Optimizing Inpatient Preeclampsia Discharge Practices

Molly K. Williams

Edson College of Nursing and Health Innovation, Arizona State University

Author Note

Molly K. Williams is a graduate student in the Edson College of Nursing and Health Innovation at Arizona State University. She is a registered nurse with experience in postpartum and neonatal care.

She has no known conflict of interest to disclose.

Correspondence concerning this article should be addressed to Molly K. Williams, Edson College of Nursing and Health Innovation, Arizona State University, 550 N. 3rd Street, Phoenix, AZ 85004. Email: mheiss@asu.edu

Abstract

Postpartum preeclampsia poses a substantial risk for cardiovascular complications and mortality amongst affected mothers. The scarcity of widespread understanding regarding the symptomatic presentation and associated risks of postpartum preeclampsia contributes to an elevated incidence of readmissions following childbirth. Such readmissions exert a detrimental effect on maternal-infant bonding, intensify healthcare-related expenditures, and amplify the maternal susceptibility for cardiac complications and mortality. Existing research accentuates the preventability of preeclampsia-related readmissions through meticulous and comprehensive patient education. A review of the literature points to the efficacy of modified discharge instruction protocols in mitigating the occurrence of postpartum preeclampsia readmissions. Consequently, an educational intervention engrained in evidence-based practice was introduced to evaluate the influence of a postpartum preeclampsia awareness on the frequency that postpartum registered nurses (RNs) provide patients with preeclampsia education at the time of discharge. The intervention design was informed by the Health Belief Model (HBM) and the Iowa Model Revised, which were used in conjunction to formulate a survey that assessed RNs perceptions of and confidence related to postpartum preeclampsia, as well as the effect of unit education on the frequency and quality of preeclampsia discharge teaching. The intervention intended to enhance nurses' knowledge and confidence in divulging education concerning the appropriateness of seeking outpatient versus emergent care for postpartum preeclampsia. If maintained, the intervention has the potential to diminish the occurrences of maternal-child separation, reduce readmission rates, and lessen the risks of adverse outcomes for postpartum.

Keywords: postpartum, preeclampsia, prevention, readmission, education, teach-back

Optimizing Inpatient Preeclampsia Discharge Practices

Readmissions in the postpartum period affect mothers across the country daily. This type of readmission is often preventable with adequate discharge education and close outpatient follow up. Postpartum preeclampsia can impact a mother's ability to care for and bond with her newborn baby. Hypertension and preeclampsia do not discriminate, affecting mothers of all ages, races, and socioeconomic statuses. Adequate patient education regarding the disease process, medication regimen, when to call a provider, and having a pre-scheduled follow-up appointment may contribute to decreased readmission rates for postpartum preeclampsia. The purpose of this project is to determine understand baseline knowledge RNs have regarding postpartum preeclampsia prior to administering an educational intervention and providing organization approved resources. The secondary aim, then, is to sustain the quality of postpartum discharge education and curb the rate of postpartum preeclampsia-related readmissions.

Problem Statement

Hypertensive disorders of pregnancy, including preeclampsia, are connected to approximately 30% of postpartum readmissions (Bruce et al., 2021). Despite preeclampsia being well-studied and quite common in pregnancy, six to eight percent of postpartum re-hospitalizations are due to hypertensive complications (Stamilio et al., 2021). A postpartum mother may develop preeclampsia for up to six weeks after delivery, although case reviews show readmissions more commonly occur within one week of delivery (Stamilio et al., 2021). This is noteworthy as untreated hypertensive disorders in the postpartum timeframe contribute significantly to maternal morbidity and mortality (Louis et al., 2022; Lovgren et al., 2021; Rana et al., 2019; Redman et al., 2019; Wen et al., 2019). In Arizona, approximately 900 women will be impacted by a severe event annually during labor or delivery (Lewandowski et al., 2020).

National rates of maternal morbidity and mortality are steadily rising, which indicates a need for improvement in the care of women in their childbearing era (Lewandowski et al., 2020). Adequate blood pressure control during hospitalization and thorough discharge education about warning signs and follow up are necessary to reduce postpartum readmissions secondary to postpartum preeclampsia.

Purpose and Rationale

Healthcare clinicians, especially RNs, play a key role in reducing readmissions through effective and accurate discharge education. The need for readmission related to postpartum preeclampsia may be reduced by increasing utilization of discharge education resources and by improving bedside RN confidence levels related to the topic. Postpartum readmission, a highly preventable adverse outcome, leads to strain on the mother, her support system, and the newborn baby. The purpose of this paper is to identify current practices related to postpartum preeclampsia discharge education and the teaching avenues by which the education is provided. By enhancing patient education and initiating early postpartum follow-up appointments, the readmission rates for postpartum preeclampsia may be reduced.

Background and Significance

Preeclampsia is a disorder of pregnancy related to placental insufficiency characterized by new-onset hypertension, proteinuria, thrombocytopenia, or elevated liver enzymes (Rana et al., 2019). The condition affects five to seven percent of pregnancies and can lead to maternal and fetal death if left uncontrolled (Rana et al.., 2019). The definitive treatment for antepartum preeclampsia is delivery of the fetus, although symptoms may persist (Rana et al., 2019). There is another condition, called de novo postpartum preeclampsia, that affects women after delivery. De novo postpartum preeclampsia is new-onset hypertension that occurs 48 hours or more after

childbirth and increases the risk of heart failure, cardiomyopathy, and death (Rana et al., 2019). The etiology of postpartum preeclampsia is not well understood, which leaves room for improvement in the management and care of these patients.

Readmission for Postpartum Preeclampsia

In recent years, there has been a notable uptick in women developing postpartum preeclampsia between 48 hours and six weeks after childbirth (McLaren et al., 2021). Due to limited office visits after giving birth, the incidence of postpartum preeclampsia is estimated to be between 0.3% to 27.5% (Hauspurg & Jeyabalan, 2022; McLaren et al., 2021; Redman et al., 2019; Smithson et al., 2021). Hypertensive disorders are the number one cause of postpartum readmissions (Hauspurg & Jeyabalan, 2022). The need for rehospitalization most commonly occurs within seven days after giving birth, with varying factors impacting the need for inpatient care (Chornock et al., 2021; Stamilio et al., 2021). Risk factors include advanced maternal age, abnormal BMI, and Non-Hispanic black race (Redman et al., 2019; Smithson et al., 2021). Mothers who smoke, deliver their babies preterm, deliver by cesarean section, and have gestational diabetes are also at increased risk (Parker et al., 2023). Common warning signs that precede readmission include severe headache and changes in vision (Hauspurg & Jeyabalan, 2022; Powles & Gandhi, 2017; Redman et al., 2019). Women requiring readmission for preeclampsia are at high risk of complications later in life including, but not limited to, cardiovascular comorbidities, arterial abnormalities, and mortality (Rana et al., 2019). In addition, bonding time is lost and medical bills are increased when mothers are readmitted.

Interventions to Decrease Readmission Rates

Various studies have shown a successful reduction in and prevention of readmissions when patients had close monitoring in a provider's office after discharge. Close monitoring and

timely follow-up appointments are recommended for all patients diagnosed with hypertensive disorders (Wen et al., 2020b). Blood pressure readings should be closely monitored in a hospital setting for the first 72 hours after childbirth and then reassessed by an outpatient provider seven to ten days later (Wen et al., 2020b). More conservative recommendations suggest outpatient follow up within 24 to 48 hours after discharge from the hospital, which allows for early identification of complications and implementation of preventive measures (Lovgren et al., 2021). At-home monitoring of blood pressure by the patient or a home health nurse may assist in the early identification of increasing values (Louis et al., 2022; McLaren et al., 2021). Patient education regarding symptoms, management, reportable changes, and when to seek medical care is critical to preventing readmissions (Hauspurg & Jeyabalan, 2022; Louis et al., 2022; McLaren et al., 2021).

Current Practices Regarding Post-Delivery Care

The American College of Obstetricians and Gynecologists (ACOG) recommends an initial blood pressure follow up three to ten days after giving birth and a comprehensive visit one to three weeks postpartum (Louis et al., 2022). After the initial postpartum visits, patient with known hypertensive disorders should undergo advanced cardiovascular risk assessments within three months (Louis et al., 2022). Management of preeclampsia is determined by medical providers based on comorbidities, severity of the disease process, and patient specific needs in combination with current evidence-based practices. Being that the initial treatment for preeclampsia is delivery, antihypertensives are often first line in treating postpartum preeclampsia to prevent stroke. Commonly prescribed medications include nifedipine XL, labetalol, methyldopa, and enalapril (Powles & Ghandi, 2017). As recommended by the ACOG, the best practice is to have all patients with hypertensive disorders follow up within 72 hours of

discharge (Chornock et al., 2021). Providers adjust the care plans recommended by ACOG to meet each patient's complex needs, which makes it difficult to develop and standardize a single management plan. Due to the complexity of preeclampsia in the postnatal period, enhanced standardized education practices at the time of discharge could be lifesaving.

Desired Future State via Improved Postpartum Preeclampsia Education

Maternal health is compromised with any diagnosis of preeclampsia; thus, early identification and preventive measures are required to make proactive changes and improve readmission rates (Hauspurg & Jeyabalan, 2021). Approximately seven percent of maternal deaths in the United States are related to hypertensive disorders (Lovgren et al., 2021). Readmissions suggest suboptimal education and contribute to increased risks of morbidity (Combs et al., 2022). Detailed discharge education on preeclampsia precautions, warning signs, and follow up needs is critical when working to reduce maternal mortality (Dol et al., 2022).

Effective management of postpartum preeclampsia would reduce the number of overall readmissions across the country, which would decrease costs. The average cost of postpartum readmission is between $3,900 and $8,500, which impacts patients, especially those without insurance or of lower socioeconomic status (Wen et al., 2020a). Although patients may not desire it at the time, a longer initial stay after childbirth is a beneficial outcome. An extended stay allows for medication adjustments, improved pain control, lab monitoring, and thorough education (Wen et al., 2020b). When initial postpartum hospital stays were five to seven days long, the risk for readmission within 60-days of discharge was significantly decreased (Wen et al., 2020b). A longer stay supports improved management of medications and pain, which can impact blood pressure readings if uncontrolled (Wen et al., 2020b). Current literature suggests a long-term evaluation of how the length of stay affects readmission rates.

A Link Between Discharge Education and Readmissions

Due to the varying needs of patients, there are numerous approaches to managing postpartum preeclampsia. Without a streamlined process for the management of all patients, there is a high risk of readmission. Due to the unique circumstance, education plays a critical role in preventing hospitalizations after discharge. Bedside RNs would benefit from a standardized education process to guide postpartum preeclampsia discharge education for all patients, regardless of diagnoses.

Internal Evidence

An increase in readmission rates for postpartum preeclampsia initiated an internal review of existing discharge practices within a large hospital system serving a major Southwestern metropolitan area. This organization, dedicated to enhancing healthcare practices, serves a varied demographic population, including homeless individuals, substance users, underserved populations, those of varying socioeconomic statuses, and complex high-risk patients. The diversity of the patient population suggests a multifaceted set of contributory factors to the noteworthy rate of readmissions for postpartum preeclampsia.

Nursing staff reported an uptick in readmissions, which prompted dialogue with key stakeholders to distinguish the necessity for standardized discharge practices and patient education exclusive to postpartum preeclampsia. While the organization tracks generalized readmission indicators, there is a recognized need for precise tracking of postpartum preeclampsia readmissions. This issue is of considerable significance to the institution and its patient population, given the serious implications associated with readmission. The initial plan includes implementation of an educational intervention to increase postpartum preeclampsia discharge teaching in combination with organization approved resources.

PICOT Question

In postpartum-trained RNs, how does an educational intervention combined with organization approved resources compared to current practice affect the frequency that postpartum preeclampsia education is administered at the time of discharge?

Search Strategy

A comprehensive review of existing evidence was performed to evaluate the concerns brought forth by the PICOT question. A detailed search of four databases included PubMed, ProQuest, Ovid, and Science Direct. Databases were selected based on relevancy to health, nursing, and medicine. Furthermore, these databases provided significant findings on postpartum readmissions related to preeclampsia.

