Stop the Bleed and Seize Control: The Use of Simulation in Educating Emergency Department Staff Regarding Maternal Hypertension and Hemorrhage: A Quality Improvement Project

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Stop the Bleed and Seize Control: The Use of Simulation in Educating Emergency Department Staff Regarding Maternal Hypertension and Hemorrhage:

A Quality Improvement Project

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NURS 653: Internship
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May 10, 2022
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Section I: Abstract

A quality improvement (QI) initiative was geared to assess and prepare Emergency Department (ED) nurses and clinical staff preparedness of pre-eclampsia and postpartum hemorrhage (PPH). The Non-Profit Hospital, with two different Emergency Room locations, currently does not have a Labor and Delivery (L&D) unit at one of their campuses. Additionally, there is no current policy or procedure set in place for the treatment of preeclamptic or postpartum women in the emergency room. As a direct result of The Joint Commission (TJC) standards and a very short timeline, a group of University of San Francisco Clinical Nurse Leader (CNL) graduate students prepare the Emergency Department clinical staff with preeclampsia and PPH scenarios through both in-person and video simulation. The CNL students created pre-implementation and post-implementation surveys in order to assess the effectiveness of the live simulation. After the in-person simulations are conducted at both Non-Profit emergency rooms, the CNL students created an educational plan to train emergency room clinical staff in effectively identifying and treating common obstetrical emergencies such as preeclampsia and postpartum hemorrhage. The video scenario will be implemented in the clinical staff’s knowledge center to be used as their annual training to meet educational needs. It is hoped that with the video simulations prepared by the CNL students, it will serve to support simulation as an educational tool for clinical staff in order to improve healthcare outcomes in preeclamptic and postpartum hemorrhage women when presenting in an Emergency Department setting.

Keywords: Emergency Department, Preeclampsia, Postpartum Hemorrhage, Simulation Training, Nursing Education, Quality Improvement
Section II: Introduction

The Emergency Department (ED) is a critical point of access for emergent needs that may come at any minute. Emergency Department nurses must be able to quickly assess and identify the best way to stabilize their patient, which requires a diverse level of knowledge from all specialty departments. It is also crucial to have healthcare professionals prepared for any case and to appropriately intervene during time-sensitive situations. While there may be rare instances of maternal cases in the emergency room, they require immediate assessment and care. In California, cardiovascular disease was the leading cause of pregnancy-related death, and “forty-one percent of the pregnancy-related deaths had a good-to-strong chance of preventability” (California Department of Public Health, 2018). California accounts for one in eight births in the United States, and “approximately one in twelve women used the ED as a source of unscheduled postpartum medical care from 2009 to 2011” (Batra et al., 2017). There is a dire need for better management of pregnancy related-emergencies in which their first point of contact may be at their local hospital emergency room. Pregnant women presenting to the Emergency Department “require thorough evaluation for early identification of life-threatening complications” (American College of Obstetricians and Gynecologists, 2016).

The Standards for Maternal Safety, published by the Joint Commission in 2019, aimed to reduce the likelihood of harm related to maternal severe hypertension or preeclampsia, and have several components that hospitals must meet in order to fulfill their standards (The Joint Commission, 2019). The new Maternal Safety Standards, effective January 1, 2021, calls for immediate readiness and preparedness of the hospital, including the Emergency Department. Emergency Departments typically have “structured triage guidelines for health care providers encountering the diverse cases that may present to their units” (American College of
Obstetricians and Gynecologists, 2016). The new guidelines for Maternal Safety now must require a specific set of triage guidelines for pregnant and postpartum women. In this paper, a quality improvement initiative will be detailed in a Non-Profit Hospital, where Emergency Department nurses and clinical staff will participate in live and video simulation aimed to increase their preparedness in preeclamptic and postpartum hemorrhage emergencies.

**Background**

Preeclampsia is a condition of pregnancy where the woman develops hypertension and proteinuria. It is one of the many hypertensive disorders of pregnancy and may present itself as preeclampsia with or without severe features. Diagnostic criteria for preeclampsia based on the American College of Obstetrics and Gynecology states that, “Systolic blood pressure of 140 mm Hg or more or diastolic blood pressure of 90 mm Hg or more on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure” and proteinuria 300 mg or more per 24-hour urine collection, protein/creatinine ratio of 0.3 or more or dipstick reading of 2+ (American College of Obstetrics and Gynecology, 2020). Preeclampsia with severe features may also include thrombocytopenia, renal insufficiency, edema, new-onset headache that is not relieved with over the counter medications, and visual disturbances. The neurological effects of uncontrolled hypertension in pregnancy can ultimately lead to seizures.

Additionally, preeclampsia can present in the postpartum period, developing as early as 48 hours after childbirth and up to six weeks after delivery (Mayo Clinic, 2021). Preeclampsia poses a major risk for the postpartum woman, as the first postpartum follow-up visit is recommended within the first 3 weeks postpartum and concluding with a comprehensive postpartum visit no later than 12 weeks after birth (American College of
Obstetricians and Gynecologists, 2018). It is important to thoroughly assess women in the postpartum period, because “delivery does not eliminate the risk for preeclampsia and its complications” (White, 2006). While the clinical presentation of postpartum preeclampsia may be atypical, “the most common complaint (69%) is headache” (Al-Safi et al., 2011). Often, atypical and missed symptoms of severe preeclampsia include chest pain, epigastric pain or shortness of breath. Patients with preeclampsia and eclampsia as complications of pregnancy can present to the emergency department sometimes days to weeks after delivery, with a varied spectrum of signs and symptoms and many emergent needs (White, 2006). Severe preeclampsia is a hypertensive emergency that requires immediate interventions to control blood pressure (≥160/≥110) with antihypertensive medications (Hydralazine, Labetalol, Nifedipine) and treatment to prevent seizures with magnesium sulfate administration.

Postpartum hemorrhage (PPH) is defined by the American College of Obstetricians and Gynecologists, of at least 1,000 mL total blood loss or loss of blood coinciding with signs and symptoms of hypovolemia within 24 hours after delivery of the fetus or intrapartum loss (Evenson et al., 2017). However, postpartum hemorrhage can also occur after 24 hours, and up to 6 weeks after delivery. Approximately 3% to 5% of obstetric patients will experience postpartum hemorrhage (Knight et al. 2009). It is important to recognize early signs of excessive bleeding during the postpartum period and immediately intervene. Blood loss should be monitored throughout Labor and Delivery and postpartum and should be quantified for accurate measurement (Association of Women’s Health, Obstetric and Neonatal Nurses, 2021). Nurses
must be diligent to assess and recognize postpartum hemorrhage and to intervene in a timely manner, which includes medication administration to control the blood loss (Pitocin, Methergine, Misoprostol, or Hemabate).

**Problem Description**

The Non-Profit Hospital conducting the quality improvement project has two sites, campus A and campus B, roughly five miles apart. While both hospital campuses have emergency departments, only campus A has a labor & delivery unit on site. The Non-Profit Hospital was recently cited by The Joint Commission due to their lack of implementation of the Maternal Safety Guidelines in all of their hospital units. TJC requires all birth facilities to demonstrate how they are achieving the six Elements of Performance (EPs) to ensure competent care of women experiencing maternal hemorrhage and preeclampsia (Druzin et al., 2021). The Elements of Performance, which must also be represented in the Emergency Department, include (PC.06.03.01):

1. Develop written evidenced-based procedures for managing pregnant and postpartum patients with severe hypertension/preeclampsia that includes the following:
   a. The use of an evidence-based set of emergency response medications that are stocked and immediately available
   b. The use of seizure prophylaxis
   c. Guidance on when to consult additional experts and consider transfer to a higher level of care
   d. Guidance on when to use continuous fetal monitoring
   e. Guidance on when to consider emergent delivery
f. Criteria for when a team debrief is required

2. Provide role-specific education to all staff and providers who treat pregnant/postpartum patients about the hospital’s evidence-based hypertensive disorders of pregnancy (HDP) procedure. At a minimum, education occurs at orientation, whenever changes to the procedure occur, or every two years.

3. Conduct drills at least annually to determine system issues as part of ongoing quality improvement efforts. Severe hypertension/preeclampsia drills include a team debrief.

4. Review severe hypertension/preeclampsia cases that meet criteria established by the hospital to evaluate the effectiveness of the care, treatment, and services provided to the patient during the event.

5. Review severe hypertension/preeclampsia cases that meet criteria established by the hospital to evaluate the effectiveness of the care, treatment, and services provided to the patient during the event.

