta se refiere a la información posparto y se le pedirá durante las seis semanas posteriores al alta. Todo la información de esta encuesta es confidencial y los datos personales de salud se eliminarán durante el interpretacion de datos.

Parte A- Información demográfica

1. Que es tu fecha de nacimeinto?
    a. (MM/DD/YYYY)
2. ¿Con qué raza te identificas mejor?
    a. Blanca (0)
    b. Black, No-Hispano (1)
    c. Negra, Hispanic (2)
    d. Hispano (3)
    e. Indígena de las Américas (4)
    f. Asiatico (5)
    g. India-Asiatico(6)
3. Cual es tu nivel más alto de educación?
    a. Menos de secundaria (0)
    b. Graduado de la escuela secundaria (1)
    c. Grado Asociado (2)
    d. Licenciatura (3)
    e. Maestría (4)
    f. Doctorado/PhD Grado (5)
4. Cuál es tu estado civil?

a. Viudo (0)

b. Divorciado (1)

c. Separados (2)

d. Nunca casado (3)

e. Casado (4)

f. En una relación/pareja (5)

5. ¿Cuál es el estado de su seguro?

a. Asegurado, seguro público (Medicare/Medicaid) (0)

b. Asegurado, seguro privado (1)

c. Sin seguro (2)

6. ¿Cuál es su situación de trabajo?

a. Trabajo, tiempo completo (40+ horas/semana) (0)

b. Trabajo, tiempo parcial (menos de 40 horas/semana) (1)

c. Desempleado (2)

7. ¿Tienes un doctor primaria regular?

a. Sí (0)

b. No (1)

c

8. ¿Hay otros adultos (mayores de 18 años) viviendo en su hogar además de su pareja/cónyuge?

a. Sí (0)

i. Si es así, ¿cuántos? _____

b. No (1)

9. ¿Qué tipo de parto tuvo?

a. Vaginales (0)

b. Cesárea (1)

10. ¿Cuál fue su fecha de parto?

a. (MM/DD/AAAA)

11. ¿Cuántas veces ha estado embarazada, incluyendo este parto (incluyendo abortos espontáneos, abortos electivos, partos prematuros)?

a. _____ (especificar numéricamente)

12. ¿Tuvo más de un bebé de este embarazo?

    a. No (0)

    b. Sí (1)

        i. a. ¿Cuántos bebés? ____

13. ¿A cuántos niños, incluido su nuevo bebé/bebés, mantienes económicamente?

    a. ____ numero de niños

14. ¿Qué edad tiene su bebé?

    a. ____ semanas

15. ¿Tuviste tu bebe temprano de la fecha que te dieron los doctores?

    a. No (0)

    b. Sí (1)

        i. ¿Cuántas semanas antes? ____semanas,

16. Después del nacimiento, ¿fue admitido su bebé/bebés en una unidad de cuidados intensivos para recién nacidos?

    a. No (0)

    b. Sí (1)

        i. a. ¿Por qué razón? _____ bebé #1

        ii. b. ¿Por qué razón? _____bebé #2

        iii.

17. Después del nacimiento, ¿le dijo un médico que su bebé o bebés tenían algún defecto congénito significativo o discapacidad?

    a. No (0)

    b. Sí (1)

        i. Por favor explique _____

Part B-Postpartum Information

1. Durante su embarazo, parto o puerperio, ¿le dijo alguna vez un médico que tuviste problemas con:

    a. Cardiopatía

        i. No (0)

        ii. Sí (1)

    b. Enfermedad pulmonar crónica

i. No (0)

ii. Sí (1)

C. Diabetes

i. No (0)

ii. Sí (1)

d. Hipertensión

i. No (0)

ii. Sí (1)

e. Cáncer

i. No (0)

ii. Sí (1)

F. Nefropatía

i. No (0)

ii. Sí (1)

2. Durante su embarazo, parto o puerperio, ¿alguna vez tuvo algún problema con su estado de ánimo, por ejemplo, depresión y ansiedad?

a. No (0)

b. Sí (1)

3. Durante el trabajo de parto y el parto, ¿alguna vez un médico le dijo que tenía complicaciones?

como:

a. Convulsiones, preeclampsia, toxemia o eclampsia

i. No (0)

ii. Sí (1)

b. Lagrimeo (vagina o recto)

i. No (0)

ii. Sí (1)

c. Sangrado severo

i. No (0)

ii. Sí (1)

d. Parto por cesárea

i. No (0)

ii. Sí (1)

e. Otro:

i. No (0)

ii. Sí (1)

