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**Using Digital Technology to Decrease Postpartum Depression**

Camille E. Last

Roseman University of Health Sciences

NURS 512 – Nursing Research & Evidence-Based Practice

Dr. Watson & Dr. Schwartz

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## Using Technology to Decrease Postpartum Depression

While the postpartum period is a joyful time for many women, it also comes with many challenges including feeding difficulties, lack of social support, sleep deprivation, and postpartum depression. Postpartum depression [PPD] is common, affecting up to 15% of mothers (Pearlstein et al., 2009). This stage can have long-term effects on a woman's health and well-being. Most women in the United States are left to navigate this early postpartum period independently (The American College of Obstetricians and Gynecologists [ACOG], 2018). Pearlstein et al. (2009) state that the most optimal time to initially screen for PPD is around two weeks postpartum, however, standard postpartum follow-up occurs in person around weeks four to six.

Given that more than half of all pregnancy-related deaths occur in the postpartum period, there is an urgent need to reduce this risk of maternal morbidity and mortality (ACOG, 2018). An aim of Healthy People 2020 is for healthcare to attain high-quality, longer lives that are free of preventable disease, disability, injury, and premature death (2010). ACOG (2018) states, "To better meet the needs of women in the postpartum period, care would ideally include an initial assessment, either in person or by phone, within the first 3 weeks postpartum to address acute postpartum issues" (p. 141). Technology innovations have provided increased communication opportunities between healthcare providers and patients, across all majority and minority groups. Digital communication, specifically text messaging, may be an effective tool to screen for postpartum depression earlier in the postpartum period, which increases the quality of care provided and decreases postpartum depression.

A major gap in postpartum care is the discharge education provided to patients when they leave the hospital. When surveyed, 67% of postpartum nurses indicated spending less than 10

minutes discussing postpartum care, warning signs, and newborn care instructions (Morris et al., 2021). This is the last bit of information patients receive before they are left to navigate the struggles of early postpartum life. This lack of communication leads many women to search for information and support on the internet, however, women reported a lack of relevant, useful, and free quality postpartum mobile apps or information (Morris et al., 2021). According to Morris et al. (2021), 97% of Americans own a cell phone, regardless of age, race, location, education, or income levels, which supports text messaging as a viable intervention to enhance postpartum care. The use of text messaging as part of postpartum care has been studied and is widely accepted by patients, who report being satisfied with the convenience of the intervention. This project will evaluate how digital communication can be used to decrease postpartum depression by communicating with postpartum women sooner than the standard postpartum four to six-week follow-up. The primary aim of this MSN quality improvement project is to evaluate the effectiveness of text-messaging postpartum patients in decreasing postpartum depression.

### **PICOT Question**

Among postpartum women, does digital communication in the early postpartum period help to decrease their Edinburgh postnatal depression score [EPDS], as compared to those who receive standard postpartum follow-up without digital communication?

### **Nursing Theoretical Framework**

In the United States, approximately 70% to 80% of all women experience some sort of ‘baby blues,’ and many of these women will experience more severe postpartum depression (Carberg, 2019). Standard postpartum follow-up with a provider occurs within four to 12 weeks postpartum. However, as many as 40% of women do not follow up with their healthcare provider within that four to 12-week window (Stuebe et al., 2018). Lewin’s Change Theory provides a

theoretical framework supporting the importance of implementing new processes in healthcare to increase the health and well-being of their patients (2020). The General Systems Theory adds to this theoretical framework by describing how nursing informatics can be a useful tool among healthcare providers to aid in communicating and scheduling with their patients, more specifically, by implementing text message follow-up for those patients at risk for postpartum depression.

### **Change Theory of Nursing**

Kurt Lewin, considered the father of social psychology, developed the Change Theory of Nursing, which eventually became his most influential theory (*Lewin's Change Theory, 2020*). Lewin's definition of behavior in this model is "a dynamic balance of forces working in opposing directions" (2020). This theory has three major concepts: *driving forces* which push in a direction of change, *restraining forces* that counter the driving forces and hinder change from pushing in the opposite direction, and *equilibrium* which is a state of being where driving forces equal restraining forces, and no change occurs (*Lewin's Change Theory, 2020*).