Keyword Selection

Various keyword combinations related to the PICOT question were searched across the databases. Initial keywords included: *postpartum, readmission, preeclampsia, hypertension, patient education,* and *discharge education.* The initial search yielded thousands of results. Thus, variation in keyword searches and phrases was implemented. Enhanced keywords included: *postnatal, after birth, after delivery, hypertensive disorder of pregnancy, re-hospitalization, discharge teaching,* and *patient teaching.* Boolean operators were utilized to refine results and identify studies with increased relevance to the PICOT question. Examples of Boolean operators included *postpartum* OR *postnatal, preeclampsia* OR *hypertension,* and *patient teaching* OR *discharge teaching.*

Initial and Final Search Yields

The initial search of *postpartum, preeclampsia* OR *hypertension,* and *readmission* yielded 46 results in PubMed, 13,325 in ProQuest, 2,526 in Ovid, and 11,391 in Science Direct.

Then, a combination of various keywords and Boolean operators were implemented to refine the search further. Superior keywords included *hypertensive disorder of pregnancy, after birth, after delivery, patient teaching,* and *discharge teaching.* The narrowed combination of keywords yielded ten results in PubMed, 1,390 in ProQuest, eight in Ovid, and 146 in Science Direct. Supplemental literature from the Arizona Department of Health Services was also searched and reviewed.

Limitations, Inclusion, and Exclusion Criteria

Inclusion and exclusion criteria were implemented to eliminate studies that did not meet the search needs of the PICOT question. Search limits were set to include publications between 2018 – 2023, peer-reviewed journals, and journals available in English. Partial-text and abstract-only literature were excluded from the results. Criteria for inclusion encompassed literature regarding postpartum patients, preeclampsia or hypertension, readmissions, and risk factors for readmission related to preeclampsia. Solely studies of primary research were included. After vigorous database searches were performed, a final set of ten studies were selected for further evaluation. The studies included two cohort studies, four retrospective cohort studies, one mixed-methods study, one single-cohort feasibility study, one case control study and one systematic review (see Appendix A, Table A1 and Table A2). The selected studies addressed the PICOT question and examined the causes of readmission for postpartum preeclampsia.

Critical Appraisal and Synthesis of Evidence

The final ten studies were examined via a rapid critical appraisal (RCA) checklist, which assisted in determining validity, reliability, and applicability to practice (Melnyk & Fineout-Overholt, 2019). Due to the nature of readmissions being primarily of quantitative focus, nine studies emphasized numerical data (see Appendix A, Table A1). A single mixed-methods study

was evaluated and provided remarkable qualitative data applicable to the PICOT question (see Appendix A, Table A2). Finally, a complete synthesis of the evidence was performed (see Appendix A, Table A3) to confirm the relevance and applicability of findings across the studies.

Subjects in the selected studies were between the ages of 15 to 54 with a history of preeclampsia or pregnancy-related hypertension and were of varying demographics. Of the studies, 60% were conducted in the United States, and 70% were conducted in a hospital rather than a research setting. There was heterogeneity among interventions, including blood pressure evaluation, prediction tools, identifiable risk factors, and modified discharge processes. Findings were determined based on chart reviews for 100% of the studies, risk assessments for 50% of the studies, and readmission databases for 20% of the studies. Evaluations of the interventions on readmission rates were documented in 80% of the studies and showed that modified discharge education and use of teach-back were effective in reducing readmissions.

A handful of successful interventions were identified via the evidence synthesis. Discharge education related to diagnoses, warning signs, and follow up needs were effective in decreasing readmission rates (Becker et al., 2021; Pugh et al., 2021). Patient education specific to the disease process demonstrated a reduction in readmissions (Becker et al., 2021). Use of the teach-back method at discharge resulted in a 45% reduction in readmissions (Oh et al., 2021). The comprehensive literature review supported the use of discharge education and the teach-back method at the time of discharge as effective methods to reduce readmissions.

Using Evidence to Influence the DNP Project

From the appraised studies, data suggested that various interventions have potential to reduce preeclampsia readmissions. Literature indicated that modified discharge education and the use of the teach-back method positively impacted postpartum readmission rates secondary to

preeclampsia. Education should include risks of developing preeclampsia, symptoms of preeclampsia, when to call the doctor, and when to seek care at a hospital. If subtle changes are discovered early, patients may be managed in the outpatient setting, potentially preventing readmission. Several benefits accompany a reduction in readmissions, including cost reduction for patients and facilities, prevention of maternal-child separation, and decreased maternal cardiovascular risks.

Educating bedside RNs is a fundamental step in preventing readmissions. Baseline confidence and current practices were assessed with a pre-survey questionnaire. An educational PowerPoint with detailed statistics about de novo postpartum preeclampsia was presented to RNs after completion of the pre-survey. RNs on the unit received education on organization-provided resources that have been approved for distribution to patients. After allowing the RNs two weeks to implement discharge education about postpartum preeclampsia utilizing the teach-back method, a post-survey was administered. Desired findings included: 1) an increase in registered nurse confidence when providing education about postpartum preeclampsia, 2) increased frequency of education provided, and 3) increased use of the teach-back method at the time of discharge. Long-term benefits of the education would demonstrate a reduction in readmissions related to postpartum preeclampsia.

Theoretical Framework Application

The Health Belief Model (HBM) was developed based on the idea that community members did not participate in screenings due to personal beliefs and perceptions regarding disease susceptibility (Glanz et al., 2018). Years of research concluded that six key factors play a role in an individual's beliefs about disease susceptibility, the need for routine screening, and their desire to treat (Glanz et al., 2018). The factors are *perceived susceptibility*, *perceived*

severity, *perceived benefits*, *perceived barriers*, *cue to action*, and *self-efficacy* (Glanz et al., 2018). The theory explains that a patient must believe they are susceptible to a severe illness. Therefore, they will evaluate risks and benefits, leading them to decide whether they will change their health behaviors (see Appendix B, Figure B1). The HBM is a vital resource for assessing high-risk behaviors and patient understanding of health consequences. The HBM focuses on developing a screening or treatment plan that meets the patient's needs. The model encourages providers to educate patients and alter treatment plans to assist the patient in a way that they can successfully follow the regimen. The high-risk population at the large hospital system in metropolitan Phoenix would benefit from using the HBM in planning and managing care.

Implementation Framework

The Iowa Model Revised is an evidence-based practice framework that promotes excellence in healthcare (Iowa Model Collaborative, 2017). This process works by identifying an issue, stating a question, forming a team, synthesizing evidence, piloting practice changes, and determining if practice change is sustainable (see Appendix B, Figure B2). For example, staff on the unit identified an increased frequency of postpartum readmissions for preeclampsia. A question was posed to determine whether a modified discharge education process including use of the teach-back method would increase RNs knowledge regarding preeclampsia and confidence in educating patients on the topic, which in turn would decrease readmissions. Key stakeholders at the organization were included in conversations about process improvement. After initial organizational approval was obtained, a thorough literature review and synthesis were performed to provide evidence to support a practice change. RNs and key stakeholders played a vital role in implementing practice changes to determine their impact on the unit-identified issue.

Implications for Practice Change

Evidence showed that modified discharge practices, including the teach-back method and detailed follow-up instructions, can decrease the risk of readmission (Oh et al., 2021; Pugh et al., 2021). Development and implementation of a discharge education tool that includes warning signs, when to contact a healthcare provider, and when to seek emergency care has the potential to decrease the number of readmissions for preeclampsia. Due to the limited data collection window, the Likert-scale pre- and post-evaluations of discharge practices and nursing confidence levels will be used to assess for practice change and improvement. Continued use of the educational tool and surveys may be combined with comparisons of readmission rates in the future. The intervention is beneficial to the organization and postpartum patients. Reducing postpartum readmissions related to preeclampsia reduces costs to the organization and the patient, reduces impaired bonding rates, and reduces maternal morbidity and mortality.

Project Setting and Role of Stakeholders

The project setting was a 72-bed women and infants services (WIS) department at a large metropolitan hospital in Southwest Phoenix. The WIS department was staffed with 87 postpartum nurses and 43 antepartum nurses who were cross trained to care for postpartum mother-baby dyads, also known as couplets. The facility is well-known for its ability to treat women with high-risk obstetrical needs. In addition, quality improvement (QI) and continuous learning were encouraged at the facility as it is an academic medical center.

Various stakeholders played a role in the implementation of the project. RNs in the WIS department played the most prominent role as key stakeholders. The RNs had a significant part in the project as the education they received was to be reciprocated with patients to prevent postpartum preeclampsia complications. The WIS RN Director was a key stakeholder as she

approved project implementation within the WIS department and encouraged her staff to seek opportunities to improve patient outcomes. The WIS RN Associate Director's role included facilitating staff meetings where the educational intervention was provided and sending out communications to staff regarding the project. Communications sent by the WIS RN Associate Directors included reminders about the staff meetings and survey links to the post-intervention and three-month follow-up surveys. A Maternal-Child Clinical Nurse Specialist (CNS) acted as the site mentor and provided connections within the facility. An evidence-based practice (EBP) coordinator assisted in understanding organizational processes for project approvals and requirements. Key stakeholders worked cohesively with the project lead to ensure that all project processes were seamless.

DNP Project Methodology

Several facets were considered and evaluated when developing the project methods. Participant protection and ethical considerations were at the forefront of project development, especially due to firm organizational requirements. These considerations were involved at every part of project development, including recruitment, data collection, and data analysis.

Ethical Considerations

The safeguarding of participant welfare is the primary concern in all QI initiatives. This project was governed by four cardinal ethical principles: respect for autonomy, beneficence, non-maleficence, and justice. Autonomy is the individual ability to make decisions regarding participation without being coerced (Barrow et al., 2022). The project adhered to this principle by allowing RNs adequate time to make an informed decision regarding their participation in this voluntary project. Beneficence is partaking in actions that improve the well-being and safety of others (Barrow et al., 2022). The project adhered to this principle as the interventions were aimed

at improving patient safety, which has the potential to decrease readmissions and improve nursing satisfaction. Non-maleficence is the idea of doing no harm and protecting participants from exploitation (Barrow et al., 2022). The project adhered to this principle through informed consent and allowing participants to withdraw from participation at any point, without question. Justice is the right to privacy and equality (Barrow et al., 2022). The project adhered to this principle through use of unique identifier codes, rather than requesting identifying information, such as participant names.

Prior to the initiation of data collection, a thorough evaluation of potential aforementioned ethical issues was conducted. The utilization of anonymous surveys, coupled with unique identifier codes for survey correlation, ensured a minimal risk of ethical breach to participants. Participating RNs were prompted to answer four demographic queries yet retained the opportunity to omit these questions to preserve their anonymity. To further maintain confidentiality, participants were instructed to register their employee email addresses via a distinct survey link, exclusively for the receipt of the post-intervention survey. This divided process assured participants that their responses remained unlinked to their email identities. The oversight of the participant registry was exclusively handled through Microsoft Forms™ by the project leader, who then conveyed a confidential written roster to the WIS RN Associate Director. This list was securely stored in a locked file cabinet within the Associate Director's office, safeguarded by restricted access. Subsequent communications relating to the post-intervention survey notice and three-month follow-up survey were managed by the WIS RN Associate Director.

An initial review of the project's methodology was performed by the organization's Research Determination Committee (RDC). After the RDC approved the project for

implementation, the student submitted the methodology to the institutional review board (IRB) at Arizona State University (ASU). The student tended to requested changes and modifications from the IRB and obtained reapproval from the organization's RDC. All modifications were resubmitted and approved by both the organization's RDC and ASU's IRB prior to project implementation.

Recruitment Strategies

One week prior to the staff education intervention, the WIS RN Associate Director distributed a recruitment flyer and script via email to all 130 RNs on the unit. The recruitment flyer provided general attention-grabbing statements regarding de novo preeclampsia and the dates of the information sessions. Within the recruitment email script, it was asked that RNs who are not trained to care for postpartum patients and RNs on orientation do not participate in the surveys due to their limited exposure to discharge practices on the unit. In addition to the email communication, the charge nurses on the unit read a short statement regarding the doctoral project during the staff huddles prior to each shift for one week prior to the intervention. Nurses who desired to participate were encouraged to follow the pre-survey and participant survey links from the recruitment email.