The Joint Commission clearly states that, “the Emergency Department is often where patients with symptoms or signs of severe hypertension present for care after delivery” (The Joint Commission, 2019). For this reason, the Non-Profit Hospital was tasked with meeting all guidelines that meet the education standards in both of their ED’s. Education should be provided to staff and providers in emergency departments regardless of the hospital’s ability to provide Labor and Delivery services” (American College of Obstetricians and Gynecologists, 2016). Due to the Non-Profit Hospital’s lack of a Labor and Delivery department at campus B, the Maternal Safety guidelines play an important role in policy and procedure implementation in order to both meet the Joint Commission standards of care and to improve healthcare outcomes in the maternal
and postpartum population. Specifically, the Non-Profit Hospital is focusing on emergency
department preparedness of postpartum hemorrhage and preeclampsia.

In the United States, where most births occur in hospitals and where resources are more
likely to be available as compared to developing countries, maternal mortality rate has been
“increasing since 2000, and in 2018, there were 17 maternal deaths for every 100,000 births”
(Lagrew et al., 2022). Hypertensive disorders of pregnancy are one of the most common medical
disorders of pregnancy, occurring in 8-10% of pregnancies (Druzin et al., 2021). Research shows
that while there has been an overall decrease in the frequency of eclampsia, the “frequency of
postpartum and delayed eclampsia has increased, making it more common for patients to present
to the ED with symptoms” (Druzin et al., 2021). The Non-Profit Hospital also identified gaps in
their medication supply in the ED that is needed for preeclamptic and postpartum hemorrhage
emergencies. They also noted they did not have the correct doses of medications in their
Emergency Department, such as the needed premixed IV bags of magnesium sulfate dosage for
seizure prophylaxis in a preeclamptic emergency. With this in mind, nurse educators and
Medical Doctors collaborated to create a policy and procedure for their Emergency Department
to follow an algorithm that states the medications needed and their doses to administer. Refer to
Appendix A for the postpartum hemorrhage and preeclampsia treatment algorithms.

In addition to the new procedure, the nurse educators needed to create educational tools
to prepare their staff for commonly seen scenarios. The nurse educators called upon a team of
graduate nursing students with a clinical nurse leader (CNL) program emphasis background to
implement a solution to better support their nurse’s education. In order to meet The Joint
Commission standards by their deadline of March 6, 2022, a team of nurse educators, ED
managers, and CNL nursing students embarked on quality improvement measures to educate the
clinical staff through live simulation and recorded video simulation to further support the Emergency Department’s education. The PICO question is as follows: Among Emergency Department staff, what is the effectiveness of curated maternal hemorrhage and preeclampsia simulation training and/or recorded simulation video modules in increasing staff’s knowledge of hospital policy and procedures and increasing self-reported comfort levels in recognizing and treating maternal hemorrhage and preeclampsia?

**Literature Review**

In a retrospective cohort study performed by Dilla, Waters and Yazer, the researchers sought to determine whether the California Maternal Quality Care Collaborative (CMQCC) risk groups predicted the risk of peripartum hemorrhage. The incidence of peripartum hemorrhage has increased over the past two decades in the United States and hemorrhage is still a leading cause of maternal death (Dilla, Waters & Yazer, 2013). CMQCC established guidelines based on known clinical and laboratory risk factors for peripartum hemorrhage and assigned pregnant women to one of three risk categories that was used to determine the extent of pretransfusion testing required. Pretransfusion was defined in this study as “peripartum bleed significant enough to require the transfusion of at least 1 unit of packed red blood cells” (Dilla, Waters & Yazer, 2013). Over a one year timeframe, data was collected for each woman who gave birth at a Pittsburgh hospital, using the CMQCC Peripartum Hemorrhage Risk Group Guidelines. There were 10,134 women who gave birth, with pretransfusion testing occurring in 139 women (1.4%). Of the 139 women, the incidence of a significant peripartum hemorrhage within each group was as follows: low (0.8%); medium (2.0%); and high (7.3%) (Dilla, Waters & Yazer, 2013). Furthermore, the high-risk group captured the majority (85%) of women who had a significant peripartum hemorrhage (Dilla, Waters & Yazer, 2013). This study found that the CMQCC
toolkit showed an increasing risk for transfusion as the risk grade increased and women categorized in high-risk groups should have pretransfusion testing performed. This study provides statistical significance in California Maternal Quality Care Collaborative efforts on creating toolkits that improve maternal care. This also supports the reasoning behind TJC utilizing CMQCC evidence-based practices as their foundation to implement Maternal Safety Standards nation-wide.

In a cohort study performed by Froehlich et al., (2020) in a tertiary care hospital, the institutional review board and quality council approval allowed the team to assess treatment outcomes associated with a quality improvement intervention designed to align clinical practice in a women’s Emergency Department with guidelines of treatment algorithms of a hypertensive emergency. The researchers used the American College of Obstetricians and Gynecologists (ACOG) updated guidelines for interventions in a hypertensive emergency, which includes first line antihypertensive agents, such as IV Labetalol, IV hydralazine, or oral nifedipine. The ACOG guidelines suggest patients should achieve blood pressure control within one hour of treatment. Data was collected from pregnant (20 weeks of gestation or greater) and postpartum (6 weeks of gestation or less) women treated for hypertensive emergencies before and after a quality improvement intervention. Data revealed that the proportion of women achieving goal blood pressure within 60 minutes of therapy was not statistically different between groups, however, the median time from first severe BP to achieving goal BP decreased significantly, from 122 minutes to 95 minutes (Froehlich et al., 2020). Additionally, IV Labetalol and oral nifedipine were used more frequently than IV hydralazine. This study also highlighted that although the initial quality improvement intervention did not achieve the initial aim of controlling BP within an hour after an aggressive treatment approach, it did increase the number of women achieving
BP control within an hour of obstetric hypertensive emergency treatment (Froehlich et al., 2020). This supports the need for a quality improvement initiative in an emergency setting to improve staff awareness and comfort in recognizing and treating hypertensive disorders of pregnancy and the need for treatment algorithms for immediate interventions. Limitations to the study include removing barriers to confirm and communicate the presence of an obstetric hypertensive disorder in a timely manner to begin treatment.

A retrospective cohort study was performed by Kantorowska et al., (2020) to identify barriers that lead to delayed treatment of obstetric hypertensive emergencies. Through their research, they compared women who were treated appropriately within 60 minutes versus those who were delayed in first line therapy. The results of 213 women were used for analysis, and 110 women had delayed treatment versus 103 who were treated appropriately. The study found that the women who had delayed treatment were 3.2 times more likely to have an initial blood pressure in the non-severe range versus those who had timely treatment in the severe range, meaning initial blood pressure readings may not present the women’s true hypertensive state (Kantorowska et al., 2020). Additionally, timeliness of treatment was associated with the presence or absence of preeclampsia symptoms. Delayed treatment also has an association with race, with “white patients being 1.8 times more likely to have delayed treatment” (Kantorowska et al, 2020). This study serves as an analysis to determine barriers that lead to a delay of treatment of obstetrical hypertensive emergencies, which can be applied to the quality improvement process. Such factors must be considered when assessing patients who present to the Emergency Room with not so common signs or symptoms of obstetric emergencies.

While the retrospective cohort study by Kantorowska et al. in 2020 found that white patients were 1.8 times more likely to have delayed treatment of obstetric emergencies, it is
important to note the racial disparities among the maternal population and how these disparities contribute to the maternal mortality rate. According to the Centers for Disease Control and Prevention (CDC), Black, American Indian, and Alaska Native (AI/AN) women are two to three times more likely to die from pregnancy-related causes than white women – and this disparity increases with age. Pregnancy-related deaths per 100,000 live births (PRMR) for Black and AI/AN women older than 30 was four to five times as high as it was for white women (Centers for Disease Control and Prevention, 2019). From the CDC’s national data on pregnancy-related mortality from 2007-2016, researchers found that cardiomyopathy, thrombotic pulmonary embolism, and hypertensive disorders of pregnancy contributed more to pregnancy-related deaths among black women than among white women. Additionally, hemorrhage and hypertensive disorders of pregnancy contributed more to pregnancy-related deaths among AI/AN women than white women (Centers for Disease Control and Prevention, 2019). This data further supports the need for a quality improvement initiative that focuses on Emergency Department readiness in obstetric emergencies, such as hemorrhage and hypertension disorders, and to further consider the care provided to marginalized women during pregnancy.