The Change Theory consists of a three-stage model that requires prior learning to be rejected and replaced (*Lewin's Change Theory, 2020*). These stages include unfreezing, changing, and refreezing when implementing any major change. Unfreezing is finding a method that helps people let go of the old and counterproductive patterns, overcoming strains of individual resistance, and group conformity (*Lewin's Change Theory, 2020*). The stage of change is moving to a new level by changing thoughts, feelings, behaviors, or all three, leading to a more productive process (*Lewin's Change Theory, 2020*). And finally, the refreezing stage is establishing the change as the new process, leading to a new "standard operating procedure" (*Lewin's Change Theory, 2020*). In the case of postpartum healthcare, we must let go of the idea

that one postpartum visit with a healthcare provider is adequate. Instead, postpartum care should be considered an ongoing process, with increased communication in the challenging and chaotic early postpartum period. Therefore, text message follow-up should be considered as a way to increase communication with patients.

Change is ever-present in all aspects of healthcare and is a barrier that all healthcare providers will have to overcome, which is why Lewin's Change Theory is so influential for healthcare providers around the world. Lewin's three-stage model is an effective way for organizations and individuals to implement process changes. "Organizations that handle change well thrive, whilst those that do not may struggle to survive" (*Lewin's Change Management Model: Understanding the Three Stages of Change*, n.d.).

### **General Systems Theory**

The General Systems Theory was proposed in the 1940s by Ludwig von Bertalanffy and furthered by Ross Ashby in 1964 (*Ludwig von Bertalanffy - General System Theory*, 2014). Von Bertalanffy was using the General Systems Theory to revive the unity of science and is considered to be the founder and principal author of this theory (*Ludwig von Bertalanffy - General System Theory*, 2014). The General Systems theory explains that a system is a complex of interacting elements that are open to and interact with their environment (*Ludwig von Bertalanffy - General System Theory*, 2014). This theory consists of closed and open systems, whereas closed systems are isolated from their environment, and open systems maintain continuous inflow and outflow, building up and breaking down of components, maintained in a 'steady-state' (Bertalanffy, 1968).

Most systems within healthcare are open systems, as they are constantly changing, updating, and growing. Technology innovations have advanced nursing informatics substantially

and contributed to increased access to a healthcare provider across all majority and minority groups. According to Healthy People 2020, healthcare aims to attain high-quality, longer lives that are free of preventable disease, disability, injury, and premature death, as well as creating social and physical environments that promote good health for all (2010). The General Systems theory describes the importance of nursing informatics and using technology to create interventions that will increase health outcomes for postpartum women who are at high risk for postpartum depression. More specifically, using nursing informatics to increase communication with patients by using text messaging increases efficiency and quality of care and decreases rates of postpartum depression.

The General Systems Theory asserts the necessity for a causal analysis when errors occur, stating that one ought not to focus solely on individual failings, but rather on the surroundings that allowed such events to occur (Anderson, 2016). This theory maintains that outcomes can be influenced, and thus, changed when smart interventions are developed based on common patterns and behaviors across time (Anderson, 2016). Furthermore, this theory states that systems cannot be reduced to a series of isolated functioning parts, but rather, to understand a system as a whole, one must understand the interrelations between its parts (Anderson, 2016). This idea contributes much to healthcare, as root cause analyses are frequently used to help prevent serious harm or death by figuring out the root cause and developing solutions that address the problems from a systems perspective, rather than focusing on the individual (Joint Commission International, 2015).