1. En caso afirmativo, especifique: _____

4. A continuación se incluye una lista de posibles problemas de salud. ¿Ha tenido alguno de los siguientes problemas desde el alta hospitalaria:

a. Rigidez en las articulaciones

i. No (0)

ii. Sí (1)

b. Entumecimiento u hormigueo en las manos

i. No (0)

ii. Sí (1)

c. Dolor de cuello o espalda

i. No (0)

ii. Sí (1)

d. Dolor de cabeza

i. No (0)

ii. Sí (1)

e. Mareo

i. No (0)

ii. Sí (1)

f. Goteo o nariz tapada

i. No (0)

ii. Sí (1)

g. Dolor de oído o infección

i. No (0)

ii. Sí (1)

h. Tos o resfriado

i. No (0)

ii. Sí (1)

i. Dolor de garganta

i. No (0)

ii. Sí (1)

j. Problema de los senos paranasales

i. No (0)

ii. Sí (1)

k. Piel (p. ej., erupción cutánea, eccema, psoriasis, acné)

i. No (0)

ii. Sí (1)

l. Gripe

i. No (0)

ii. Sí (1)

m. Diarrea o estreñimiento

i. No (0)

ii. Sí (1)

n. Dolor estomacal o abdominal

i. No (0)

ii. Sí (1)

o. Hemorroides

i. No (0)

ii. Sí (1)

p. Sangrado o flujo vaginal anormal

i. No (0)

ii. Sí (1)

q. Malestar o dolor cerca de la vagina

i. No (0)

ii. Sí (1)

r. Molestias en los senos

i. No (0)

ii. Sí (1)

s. Cualquier otro problema

i. No (0)

ii. Sí (1)

1. En caso afirmativo, especifique: _____

5. Desde el alta hospitalaria, ¿cuántos ingresos hospitalarios tuvo que era menos de una noche de estancia?

a. ____ # de admisiones

i. ¿Cuántos días estuviste en el hospital?

1. ____días

6. Desde el alta hospitalaria, ¿cuántas veces se sometió a cirugías ambulatorias que no tuviste una noche de hospitalización?

a. _____ cirugías

i. a. ¿Para qué fue la cirugía? _____,

7. Desde el alta del hospital, ¿cuántas visitas a la sala de emergencias o al hospital como paciente ambulatorio a tenido?

a. ___ Número de visitas

8. Desde el alta del hospital, ¿cuántas visitas al consultorio médico o a la clínica tuvo?

a. _____ Número de visitas

9. Desde el alta del hospital, ¿cuántas visitas de salud mental de atención médica (psicóloga, trabajadora social, enfermera) tuviste?

a. ___ Número de visitas

Recursos importantes:

Línea directa de depresión posparto/salud mental: 1-866-626-2111

Línea caliente de lactancia: 973-983-5262

Appendix C

Survey Reliability and Validity from McGovern et al. (2006)

APPENDIX 2 ALTERNATIVE ESTIMATION OF MATERNAL MENTAL HEALTH USING SELF REPORT DATA TO ASSESS THE VALIDITY IN RELATION TO BIRTH CERTIFICATE DATA

MODEL COMMAND:
2SLS;LHS=QSP234;RHS=ONE,QS222I,MHPD;INST=ONE,EXOG2,BPSTHLTH,
MPSTHLTH,TASTE1,PRICE;WTS=WT$

Two stage least squares regression		Dep. Variable	= QSP234
Observations	= 654	Weights	= WT
Mean of LHS	= 0.7619287E+02	Std.Dev of LHS	= 0.1452128E+02
StdDev of residuals	= 0.1235880E+02	Sum of squares	= 0.9515691E+05
R-squared	= 0.2745507E+00	Adjusted R-squared	= 0.2396174E+00
F[30, 623]	= 0.7859272E+01	Prob value	0.3217295E-13