Staff Education Intervention and Timeline for Implementation

Nursing staff play a crucial role in preventing complications after discharge as they provide patients with information on warning signs and reasons to call their medical provider. Limited understanding of maternal warning signs by bedside nurses contributes significantly to maternal morbidity (Suplee et al., 2016). Strategies to prevent maternal morbidity include ensuring adequate discharge education related to the signs of postnatal complications, urgent versus emergent symptoms, and the quickest way to receive necessary care (Carlson Bowles et

al., 2020). A 2017 survey of obstetric RNs determined that most nurses spent less than ten minutes educating postpartum patients on warning signs that warrant medical evaluation (Carlson Bowles et al., 2020). The literature identifies a need for increased staff education on the warning signs of postpartum preeclampsia.

Secondary to a historically documented need for increased staff education, an intervention was developed to educate postpartum nurses on de novo postpartum preeclampsia. Nurses on the postpartum unit attended virtual staff meetings via TEAMS; meetings were held on two consecutive days. The project lead administered an educational PowerPoint on de novo postpartum preeclampsia for approximately 15 minutes during both staff meetings. The intervention was displayed virtually via screen sharing, allowing nurses to view the PowerPoint information as the project lead provided verbal education. Information discussed included definitions of preeclampsia, timeframe of occurrence, risk factors for development, warning signs, follow-up recommendations, and actions to be performed by the nurses. The organization provides several education resources related to preeclampsia that can be given to patients. Unit RNs were educated on the availability and location of these resources and were encouraged to modify their discharge practices to educate all patients on postpartum preeclampsia in combination with the organization approved resources. The project lead requested that staff implement these changes over the following two weeks to allow for an assessment of practice change with the post-surveys. Two weeks after the staff meeting, the WIS RN Associate Director sent a post-survey link via email to all RNs that participated in the pre-survey. A final reminder with the post-survey link was sent three weeks post-intervention to ensure adequate responses were collected. The post-survey closed one week after the final email reminder was sent.

Data Collection Methods

Data was collected via pre- and post-intervention surveys. Per organization requirements, the surveys were created via Microsoft Forms™ under the student's organizational account. The platform is two-factor authenticated for additional participant privacy. The surveys were intended to mimic a hypertensive disorders of pregnancy discharge checklist developed by the California Maternal Quality Care Collaborative, also known as CMQCC (see Appendix C, Figure C1). The pre-surveys were sent to RNs on the postpartum unit via email one week prior to the staff education meetings. In the email, RNs also received a recruitment flyer and additional information regarding the doctoral project and voluntary participation. The pre-survey and doctoral project were announced in the daily nursing huddles before day and night shift for one week to increase engagement. After the recruitment period, the pre-survey closed at the start of the first staff education session to prevent skewed data.

The pre-intervention survey consisted of eighteen questions. The first question was designed to obtain written consent from participants. After agreeing to participate, the RN created a unique identifier code that was used to compare pre- and post-intervention data. The participant then answered four demographic questions related to age, highest level of education, ethnicity, and years of experience. Next, the participant answered nine Likert-style questions regarding their current discharge practices related to postpartum preeclampsia. The final three questions were Likert-style questions aimed at assessing the RNs current confidence levels related to postpartum preeclampsia. Participants had the option to opt-out of answering any question they were uncomfortable answering. After completing the pre-intervention survey, participants opened a separate survey and provided their employee email address for post-intervention follow-up.

To ensure accurate and reliable data collection, the post-survey assessed for practice change with the same questions as the pre-survey. The consent and demographic questions were removed and there were small changes in verbiage to the unique identifier question. The content questions on the post-survey were exact matches to the pre-survey. Post-survey questions were aimed at evaluating for a practice change in discharge teaching related to preeclampsia and an increase in RN confidence related to the topic. The post-survey link closed two weeks after the initial email invitation to participate was sent to RNs who completed the pre-survey.

To gain additional insight into the longevity of the intervention, a three-month follow-up survey was sent to all RNs that attended the staff meeting and received the educational intervention. The three-month follow-up survey was an exact match to the initial pre-survey. The only change to the survey was the description that educated RNs on the purpose of the three-month follow-up assessment.

Data Analysis and Outcome Measures

Data from the pre-intervention, post-intervention, and three-month follow-up surveys were compiled in Microsoft Forms™ and subsequently exported to a Microsoft Excel™ spreadsheet. This data was then uploaded into Intellectus Statistics™ for analysis. Individual assessments of the pre- and post-intervention data and three-month follow-up data were conducted to evaluate for shifts in practice and self-reported confidence among participants. The comparative analysis aimed to determine the significance of the educational intervention's impact on discharge practices, confidence levels, and key outcome measures.

To assess the effectiveness of the educational intervention on practice change, two outcomes were measured. The first outcome assessed for an increase in the frequency that RNs provided de novo postpartum preeclampsia education at the time of discharge. The second

outcome assessed for an increase in RNs confidence in providing de novo postpartum preeclampsia education. The impact of these outcomes was assessed through comparison of pre-intervention, post-intervention, and three-month follow-up responses from RNs on the unit.

In addition to the main outcomes detailed previously, there are various short, intermediate, and long-term outcomes (see Appendix B, Figure B1). Short-term outcomes include increased nursing awareness of new onset postpartum preeclampsia and increased discussions with providers about patients at risk of developing the complication. Intermediate outcomes include increased patient knowledge of new onset postpartum preeclampsia, increased utilization of organization approved preeclampsia resources, and the opportunity to change outpatient follow-up practices. Long-term outcomes include continued use of educational resources, increased frequency of 72-hour outpatient follow-ups, reduced readmission rates secondary to postpartum preeclampsia, and reduced maternal morbidity and mortality rates.

Instrumentation, Reliability, and Validity

Limited data on de novo postpartum preeclampsia led to challenges in identifying an instrumentation tool to implement with the DNP project. Due to the unique nature of the data being collected, the DNP student developed a new instrumentation measure. The pre- and post-intervention surveys were developed based on a CMQCC hypertensive disorders of pregnancy discharge checklist and a Caregiver Self-Efficacy Scale. The Self-Management Resource Center adapted a self-efficacy assessment that correlated with their organizational goals (see Appendix C, Figure C2). The initial scale from 2002 was modified to include further confidence questions related to caregiving (Self-Management Resource Center, n.d.). Assessment questions were ranked on a scale of 1-10, with one being not confident at all and ten being totally confident (Self-Management Resource Center, n.d.). The DNP student made appropriate modifications to

address RNs' confidence levels in providing discharge education related to postpartum preeclampsia.

The initial tool was validated in 2002 when it was produced (Lorig et al., 2019). At that time, reliability was confirmed via a Cronbach's alpha of .89 (Lorig et al., 2019). The instrument was deemed valid and reliable after being implemented in research on various occasions with demonstrated success of Cronbach's alpha scores above .80. Psychometric evaluation of the Caregiver Self-Efficacy Scale (CSES-8) has been performed to determine long-term reliability, usability, and validity. The assessment scale demonstrated sensitivity to change between baseline and follow-up performances (Ritter et al., 2020).

Although the self-efficacy was not developed for postpartum nurses, the format of the questionnaire was modifiable to fit the needs of the doctoral project. Maintaining the scoring format of the Likert scale will ensure the validity is maintained. Reliability can be determined after long term administration of the assessment, likely after at least six months. The reliability and validity of the CSES-8 reinforces the ability to utilize a modified version of the tool to assess RNs' confidence in providing postpartum preeclampsia education.

Budget

This DNP QI project did not receive any funding. Costs for the DNP student were minimal (see Appendix D, Figure D1). Student costs included approximately $30 of gas for travel to meetings at the project site for discussions with key stakeholders. The student utilized a free design service to develop the recruitment flyer. ASU provided student subscriptions to the Intellectus Statistics™ software; thus, the student did not accrue a cost for the application. Costs to the organization were already budgeted within their annual unit budget. These costs included employee subscriptions to Microsoft Forms™ and Microsoft TEAMS™, copies of patient

education handouts, and payment to staff for attending required staff meetings bi-monthly. The project did not accrue any additional costs for the unit.

Results

The survey outcomes were mixed, which may be attributed to the variable levels of engagement among survey participants and a general reluctance to participate. While an analysis of the pre- and post-intervention survey data revealed significant enhancements in discharge education processes and registered nurses' confidence levels, the validity of these findings is uncertain. This uncertainty is due to the fact that only two out of six initial participants completed the post-intervention survey, and one participant completed the three-month follow-up survey instead of the immediate post-intervention survey. Moreover, two nurses who underwent the educational intervention provided data for the three-month follow-up survey without having participated in the initial surveys, rendering comparative analysis challenging. The three-month follow-up indicated a nominal decrease in some scores; however, these findings are not definitive since these participants did not contribute to the initial data set. Descriptive statistics were applied in the evaluation and documentation of the project's findings.

Participant Demographics

The pre-intervention survey was completed by six postpartum trained RNs (n = 6). Of the initial participants, one was aged 20-29 (n = 1), three were aged 30-39 (n = 3), one was aged 40-49 (n = 1), and one was aged 50-59 (n = 1). These participants reported education levels of Bachelor’s degree (n = 5) and Master’s degree (n = 1). The reported ethnicity of all participants was White (n = 6). Years of experience caring for postpartum patients varied starting with less than one year (n = 1), three to four years (n = 1), five to ten years (n = 2), eleven to twenty years (n = 1), and more than twenty years (n = 1).

The post-intervention survey was completed by two postpartum trained RNs (n = 2) after completing the pre-intervention survey and receiving the educational intervention. The participants were aged 30-39 (*n* = 1) and 50-59 (*n* = 1). Education levels were reported to be Bachelor's degree (*n* = 1) and Master's degree (*n* = 1). Ethnicity of both participants was reported as White (*n* = 2). Years of experience caring for postpartum patients were five to ten years (*n* = 1) and eleven to twenty years (*n* = 1). Both RNs completed the pre-intervention surveys.

The three-month post-intervention follow-up survey was completed by three postpartum trained RNs (*n* = 3). One participant completed a pre-intervention survey and two participants did not engage in previous surveys but did receive the educational intervention. Participants were aged 30-39 (*n* = 2) and 50-59 (*n* = 1). Highest level of education reported as Bachelor's degree (*n* = 3). Ethnicity reported was White (*n* = 3). Years of experience caring for postpartum patients were reported as less than one year (*n* = 1), three to four years (*n* = 1), and more than twenty years (*n* = 1). One of these RNs completed the initial pre-survey.

Pre-Intervention Discharge Practices and Confidence Levels

Prior to the intervention, the frequency that RNs taught all patients about preeclampsia scored an average of 3.83 (*SD* = 0.41). The frequency that RNs educated patients on blood pressure elevation for up to six weeks postpartum scored an average of 3.33 (*SD* = 0.52). Use of verbal discharge instructions averaged a score of 3.67 (*SD* = 0.52) and use of written discharge instructions averaged 3.50 (*SD* = 0.55). Utilization of the warning signs flyer had an average score of 3.67 (*SD* = 0.52), use of the POST-BIRTH flyer had an average of 3.50 (*SD* = 0.84), and use of the Krames flyers had an average of 1.67 (*SD* = 1.03). Use of the warning complications flyer had an average score of 1.17 (*SD* = 1.17). RNs utilizing teach back at the time of discharge

had an average score of 3.33 (*SD* = 0.52). Assessments of RN confidence in personal ability to understand preeclampsia had an average score of 2.83 (*SD* = 0.98), confidence educating on preeclampsia had an average of 2.83 (*SD* = 0.98), and confidence locating resources related to preeclampsia had an average of 3.00 (*SD* = 1.10). Findings are summarized in table 1.