In an analysis performed by Dryver et al., (2021), research studies were performed to determine if simulation environments with checklists improve the management of Emergency Department crises. The researchers conducted a randomized controlled simulation-based trial to evaluate the impact of checklists on the management of medical crises by local resuscitation teams during their clinical shifts using simulations carried out in the emergency department (Dryver et al., 2021). Scenarios were developed for eight medical crises based on cases that may present in the ED and a checklist was developed for each of the eight crises. Each scenario was simulated at least twice, once with and once without checklist access. Results of the simulation
determined that the median percentage of interventions performed was 38.8% without checklist access and 85.7% with checklist access (Dryver et al., 2021). This study supports the need for an algorithm that provides a checklist of medications and interventions needed when a patient presents to the ED in a medical emergency. This can be applied to the quality improvement initiative to create a checklist specifically for obstetric emergencies, such as preeclampsia and postpartum hemorrhage. This article was very useful in constructing the methods of the quality improvement initiative.

In the research conducted by Sullivan et al., (2015), they wanted to determine if simulation exercise improves retention of cardiopulmonary resuscitation priorities. A randomized controlled trial was conducted at a large mid-Atlantic teaching hospital to evaluate the effectiveness of short, repeated training sessions for nurses from the moment help was needed to the initiation of chest compressions to defibrillation. The study design was approved by Johns Hopkins Hospital Institutional Review Board and participants gave written consent. The researchers compared training conducted every two months, three months, six months and traditional American Heart Association (AHA) training. Statistical analysis showed that, “there was a significant decrease in the median seconds elapsed between the call for help and initiation of chest compressions with more frequent training sessions; with no significant difference between the six-month interval and the control” (Sullivan et al., 2015). The data clearly revealed improved performance of the initial priorities with short, frequent training simulations, with training every 2 months and 3 months notes a significant improvement compared to the six month groups (Sullivan et al., 2015). Additionally, the training highlighted the importance of teamwork necessary to minimize interruptions and maximize resuscitation efforts. This study also revealed that short training sessions during work hours was efficient in both time and
resources. The research has evidence that shorter and more frequent simulations and training help emergency staff with skill retention. While this article was resuscitation skills training specific, this data can be applied to a variety of emergency situations that require simulation training. This study serves as another supporting evidence that utilizing frequent simulation training in the quality improvement initiative can further improve obstetrical emergency healthcare outcomes.

**Project Aim**

Global Aim Statement: The CNL graduate students aim to improve the awareness of and comfort in responding to preeclampsia and postpartum hemorrhage (PPH) within the Emergency Department staff. The process will begin with evaluating the current policies, processes, and training and end with recommendation of revised policies, processes, and implementation of new training regimes. The CNL graduate students expect to improve the overall staff awareness and comfort in recognizing and treating PPH and preeclampsia. It is important to develop and implement simulation training and a recorded simulation video as training material for the ED staff in the early recognition and treatment of preeclampsia and postpartum hemorrhage to satisfy new Joint Commission Standards.

Specific Aim Statement: By implementing annual simulation training, the CNL graduate students aim to fulfill one of The Joint Commission guidelines necessary for accreditation, while increasing ED staff comfort in recognizing and responding to maternal hemorrhage and hypertension/preeclampsia by 10% by April 2022. The CNL students also aim to implement a new maternal hemorrhage and preeclampsia simulation-based video as new training modalities by January 2023.

**SECTION III: Methods**
Theoretical Framework

The quality improvement project relied on both the urgent need for change and Emergency Department nurses’ and clinical staff self-reported confidence and readiness in an obstetrical emergency. Due to the nature of the initiative and in order to meet stakeholder’s needs, the QI team utilized Kotter’s 8 Step Process for leading change. Kotter’s Change Management Model (KCMM) is an 8-step method for implementing change that can be applied to educational initiatives (Haas et al., 2019). The model was designed by John Kotter, a Harvard Business School Professor and expert on change leadership, and was initially described in a corporate context. Kotter’s model consists of a logical sequence of 8 steps that include (1) create urgency, (2) form powerful leadership coalition, (3) create vision for change, (4) communicate vision, (5) remove obstacles, (6) create short-term wins, (7) build on the change, and (8) anchor changes (Haas et al., 2019). There was an urgency created due to possible fines the Non-Profit Hospital may face due to the citation and deadline made by The Joint Commission. A powerful leadership coalition was formed among the interdisciplinary team of Medical Directors, nurse educators, clinical nurse specialists, and Medical Doctors in order to create the change. The vision for change was created, along with the participation of the CNL students through advertisements in the ED and through live and pre-recorded simulations. A plan of action was then communicated to promote both short-term and long-term educational goals for the ED clinical staff in regards to preparation of common obstetrical emergencies. Removing obstacles, such as ED room availability as well as staff availability, was meticulously planned to ensure the live simulation were to go as scheduled. The short-term wins included an interactive debriefing session with the staff participants and the Medical Doctors, specialists, and nurse educators, where the staff expressed the positive impact of the simulation and how they learned valuable
information in the case study. The CNL graduate students will build on and anchor the change through implementation of the recorded simulation, created by the CNL students, in the staff’s knowledge center that will be a required yearly training module, beginning 2023. TJC did not provide specific direction regarding what percentage of ED staff needed to be trained by their deadline, and in response, the Non-Profit Hospital considered a minimum of one person attending the live training as meeting the requirement for the 2022 year.

The QI team also utilized the PDSA Cycle to implement the quality improvement initiative at the Non-Profit Hospital. The PDSA cycle, created by Dr. William Edward Deming, consists of a logical sequence of four repetitive steps for continuous improvement and learning: Plan, Do, Study and Act (Taylor et al., 2014). In order to implement a simulation in the Emergency Room to improve the clinical staff’s education and readiness, the team found it fitting to use this model to guide the process and determine further improvements. In the “Plan” phase, the CNL graduate students began to perform literature review, research, and baseline assessments of the microsystem to determine how they are not meeting the new TJC standards. A collaboration with the ED manager and experts in the L&D field mediates the discussion of implementing the new standards based on current literature and procedure. Then the process of creating the simulation and material begins, as well as selecting dates for the simulation at both campus A and B. Meanwhile, the CNL graduate students plan their part of creating a simulation script, using evidence-based practices, to ensure TJC educational standards are met. In the “Do” phase, the simulation training is pieced together, the simulation scenario is carried out, and the simulation training videos are filmed. In the “Study” phase, the CNL students analyze the pre survey and post survey results, assess participation and analyze the debriefing session. Finally, in the “Act” phase, the CNL students collaborates with the leadership team and nurse manager to
decide whether the intervention being tested should be modified or abandoned based on the results and feedback attained before, during, and after the live simulation and Knowledge Center implementation, and changes are made accordingly to repeat the cycle. Please see Appendix B for the full PDSA Cycle used for this project.

The quality improvement project was initiated because the Non-Profit Hospital was cited by The Joint Commision due to the lack of the Maternal Safety Standards implementation at campus A and B. The new Joint Commission Standards was only applied to their Labor and Delivery unit, however they were not applied to both campus’ Emergency Departments. This created urgency in the Non-Profit Hospital’s initiative to act because their deadline set by the Joint Commission was Spring 2022. Through meetings with the nursing administration and the nurse educators, collaboration among both campus’ Emergency Departments and the Labor and Delivery team created an all-in-one scenario that presented a patient with both preeclampsia and postpartum hemorrhage. This created a vision to ensure ED preparedness in the event an obstetric emergency presents where labor and delivery services are not available.

Resources were assessed and gathered to support the change in the ED, which included the nurse educators and pharmacists to ensure correct dosages of medications were in stock, such as 2 gram Magnesium Sulfate bags, and a dedicated obstetric emergency cart. Computerized surveys were sent to all emergency clinical staff to assess baseline knowledge, as well as handouts with a QR code that linked the survey for easy access. The maternal simulator mannequin (NOELLE), which was donated to the Non-Profit Hospital, was used for the live and recorded scenario. Please see Appendix C to view the simulator mannequin. Moreover, the Simulation Technician eased the technology barriers by setting up the mannequin, simulation props and video and computer equipment to ensure a smooth simulation process. The change
objects measured were the nurse’s confidence and readiness in a postpartum hemorrhage or
preeclamptic scenario. The change agents were scheduled simulations at both Non-Profit
Hospital campuses conducted by the nurse educators and two video recorded simulations
conducted by the team of graduate CNL students. The change was maintained through the
dedicated efforts of the ED nurse educator, L&D nurse educator, charge nurses, and nursing staff
to implement the recorded videos as yearly educational modules on the Knowledge Center, as
the ED nurse manager’s timeline for the videos and module is to go live in 2023.