Variable	Coefficient	Std. Error	t-ratio	Prob|t|>|x|
Constant	101.70	27.71	3.670	0.00024
QS222I	-1.1392	1.624	-0.702	0.48293
SC43	1.0648	1.426	0.747	0.45518
V12PLD	0.13763	2.102	0.065	0.94779
MPRDBSR	3.0044	1.536	1.956	0.05042
SC39	-6.6386	1.207	-5.498	0.00000
SC08	2.3477	4.529	0.518	0.60421
Q190	-3.0678	2.739	-1.120	0.26278
Q180R2	-1.4214	7.286	-0.195	0.84532
Q184R2	-3.1220	15.60	-0.200	0.84135
QS222NI	-1.5085	0.7517	-2.007	0.04476
QS160	-0.15425	1.052	-0.147	0.88345
MHSU	0.70532E-03	0.7819E-02	0.090	0.92812
SUBSVCPD	-0.12059E-01	0.2537E-01	-0.475	0.63455
Q55SRLN	-2.6149	1.362	-1.920	0.05484
FTE	-3.4273	1.641	-2.088	0.03675
QSP270B	1.3308	0.3242	4.105	0.00004
Q268	1.3516	0.4958	2.726	0.00641
V19	-0.20865	0.1802	-1.158	0.24691
V20	-0.56489	0.8689	-0.650	0.51562
WHITE	-7.3468	3.293	-2.231	0.02566
Q315	-0.82592E-02	0.6002	-0.014	0.98902
CDB18	0.76914	2.259	0.340	0.73353
Q322R2	0.11231E-03	0.8844E-04	1.270	0.20413
NEINC	0.61572E-05	0.3729E-04	0.165	0.86884
Q306R	-1.8437	0.7556	-2.440	0.01469
Q310R	0.62228	1.092	0.570	0.56887
Q310D	11.242	6.005	1.872	0.06121
NUMKIDS	-0.51134	1.030	-0.497	0.61945
QS194R	-0.15972	0.4252	-0.376	0.70720
QS122W	0.45292	0.3252	1.393	0.16369

APPENDIX 2 CONTINUED: WEIGTED 2SLS ON INFANT WELL-BEING

```
MODEL COMMAND:
2SLS;LHS=BOENHLTH;RH2=ONE,BNPD;INST=ONE,EXOG2,BPSTHLTH,MPSTH
LTH,TASTE1,PRICE;WTS=WT
```

```
Two stage   least squares regression.      Dep. Variable      =  BOENHLTH
Observations        =          654         Weights            =  WT
Mean of LHS         = -0.4215422E-01       Std.Dev of LHS     =
0.7219521E+00
StdDev of residuals=  0.5569738E+00        Sum of squares     =
0.1954385E+03
R-squared           =  0.4039026E+00       Adjusted R-squared=
0.3821403E+00
F[ 23,    630]      =  0.1855975E+02       Prob value
0.3217295E-13
```

Variable	Coefficient	Std. Error	t-ratio	Prob|t|Ûx
Constant	1.1100	0.4380	2.534	0.01128
V4	-0.10655E-04	0.4460E-04	-0.243	0.80769
ODB15	0.62001E-01	0.4949E-01	1.253	0.21025
V3	0.77422E-02	0.1032	0.075	0.94022
SC31	0.15924E-01	0.1569	0.102	0.91914
Q140R	-0.15479	0.1575	-0.983	0.32582
Q135R	-0.31115	0.1599	-1.946	0.05165
QS160	-0.27937	0.3601E-01	-7.758	0.00000
BHSU	-0.53563E-03	0.1885E-03	-2.841	0.00450
QS5SRLN	-0.26432E-01	0.5016E-01	-0.527	0.59822
FTE	0.58508E-01	0.6238E-01	0.938	0.34830
SUBSVCPD	0.20013E-02	0.9622E-03	2.080	0.03754
Q268	0.28320E-01	0.1902E-01	1.489	0.13641
Q322R2	-0.73064E-05	0.3207E-05	-2.278	0.02271
NEINC	0.19516E-05	0.1534E-05	1.273	0.20315
BWHITE	0.95590E-01	0.8991E-01	1.063	0.28771
V19	-0.36637E-02	0.5951E-02	-0.616	0.53812
Q315	-0.16720E-01	0.1625E-01	-1.029	0.30358
ODB18	0.27206E-01	0.6752E-01	0.403	0.68701
NUMKIDS	0.86643E-01	0.3272E-01	2.648	0.00810
Q297R	0.17198E-03	0.6515E-01	0.003	0.99789
Q299R	0.23429E-01	0.6261E-01	0.374	0.70824
Q302R	-0.26955E-01	0.7040E-02	-3.829	0.00013
V20	-0.27318E-01	0.3715E-01	-0.735	0.46212