Table 1

Pre-Intervention Likert-Scale Assessment of Discharge Practices and Confidence Levels

Variable	*M*	*SD*	*n*	Min	Max
Teach All Patients about PreE	3.83	0.41	6	3.00	4.00
Educate on BP Elevation Up to 6 Weeks	3.33	0.52	6	3.00	4.00
Use of Verbal Discharge Education	3.67	0.52	6	3.00	4.00
Use of Written Discharge Education	3.50	0.55	6	3.00	4.00
Use of Warning Signs Flyer	3.67	0.52	6	3.00	4.00
Use of POST-BIRTH Flyer	3.50	0.84	6	2.00	4.00
Use of Krames Flyers	1.67	1.03	6	0.00	3.00
Use of Warning Complications Document	1.17	1.17	6	0.00	3.00
Use of Teach Back	3.33	0.52	6	3.00	4.00
Confidence in Understanding PreE	2.83	0.98	6	2.00	4.00
Confidence Educating on PreE	2.83	0.98	6	2.00	4.00
Confidence Locating PreE Resources	3.00	1.10	6	1.00	4.00

Post-Intervention Discharge Practices and Confidence Levels

Of the RNs that completed the two-week post-intervention survey, the frequency of RNs educating all patients on preeclampsia scored an average of 4.00 (*SD* = 0.00). The frequency that RNs educated patients on blood pressure elevation for up to six weeks postpartum scored an average of 4.00 (*SD* = 0.00). Use of verbal discharge instructions averaged a score of 4.00 (*SD* = 0.00) and use of written discharge instructions averaged 4.00 (*SD* = 0.00). Utilization of the warning signs flyer had an average score of 4.00 (*SD* = 0.00), use of the POST-BIRTH flyer had an average of 4.00 (*SD* = 0.00), and use of the Krames flyers had an average of 2.50 (*SD* = 0.71). Use of the warning complications flyer had an average score of 1.50 (*SD* = 0.71). RNs utilizing

teach back at the time of discharge had an average score of 4.00 (*SD* = 0.00). Assessments of RN confidence in personal ability to understand preeclampsia had an average score of 4.00 (*SD* = 0.00), confidence educating on preeclampsia had an average of 4.00 (*SD* = 0.00), and confidence locating resources related to preeclampsia had an average of 4.00 (*SD* = 0.00). Findings are summarized in table 2.

Table 2

Post-Intervention Likert-Scale Assessment of Discharge Practices and Confidence Levels

Variable	*M*	*SD*	*n*	Min	Max
Teach All Patients about PreE	4.00	0.00	2	4.00	4.00
Educate on BP Elevation Up to 6 Weeks	4.00	0.00	2	4.00	4.00
Use of Verbal Discharge Education	4.00	0.00	2	4.00	4.00
Use of Written Discharge Education	4.00	0.00	2	4.00	4.00
Use of Warning Signs Flyer	4.00	0.00	2	4.00	4.00
Use of POST-BIRTH Flyer	4.00	0.00	2	4.00	4.00
Use of Krames Flyers	2.50	0.71	2	2.00	3.00
Use of Warning Complications Document	1.50	0.71	2	1.00	2.00
Use of Teach Back	4.00	0.00	2	4.00	4.00
Confidence in Understanding PreE	4.00	0.00	2	4.00	4.00
Confidence Educating on PreE	4.00	0.00	2	4.00	4.00
Confidence Locating PreE Resources	4.00	0.00	2	4.00	4.00

Three Month Follow-Up on Discharge Practices and Confidence Levels

Of the RNs that completed the three-month post-intervention survey, the frequency of RNs educating all patients on preeclampsia scored an average of 3.67 (*SD* = 0.58). The frequency that RNs educated patients on blood pressure elevation for up to six weeks postpartum scored an average of 3.67 (*SD* = 0.58). Use of verbal discharge instructions averaged a score of 4.00 (*SD* = 0.00) and use of written discharge instructions averaged 3.67 (*SD* = 0.58). Utilization of the warning signs flyer had an average score of 4.00 (*SD* = 0.00), use of the POST-BIRTH flyer had an average of 2.67 (*SD* = 2.31), and use of the Krames flyers had an average of 2.33

(*SD* = 2.08). Use of the warning complications flyer had an average score of 2.67 (*SD* = 2.31). RNs utilizing teach back at the time of discharge had an average score of 3.67 (*SD* = 0.58). Assessments of RN confidence in personal ability to understand preeclampsia had an average score of 3.67 (*SD* = 0.58), confidence educating on preeclampsia had an average of 3.33 (*SD* = 0.58), and confidence locating resources related to preeclampsia had an average of 3.33 (*SD* = 0.58). Findings are summarized in table 3.

Table 3

Three-Month Post-Intervention Likert-Scale Assessment of Discharge Practices and Confidence Levels

Variable	*M*	*SD*	*n*	Min	Max
Teach All Patients about PreE	3.67	0.58	3	3.00	4.00
Educate on BP Elevation Up to 6 Weeks	3.67	0.58	3	3.00	4.00
Use of Verbal Discharge Education	4.00	0.00	3	4.00	4.00
Use of Written Discharge Education	3.67	0.58	3	3.00	4.00
Use of Warning Signs Flyer	4.00	0.00	3	4.00	4.00
Use of POST-BIRTH Flyer	2.67	2.31	3	0.00	4.00
Use of Krames Flyers	2.33	2.08	3	0.00	4.00
Use of Warning Complications Document	2.67	2.31	3	0.00	4.00
Use of Teach Back	3.67	0.58	3	3.00	4.00
Confidence in Understanding PreE	3.67	0.58	3	3.00	4.00
Confidence Educating on PreE	3.33	0.58	3	3.00	4.00
Confidence Locating PreE Resources	3.33	0.58	3	3.00	4.00

Clinical Significance and Impact

Suboptimal engagement across all three surveys presented challenges in assessing the effectiveness and implications of the intervention. However, the data from participants who completed both the pre- and post-intervention surveys indicated progress in education and confidence scores (see Appendix E, Figure E1). Specifically, the average score for education rose from 29.50 to 32.00, and the average score for confidence rose from 10.50 to 12.00. An interesting trend was noted: RNs with fewer years of service tended to provide preeclampsia

education more frequently than their more seasoned counterparts, although the latter group demonstrated greater confidence in delivering such education and in accessing relevant resources. A comparison of a single pre-intervention survey with a three-month post-intervention survey revealed substantial gains in education and confidence scores, with education scores climbing from 28.00 to 35.00 and confidence scores rising from 8.00 to 10.00 (see Appendix E, Figure E1). These findings suggest that with greater participation and adherence to the recommendations of the intervention, there is a potential for success in boosting the regularity with which RNs deliver standardized discharge education and in elevating their confidence levels in providing this education.

Project and Intervention Sustainability

The low-cost nature of the intervention and ease of completion make the project and intervention sustainable for several years. The organization can seamlessly include the educational intervention in their new hire training to ensure all staff receive the information. The intervention is sustainable as it can be easily modified to include the most up-to-date guidelines and recommendations as they are announced. This is an intervention that can be shared with staff in meetings, via email, and verbally, which makes it very appealing and easy to implement.

Discussion

This project entailed the deployment of multifaceted strategies aimed at enhancing the discharge process for inpatient postpartum women. The execution of this project was met with a series of obstacles and constraints that tested the resilience and adaptability of the intervention strategies. Despite these challenges, the project reached its completion and yielded insightful data and experiences. These findings are instrumental for the DNP student, providing critical learning opportunities that will contribute to the refinement of future QI projects. The knowledge

gained through navigating the complex dynamics of this project underscores the potential for evidence-based practice to inform and transform the discharge procedures, thereby improving patient outcomes and optimizing the use of healthcare resources.

Limitations and Barriers

The project's implementation phase met with several hurdles. The participant recruitment strategy achieved only marginal success in sustaining engagement from the pre-intervention through the post-intervention surveys. While the leadership team facilitated the dissemination of recruitment materials, allotted time during staff meetings for educational purposes, and approved the inclusion of an additional survey, there was a notable absence of ongoing dialogue and encouragement from leadership regarding the DNP project, which affected the staff's completion of the surveys and their attendance at the educational intervention. The subdued participation from staff members posed significant challenges in drawing a direct correlation between pre- and post-intervention data to substantiate the project's impact. Furthermore, the variability in participant response rates introduced difficulties in presenting accurate graphical data without potentially misrepresenting results to those unfamiliar with the participation dynamics throughout the study. Despite these hurdles, the DNP project generated substantial insights and furnished valuable recommendations for future QI initiatives on the unit.

Future Recommendations

To optimize the standardization of preeclampsia discharge procedures in future interventions, it is critical to secure unwavering support from the leadership team. Robust advocacy, both verbally and through formal communications from leadership, can significantly reduce the reluctance of staff RNs to participate in QI interventions. Prior dissemination of scholarly articles and evidence-based materials that illuminate the rationale for such QI

endeavors could foster a deeper understanding among RNs of the critical nature of their participation.

For the successful implementation of subsequent quality improvement initiatives, the project lead is advised to conduct in-person education sessions, employing tangible visual aids, and providing hard copy resources. This tactile and engaging approach is likely to resonate with RNs who prefer direct interaction with educational materials and may facilitate a more interactive and impactful learning experience. It is envisioned that such strategies would not only enhance RNs' engagement but also their retention of the key practices to be applied within their clinical roles.

Conclusion

In one Southwestern metropolitan area's high-risk obstetrics unit, readmissions due to postpartum preeclampsia had risen, a trend increasingly recognized as a significant health issue. A comprehensive review of the literature validated that women, regardless of their history of hypertension or preeclampsia, were susceptible to developing these complications following childbirth. This underscored the imperative need for universal patient education on the warning signs, symptoms, and urgency of seeking immediate care when faced with postpartum preeclampsia.

Evidence suggested that strategic modifications in clinical practice, especially those that enhanced discharge education about preeclampsia's warning signs, could significantly reduce the incidence of readmissions. Targeted educational initiatives for RNs, complemented by access to institutionally approved educational materials and the enactment of practice changes informed by the Health Belief Model and the Iowa Model Revised, represented a cohesive approach to addressing this issue.

The completion of this research highlighted the importance of persistent vigilance in postpartum care, promoting the seamless integration of education and practice modifications in the quest for better health outcomes for mothers and their newborns. It offered a framework for the enduring improvement of patient education, advocating for a patient-centered approach that could serve as a paradigm for obstetrics units at the national and international levels. Furthermore, the changes proposed in discharge education protocols showed potential for long-term benefits and could be sustained indefinitely, assuming their proven effectiveness in reducing preeclampsia readmissions.

References

Abraham, C. & Sheeran, P. (2015). The health belief model. In M. Conner & P. Norman (Eds.), *Predicting and changing health behaviour: Research and practice with social cognition models* (3rd ed., pp. 30-69). Open University Press.