**Microsystem Assessment**

The quality improvement initiative was implemented in the Emergency Departments at
campus A and B at the Non-Profit Hospital to readily prepare their ED clinical staff. To assess
this microsystem, the 5 Ps were utilized to framework the analysis, which include: purpose,
patients, professionals, processes, and patterns. The purpose of the Emergency Department is to
be ready to deal with emerging, life-threatening situations, with one of their campuses being a
designated trauma center. The patients that present in their ED are admitted with a diverse set of
conditions that range from acute to life threatening conditions, which they are seeking emergent
care. Professionals working on this unit include the staff nurses, ED technicians, unit secretaries,
charge nurse, transporters, physicians, nurse practitioners, and housekeeping. The ED also
receives a wide range of support such as specialists, respiratory therapists, phlebotomists,
pharmacists and social workers. Processes include team huddles and patient hand-offs at the
beginning of each shift. The Emergency Department at both campus A and B did not have a
process or procedure in place to address obstetric emergencies. In the event of an obstetric
emergency, an on-call L&D provider will arrive within 30 minutes of consultation at campus B
or transferred to their campus A on-site L&D unit. At hospital B, a Labor and Delivery team is
readily available for assistance during any maternal emergency in the ED, therefore their process was simply to transfer immediately. Patterns at the Non-Profit Hospital involve spontaneous and infrequent maternal hemorrhage or hypertension/preeclampsia admissions. The Emergency Department staff displayed an avoidance of these maternal emergencies, and any patient would be immediately transferred to the L&D unit.

It was also noted that many ED nurses were unfamiliar with interventions related to obstetric emergencies or how to stabilize these patients. Their Omnicell dispensing system, or medication supply, did not have the correct dosages needed for specific cases related to patients presenting with an obstetric related complication. For example, treatment for seizure prophylaxis is a top priority when a woman presents with borderline severe blood pressures (>155/>105), which could escalate to preeclampsia with severe features (Druzin et al., 2021). The standard of care for seizure prophylaxis is prompt initiation of Magnesium Sulfate in a dose of 4 to 6 gram bolus, followed by a maintenance dose of 1 to 2 grams per hour based upon renal status (Druzin et al., 2021). Unfortunately, the Non-Profit Hospital ED did not carry 4 gram doses in their medication supply, and the magnesium sulfate doses currently in their Omnicell was not adequate enough for seizure prophylaxis during a preeclamptic event. If the medication dose availability is not corrected in the emergency setting, this does not promote quality and competent care, which further leads to adverse outcomes in the maternal population. The lack of any process and patterns noted during the Microsystems assessment proved the need to address Emergency Department readiness and skills regarding postpartum hemorrhage and preeclamptic emergencies.

Root Cause Analysis
A root cause analysis (RCA) was conducted to determine the main factors of poor recognition and readiness in specific obstetric emergencies at the Non-Profit Hospital. Please refer to Appendix D for the fishbone diagram that details the root cause analysis. After careful consideration of the possible influencers, it was clear that there were 4 main factors that led to the lack of readiness and preparedness in postpartum hemorrhage and preeclamptic emergencies: (1) new provisions made by the Joint Commission, (2) lack of education, (3) lack of training and (4) lack of equipment. As mentioned previously, the new Maternal Safety Standards set, effective January 1, 2021, created a need for better preparedness in this patient population. Due to the lack of specificity in the new TJC Maternal Safety Standards and how it applies in the Emergency Room setting, this led to inadequate preparation in the Non-Profit Hospital campus A and B Emergency Departments. Lack of education could be due to a lack of understanding the needed interventions in the ED when there is a labor and delivery unit readily available, which is a protocol that is legally driven, nationwide through the Emergency Medical Treatment and Labor Act (EMTALA). As a result, the lack of education could be due to a lack of understanding the initial necessary interventions to stabilize an obstetric emergency prior to transfer to the L&D unit. Lack of training could be due to the rare instances the Non-Profit Hospital ED encounters these specific obstetric conditions, therefore the skills, such as fundal massages, are not practiced frequently. Lack of equipment could be due to the lack of needed medication supply in their unit to treat these patients and therefore not adequately prepared for these scenarios. The resulting effects on the microsystem could lead to a financial penalty, or worse, accreditation loss, that may affect the Non-Profit Hospital’s ability to provide healthcare services or collect financial payments. The financial implications will severely impact the Non-Profit Hospital.

Cost Benefit Analysis
A cost benefit analysis (CBA) was also conducted to determine the costs associated with implementing the change. Please refer to Appendix E, which thoroughly describes the simulation and video cost analysis. The cost of the printed handout sheets was minimal and did not seem significant to the overall analysis. The quality improvement project required efforts among many members among the interdisciplinary team, and cost is reflected in the amount of hours spent multiplied by the median wage. The Medical Doctors are not directly paid through the Non-Profit Hospital, therefore not considered as part of the cost. The total hours spent to develop, plan, and implement the quality improvement initiative amounted to 117 hours. The Non-Profit Hospital previously owned the simulation mannequin NOELLE and equipment, therefore, equipment costs were not included in the overall CBA. The total breakdown of costs was based on policy development, simulation development, implementation, and participants’ time. After including the time spent with data collection and IT involvement, the final cost came out to $7,574.05. The economic benefits are difficult to quantify, however the CNL graduate students attempted to display the overall cost to meet current Joint Commission standards. The Non-Profit Hospital may also lose their accreditation status with TJC if their standards were not met, which poses an economic threat to both the institution and the community. The cost of the quality improvement initiative outweighs the tremendous impact of losing accreditation.

**Intervention**

In an aim to improve Emergency Department nurses and clinical staff’s confidence and readiness in obstetric emergencies, the CNL students collaborated with the ED nurse educator and the L&D Nurse Educator to determine a strategy to provide resources and education to benefit the nurses. Due to the significant time restraints imposed by their deadline, the nurse educators already coordinated a date and time for the simulation at campus A and B. The nurse
educators tasked the CNL students with creating a pre-intervention survey, simulation training advertisement, and a recorded video simulation of the scenarios to implement in their knowledge training center accessible to staff. The CNL students created the pre-implementation survey “Maternal Hypertensive Disorders and Postpartum Hemorrhage Emergency Department Staff Survey” to all ED staff to assess nurse’s current self-reported confidence and readiness. After minimal responses to the emailed survey, the CNL students created a QR code and added to the flyer for easy accessibility to the pre-survey questions—refer to Appendix F for the survey promotion flyer and Appendix G for the survey questions. The CNL students then attended shift huddles to promote participation in the survey and walked through both Emergency Departments to ask staff for their participation. This survey collected responses through the Non-Profit Hospital’s IT department via a summary report of the pre-implementation survey results.

Referring to Appendix H that displays the Pre-implementation Survey Results, it appears that 89% of the ED staff did not have prior experience working directly with L&D or postpartum patients on an obstetric unit. Furthermore, 78% of the respondents were not aware of the current hospital policies and protocols in place when a patient presents to the ED with postpartum hemorrhage. Based on the results, very few pregnant or postpartum patients are seen in the ED on a daily basis (0-1, 70.4%); 2-4, 29.6%). All of the respondents also reported seeing 0-1 postpartum hemorrhage patients on a weekly basis, while 85.2% reported seeing hypertensive disorder of pregnancy (HDP) patients 0-1 times per week and 14.8% reported seeing HDP 2-4 times per week. This data further supports the need for the intervention to address the gaps in knowledge in both postpartum hemorrhage and HDPs such as preeclampsia.

There was also a diverse level of opinions in regards to the effectiveness of the ED staff appropriately intervening in a timely manner for preeclampsia and postpartum hemorrhage.
There were reported gaps of knowledge in treating preeclampsia and postpartum hemorrhage along with what order sets are to be added into their electronic charting system. Common themes in the pre implementation survey results were “no experience with this population”, “both conditions are rarely seen in the ED”, “what medications are given”, and “unfamiliar with managing these patients without our L&D nurses”. Out of the twenty-seven participants in the pre-survey, twenty of the responses came from registered nurses (RN). While the nursing care of the maternal patient is within a nurse’s scope of practice, it is evident that they are underprepared and require additional support in order to meet TJC standards. This data further supported the need to conduct a simulation in the Emergency Department that provides an educational opportunity to prepare for preeclampsia and postpartum hemorrhage emergencies, in the rare event they present at the Non-Profit Hospital.