### **Theoretical Contributions**

Just as Lewin's change theory supports the idea of rejecting prior learnings to replace them with new ideas, this project rejects the idea of postpartum care consisting of a single visit

and replaces it with postpartum being a continuous and ongoing process (*Lewin's Change Theory*, 2020; Stuebe et al., 2018). To make postpartum care an ongoing process, text message follow-up will be implemented for all patients in the early postpartum period. The general systems theory states that healthcare is an open system with continuous inflow and outflow, and building up and breaking down of components (Bertalanffy, 1968). As technology advances, so must the healthcare world. As an example, many doctors' offices send text message appointment confirmations and reminders. A similar system could be put into place for postpartum patients to receive a set of standardized text messages in the weeks between discharge from the hospital and the postpartum visit. This quality improvement project is supported by the general systems theory and the change theory, which provides a robust theoretical framework and is a strong contribution to the nursing profession.

### **Literature Search**

Databases that were used for the literature search included Clinical Key for nursing, Cumulative Index to Nursing and Allied Health Literature (CINAHL), Google Scholar, and PubMed. The following keywords were used in the search for empirical literature: postpartum depression, postpartum depression follow-up, text message follow-up for patients, technology, digital health, peer support, and social support. Three hundred and eighty-seven articles were found in the electronic scientific databases. The inclusion criteria for the search were applicable evidence-based research data, full-text and peer-reviewed articles published within the past five years. To narrow down the search studies were excluded for the depression screening instrument used, the sample size of the study, date of publication, and population being studied. In total, five articles were included after the content was analyzed and the categorized key findings are presented. Two randomized control trials (Shorey et al., 2019; McCarter et al., 2018), one



qualitative interview (Shorey & Debby, 2019), one prospective cohort study (Posmontier et al., 2016), and one descriptive study (Niksalehi, 2018).

### **Definitions:**

- *Postpartum*: Related to the weeks following the birth of a child (“Postpartum”, n.d.).
- *Postpartum depression*: A depressive mood disorder that develops in the first year after the birth of a child and can affect a woman’s ability to take care of her child (“Postpartum Depression,” n.d.).
- *Perinatal period*: The time frame surrounding the time of birth, from the twentieth week of gestation to the twenty-eighth day of newborn life (Random House, Inc., 2021).
- *Edinburgh Postnatal Depression Scale (EPDS)*: a 10-question self-rating questionnaire designed to identify postnatal depression within the past 7 days, with an optimal cutoff score ranging from 7-13 depending on the country (Eberhard-Gran et al., 2001; Smith-Nielsen et al., 2018).

### **Review of Literature**

*Digital Communication*: With the expansion of digital technology, there are many ways to follow up with patients, including text-message, phone calls, video calls, and e-mail. In the randomized control trials, Shorey et al. (2019) evaluated the effectiveness of a technology-based peer-support intervention program on maternal outcomes during the early postpartum period whereas McCarter et al. (2018) focused on using text messaging to follow up with postpartum women and evaluate the effectiveness in improving mood and decreasing stress. Shorey et al. (2019) recruited 138 mothers to participate in this study, dividing participants into a control group (n = 69) and intervention group (n = 69). The 4-week intervention consisted of weekly follow-up from peer volunteers via text messages, phone calls, and WhatsApp in addition to

standard postpartum care, while the control group just received standard postpartum care (Shorey et al., 2019). McCarter et al. (2018) conducted an open, parallel, three-arm randomized controlled trial, dividing 167 subjects into three groups, a control group, and two intervention groups where both received standardized text messages four times per week for six months postpartum, with group two receiving a follow-up message twice a week asking if they would like a nurse to call them and they could respond with “yes” or “no”.

Niksalehi et al. (2018) conducted a descriptive study with a pre-test/post-test design consisting of 54 participants whereas Posmontier et al. (2016) conducted a prospective cohort study with 41 participants, dividing them into a control group ( $n = 20$ ) and an intervention group ( $n = 21$ ). To recruit participants, Posmontier et al. (2016) administered an EPDS self-scoring tool to 166 new mothers and identified women with postpartum depression (EPDS score  $> 9$ ) and had certified nurse-midwives (CNM's) provide long-distance counseling to the participants over the phone. Niksalehi et al. (2018) sent daily educational text messages to postpartum women for 35 days, providing information about postpartum depression, coping techniques, relaxation techniques, and the importance of social support. One week after the 35-day follow-up, Niksalehi et al. (2018) re-administered a follow-up EPDS to evaluate the effectiveness of the intervention.