Barrow, J. M., Brannan, G. D., & Khandhar, P. B. (2022). *Research ethics.* StatPearls [Internet]. https://www.ncbi.nlm.nih.gov/books/NBK459281/

Becker, C., Zumbrunn, S., Beck, K., Vincent, A., Loretz, N., Muller, J., Amacher, S. A., Schaefert, R., & Hunziker, S. (2021). Interventions to improve communication at hospital discharge and rates of readmission: A systematic review and meta-analysis. *JAMA Network Open, 4*(8), 1-23. https://doi.org/10.1001/jamanetworkopen.2021.19346

Beraki, G. G., Tesfamariam, E. H., Gebremichael, A., Yohannes, B., Haile, K., Tewelde, S., & Goitom, S. (2020). Knowledge on postnatal are among postpartum mothers during discharge in maternity hospitals in Asmara: A cross-sectional study. *BMC Pregnancy and Childbirth, 20*(17), 1-10. https://doi.org/10.1186/s12884-019-2694-8

Bruce, K. H., Anderson, M., & Stark, J. D. (2021). Factors associated with postpartum readmission for hypertensive disorders of pregnancy. *American Journal of Obstetrics & Gynecology MFM, 3*(5), 1-9. https://doi.org/10.1016/j.ajogmf.2021.100397

Carlson Bowles, B., Gibson, M., & Jansen, L. (2020). Continuing education module – The childbirth educator's role in teaching post-birth warning signs. *The Journal of Perinatal Education, 29*(2), 90-94. https://doi.org/10.1891/J-PE-D-19-00008

Chornock, R., Iqbal, S. N., & Kawakita, T. (2021). Racial disparity in postpartum readmission due to hypertension among women with pregnancy-associated hypertension. *American Journal of Perinatology, 38,* 1297-1302. https://doi.org/10.1055/s-0040-1712530

Combs, C. A., Goffman, D., & Pettker, C. M. (2022). Society for maternal-fetal medicine special statement: A critique of postpartum readmission rate as a quality metric. *American Journal of Obstetrics and Gynecology, 226*(4), 82-89. https://doi.org/10.1016/j.ajog.2021.11.1355

Dol, J., Hughes, B., Bonet, M., Dorey, R., Dorling, J., Grant, A., Langlois, E. V., Monaghan, J., Ollivier, R., Parker, R., Roos, N., Scott, H., Shin, H. D., & Curran, J. (2022). Timing of maternal mortality and severe morbidity during the postpartum period: A systematic review. *JBI Evidence Synthesis, 20*(9), 2119-2194. https://doi.org/10.11124/JBIES-20-00578

Emeruwa, U. N., Gyamfi-Bannerman, C., Wen, T., Booker, W., Wright, J. D., Huang, Y., D'Alton, M. E., & Friedman, A. M. (2022). Adverse outcomes during postpartum readmissions after deliveries complicated by hypertensive disorders of pregnancy. *American Journal of Perinatology, 39*(7), 699-706. https://doi.org/10.1055/s-0041-1739429

Glanz, K., Burke, L. E., & Rimer, B. K. (2018). Health behavior theories. In J. B. Butts & K. L. Rich (Eds.), *Philosophies and theories for advanced nursing practice* (3rd ed., pp. 241-265). Jones & Bartlett Learning.

Hauspurg, A. & Jeyabalan, A. (2022). Postpartum preeclampsia or eclampsia: Defining its place and management among the hypertensive disorders of pregnancy. *American Journal of Obstetrics and Gynecology, 226*(2), S1211-S1221. https://doi.org/10.1016/j.ajog.2020.10.027

Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175-182. https://doi.org10.1111/wvn.12223

Lewandowski, K., Baer, C. E., Schoustra, R., Indatwa, A., Celaya, M. F., & Tarango, P. (2020). *Maternal mortalities and severe maternal morbidity in Arizona.* AZDHS.gov. https://www.azdhs.gov/documents/director/agency-reports/sb-1040-report-on-mmm-in-az.pdf

Lorig, K., Ritter, P. L., Laurent, D. D., & Yank, V. (2019). Building better caregivers: A pragmatic 12-month trial of a community-based workshop for caregivers of cognitively impaired adults. *Journal of Applied Gerontology, 38*(9), 1228-1252. https://doi.org/10.1177/0733464817741682

Louis, J. M., Parchem, J., Vaught, A., Tesfalul, M., Kendle, A., & Tsigas, E. (2022). Preeclampsia: A report and recommendations of the workshop of the Society for Maternal-Fetal Medicine and the Preeclampsia Foundation. *American Journal of Obstetrics and Gynecology, 227*(5), B2-B24. https://doi.org/10.1016/j.ajog.2022.06.038

Lovgren, T., Connealy, B., Yao, R., & Dahlke, J. D. (2021). Postpartum management of hypertension and effect on readmission rates. *American Journal of Obstetrics and Gynecology Maternal-Fetal Medicine, 4*(1), 1-6. https://doi.org/10.1016/j.ajogmf.2021.100517

MacDonald, E. J., Lepine, S., Pledger, M., Geller, S. E., Lawton, B., & Stone, P. (2019). Pre-eclampsia causing severe maternal morbidity – A national retrospective review of preventability and opportunities for improved care. *Australian and New*

Zealand Journal of Obstetrics and Gynaecology, 59, 825-830. https://doi.org/10.1111/ajo.12971

McLaren, R. A., Magenta, M., Gilroy, L., Duarte, M. A., Narayanamoorthy, S., Weedon, J., & Minkoff, H. (2021). Predictors of readmission for postpartum preeclampsia. *Hypertension in Pregnancy, 40*(3), 254-260. https://doi.org/10.1080/10641955.2021.1975737

Melnyk, B.M., & Fineout-Overholt, E. (2019). *Evidence-based practice in nursing and healthcare: A guide to best practice* (4th ed.). Lippincott, Williams & Wilkins.

Oh, E. G., Lee, H. J., Yang, Y. L., & Kim, Y. M. (2021). Effectiveness of discharge education with the teach-back method on 30-day readmission: A systematic review. *Journal of Patient Safety, 17*(4), 305-310. https://doi.org/10.1097/PTS.0000000000000596

Parker, S. E., Ajayi, A., & Yarrington, C. D. (2023). De novo postpartum hypertension: Incidence and risk factors at a safety-net hospital. *Hypertension, 80*(2), 279-287. https://doi.org/10.1161/HYPERTENSIONAHA.122.19275

Powles, K. & Gandhi, S. (2017). Postpartum hypertension. *Canadian Medical Association Journal, 189*(27), 1. https://doi.org/10.1503/cmaj.160785

Pugh, J., Penney, L. S., Noel, P. H., Neller, S., Mader, M., Finley, E. P., Lanham, H. J., & Leykum, L. (2021). Evidence based processes to prevent readmissions: More is better, a ten-site observational study. *BMC Health Services Research, 21*(189), 1-11. https://doi.org/10.1186/s12913-021-06193x

Rana, S., Lemoine, E., Granger, J. P., & Karumanchi, S. A. (2019). Preeclampsia pathophysiology, challenges, and perspectives. *Circulation Research, 124,* 1094-1112. https://doi.org/10.1161/CIRCRESAHA.118.313276

Redman, E. K., Hauspurg, A., Hubel, C. A., Roberts, J. M., & Jeyabalan, A. (2019). Clinical course, associated factors, and blood pressure profile of delayed-onset postpartum preeclampsia. *Obstetrics & Gynecology, 134*(5), 995-1001. https://doi.org/10.1097/AOG.0000000000003508

Ritter, P. L., Sheth, K., Stewart, A. L., Gallagher-Thompson, D., & Lorig, K. (2020). Development and evaluation of the Eight-Item Caregiver Self-Efficacy Scale (CSES-8). *The Gerontologist, 62*(3), e140-e149. https://doi.org/10.1093/geront/gnaa174

Self-Management Resource Center. (n.d.). *Self-efficacy for caregiving.* Self-Management Resource Center. https://selfmanagementresource.com/wp-content/uploads/English_-_self-efficacy_for_caregiving.pdf

Smithson, S. D., Greene, N. H., & Esakoff, T. F. (2021). Risk factors for re-presentation for postpartum hypertension in patients without a history of hypertension or preeclampsia. *American Journal of Obstetrics & Gynecology MFM, 3*(2), 1-6. https://doi.org/10.1016/j.ajogmf.2020.100297

Stamilio, D. M., Beckham, A. J., Boggess, K. A., Jelovsek, J. E., & Venkatesh, K. K. (2021). Risk factors for postpartum readmission for preeclampsia or hypertension before delivery discharge among low-risk women: A case-control study. *American Journal of Obstetrics and Gynecology MFM, 3*(3), 1-6. https://doi.org/10.1016/j.ajogmf.2021.100317

Wen, T., Wright, J. D., Goffman, D., D'Alton, M. E., Attenello, F. J., Mack, W. J., & Friedman, A. M. (2019). Hypertensive postpartum admissions among women without a history of hypertension or preeclampsia. *Obstetrics & Gynecology, 133*(4), 712-719. https://doi.org/10.1097/AOG.0000000000003099

Wen, T., Krenitsky, N. M., Clapp. M. A., D'Alton, M. E., Wright, J. D., Mack, W. J., & Friedman, A. M. (2020a). Fragmentation of postpartum readmissions in the United States. *American Journal of Obstetrics and Gynecology, 223*(2), e1-e14. https://doi.org/10.1016/j.ajog.2020.01.022

Wen, T., Yu, V. X., Wright, J. D., Goffman, D., Attenello, F., Mack, W. J., D'Alton, M., & Friedman, A. M. (2020b). Postpartum length of stay and risk for readmission among women with preeclampsia. *Journal of Maternal-Fetal and Neonatal Medicine, 33*(7), 1086-1094. https://doi.org/10.1080/14767058.2018.1514382