There was one scheduled training event for each campus ED, on March 3, 2022 and March 16, 2022, at 0900. The allocated time was roughly 4 hours, with 2 hours for setup and breakdown of the scene and two hours for running the simulation and the debriefing session. The team of CNL students and nurse educators did not disclose the content of the simulation, but rather encouraged all staff participation and incentivized the simulation as a fun event to practice their skills. Due to the time limitations of the initial planning for the live simulation, the CNL students were tasked with recording a similar scenario simulation in order to accommodate the staff that were unable to attend. The CNL students proceeded to implement the quality improvement change, using evidence-based practices to identify the correct medication needed for each scenario, appropriate responses from Medical Doctors and obstetric consults, clear roles and responsibilities, and demonstrating effective communication between the interdisciplinary team involved. Once the video script was finalized and recorded, it will be utilized in the Non-
Profit Hospital’s online Knowledge Center for education, anchoring the new change in the staff’s annual competencies.

After the scheduled simulation went live at campus A and B Emergency Departments, a post-implementation survey was sent to the ED staff via an advertisement flyer with a QR code for easy accessibility. The post-survey included the same questions as the pre-survey to assess the effectiveness of the quality improvement initiative in improving readiness in recognizing and responding to preeclampsia and postpartum hemorrhage. The survey questions also asked how comfortable the staff are in recognizing and treating postpartum hemorrhage and preeclampsia with and without severe after having participated in the training, as well as further identifying any gaps in knowledge and if they participated in the live simulation. The respondents were asked to answer the questions using a Likert scale and were asked to identify their role at the Non-Profit Hospital. Please see Appendix I to review the post-implementation survey flyer sent to the ED staff and Appendix J for the post-implementation survey questionnaire.

**Study of the Interventions**

The simulation across both Non-Profit Hospital campuses were met with a surprisingly high turnout, described in the results section. The Emergency Department staff presented with an eagerness to learn and were very optimistic about participating in the scenario simulation. The clinical staff were actively involved with the simulation mannequin, and treated the simulation as a real case in the Emergency Department, which directly aligned with the anticipated outcome of the quality improvement initiative. There was a very interactive post-simulation debriefing session with the clinical staff, nurse educators, and the ED and L&D Medical Doctors, and all presented very important literature that addressed the case and the outcomes as evidenced by literature and research.
Section IV: Results

A total of twelve clinical staff members attended the live simulation at campus A, accounting for 2 Medical Doctors, 8 registered nurses, and 1 ED technician. A total of twenty clinical staff members attended at campus B, which included 2 Medical Doctors, 1 nurse-midwife, 16 registered nurses, and 1 ED technician. Refer to Appendix K for post-implementation survey results. The participation of the post-implementation survey was very low, showing only 3 recorded responses. All three respondents did participate in the live simulation. The limited data collected showed an overall trend of improvement in staff readiness in recognizing postpartum hemorrhage and preeclampsia (with severe and non-severe features) after participating in the live simulation intervention. Participants scored a 6 or greater in a Likert scale from 0-10, when asked how comfortable are you in recognizing and treating preeclampsia, postpartum hemorrhage, and preeclampsia with severe symptoms after having participated in the training.

The recorded video scenario that was developed and acted out by the CNL students became finalized at the end of March 2022. The two-part video simulation met all of the educational requirements the Non-Profit Hospital needed to fulfill the Maternal Safety Standards implemented by The Joint Commission. The two recorded videos will go live on the Non-Profit Hospital’s online Knowledge Center in January 2023, an annual requirement also mandated by TJC. The team is unable to quantify the effectiveness of the prerecorded simulation training, however, it is expected that the new educational video module will prove to be effective in promoting readiness and preparedness among the Emergency Department staff regarding preeclampsia and postpartum hemorrhage.

Section V: Discussion
This quality improvement initiative proved to be beneficial in the Emergency Department’s readiness to identify and intervene in obstetric emergencies, such as preeclampsia and postpartum hemorrhage. Key factors that led to the success of this initiative include the collaboration among the interdisciplinary team, such as the Labor and Delivery nurse educator, the Emergency Department nurse educator, the Medical Directors from both departments, and the astounding participation among the clinical staff. The registered nurses, ED technicians, and Medical Doctors promoted collaboration during a moment in which their skills and knowledge were questioned. This fostered a positive learning environment that allowed for the nurses to express gaps of information in maternal care and allowed them to practice their critical thinking. For example, the ED nurses did not have the skills needed to massage the fundus, were not aware of the standing orders needed to control blood pressure in a preeclamptic patient, and were unfamiliar with the indications for Pitocin and Magnesium Sulfate administration. This provided a great educational opportunity for the nurses to practice their skills, understand the orders, and address the gaps in their knowledge of the method of medication administration. With the support of the L&D Medical Director and the ED Medical Director, they provided specific administration details regarding hypertensive and hemorrhage medications, such as the loading doses, the algorithm to follow, and supported their rationale with evidence based research. Additionally, it was an important teaching moment for the staff to understand contraindications of certain medications. For example, Hemabate is contraindicated for patients with asthma, and Methergine is contraindicated for patients with hypertension. The ED clinical staff were provided with a plethora of obstetric information in a twenty-minute simulation, a much needed intervention in response to their gaps of knowledge.
Furthermore, the live simulation and the recorded scenario created by the CNL students emphasized the need for a mass blood transfusion protocol when a postpartum hemorrhage woman presents in the ED. Campus B has a protocol named “Keep Ahead”, which informs the Non-Profit Hospital’s Blood Bank to prepare units of blood for a possible transfusion underway. The education and protocol described in the video training provided further information to the ED clinical staff regarding the need to activate the transfusion protocol and how maternal complications, such as postpartum hemorrhage, will need the “Keep Ahead” support for better healthcare outcomes. It was also important to have the L&D Medical Director explain the importance of Pitocin administration in this emergency to reduce bleeding, which further supports the need for readily available Pitocin in the ED medication supply. The L&D Medical Director also described the pathophysiology behind hemorrhage in depth and how women compensate during hemorrhage, where they may present hemodynamically stable, but their stability can drastically change in a short timeframe. Overall, there was great feedback from all of the ED staff in response to the effectiveness of simulation training and the amount of education the twenty-minute scenario provided.

SWOT Analysis

A SWOT analysis (Appendix L) was performed to assess the strengths, weaknesses, opportunities, and threats of the change intervention implemented at the Non-Profit Hospital. Strengths include the hands-on training, the faculty commitment to learning new skills, the collaborative environment among the ED staff and L&D nurse educators to ensure a smooth transition between policy development and live simulation, and the overall supportive environment among the interdisciplinary team that fostered positive outcomes in the nurse’s learning. Weaknesses include the time constraints due to the narrow timeline given to meet Joint
Commission standards which led to time constraints with the development of the training, the ED environment and the unpredictability of the availability of nurses during the simulation, and low participation due to the current needs of the unit. Opportunities of growth include increased readiness of recognizing and treating postpartum hemorrhage and preeclampsia, positive healthcare outcomes for obstetric cases presenting in the emergency room, and an additional quality improvement to prepare supplies and medications needed to treat these cases. Threats to the intervention include limited incentive to change among staff that participated in the simulation due to inadequate compensation, poor attitude among the ED staff due to the L&D unit’s quick availability during these emergencies, the lack of participation among the simulation trainings, and possible power dynamics among the ED and L&D staff.

Limitations to the quality improvement project include the time restraints in both the design of the simulation and the staff availability. The simulation scenario presented a woman that had both preeclampsia and postpartum hemorrhage, a rare instance where both pathophysiology are presented together. Refer to Appendix N for the live simulation scenario. This may lead to confusion among the staff in what medications to administer, priority interventions, and if stopping the excessive bleeding may affect the patient’s high blood pressure. Additionally, due to the busy nature of an Emergency Room setting, it may have contributed to the lack of participation of staff in both the live simulation and in the post-implementation survey. Additionally, due to the lack of staff participation in the post-implementation survey results, the QI team was unable to truly measure the success of live simulation training. The recorded simulation video will not be implemented until 2023, and further assessment will be needed to determine the effectiveness of the recorded video in staff's self reported confidence in their knowledge and skill when treating an obstetric emergency
related to preeclampsia and hemorrhage. There was only one live simulation session at each campus, leading to possible missed opportunities among staff participation and could have impacted the survey results. For future considerations, multiple, short simulation sessions throughout working hours—proven to be efficient in both time and resources by Sullivan et. al in 2015—may benefit with increased staff participation to improve their confidence and readiness in specific obstetric emergencies.