Posmontier et al. (2016) concluded that CNM administered therapy significantly decreased the Hamilton rating scale for depression at 8 and 12 weeks ( $p = 0.047$  at 8 weeks and  $p = 0.029$  at 12 weeks), however, there was no statistically significant difference in the EPDS scores even though they did see a decrease in the EPDS scores across both treatment groups over time. Shorey et al. (2019), reported a statistically significant 1.16-point decrease in the EPDS score of the intervention group with a 95% confidence interval, and similarly, Niksalehi et al. (2018) reported a statistically significant decrease in the EPDS scores, with a pre-intervention

EPDS score of 14.44 (SD = 2.66) and a post-intervention EPDS score of 11.94 (SD = 2.49) in the control group. However, McCarter et al. (2018) concluded that the interventions were perceived as helpful but did not significantly reduce depression scores or parenting stress, likely because the EPDS is not a sensitive enough instrument to reflect the benefits received from a simple nursing intervention (calls/texts). Future research is needed to identify a measure that is sensitive to nursing interventions to accurately evaluate the interventions' effect (McCarter et al., 2018). The study by McCarter et al. (2018) is also limited in application because all the participants were recruited from one hospital in the Northeastern area of the United States consisting of a predominantly white and well-educated population. It may have been more applicable to broaden the scope of the study to several facilities to include people from all economic and social backgrounds.

Shorey & Debby (2019) conducted a descriptive qualitative interview to evaluate the postnatal experiences of the mothers in the previously mentioned study by Shorey et al. (2019). Participants were recruited through email which was sent to the 136 participants from the original study (Shorey & Debby, 2019). Thirty-six mothers volunteered for the interviews, but data saturation was reached and only 20 volunteers were utilized (Shorey & Debby, 2019). Through the interview process, this study generated two overarching themes that comprised of five subthemes: postnatal experience (a bouncy ride, a way forward) and evaluation of the peer-intervention program (valuable, flexible, and supportive program; building blocks of a good relationship; and lessons learned and the road ahead) (Shorey & Debby, 2019). A major strength of this study is that Shorey & Debby (2019) interviewed both the mothers and the peer volunteers which provided a well-rounded perspective of the peer intervention program [PIP]. This study also provided valuable insight on the preferred types of social support and help

seeking-behaviors of Asian mothers in the postpartum period (Shorey & Debby, 2019). Limitations of this study include the cross-sectional design which does not allow for a pre-test/post-test comparison, making it difficult to determine how effective the intervention was (Shorey & Debby, 2019). This study excluded first-time mothers which may have created a positive bias in the findings and provided inaccurate information on the usefulness of the PIP (Shorey & Debby, 2019). Future interviews should include an equal number of first-time mothers and experienced mothers to evaluate the effectiveness of the intervention (Shorey & Debby, 2019).

Overall, Shorey & Debby (2019) concluded that the peer-intervention program was useful in meeting mothers' postpartum needs and was generally acceptable by both mothers and volunteers. This is significant because hospitals and healthcare providers can provide additional support to at-risk mothers by using digital communication in addition to the standard postpartum care that is currently in place. However, these studies were limited in application because participants were recruited from a single site and targeted only English-speaking mothers (Shorey et al., 2019). This is important because minority groups tend to experience greater social and economic adversity which increases their risk for postpartum depression (Liu et al., 2016). Participant satisfaction is also worth noting because technology can be used to increase the timeliness and quality of care provided to patients and can decrease rates of postpartum depression in many different populations. Future research should consider integrating more languages to study the effects of technology on postpartum depression in minority groups.