Appendix A

Evaluation and Synthesis Tables

Table A1

Evaluation Table for Quantitative Studies

Citation	**Theoretical/ Conceptual Framework**	**Design/ Method/ Purpose**	**Sample/Setting**	**Variables**	**Measurement/ Instrumentation**	**Data Analysis**	**Results/ Findings**	**Level of Evidence; Application to practice; Generalization**
(Lovgren et al., 2022) Postpartum management of hypertension and effect on readmission rates **Country**: United States **Funding**: No funding was provided. **Bias**: No explicitly stated author bias. Stated bias related to retrospective cohort design.	Physiologic framework or implementation theory Lack of current data surrounding HTN management and its effect on readmissions for HTN in the PP period	**Design:** retrospective cohort study **Purpose:** to determine if hypertensive BPs within 12 hours of D/C and prescription antihypertensive use at D/C are related to postpartum readmissions	**N**= 3,480 **Demographics:** Women with peripartum HTN, delivered in past 12 months, required ER evaluation/admission, postpartum patients with HTN during ER visit **Setting:** EMR review of PP patients at a single tertiary care center in Nebraska **Exclusion:** Readmission for infection, injury, gestational HTN, preE without severe features **Attrition:** n/a	**IV1:** BP measurements within 12 hours of D/C and use of prescription antihypertensives at D/C **DV1:** postpartum readmissions **Definitions:** n/a	**Tools:** Readmission rate comparisons between group that received Rx antihypertensives prior to D/C and the group that did not **Validity/ Reliability:** Study findings are valid and relevant. Reliability cannot be confirmed. Findings were confined to one hospital setting in one state and not confirmed across the country.	**Statistical Tests Used:** Stata Statistical Software, version 12 and logistic regression	**DV1:** Readmissions were 5.9% when D/C without an antihypertensive Rx, compared to D/C with antihypertensive Rx (5.7%).	**Level of Evidence**: Level IV: cohort study **Strengths**: broad inclusion criteria, included patients without hx of HTN with HTN in ER or during readmission **Weakness**: outlier BPs may meet inclusion criteria, small sample, no F/U on Rx compliance **Feasibility**: Replication is feasible if providers prescribe antihypertensives. **Application**: Applicable as readmissions are a national focus.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
(McLaren et al., 2021) Predictors of readmission for postpartum preeclampsia **Country**: United States **Funding**: No funding was provided for this study. **Bias**: No explicitly stated author bias.	Implementation framework No current standard practice for predicting and preventing readmissions for HTN in the PP period	**Design:** case-control study **Purpose:** create a tool or model that would assist in predicting readmissions in PP patients	**N**= 428 **Demographics:** age (25-36 years), race, BMI (26.1-35.3), parity, insurance status, gestational age at delivery, type of delivery, diagnoses of HTN at time of delivery, BPs on admission (122-144.5/73-89), BP at D/C (109-135/61-80), length of stay (2-4 days) **Setting:** urban hospital in the U.S. with high patient volumes **Exclusion:** PP PreE coded incorrectly during initial hospitalization, delivered at other facilities, readmitted >6 weeks PP, known fetal anomalies **Attrition:** n/a	**IV1:** use of readmission prediction tool **DV1:** rate of readmission is accurately estimated **DV2:** outcomes based on results of risk calculator **Definitions:** Risk calculation score sheet is an evaluation tool that combines age, D/C BP, and ethnicity to determine risk of readmission.	**Tools:** predictive model/readmission prediction tool called "risk score calculation sheet" **Validity/ Reliability:** Authors tried to ensure validity by including a control or cross-validation group. They compared the hypertensive group to a control group with no hx of HTN to ensure accuracy.	**Statistical Tests Used:** Fisher's exact Mann-Whitney Hosmer-Lemeshow Chi-square	**DV1:** The predictor tool determined a high number of women at risk for readmission. Of the women identified, over 50% were eventually readmitted. **DV2:** There is limited discussion surrounding next steps to prevent readmission in patients that are identified as a high risk for readmission in the postpartum period.	**Level of Evidence**: Level IV: case control study **Strengths**: large sample, increased sensitivity of results, included study group and control group **Weakness**: limited evaluation of Hispanic and advanced maternal age patients, no discussion on demographic area, primarily White insured patients with low BMI **Feasibility**: The prediction tool is easy to implement with minimal room for error by the user. **Application**: Helps providers identify patients at risk of readmission; allows them to provide additional education.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
(Redman et al., 2019) Clinical course, associated factors, and blood pressure profile of delayed-onset postpartum preeclampsia **Country:** United States **Funding:** One author received funding from an American Heart Association grant and a scholar fund. **Bias:** No explicitly stated author bias. Potential for bias as an author received funding from two separate organizations.	Determinant framework Limited available information surrounding risk factors for development of preE in the post-natal period	**Design:** case-control study **Purpose:** determine factors that increase risk for development of delayed-onset PreE	**N=** 27,057 **Demographics:** age (26-35 years), race, pre-pregnancy BMI (21.6-34), BMI category (<18.5 - >40), nulliparous or multiparous, diagnosis of gestational diabetes, gestational age at delivery (37.7-40.3 weeks), birthweight (2878-3720g), cesarean delivery **Setting:** single tertiary-care center **Exclusion:** antenatal diagnosis of PreE or pre-pregnancy diagnosis of chronic HTN, hx of pre-gestational diabetes **Attrition:** n/a	**IV1:** individual risk factors for postpartum development of preE **DV1:** postpartum readmission **DV2:** interventions provided during readmission **DV3:** presence of HTN >3 months PP **Definitions:** n/a	**Tools:** chart reviews, collection of readmission data, and Magee Obstetric Maternal and Infant (MOMI) database **Validity/ Reliability:** 95% confidence intervals reported. Results are relevant, but reliability cannot be confirmed. Results were limited to one care setting and were not confirmed via findings at other facilities.	**Statistical Tests Used:** Stata IC 15 software Wilcoxon-Mann Whitney Independent t-tests Chi-square and Fisher's exact where applicable	**DV1:** readmissions were higher in women of non-Hispanic black race (31.4% vs 18%), obesity (39.7% vs 20.1%), and cesarean delivery (40.5% vs 25.8%) – average day of readmission was postpartum day 7 **DV2:** 73.6% had imaging, 49.6% received antihypertensive medication **DV3:** increased BPs recorded at >3 months postpartum (SBP 130 vs 112 mmHg and DBP 80 vs 70 mmHg)	**Level of Evidence**: Level IV: case control study **Strengths**: large sample size, variation in patient demographics **Weakness**: study was limited to a single tertiary-care center, no comparison with rates of readmission in patients with antenatal or pre-pregnancy HTN, majority of data was collected via chart reviews **Feasibility:** Difficult to replicate as large volume data would be needed to obtain accurate results. **Application:** Findings can be used to focus education on populations at high risk of readmission.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
(Wen et al., 2019) Hypertensive postpartum admissions among women without a history of hypertension or preeclampsia **Country:** United States **Funding:** Two authors received funding from different organizations. One author is a consultant for an organization that may benefit from study results. **Bias:** No explicitly stated author bias. Potential for bias as two	Determinant framework Lack of information regarding PP readmissions in patients without hx of preE	**Design:** cohort study **Purpose:** identify risk factors of developing PP preE in patients without a hx of HTN within 60 days of delivery D/C	**N=** 14,184,074 **Demographics:** age (15-54 years), Medicare/Medicaid vs private insurance, delivery at metropolitan teaching hospital vs non-teaching hospital, zip code quartiles **Setting:** hospitalizations assessed via Nationwide Readmissions Database across 22 states enrolled in the database **Exclusion:** diagnosis of chronic HTN or HDP, severe maternal morbidity during delivery hospitalization **Attrition:** n/a	**IV1:** individualized risk factors for PP readmission in patients without hx of preE **DV1:** PP readmissions related to HTN or preE **Definitions:** n/a	**Tools:** Nationwide Readmissions Database, evaluation of ICD-9 codes **Validity/ Reliability:** 95% confidence interval reported. The findings appear valid, but they may not be reliable. The study used a nationwide database, but it only covered 22 states, which leaves reliability questionable for the remaining 28 states.	**Statistical Tests Used:** Chi square Fisher's exact	**DV1:** readmissions were higher in ages 30-34 (28.3%), Medicaid insured (48.9%), lowest income zip code quartile (34.1%), vaginal deliveries (56.4%) – 88.6% were readmitted within 10 days of D/C with an average length of stay 2.3 days	**Level of Evidence**: Level IV: cohort study **Strengths**: large sample size, variation in patient demographics, multi-state assessment **Weakness**: no assessment of BP readings, no information on home visits/PP office visits, potential for error in ICD-9 coding, inability to link delivery and readmissions in different states **Feasibility:** The study is easy to replicate, but tedious as it requires evaluation via a national database, rather than through EMR. Only information in the database can be evaluated.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
authors received funding from organizations and another author works for an organization that may benefit from study findings.								**Application:** Findings are applicable to practice as they help clinicians identify normotensive patients that are at risk of readmission after delivery D/C.
(Bruce et al., 2021) Factors associated with postpartum readmission for hypertensive disorders of pregnancy **Country:** United States **Funding:** Provided by Kaiser Permanente Northern California Graduate Medical Education.	Physiologic framework or determinant framework Conflicting information in previous studies regarding risk factors for PP readmission for HTN	**Design:** retrospective cohort study **Purpose:** evaluate frequency and risk factors for readmissions related to HDP in women with a diagnosis of preexisting HDP	**N=** 7,151 **Demographics:** age (less than 30 – greater than/equal to 40), parity (1 or >2), race, ethnicity, comorbidities (gestational or pre-gestational diabetes, multiple gestation, tobacco use), BMI, hypertensive diagnosis, type of delivery, gestational age at delivery, length of PP hospital stay **Setting:** Kaiser Permanente Northern California (KPNC) hospital	**IV1:** SBP greater than or equal to 140 mmHg AND/OR DBP greater than or equal to 90 mmHg within 24 hours of D/C **DV1:** readmission for PP HTN **Definitions:** n/a	**Tools:** confirmation of specific ICD-10 coded diagnoses, electronic medical record reviews **Validity/ Reliability:** 95% confidence interval reported. Results appear valid, but further examination is required to confirm reliability as these findings were only evaluated across one hospital for one year.	**Statistical Tests Used:** Chi square Fisher's exact Student t-tests Wilcoxon rank-sum test Statistical Analysis System (SAS) software	**DV1:** 317 women (4.43%) were readmitted within 42 days of delivery for HTN or stroke; 84% were diagnosed with preE or superimposed preE; 15% were readmitted with gestational HTN, chronic HTN, or unspecified HTN; average SBP within 24 hours of D/C was 146 mmHg and average DBP within 24 hours of D/C	**Level of Evidence**: Level IV: cohort study **Strengths**: diverse population of Northern California residents, data extraction performed via EMR **Weakness**: some ICD-10 codes were too vague to confirm HDP diagnosis, only patients with antepartum HTN were included in readmission study, risk for bias, data limited to one year (Jan-Dec 2018) **Feasibility:** Results are easy to replicate in

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Bias: Risk for bias noted. Bias may have occurred when providers readmitted based on known risk factors. Risk for bias as medical center funded their own research.			**Exclusion:** no electronic medical record (EMR), no age documented in EMR, no documented BP within 24 hours of D/C in EMR **Attrition:** n/a				was 89 mmHg in women who were readmitted	organizations with EMRs that utilize ICD-10 codes. **Application:** Findings are applicable to practice as they provide insight into how pre-D/C BPs impact readmission rates. Findings support need for evaluation of risk factors while inpatient to prevent PP readmission.
(MacDonald et al., 2019) Pre-eclampsia causing severe maternal morbidity – A national retrospective review of preventability and opportunities for improved care **Country:** New Zealand	Physiologic framework or determinant framework Lack of evaluations of current practices and impacts on severe maternal morbidity (SMM)	**Design:** retrospective cohort study **Purpose:** To understand outcomes of patients with preE and identify opportunities to change practices to prevent SMM	**N**= 89 **Demographics:** age (less than 20 – greater than/equal to 40), parity (1 to greater than/equal to 4), ethnicity, BMI (15-30+), smoking status (smoker or non-smoker), area-based deprivation index information or NZDep Index (1-5) **Setting:** intensive care units and high	**IV1:** preventability of SMM **IV2:** improved care needed to prevent SMM **DV1:** readmission for PP HTN **Definitions:** n/a	**Tools:** validated preventability tool; clinical notes and chart reviews **Validity/ Reliability:** 95% confidence interval reported. Results appear valid, but further examination is required to determine reliability due to the same sample size of 89. Results cannot be reported	**Statistical Tests Used:** X^2 tests of association	**DV1:** 28 cases of readmission were linked to preventable morbidity; preventable morbidity was linked to actions of clinicians in 96% of readmissions; lack of adequate D/C education and outpatient F/U were identified as	**Level of Evidence**: Level IV: cohort study **Strengths**: identification of numerous factors impacting SMM, reviews performed by various clinicians **Weakness**: limited to New Zealand, small sample size, limited evaluation of interventions to

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
Funding: New Zealand Health Research Council and New Zealand Ministry of Health (MOH) **Bias:** No explicitly stated author bias.			dependency units in hospitals across New Zealand **Exclusion:** not explicitly stated; assume that exclusions were made for patients >42 days post-delivery or without a diagnosis of severe preE **Attrition:** n/a		as reliable as the study was only performed in New Zealand.		factors in readmissions	prevent SMM and readmissions **Feasibility:** Results are easy to replicate but would benefit from refining to obtain precise results. Identification of at-risk patients is feasible via diagnosis of severe preE. **Application:** Findings are applicable as they provide insight on how patient education at D/C, F/U appointments, and contraception after birth impact readmission rates.
(Becker et al., 2021) Interventions to improve communication at hospital discharge and rates of readmission: A systematic	Self-efficacy theory Lack of information regarding how D/C education impacts readmission rates	**Design:** systematic review and meta-analysis **Purpose:** To understand if D/C communication impacts readmission rates	**N=** 3,953 **Demographics:** patients with various conditions (cardiac, respiratory, polypharmacy, etc); no specific demographic information due to	**IV1:** use of communication interventions at D/C **DV1:** readmission rates **Definitions:** n/a	**Tools:** Cochrane Risk of Bias Tool **Validity/ Reliability:** 95% confidence interval reported in intervention and control groups. Results appear valid due to	**Statistical Tests Used:** Egger test Stata MP (StataCorp)	**DV1:** Use of communication interventions at time of D/C decreased readmission rate (9.1% in intervention group compared to 13.5% in	**Level of Evidence**: Level I: systematic review and meta-analysis **Strengths**: review of 19 studies reported; provided suggestions to prevent readmissions and