**Section VI: Conclusion**

As a direct result of the Maternal Safety Standards implemented by the Joint Commission, the Non-Profit Hospital was tasked with quickly preparing their Emergency Department nurses and clinical staff in readiness and preparedness of postpartum hemorrhage and preeclamptic emergencies. The PICO question posed to address the gaps in education and is as follows: Among Emergency Department staff, what is the effectiveness of curated maternal hemorrhage and preeclampsia simulation training and/or recorded simulation video modules in increasing staff’s knowledge of hospital policy and procedures and increasing self-reported comfort levels in recognizing and treating mate hemorrhage and preeclampsia? A microsystems assessment revealed multiple factors leading to a lack of preparation in these postpartum complications, including incorrect doses of medications readily available in the ED and the presence of an L&D unit at campus B, where these patients are quickly transferred there with minimal Emergency Department interventions. A group of CNL graduate nursing students implemented a quality improvement project to support the ED nurses and clinical staff need for education and training in the form of video and live simulation training. Live simulation training proved to be effective in preparation for postpartum complications and allowed the nurses to practice their skills and clinical decision making. To build on the change, video recorded
simulation scenarios created by the CNL students will be implemented in the ED clinical staff’s Knowledge Center training by January 2023. This further anchors the change and maintains the ED nursing education required by TJC. The QI team also recommends yearly live simulation training in addition to the video module created to allow for true preservation of the change agent. Using an interdisciplinary approach, research and planning and an evidence-based practice, the CNL graduate students demonstrated an improvement in the Emergency Department clinical staff confidence in postpartum hemorrhage and preeclampsia, which will ultimately lead to improved patient outcomes in the maternal population.
Section VII: References

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Appendix A: Algorithm for Maternal Hemorrhage and Preeclampsia at Non-Profit Hospital

Precipitous Vaginal Delivery + Maternal Hemorrhage
- Contact Change RN, ED MD, OB, and Neonatology, if available
- Ensure maternal and neonatal resuscitation equipment and OB cart is at the bedside
- Turn on infant warmer
- Record fetal heart tones and maternal vital signs every 10 minutes during pushing and
- Establish IV (10g)

Newborn Care Managed by ED MD, RN to Modify’s skill - Initial Assessment

Immediate Postpartum assess the mother every 15 minutes x 2 hours
- Provide Pain Management and administer Oxytocin
- Promote Skin to Skin Contact with infant
- Assess for signs of significant maternal hemorrhage
  - > 500 mL Vaginal blood loss with continued bleeding
  - Abnormal Vital Signs (HR > 110, BP < 90/50, 12 surf NIV)
  - Confusion, altered scores

VS q5 minutes
- Establish expected losses (10 g/kg) and strict IV including TNC
- Monitor continuous blood loss
- Medications - oxytocin, magnesium, esmolol, terbutaline, EDA
- Intramuscular bleeding, consider laceration repair, vaginal/biopsy packing
- Urinary bag, Foley before delivery
- Intrapartum transfusion
- Maternal morcellization of Adnexal mass
- Close uterus

Consider Interventional Radiology or surgical interventions per OB provider

Evaluation + Treatment of Antepartum + Postpartum Preeclampsia

+20 weeks gestation – 6 weeks postpartum

Measure BP + Assess for Symptoms
  - IHA, AMS, Vision Changes, Seizure, CVA
  - Abdominal pain (especially RUQ)
  - SCID/Pulmonary Edema

SBP ≥ 160 OR
DBP ≥ 110 validated by repeat BP within 15 min
(within 10 min)

SBP 140-160 OR
DBP 90-110
Symptoms

SBP 140-159 OR
DBP 90-110
Symptoms

SBP < 140 OR
DBP ≤ 90
No Symptoms

+ Contact Change RN & ED MD
+ Monitor BP q 15 min
+ IV access
+ Send UA
+ Consult OB
  (Consider initiating OB IF Severe Hypertension order issued)

HTN meds within 10 minutes (Target BP 150/100):
  - Enalapril
  - Hydrochlorothiazide, and/or
  - p.o. Nitroglycerin
  - Seizure Prevention/Treatment:
  - Magnesium Sulfate

Transfer to L&D or a facility with OB services

Dispose made in consultation with OB provider
Appendix B: PDSA Cycle

PDSA Cycle 1 (Simulation)

Plan (Weeks 1-3)

- Week 1: Perform literature review, research, baseline assessments
  - Through observation/analysis, it is evident that maternal morbidity rates are not declining, emergency departments A and B are not currently meeting the Joint Commission requirements
  - Talk to subject matter experts, other fellow leaders: Collaborate and discuss what should be the priority intervention, in tandem with evidence-based practice/research
    - Aim is established: Meet the Joint Commission’s requirement using simulation
  - Recognizing a source for improvement is to implement an annual maternal hemorrhage and hypertension/preeclampsia simulation training in the ED

- Week 2: Survey staff on proposed idea (physicians and nurses) and inform staff of the upcoming simulation dates
  - This information will allow the CNL to gauge how the unit currently feels about the addition of simulation for education, as well as assess motivation
  - The CNL provides education on the purpose and benefits associated with simulation
  - After providing education, meet with staff about the intervention
  - Gain buy-in from staff and allow time for staff to provide input and ask questions

- Week 3: Meet with nurse manager to discuss implementation of simulation and prepare presentation
  - Bring results to leadership team/nurse manager to see who will support the CNL in implementing simulation
  - A need for change has been shown
  - Explain that you have learned from community (other currently existing hospital-based programs) and want to test it in this microsystem
  - Present the evidence, staff feedback, and explain how the change aligns with community and Joint Commission standards.

Do (Weeks 4-6):

- Week 4: Putting Simulation Training Together
  - Create the simulation scenario, debrief questions, and survey questions

- Week 5: Disperse flyers with QR codes linking staff to pre-simulation survey, disperse flyers and emails regarding upcoming simulation date

- Week 6: Carry out first simulation at Concord ED
  - Announce simulation time in morning huddle
  - Recruit staff to participate
Perform a team huddle right before starting simulation to ensure that everyone is clear on roles and scenario
Carry out simulation and follow up with a debrief

**Study (Weeks 7-9):**
- Analyze the results
  - Review and compare staff survey results from pre- and post-simulation implementation
    - This will allow CNL to identify what is working and what is not
    - Has education been effective?
    - Do they feel it is worth continuing?
    - What changes/improvements would they like to see, if any?
- Assess participation

**Act (Weeks 10-12):**
- CNL collaborates with the leadership team/nurse manager to decide whether the intervention being tested should be modified or abandoned based on the results and feedback attained before, during, and after simulation implementation
  - If feedback from staff was generally positive, emergency departments A and B may benefit from permanent annual implementation of simulation
  - **Positive feedback was attained**
    - Make changes to simulation based on results of the surveys
    - Move on to PDSA Cycle II to collect more evidence (i.e. more surveys to staff, more simulation days, collect maternal outcomes data from microsystem)
      - Is only once annually sufficient? Do we need more participants?

**PDSA Cycle 1 (Video)**

**Plan (Weeks 1-3)**
- Week 1: Perform literature review, research
  - Through observation/analysis, a wealth of evidence and resources exist to aid in creating staff education on maternal hemorrhage and hypertension/preeclampsia (data and statistics, signs/symptoms, treatment, etc.)
    - Aim is established: Aid in meet the Joint Commission’s requirement by adding staff education and videos to Knowledge Center
  - Recognizing a source for improvement is to implement annual maternal hemorrhage and hypertension/preeclampsia educational modules in the ED staff’s Knowledge Center
- Week 2-3: Create the video scripts, educational content, and pre-/post- quizzes
  - Assign roles
  - Send script to nurse educators for review and editing

**Do (Weeks 4-6):**
- Week 4: Film simulation training videos
○ 2 approximately 5-minute videos: 1 on maternal hemorrhage and 1 on hypertension/preeclampsia
○ Utilize 2 separate filming methods

○ Weeks 5: Edit simulation video
○ Week 6: Work with IT to upload videos, educational content, and pre-/post- quizzes onto John Muir’s staff Knowledge Center

Study (Weeks 7-9):

● Analyze the results
  ○ Review and compare staff results from pre- and post- quizzes
    ■ This will allow CNL to identify what is working and what is not
    ■ Has education been effective?
    ■ What changes/improvements would they like to see, if any?
  ○ Assess participation

Act (Weeks 10-12):

● CNL collaborates with the leadership team/nurse manager to decide whether the intervention being tested should be modified or abandoned based on the results and feedback attained before, during, and after Knowledge Center implementation
  ○ If feedback from staff was generally positive, emergency departments A and B may benefit from permanent annual implementation of the educational module
  ○ **Positive feedback was attained**
    ■ Make changes to module based on results of the quizzes
    ■ Move on to PDSA Cycle II to collect more evidence
      ● Is only once annually sufficient? Do we need more participants?
Appendix C: NOELLE - Simulation Mannequin

Appendix D: Root Cause Analysis and Fishbone Diagram

5 WHYS Root Cause Analysis

**Define the Problem:**
Early recognition of preeclampsia and postpartum hemorrhage in the emergency department.

**Why is it happening?**

1. Prevention and early recognition and timely treatment for maternal hemorrhage and severe hypertension/preeclampsia had the highest impact trying to decrease maternal complications.