***EPDS Validity:*** The Edinburgh Postnatal Depression Scale [EPDS] is a 10-item self-rating scale designed to screen for postnatal depression within the past 7 days (Eberhard-Gran et al., 2001). The EPDS tool is widely used throughout the world to screen perinatal women for

depression and has been found to have 100% sensitivity and 87% specificity with a cutoff score of  $\geq 10$  (Cox et al., 1987; Eberhard-Gran et al., 2001; Smith-Nielsen et al., 2018). However, a major weakness of the EPDS tool is the wide variation of cutoff scores used throughout the world. The most used cutoff score in postnatal women is  $\geq 13$ , but Smith-Nielsen et al. (2018) reviewed validation studies from several different countries and found that the cutoff scores vary from 7 to 13 depending on the country.

In a validation study comparing the EPDS against the DSM-5 and ICD-10 diagnostic criteria, Smith-Nielsen et al. (2018) found a score of 11 or more to be the optimal cutoff for depression when factoring in criteria from the DSM-5 and ICD-10. In an Italian validity study, Benvenuti et al. (1999) found a cutoff score of 11/12 to be the most sensitive and specific in a clinic setting, whereas Eberhard-Gran et al. (2001) found a score of 10 or more to be the most sensitive and specific among a Norwegian sample. Both Benvenuti et al. (1999) and Eberhard-Gran et al. (2001) used the Cronbach's alpha reliability coefficient to measure internal consistency when determining an appropriate EPDS cutoff score, which ranged from 0.74 to 0.79.

In a systematic review, Kozinszky & Dudas (2015) found that cultural differences affected the sensitivity and specificity of the EPDS score and that a universal cutoff score is not advisable due to cultural differences affecting the success of the scoring tool. A major advantage to the EPDS screening tool is that it is free to use, easy to administer, and generally acceptable among women (Kozinszky & Dudas, 2015). These validation studies confirm that the EPDS screening tool is a reliable and valid instrument for detecting postpartum depression (Eberhard-Gran et al., 2001).

***Depression Screening:*** ACOG recommends using the EPDS tool for screening peripartum women for depression as this scale is sensitive toward both depression and anxiety (Kroska & Stowe, 2020). In a randomized controlled trial, Shorey et al. (2019), collected EPDS scores at baseline and again after the intervention had been implemented, at the 4<sup>th</sup> and 12<sup>th</sup> weeks postpartum, via a Web-based questionnaire and found that the EPDS scores were lower at 3 months in the intervention group (who received a weekly text message follow-up from a peer volunteer) than the control group (standard of care). McCarter et al. (2018) also used the EPDS to evaluate their intervention after 3 weeks, 3 months, and 6 months but found no significant changes in EPDS after sending out electronic messages four times per week for 6 months. Additionally, Niksalehi et al. (2018) and Posmontier et al. (2016), found that long-distance counseling via text & phone calls with postpartum women resulted in lower EPDS scores.

A major strength of the studies by Shorey et al. (2019) and McCarter et al. (2018) was the randomized controlled trial design. Posmontier et al. (2016) recruited participants from eight obstetric practices in the United States which is a strength of this study because it makes the results more generalizable. Limitations of these studies include the pre-test/post-test method and single group design (Niksalehi et al., 2018), and EPDS score evaluation in the postpartum period only (McCarter et al., 2018; Posmontier et al., 2016; Shorey et al., 2019), however, Niksalehi et al. (2018), Posmontier et al. (2016), and Shorey et al. (2019) showed that text message follow-up in postpartum women can successfully decrease the EPDS score and rates of postpartum depression which is significant because it represents a major shift that should occur in postpartum healthcare delivery. Considering that depression in pregnancy is a major predictor of postpartum depression, future research should evaluate the effectiveness of these interventions being administered in the intrapartum and postpartum periods.