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
review and meta-analysis **Country:** Switzerland **Funding:** Swiss National Foundation and Swiss Society of General Internal Medicine **Bias:** No explicitly stated author bias. Moderate to high risk for bias in some studies that were evaluated.			systematic review process **Setting:** research setting, outside of hospital facilities **Exclusion:** studies in surgical areas/psych hospitals/outpatient settings; studies that had continued intervention after discharge were excluded; pediatric studies **Attrition:** n/a		detailed review of nineteen studies with similar interventions and outcomes.		control group). Interventions led to increased treatment regimen adherence and higher satisfaction from patients.	recommendations to evaluate effect of education on readmission **Weakness**: limited to adult inpatient studies; did not evaluate multidisciplinary factors related to D/C; no review of readmissions related to socioeconomic or demographic factors **Feasibility:** Results can be replicated with further systematic reviews and meta-analyses. **Application:** Results suggest oral and written communication combined were successful in decreasing readmission rates, which is easily applicable.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
(Oh et al., 2021) Effectiveness of discharge education with the teach-back method on 30-day readmission: A systematic review **Country:** South Korea **Funding:** Ministry of Science and ICT **Bias:** No explicitly stated author bias. Risk for bias in some studies that were evaluated.	Self-efficacy theory Lack of information on how teach-back method affects readmission rates	**Design:** systematic review and meta-analysis **Purpose:** To determine if utilizing teach-back method at D/C has an impact on 30-day readmission rates	**N=** 5 **Demographics:** discharged patients, adults **Setting:** research setting, outside of hospital facilities **Exclusion:** patients under 18 years old, cognitively impaired, difficulty with verbal communication, critically ill patients **Attrition:** n/a	**IV1:** use of teach-back method at time of D/C **DV1:** readmission rates **Definitions:** n/a	**Tools:** Risk of Bias Assessment tool **Validity/ Reliability:** 95% confidence interval reported when comparing teach-back group to usual care. Reliability is not confirmed due to limited review of five studies in specific care areas or specialties.	**Statistical Tests Used:** Cochrane Review Manager (Revman) software 5.2	**DV1:** Teach-back method reduced 30-day readmissions by 45%.	**Level of Evidence**: Level I: systematic review and meta-analysis **Strengths**: all studies provided education and used teach-back, assessed understanding at D/C **Weakness**: small sample size, high risk of bias, limited data for specialties, no standard teach-back method was evaluated **Feasibility:** Results can be replicated with further systematic reviews and meta-analyses. **Application:** Findings can be applied in practice, but would be more successful with increased findings with the same outcomes.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
(Pugh et al., 2021) Evidence based processes to prevent readmissions: More is better, a ten-site observational study **Country:** United States **Funding:** VA Health Services Research and Development Grant **Bias:** Bias was explicitly denied. Potential for bias as two authors' salaries were provided by South Texas Veterans Health Care System.	Evidence-based practice framework Understand how evidence-based practices impact readmission rates	**Design:** mixed-method observational study **Purpose:** To understand if EBP are correlated with a reduction in hospital readmission rates	**N**= 105 **Demographics:** 40 demographic criteria and medical conditions (not stated in the study) **Setting:** Ten VA hospitals across U.S. **Exclusion:** Patients who left AMA; admission for psych diagnoses, rehab, nursing home, cancer treatment, stay >365 days, death one day post-D/C **Attrition:** n/a	**IV1:** use of evidence-based D/C practices **DV1:** readmission rates **Definitions:** n/a	**Tools:** none stated; data collected by experienced investigators **Validity/ Reliability:** Confidence interval not reported. Validity and reliability unconfirmed due to variations in D/C processes at the facilities. No facility performed all 20 interventions to determine which had the greatest impact. With further testing, validity and reliability may be confirmed.	**Statistical Tests Used:** SAS Version 9.4 Cook's D Statistic	**DV1:** Utilization of a combination of various EBP at D/C decreased the RSRR by 0.185 percentage points.	**Level of Evidence**: Level III: quasi-experimental **Strengths**: performed at 10 facilities, included interviews and observations of work, applicable to any acute care setting **Weakness**: study was limited to VA hospitals, no focus on high-risk patients or specialty patients **Feasibility:** Results can be replicated and further evaluated in various settings. **Application:** Findings are applicable to practice and would benefit from further evaluation of which EBP made the biggest reduction in readmissions.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Citation	Theoretical/ Conceptual Framework	Design/ Method/ Purpose	Sample/Setting	Variables	Measurement/ Instrumentation	Data Analysis	Results/ Findings	Level of Evidence; Application to practice; Generalization
(Beraki et al., 2020) Knowledge on postnatal care among postpartum mothers during discharge in maternity hospitals in Asmara: A cross-sectional study **Country:** Eritrea (East Africa) **Funding:** No funding received. **Bias:** No explicitly stated bias.	Self-efficacy theory Evaluate PP mother's knowledge on PP care needs and impact on reducing complications	**Design:** cross-sectional, quantitative design **Purpose:** To understand maternal knowledge on PP care and prevention of complications	**N=** 250 **Demographics:** age (17-42 years), marital status (married, living together, divorced, single), education level (junior & below, secondary, higher level), occupation (professional or housewife-like duty), religion (Christian/Muslim) **Setting:** Orotta National Referral Maternity Hospital, Sembel Hospital, Edaga Hamus Community Hospital, and Betmekae Community Hospital **Exclusion:** patients that did not speak Tigrigna, still births, c-section delivery **Attrition:** n/a	**IV1:** 17 question structured questionnaires used to evaluate maternal knowledge of postnatal care **DV1:** knowledge and understanding of postnatal care in PP patients **Definitions:** n/a	**Tools:** questionnaire to assess knowledge on postnatal care **Validity/ Reliability:** 95% confidence interval reported. Validity of information provided to patients was confirmed. Reliability is implied when findings were compared to studies in Nepal, India, and Ethiopia. Findings can be confirmed via replication.	**Statistical Tests Used:** ANOVA Independent samples t-tests SPSS	**DV1:** Lack of knowledge surrounding postnatal care in rural populations, first time mothers, mothers aged 17-25 years, and lower educational levels are evident, which increases likelihood of death and disability.	**Level of Evidence**: Level IV: cross-sectional study **Strengths**: moderate sample size, standardized evaluation tool, easily replicated **Weakness**: did not assess c-section patients' knowledge, study results limited to countries outside of U.S. **Feasibility:** Results can be replicated and further evaluated in various settings. **Application:** Findings are applicable to practice and would benefit from further evaluation to determine how maternal knowledge surrounding postnatal care impacts readmissions.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Table A2

Evaluation Table for Qualitative Studies

Citation	Theory/ Conceptual Framework	Design/ Method/ Sampling	Sample/ Setting	Major Themes Studied/ Definitions	Measurement/ Instrumentation	Data Analysis	Findings/ Themes	Level/ Quality of Evidence; Decision for/ Application to practice; Generalization
(Pugh et al., 2021) Evidence based processes to prevent readmissions: More is better, a ten-site observational study **Country:** United States **Funding:** VA Health Services Research and Development Grant **Bias:** Bias was explicitly denied. Potential for bias as two authors' salaries were provided by South Texas Veterans Health Care System.	Evidence-based practice framework Understand how evidence-based practices impact readmission rates	**Design:** mixed-method observational study **Method:** semi-structured interviews combined with changes in care processes **Purpose:** To understand if EBP are correlated with a reduction in hospital readmission rates	**Sample:** *n* = 314 **Demographics:** 40 demographic criteria and medical conditions (not explicitly stated) **Setting:** Ten VA hospitals across U.S. **Attrition:** n/a	• RQ1: Is there a correlation between the number of evidence-based transitional care processes used and the RSRR? **Definitions:** n/a	**Data Collection:** 5-day site visits, observers completed semi-structured interviews with staff and observed work to evaluate number of care processes used. **Data Dependability:** dependability is not explicitly noted but can be assumed d/t evaluation across five hospitals with trained observers collecting data. Results can be replicated and interventions can be improved based on study report.	Performed by three reviewers for all five locations. Utilized NVIVO, checklist scores, RSRR scores, and simple linear regression to analyze data.	(1) Outcomes are improved if all recommended care transition processes are implemented throughout hospitalization.	**Level of Evidence:** Level III: quasi-experimental **Strengths:** large sample, mixed demographics, mixed-methods **Weakness:** limited to VA inpatients, limited time for staff to utilize teach-back **Feasibility:** Results may be challenging to replicate d/t time requirement of staff and observers. Replication possible as processes are stated. **Application:** Applicable as reduced readmissions positively impact hospitals, staff, & patients.

Key: **AMA** Against Medical Advice, **BP** Blood Pressure, **D/C** Discharge, **DBP** Diastolic Blood Pressure, **DV** Dependent Variable, **EBP** Evidence-based Practices, **ER** Emergency Room, **F/U** Follow Up, **HDP** Hypertensive Disorders of Pregnancy, **HTN** Hypertension, **Hx** History, **IV** Independent Variable, **preE** Preeclampsia, **PP** Postpartum, **RSRR** Risk Standardized Readmission Rate, **Rx** Prescription, **SBP** Systolic Blood Pressure, **SMM** Severe Maternal Morbidity

Table A3

Synthesis Table

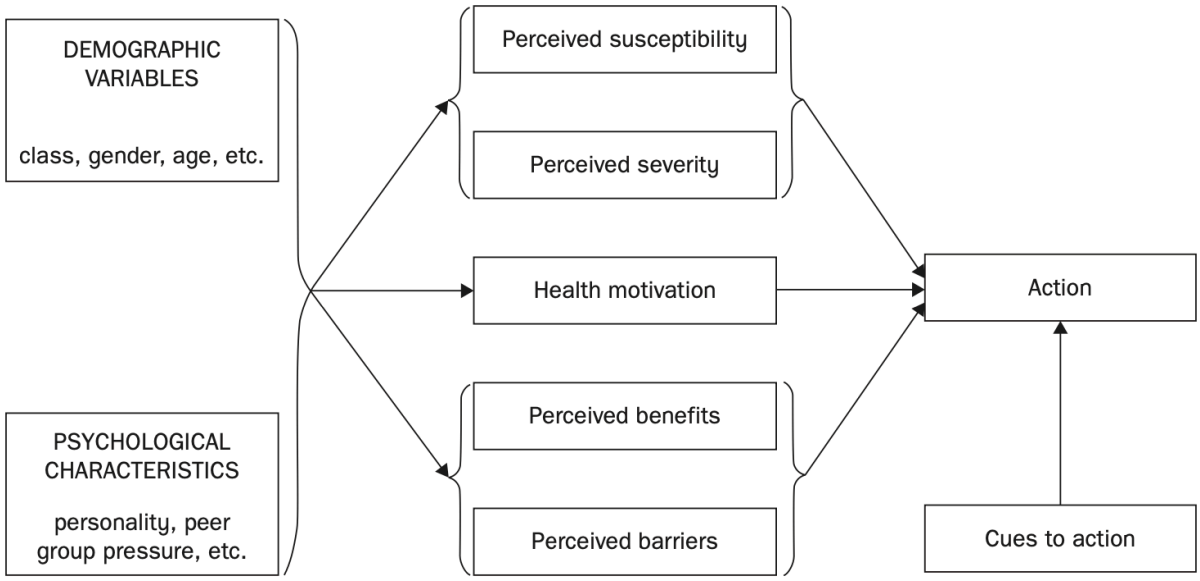
Author, Year	(Lovgren et al., 2022)	(McLaren et al., 2021)	(Redman et al., 2019)	(Wen et al., 2019)	(Bruce et al., 2021)	(MacDonald et al., 2019)	(Becker et al., 2021)	(Oh et al., 2021)	(Pugh et al., 2021)	(Beraki et al., 2020)
Design / LOE	RCS / IV	CCS / IV	CCS / IV	CS / IV	RCS / IV	RCS / IV	SR, MA/ I	SR, MA / I	MM, OS / II	CrS / IV
Demographics										
Sample Size (*n*)	3,480	428	27,057	14,184,074	7,151	89	3,953	5	105	250
Patient Age (years)	N/A	25-36	26-35	15-54	<30 - >40	<20 - >40	N/A	N/A	N/A	17-42
Elevated BP/PreE?	X	X	X	X	X					
Sample Setting										
Hospital	X	X	X		X	X			X	X
Research Setting				X			X	X		
Retrospective	X				X	X	X	X		
Interventions										
BP Evaluation	X	X	X		X					
Prediction/Prevention Tools		X				X		X		X
Identify Risk Factors	X	X		X			X			
Modified Discharge							X	X	X	X
Tools										
Chart Review	X	X	X	X	X	X	X	X	X	X
Risk Assessment		X				X	X	X		X
Readmission Database			X	X						
Outcomes/Themes										
Readmission Rates	↓ (on antihypertensive)	NA	↑ (in certain demographics)	↑ (in certain demographics)	↑ (in certain demographics)	NA	↓	↓	↓	NA

Key: **BP** Blood Pressure, **CCS** Case-control Study, **CrS** Cross-sectional Study, **CS** Cohort Study, **LOE** Level of Evidence, **MA** Meta-Analysis, **MM** Mixed-methods, **NA** Not Addressed, **N/A** Not Applicable, **OS** Observational Study, **PreE** Preeclampsia, **RCS** Retrospective Cohort Study, **SR** Systematic Review