2. 13 new provisions were made to the Joint Commission standards to improve the quality of care for women in all stages of pregnancy.

3. To fulfill new standard protocols, Hospital X must conduct drills annually to determine system issues as part of ongoing quality improvement efforts.

4. Review severe preeclampsia and postpartum hemorrhage cases that meet criteria established by the hospital to evaluate the effectiveness of the care, treatment, and services provided to the patient during the event.

5. To provide role-specific education to all staff and providers who treat pregnant and postpartum patients in the emergency department to treat preeclampsia and postpartum hemorrhage patients in a timely manner.
Appendix E: Cost Benefit Analysis- Simulation and Video Cost

Costs are estimated based on Median RN wages within the healthcare system, median ED tech wages within the healthcare system, and median San Francisco Bay area wages for RN ED Directors, Managers, and Simulation Lab Managers. MD wages are paid through a third party contractor and therefore not considered as part of the costs associated with policy development, simulation development, and training. The hospital already owned the simulation mannequin and equipment and thus those equipment costs were not included in the overall cost-analysis. The economic benefits are difficult to quantify, however this chart represents the overall cost to the hospital system to meet current Joint Commission standards.

**Median RN Wage:** $80.00/hr  
**Median ED Tech Wage:** $29.00/hr  
**Median RN ED Director Wage:** $99.49/hr  
**Median RN ED Manager Wage:** $83.60/hr  
**Median Simulation Lab Manager Wage:** $53.68/hr  
**Median IT Wage:** $41.15/hr
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Appendix F: Pre-Implementation Survey Promotion Flyer

Appendix G: Pre-Implementation Survey Questionnaire
Maternal Hypertensive Disorders and Postpartum Hemorrhage Emergency Department Staff Survey

We are a group of Master's Clinical Nurse Leader students from University of San Francisco examining the recognition and treatment of maternal hypertensive disorders and postpartum hemorrhage in the emergency department. We hope that you will complete this brief survey to help gauge the emergency department staff's evaluation of their readiness to recognize and treat maternal hypertensive disorders and postpartum hemorrhage.

This survey is completely voluntary and should take less than five minutes to complete.

Thank you for your time and consideration.

* Required

1. How often do you see postpartum hemorrhage patients? *
   
   Mark only one oval.
   
   ○ 0-1 times per week
   ○ 2-4 times per week
   ○ 5-6 times per week
   ○ 7+ times per week

2. How often do you see maternal hypertensive disorder patients? *
   
   Mark only one oval.
   
   ○ 0-1 times per week
   ○ 2-4 times per week
   ○ 5-6 times per week
   ○ 7+ times per week

3. How comfortable are you in recognizing and treating postpartum hemorrhage? *
   
   Mark only one oval.
   
   1 2 3 4 5 6 7 8 9 10

   Totally Uncomfortable

   Totally Comfortable
8. In your opinion, how effective is the ED staff in recognizing and treating a patient presenting with postpartum hemorrhage in a timely manner?
Mark only one cell.

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<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly ineffective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Highly effective</td>
</tr>
</tbody>
</table>

9. In your opinion, how effective is the ED staff in recognizing and treating a patient presenting with preeclampsia in a timely manner?
Mark only one cell.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly ineffective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Highly effective</td>
</tr>
</tbody>
</table>

10. How effective are you in recognizing and treating a patient presenting with postpartum hemorrhage in a timely manner?
Mark only one cell.

<table>
<thead>
<tr>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly ineffective</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Highly effective</td>
</tr>
</tbody>
</table>

11. Is there a specifically trained team to respond to postpartum emergencies in the ED?
Mark only one cell.

- Yes
- No

12. On average, how many pregnant patients do you see in the ED in a day?
Mark only one cell.

- 0-2 Patients per day
- 3-4 Patients per day
- 5-6 Patients per day
- 7+ Patients per day

13. On average, how many postpartum patients do you see in the ED in a day?
Mark only one cell.

- 0-2 Patients per day
- 3-4 Patients per day
- 5+ Patients per day

14. Is there a specific question set that you ask pregnant or postpartum patients upon admission?
Mark only one cell.

- Yes
- No

15. Do you ask every woman presenting to the ED about the possibility of pregnancy?
Mark only one cell.

- Yes
- No

16. Do you ask every woman presenting to the ED about postpartum status?
Mark only one cell.

- Yes
- No

17. Can you identify gaps in your knowledge base regarding postpartum hemorrhage and preeclampsia?

18. What is your job title? (Select one)

- [ ]

- [ ]
Appendix H: Pre-Implementation Survey Results

Summary Report for Maternal Hypertensive Disorders and Postpartum Hemorrhage Emergency Department Staff Survey

1. On an average, how many pregnant and/or postpartum patients do you see in the ED?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 Patients per day</td>
<td>70.4%</td>
<td>19</td>
</tr>
<tr>
<td>2-4 Patients per day</td>
<td>29.6%</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>27</td>
</tr>
</tbody>
</table>

2. How often do you see postpartum hemorrhage patients in the ED?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 times per week</td>
<td>100.0%</td>
<td>27</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>27</td>
</tr>
</tbody>
</table>
3. How often do you see maternal hypertensive disorder patients in the ED?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-1 times per week</td>
<td>85.2%</td>
<td>23</td>
</tr>
<tr>
<td>2-4 times per week</td>
<td>14.8%</td>
<td>4</td>
</tr>
</tbody>
</table>

Total: 27

4. How comfortable are you in recognizing and treating postpartum hemorrhage?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38.5%</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>11.1%</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>22.2%</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>11.1%</td>
<td>3</td>
</tr>
<tr>
<td>6</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>7.4%</td>
<td>2</td>
</tr>
<tr>
<td>8</td>
<td>38.5%</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>3.7%</td>
<td>1</td>
</tr>
</tbody>
</table>
5. How comfortable are you in recognizing and treating preeclampsia?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>18.5%</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>14.8%</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>7.4%</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>14.8%</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>18.5%</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>18.5%</td>
<td>5</td>
</tr>
<tr>
<td>10</td>
<td>7.4%</td>
<td>2</td>
</tr>
</tbody>
</table>

Total: 27

6. How comfortable are you in recognizing and treating preeclampsia with severe symptoms?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25.9%</td>
<td>7</td>
</tr>
<tr>
<td>2</td>
<td>7.4%</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>14.8%</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>18.5%</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>8</td>
<td>14.8%</td>
<td>4</td>
</tr>
<tr>
<td>10</td>
<td>7.4%</td>
<td>2</td>
</tr>
</tbody>
</table>
7. Do you have prior experience working directly with labor and delivery or postpartum patients on an obstetric unit?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>11.1%</td>
<td>3</td>
</tr>
<tr>
<td>No</td>
<td>88.9%</td>
<td>24</td>
</tr>
</tbody>
</table>

Totals: 27

8. Are you aware of the current JMHH policies and protocols in place when a patient presents with postpartum hemorrhage in the ED?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>22.2%</td>
<td>6</td>
</tr>
<tr>
<td>No</td>
<td>77.8%</td>
<td>21</td>
</tr>
</tbody>
</table>

Totals: 27
9. In your opinion, how effective is the ED staff in recognizing and treating a patient presenting with postpartum hemorrhage in a timely manner?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>7.4%</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>37.9%</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>18.5%</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>14.8%</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>22.2%</td>
<td>6</td>
</tr>
<tr>
<td>8</td>
<td>18.5%</td>
<td>6</td>
</tr>
<tr>
<td>10</td>
<td>3.7%</td>
<td>1</td>
</tr>
</tbody>
</table>

10. In your opinion, how effective is the ED staff in recognizing and treating a patient presenting with preeclampsia in a timely manner?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>3.7%</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>7.4%</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>25.9%</td>
<td>7</td>
</tr>
<tr>
<td>5</td>
<td>14.8%</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>11.1%</td>
<td>3</td>
</tr>
<tr>
<td>7</td>
<td>11.1%</td>
<td>3</td>
</tr>
<tr>
<td>8</td>
<td>22.2%</td>
<td>6</td>
</tr>
</tbody>
</table>
11. Can you identify gaps in your knowledge base regarding the treatment of postpartum hemorrhage and/or preeclampsia?