***Mode of Contact:*** Each study varied in who communicated with patients in the postpartum period. Shorey et al. (2019) recruited peer volunteers by word of mouth and had them trained by a psychiatrist on social support skills before the intervention commenced. The benefit to this model is that the healthcare providers are not spending time taking care of patients outside of the office, but the disadvantage is that the peer volunteer model may not be a good long-term solution without them receiving any sort of compensation for their time. McCarter et al. (2018) used a registered nurse to send out a standardized message to participants and follow-up with patients. This study found 72% of participants liked the option of having a nurse available to call them back if they requested, and 69.4% of participants enjoyed receiving text messages and emails from postpartum nurses (McCarter et al., 2018). Posmontier et al. (2016) used nurse-midwives to administer telephone-based interpersonal psychotherapy to patients. While patients loved the continuity of care offered with this study, this study concluded that this would not be a feasible method for all nurse-midwives due to the time-consuming nature of the project (Posmontier et al., 2016). There are advantages and disadvantages to all these models, but it is important to note that all these studies came to a similar conclusion showing some sort of improvement in postpartum depression after the intervention had been implemented. This begs the question of whether the social support provided by the multiple follow-ups could have been partially responsible for the decrease in postpartum depression. Future research is needed to determine the benefits of nurse-sensitive outcomes of technology-assisted interventions (McCarter et al., 2018).

## **Methods**

This plan-do-study-act quality improvement project aims to decrease rates of postpartum depression by implementing a text-message follow-up system for women in the early postpartum

period. The objective of this project is to increase communication between patients and healthcare providers in the early postpartum period. This section will review the evidence-based practice model (plan), project design (do), data collection method (study), evaluation (act), and study barriers and limitations. The John Hopkins evidence-based practice model serves as the framework for this project. This model is a powerful problem-solving approach to clinical decision-making and is accompanied by user-friendly tools to guide individual or group use (Vera, 2021).

### **Plan**

*Design.* This project will use a descriptive comparative design with a retrospective analysis, which is appropriate to compare EPDS scores pre-intervention and post-intervention and to gather EPDS scores from the patients' chart to input into Qualtrics.

*Sample.* Participants in this project will include a convenience sample of all women who delivered a healthy baby vaginally at St. Marks Hospital during the four-week recruitment time frame. To determine the minimum sample size, a power analysis was conducted using a student t-test for differences between independent groups, with an alpha of  $< 0.05$ , a power of 0.80, and a medium effect of 0.30. The minimum sample size was determined to be 44. Participant inclusion criteria: vaginal delivery, possession of or access to an operational cellular device with texting capability, and no current use of anti-depressant medication. Participant exclusion: c-section delivery, current anti-depressant use, current drug, alcohol, or tobacco use, and newborn admitted to NICU regardless of gestational age.

*Setting.* Participants will be recruited from an outpatient OBGYN office in Salt Lake City, UT that employs ten obstetric providers who deliver approximately 210 babies per month. The c-section rate is around 21% which equates to about 165 vaginal deliveries per month. St



Marks OBGYN is located at St. Marks Hospital in the outpatient center. The hospital and clinic are located in a culturally diverse area of Salt Lake City and they pride themselves in using the most advanced technology to provide high-quality care to all patients (*St. Mark's Hospital – About Us*, n.d.). This outpatient clinic was selected due to the professional relationship that is already established with the providers at this clinic. Clinic patients will be enrolled from St. Marks hospital during their hospital post-partum stay. The enrollment period will be four weeks in the hospital with follow-up in the outpatient clinic at the post-partum visit.

## **Do**

**Measures:** Project information will be provided to stakeholders at the hospital and the clinic including the unit manager and charge nurses in labor & delivery and postpartum, the clinic manager, clinic nurses, and all the OBGYN providers. The Primary Investigator (PI) will maintain a list of patients who delivered babies each day of the enrollment phase and will be in close contact with the stakeholders throughout the project.

Demographic data, including age, marital status, college education, ethnicity, socioeconomic status, parity, gestational age, and feeding method (breastfeeding vs. formula feeding), will be collected through an electronic survey on Qualtrics. A pre-test/post-test design will be used by administering a pen and paper EPDS screening tool to participants before discharge from the hospital and then again at the four to a six-week follow-up visit with their healthcare provider to evaluate the effectiveness of the intervention.