Appendix D

IRB Approval Protocol

THE WILLIAM PATERSON UNIVERSITY OF NEW JERSEY
INSTITUTIONAL REVIEW BOARD FOR HUMAN SUBJECT RESEARCH

c/o Office of Sponsored Programs
1800 Valley Road, Room 222
973-720-2852 (Phone)
973-720-3573 (Fax)
http://www.wpunj.edu/osp/

Chair: Professor Elizabeth Victor (VictorE@wpunj.edu)
College of Arts, Humanities, and Social Sciences
Contact: Kate Boschert (irbadministrator@wpunj.edu)
Office of Sponsored Programs

To: Samantha Rueter
Doctoral Candidate of Nursing

From: Elizabeth Victor

Subject: IRB Approval (Exempted Review)

Study: Protocol # 2023-338: Evaluation of Postpartum Follow-Up Communication on Early Identification of Maternal Complications.

Date: May 11, 2023

The IRB has APPROVED the above study involving humans as research subjects. This study was approved as: Category: Exempted 45 CFR 46.104(b)(1) and (b)(2)(i); special class of subjects: None.

IRB Number: 2023-338 This number is WPU's IRB identification that should be used on all consent forms and correspondence.

Approval Date: 05/11/2023
Expiration Date: 05/10/2024

This approval is for one year. It is your responsibility to insure that an application for continuing review approval (WPU IRB Form Appendix D) has been submitted before the expiration date noted above. If you do not receive approval before the expiration date, all study activities must stop until you receive a new approval letter. There will be no exceptions. In addition, you are required to submit an Appendix D form at the conclusion of the project. The Appendix D can be accessed at: http://www.wpunj.edu/osp/irb/index.html.

Consent Form: All research subjects must use the approved Informed Consent Form. You are responsible for maintaining signed consent forms (if approved for Active Consent format) for each research subject for a period of at least three years after study completion.

Mandatory Reporting to the IRB: The principal investigator must report immediately any serious problem, adverse effect, or outcome that is encountered while using human subjects or any complaints from your subjects. In addition, the principal investigator must report any event or series of events that prompt the temporary or permanent suspension of a research project involving human subjects or any deviations from the approved protocol using Appendix D.

Amendments/Modifications: You are required to carry out this research as described in the protocol. All amendments/modifications of protocols involving human subjects must have prior IRB approval, except

those involving the prevention of immediate harm to a subject. Amendments/Modifications for the prevention of immediate harm to a subject must be reported within 24 hours to the IRB using Appendix D.