Appendix B

Models and Frameworks

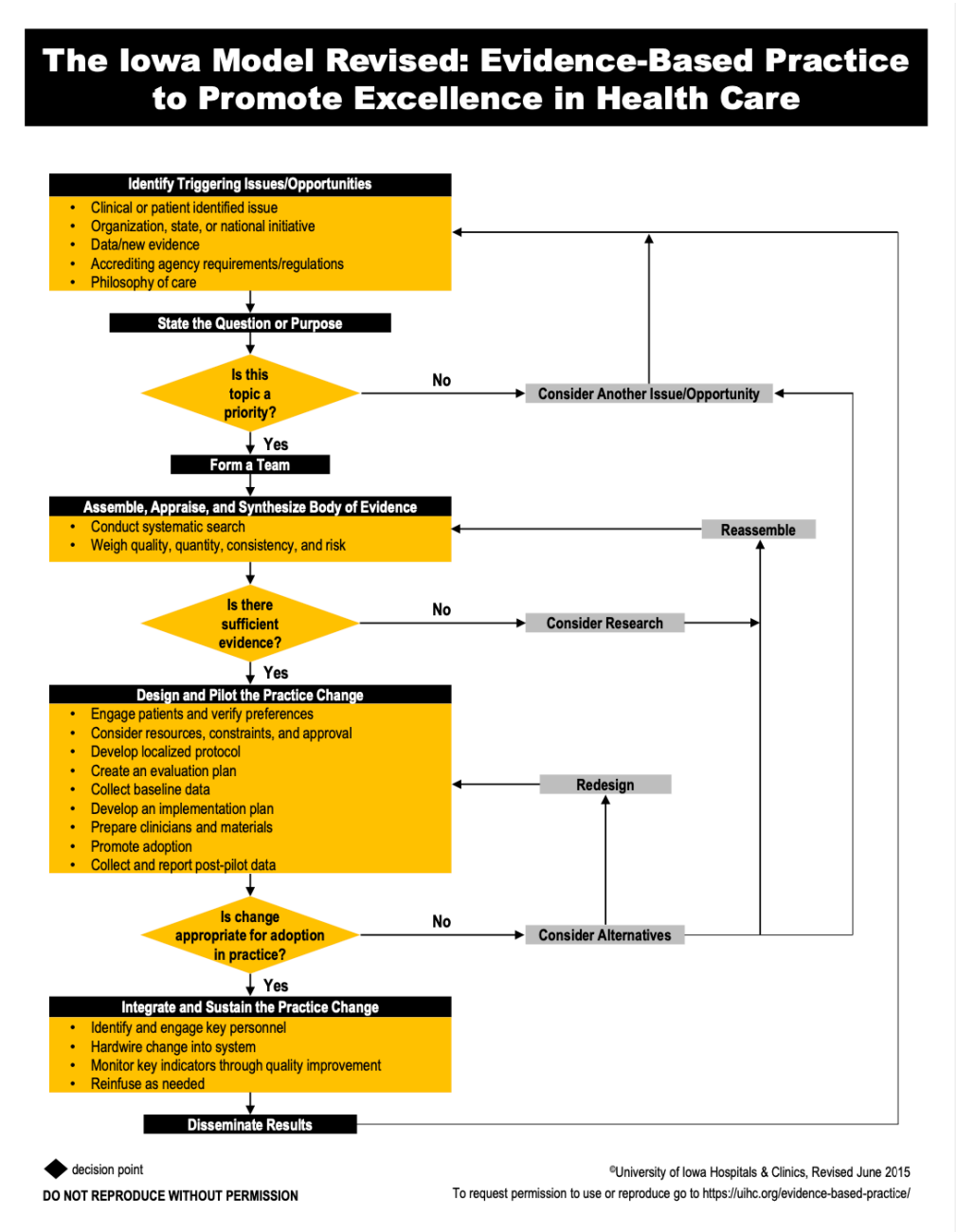
Figure B1
Health Belief Model (HBM)



(Abraham & Sheeran, 2015)

Figure B2

The Iowa Model Revised: Evidence-Based Practice to Promote Excellence in Health Care



(Iowa Model Collaborative, 2017)

Appendix C

Guideline for Development of Surveys

Figure C1
Hypertensive disorders of pregnancy discharge checklist

Checklist 2: Discharge HDP Education for All Postpartum Women

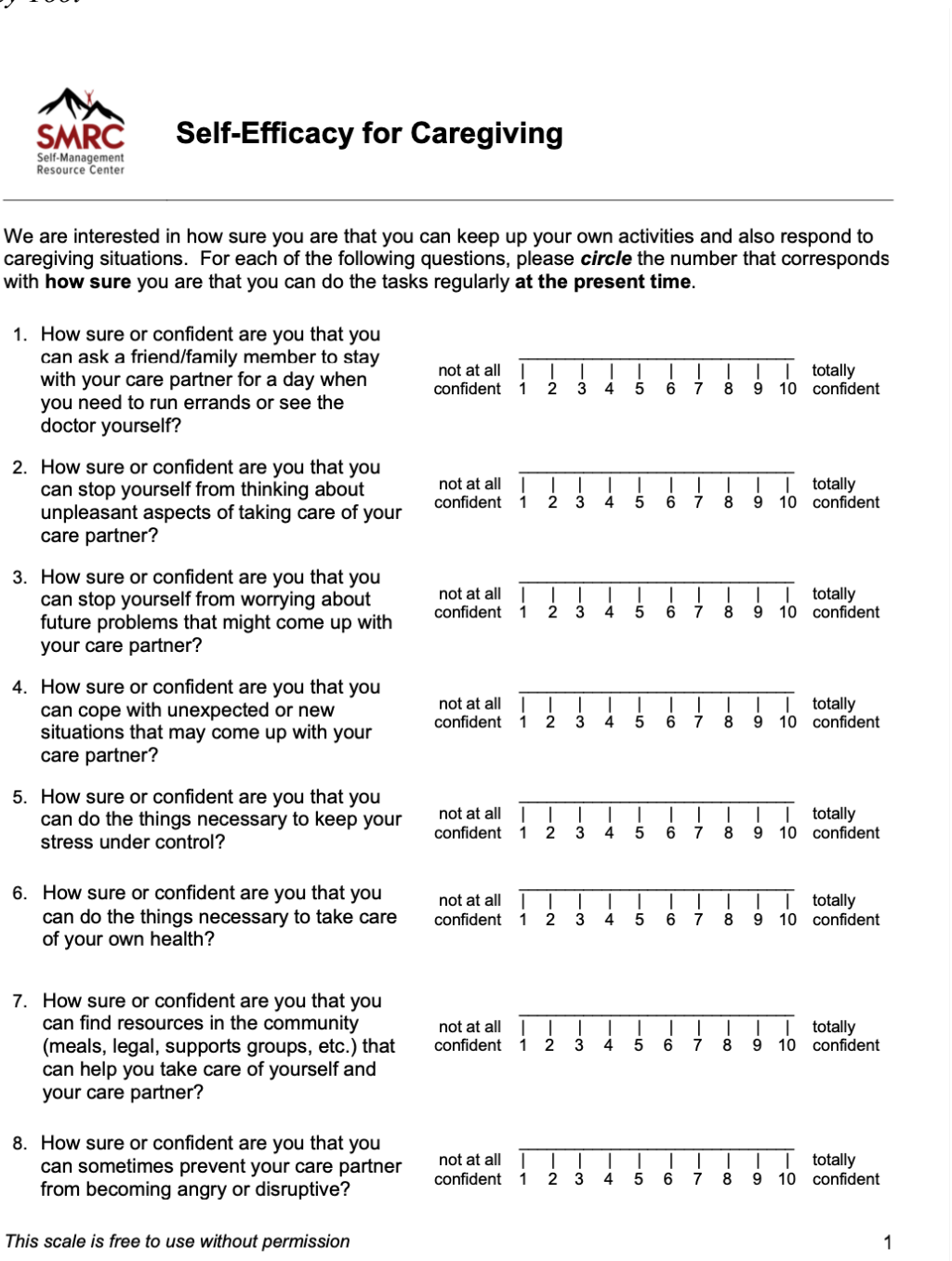
Goal	☐ Ensure all postpartum women receive education about hypertensive disorders of pregnancy (HDP) prior to discharge.
Educate and Discuss	☐ Briefly, define preeclampsia/HDP: Serious disease of high blood pressure that can be dangerous for you up to six weeks or more after delivery. ☐ Provide verbal and written explanation of signs and symptoms of preeclampsia prior to discharge, using culturally appropriate language. ☐ Emphasize urgency of symptoms and importance of calling provider/hospital immediately to women and families.
Communicate and Connect	☐ Use simple terms, communicate with empathy and listen to concerns. ☐ Ask women to repeat signs and symptoms; share information with key family members, using empathy and respectful listening in the discussion. ☐ Call interpreter or interpretation services for language barriers. ☐ Provide adequate time to answer questions, validate emotions from woman and her family.
Emergency Contact	☐ Provide emergency telephone number and location of hospital ED or L&D unit, if severe symptoms present. ☐ Inform patient what to say to administrative staff/answering service: *"I am having symptoms of preeclampsia and my provider told me call and ask to be seen right away when I experience these symptoms."*
Staff Training	☐ Provide training to administrative staff, nursing and medical services on implicit bias, respectful communication and validating patient/ family perspectives.

Improving Health Care Response to Hypertensive Disorders of Pregnancy, a CMQCC Quality Improvement Toolkit, 2021.

(California Maternal Quality Care Collaborative, 2021)

Figure C2

Self-Efficacy Tool



SMRC Self-Management Resource Center

Self-Efficacy for Caregiving

We are interested in how sure you are that you can keep up your own activities and also respond to caregiving situations. For each of the following questions, please ***circle*** the number that corresponds with **how sure** you are that you can do the tasks regularly **at the present time**.

1. How sure or confident are you that you can ask a friend/family member to stay with your care partner for a day when you need to run errands or see the doctor yourself?
2. How sure or confident are you that you can stop yourself from thinking about unpleasant aspects of taking care of your care partner?
3. How sure or confident are you that you can stop yourself from worrying about future problems that might come up with your care partner?
4. How sure or confident are you that you can cope with unexpected or new situations that may come up with your care partner?
5. How sure or confident are you that you can do the things necessary to keep your stress under control?
6. How sure or confident are you that you can do the things necessary to take care of your own health?
7. How sure or confident are you that you can find resources in the community (meals, legal, supports groups, etc.) that can help you take care of yourself and your care partner?
8. How sure or confident are you that you can sometimes prevent your care partner from becoming angry or disruptive?

not at all confident | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | totally confident

This scale is free to use without permission 1

(Self-Management Resource Center, n.d.)

Appendix D

DNP Project Budget

Figure D1

DNP Project Budget

Budget for RN Education Implementation

Phase	Activities	Cost	Subtotal	Total
Preparation	Design educational Microsoft PowerPoint™ and recruitment flyer using a free online design service (direct cost)	$0		
	Gas used to drive to facility to present project to committees and stakeholders (indirect cost)	$30		
Delivery	Use of Microsoft Business™ platform, which includes Microsoft TEAMS™, to administer intervention (access purchased by organization – indirect cost)	$12.50 x 130 RNs	$1,625	
	Use of organization approved education tools, approximately 50 flyers size 8.5x11 with two sides (already purchased by organization – indirect cost)	$55.99		
	Use of Microsoft Forms™ for survey response collection (access purchased by organization – indirect cost)	$0 – included in the cost of Microsoft™ platform		
	Payment of staff for attendance of staff meeting (indirect cost paid by organization as participation in staff meetings is required)	$43/hr x130 RNs	$5,590	
Evaluation	Use of Microsoft Forms™ for survey response collection (access purchased by organization – indirect cost)	$0 – included in the cost of Microsoft™ platform		
	Review and analysis of results via Intellectus subscription paid by ASU (indirect cost)	$0		**$7,300.99**

Appendix E

Summary of DNP Project Results

Figure E1

Comparison of Pre and Post-Intervention and Three-Month Follow-Up Survey Results