Data will be collected and organized by the PI, Camille Last, with the assistance of clinic nurses assigned to collect EPDS post-scores and keep them in a binder for the PI review for Qualtrics entry. Nurses on the postpartum unit will collect EPDS scores at the time of discharge which is already a standard procedure at St. Marks Hospital. The outpatient OBGYN clinic

employs three nurses who will have a binder with a list of patients enrolled in the study. These nurses will be responsible for collecting EPDS scores for all the study participants. The primary investigator will then conduct a retrospective chart review to obtain the EPDS scores that are collected and enter the data into Qualtrics.

The EPDS tool was chosen because it is the gold standard for postnatal depression screening and is the most used tool in clinical practice and research settings (“ACOG Committee Opinion No. 757: Screening for Perinatal Depression”, 2018). The EPDS tool is translated into 50 different languages and consists of 10 self-reported questions that take less than 5 minutes to complete (“ACOG Committee Opinion No. 757: Screening for Perinatal Depression”, 2018). This screening tool is appropriate for the perinatal period because it considers anxiety symptoms which are common in perinatal mood disorders, but it excludes constitutional symptoms, such as changes in sleep patterns, which are common in pregnancy and the postpartum period (“ACOG Committee Opinion No. 757: Screening for Perinatal Depression”, 2018).

## **Study**

***Procedures:*** Before data collection, IRB approval will be obtained through both Roseman University of Health Sciences and St. Marks Hospital. Eligible participants will then receive a brochure outlining information about the project, how text-message follow-up will be used to check-in with the participants and see how they are feeling after discharge from the hospital, and how the EPDS tool will be used to measure depression at discharge from the hospital and again at their four to six-week follow-up. The brochure will also have the PI’s name and contact information and information about the IRB. After formal education occurs, informed consent will be obtained, and patients will provide a phone number to receive text messages.

Enrollment for this project will occur over a four-week time frame. The PI will enroll participants seven days a week to capture all patients who delivered from the assigned clinic. Participants will complete the EPDS pre-test before discharge from the hospital and the PI will upload the scores into Qualtrics. Four weeks later, the PI will follow up with the clinic nurses to obtain EPDS post-test scores and enter them into Qualtrics for data analysis.

Text messaging to each participant will begin on the first day after discharge from the hospital and will continue twice a week until the participants' postpartum follow-up visit. Based on the literature review, using text messaging to follow-up with postpartum patients predicts that the EPDS scores will be decreased with twice a week follow-up for 4 weeks (Morris et al., 2021; Niksalehi et al., 2018; Shorey et al., 2019). Text messages will follow up on how the participant is feeling after being discharged from the hospital, and answer questions about the most common postpartum issues including breastfeeding, infection, pain, postpartum blues, depression, sleep, and fatigue. The PI will use a flowchart created by the OBGYN providers and the PI before the study begins. For questions or concerns not listed in the flowchart, the PI will use clinical judgment to provide anticipatory guidance and offer reassurance, and in some cases, recommend the patient schedule an appointment with their healthcare provider.

The PI will keep a binder containing a list of patients who delivered during the enrollment phase, keeping track of patients who were asked to enroll and patients who were recruited to be participants in this project. The full length of this project is 10-12 weeks. The objective is to increase communication between the patients and healthcare providers with the expectation that the post-intervention EPDS score will be lower.

***Data collection.*** The use of informatics will include an iPad to input data into Qualtrics, which is a secure password-protected database. Only the PI will have the passcode to access

information on the iPad. Any information obtained will have patient identifiers removed before leaving the hospital or clinic. Each participant will be assigned a unique patient identification number at enrollment that will be used in Qualtrics to organize and keep track of demographic information and EPDS scores throughout the project.

Once informed consent is obtained the PI will ask participants to complete an electronic demographic survey through Qualtrics on the project iPad. EPDS scores will be filled out on paper and data entered in Qualtrics as the EPDS completion on paper is the procedure at the hospital and clinic. The EPDS tool is public domain and does not require permission to use. The instructions for filling out and scoring the EPDS tool are provided on the survey therefore no additional training will be required.