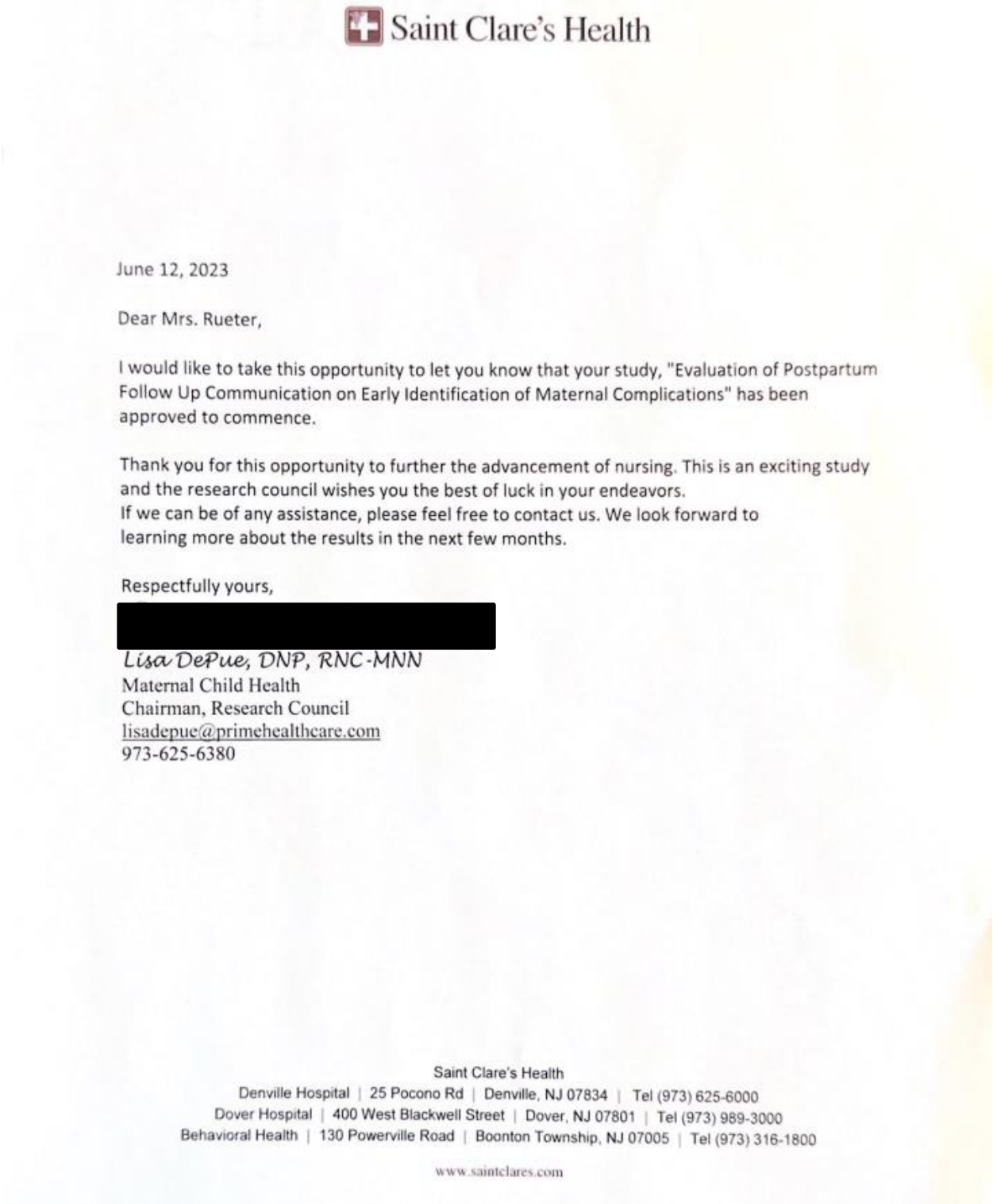
For exempted and expedited review protocols: the protocol will be reviewed by the entire IRB committee at its next meeting. Should questions arise that cannot be answered by the materials already provided, additional information may be requested from you. This most likely will not affect the approval status of your project—you are approved to initiate the project as of the date above, and you will not receive notice of the committee's final review. Only in the rare situation when serious questions arise will the IRB instruct that the project be discontinued until those questions are answered.

Records/Documentation: You are required to keep detailed records concerning this research project and appropriate documentation concerning Informed Consent in a readily accessible location for a period of not less than three (3) years. The IRB reserves the right to inspect all records, research tools and databases that are associated with this research.

If you have any questions, please do not hesitate to contact Kate Boschert at 973-720-2852 or irbadministrator@wpunj.edu, or the IRB Committee Chairperson, Dr. Elizabeth Victor, at victore@wpunj.edu.

Good Luck on your project.

Saint Clare's Research Council Approval



Saint Clare's Health

June 12, 2023

Dear Mrs. Rueter,

I would like to take this opportunity to let you know that your study, "Evaluation of Postpartum Follow Up Communication on Early Identification of Maternal Complications" has been approved to commence.

Thank you for this opportunity to further the advancement of nursing. This is an exciting study and the research council wishes you the best of luck in your endeavors.
If we can be of any assistance, please feel free to contact us. We look forward to learning more about the results in the next few months.

Respectfully yours,

[redacted]

Lisa DePue, DNP, RNC-MNN
Maternal Child Health
Chairman, Research Council
lisadepue@primehealthcare.com
973-625-6380

Saint Clare's Health
Denville Hospital | 25 Pocono Rd | Denville, NJ 07834 | Tel (973) 625-6000
Dover Hospital | 400 West Blackwell Street | Dover, NJ 07801 | Tel (973) 989-3000
Behavioral Health | 130 Powerville Road | Boonton Township, NJ 07005 | Tel (973) 316-1800

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