*Statistical Analysis.* Demographic data and EPDS scores will be downloaded from Qualtrics into SPSS for statistical analysis. Based on the interval data, the student t-test will be used to evaluate the pre-and post-test scores. Descriptive statistics will be used to summarize participant demographics using means, standard deviations, and frequencies with an alpha level of 0.05 for statistical significance.

## **Act**

*Evaluation.* This project supports the use of text-message follow-up in postpartum patients and the recommendation from ACOG (2018) for healthcare providers to use digital communication to follow-up with postpartum patients sooner than the standard four-to-six-week follow-up. Data generated from this project will be disseminated as an in-service to nurses and OB providers and St. Marks OBGYN clinic and St. Mark's hospital L&D and postpartum units.

This project has the potential to expand into the further study by increasing patient population, a correlational descriptive design. Adding another office to the project as the

standard of care group (control) and another office to be the intervention group would increase the population evaluated to further examine post-partum EPDS scores after text messages. In the future, OB clinics may implement text messaging as the standard of care, using software like the automated text-messaging appointment reminder system to help improve post-partum care to be more continuous.

### **Human Subject Protection**

IRB approval will be obtained from Roseman University of Health Sciences, and St. Mark's hospital. CITI training was completed by the primary investigator before project implementation. The PI will obtain informed consent for every mother participating in the project. Education will be provided to the office staff regarding the collection of EPDS scores and text messages being sent. Every effort will be made to secure protected health information. All patient information will be kept in a locked cabinet at the clinic. Any EPDS surveys taken from the hospital will be securely shredded. Qualtrics is a secure password-protected database that will be used to input and organize demographic data and EPDS scores. All information collected will be protected in Qualtrics by using the assigned identification number.

### **Strengths and Limitations**

Limitations of this project proposal are 1) the lack of patient education on postpartum depression and available resources which could be included in the text-message follow-up, and 2) lack of generalizability as this project only evaluated mothers at one clinic and hospital, and 3) potential for selection bias due to convenience sampling.

Strengths of this project include 1) increased social support to mothers in the early postpartum period; 2) early identification of postpartum depression symptoms, and 3) increasing awareness of postpartum depression and the need for earlier intervention.

## Conclusion

Postpartum depression is one of the most common types of depression and affects nearly one in nine women throughout the world (Hanach et al., 2021). Treatment is available, yet upwards of 40% of women do not attend a postpartum visit (Stuebe et al., 2018). Optimal postpartum care provides an opportunity to promote the overall health and well-being of women and address infant feeding plans, reproductive care, mental health, postpartum problems, and chronic health conditions (Stuebe et al., 2018). Technology is an easy and efficient way to improve the quality of care provided to patients and has been shown to lower the rates of postpartum depression and decrease EPDS scores by 2.5 ( $p < 0.001$ ), regardless of the mode of contact (Shorey et al., 2019, Niksalehi et al., 2018). Text messaging does not have the challenges that are seen with telephone and internet therapy, such as difficulty coordinating schedules to receive treatment, which is why it should be considered as a viable method to follow-up with postpartum patients in the weeks following hospital discharge (Niksalehi et al., 2018).

This project is supported by literature and can be applied to the postpartum period to improve quality of care and decrease rates of depression. The EPDS tool was used because it is the gold standard for screening postpartum women for depression and is a valid and reliable instrument (“ACOG Committee Opinion No. 757: Screening for Perinatal Depression”, 2018; Smith-Nielsen et al., 2018). The General Systems Theory and the Change Theory provide a theoretical framework that supports the implementation of technology and communication between the patient and healthcare provider, facilitating early intervention which leads to improved patient outcomes. Text messaging is a convenient and efficient way to communicate with women in the chaotic and stressful postpartum period. By implementing a text message

follow-up system, this project aims to increase communication and improve patient outcomes by decreasing rates of postpartum in the early postpartum period.

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