<table>
<thead>
<tr>
<th>ResponseID</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No experience with this at all</td>
</tr>
<tr>
<td>2</td>
<td>More exposure</td>
</tr>
<tr>
<td>3</td>
<td>What medications are used, where are they located, how do I monitor my patient, what equipment do I need for postpartum hemorrhage, does I&amp;D have a kit or cart, when should we call LC&amp;D to assist?</td>
</tr>
<tr>
<td>4</td>
<td>No experience</td>
</tr>
<tr>
<td>5</td>
<td>Not many ED nurses have direct experiences and aware of timely manner</td>
</tr>
<tr>
<td>6</td>
<td>procedures/medications</td>
</tr>
<tr>
<td>7</td>
<td>Not enough L &amp; O patients</td>
</tr>
<tr>
<td>8</td>
<td>all of it</td>
</tr>
<tr>
<td>9</td>
<td>no</td>
</tr>
<tr>
<td>10</td>
<td>Communication to prioritize these patients and obtain orders from the providers</td>
</tr>
<tr>
<td>11</td>
<td>Not super familiar with which medications are preferred to preeclampsia</td>
</tr>
<tr>
<td>12</td>
<td>I have noticed that staff don’t realize the time frame for preeclampsia</td>
</tr>
<tr>
<td>13</td>
<td>No experience in postpartum hemorrhage but same in preeclampsia.</td>
</tr>
<tr>
<td>14</td>
<td>Limited experience due to being a new ED nurse</td>
</tr>
<tr>
<td>15</td>
<td>Both conditions are rarely seen in the ED. They are high-risk low frequency situations that can lead to delay of recognition and/or mismanagement because of lack of knowledge surrounding diagnosis and treatment.</td>
</tr>
<tr>
<td>16</td>
<td>treatment medications</td>
</tr>
<tr>
<td>17</td>
<td>no</td>
</tr>
<tr>
<td>18</td>
<td>-</td>
</tr>
<tr>
<td>19</td>
<td>N/A</td>
</tr>
<tr>
<td>20</td>
<td>I don’t know</td>
</tr>
</tbody>
</table>
Appendix I: Post-Implementation Survey Promotion Flyer
Appendix J: Post-Implementation Survey Questionnaire

Maternal Hypertensive Disorders and Postpartum Hemorrhage Emergency Department Staff Post-Survey

We are a group of Medical Doctorial Nurse students from University of the Philippines who are conducting a survey to assess the effectiveness of training in recognizing and treating postpartum hemorrhage emergencies in the emergency department. We hope that your participation in this survey will help us understand the effectiveness of our training and improve the recognition and treatment of postpartum hemorrhage.

This survey is completely voluntary and should take less than five minutes to complete.

Thank you for your time and consideration.

* Required

1. How comfortable are you in recognizing and treating postpartum hemorrhage after having participated in the training? *

   Mark only one oval:
   1  2  3  4  5  6  7  8  9  10
   Totally Uncomfortable ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | Totally Comfortable

2. How comfortable are you in recognizing and treating preeclampsia after having participated in the training? *

   Mark only one oval:
   1  2  3  4  5  6  7  8  9  10
   Totally Uncomfortable ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | Totally Comfortable

3. How comfortable are you in recognizing and treating preeclampsia with severe symptoms after having participated in the training? *

   Mark only one oval:
   1  2  3  4  5  6  7  8  9  10
   Totally Uncomfortable ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | ———— | Totally Comfortable

4. Do you have prior experience working directly with labor and delivery or postpartum patients? *

   Mark only one oval:
   ☐ Yes
   ☐ No

5. Can you identify gaps in your knowledge base regarding postpartum hemorrhage and preeclampsia? *

   
   
   
   

6. What is your job title at JH? *

   
   

7. Did you attend the Maternal Hypertensive Disorders and Postpartum Hemorrhage Simulation?

   Mark only one oval:
   ☐ Yes
   ☐ No
Appendix K: Post-Implementation Survey Results

Summary Report for Maternal Hypertensive Disorders and Postpartum Hemorrhage Emergency Department Staff Post-Survey

1. Choose a rating below:

<table>
<thead>
<tr>
<th>1 - Totally Uncomfortable</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10 - Totally Comfortable</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>How comfortable are you in recognizing and treating postpartum hemorrhage after having participated in the training?</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>33.3%</td>
<td>0%</td>
<td>33.3%</td>
<td>33.3%</td>
</tr>
<tr>
<td>Count</td>
<td>Row %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How comfortable are you in recognizing and treating preeclampsia after having participated in the training?</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>33.3%</td>
<td>0%</td>
<td>66.7%</td>
<td>0%</td>
</tr>
<tr>
<td>Count</td>
<td>Row %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How comfortable are you in recognizing and treating preeclampsia with severe symptoms after having participated in the training?</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>0%</td>
<td>33.3%</td>
<td>0%</td>
<td>66.7%</td>
<td>0%</td>
</tr>
<tr>
<td>Count</td>
<td>Row %</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>Total Responses</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2. Do you have prior experience working directly with labor and delivery or postpartum patients?

Value | Percent | Responses
---|---------|---------
No | 100.0% | 3 |

Totals: 3
3. Can you identify gaps in your knowledge base regarding postpartum hemorrhage and preeclampsia?

<table>
<thead>
<tr>
<th>ResponseID</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Medication dosages, need for mag</td>
</tr>
<tr>
<td>2</td>
<td>Medications</td>
</tr>
<tr>
<td>3</td>
<td>Just hands-on experience</td>
</tr>
</tbody>
</table>

4. What is your job title at JMHI?

<table>
<thead>
<tr>
<th>ResponseID</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RN</td>
</tr>
<tr>
<td>2</td>
<td>Trauma Nurse Emergency Department</td>
</tr>
<tr>
<td>3</td>
<td>RN</td>
</tr>
</tbody>
</table>

5. Did you attend the Maternal Hypertensive Disorders and Postpartum Hemorrhage Simulation?

<table>
<thead>
<tr>
<th>Value</th>
<th>Percent</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>100.0%</td>
<td>3</td>
</tr>
</tbody>
</table>

Appendix L: SWOT Analysis
Strengths

- Hands-on Training
- Faculty committed to develop new critical thinking skills
- Collaboration among ED and L&D units
- Support of all staff during simulation

Weaknesses

- Time constraints, both in development of training and time given to conduct simulation
- Business of ED staff during simulation
- Low participation

Opportunities

- Increased readiness of recognizing and treating preeclampsia and PPH
- Positive healthcare outcomes for obstetric cases presenting in ED
- Quality improvement to prepare supplies and medications needed to treat these cases

Threats

- Potential budget constraints
- Poor attitudes among ED staff
- Unwillingness to participate in simulation
- Power dynamics among L&D staff and ED staff

### Appendix M: Live Simulation Scenario

<table>
<thead>
<tr>
<th>Scenario Title</th>
<th>Emergency Department – Preeclampsia and OB Hemorrhage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Original Scenario Developer(s)</td>
<td>Jamie Vincent, MSN, APRN-CNS, RNC-OB, C-ERM</td>
</tr>
<tr>
<td>Date - original scenario</td>
<td>1/20/2022</td>
</tr>
<tr>
<td>Validation</td>
<td></td>
</tr>
<tr>
<td>Revision Dates</td>
<td></td>
</tr>
<tr>
<td>Pilot testing</td>
<td></td>
</tr>
<tr>
<td>GSENM revision</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Estimated Scenario Time</th>
<th>20-30 minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debriefing Time</td>
<td>45 minutes</td>
</tr>
</tbody>
</table>

**Target Group:** ED staff RN's and Providers

**Core Case:** Postpartum patient admitted to ED with Severe HA and postpartum bleeding

**GSENM/VTM Competencies:**
- Patient Safety
- Quality Improvement
- Teamwork & Communication

**Brief Summary of Case:**
A 27 year old woman 5'5", 173 pounds, G3P2L2, with history of spontaneous vaginal delivery a week ago at 39 weeks presents to the ED complaining of a severe headache and increased vaginal bleeding.

OB History is unremarkable.

Medical History: HPV at 17 years old; Pap normal during prenatal studies.

Current History: Patient is 1 week postpartum; headache began yesterday and is unrelieved by OTC meds.

Patient took ibuprofen 800 mg for severe headache 1 hour ago. This scenario is appropriate for novice through experienced emergency department RN skilled at triaging and managing ED patients. It can be made more complex by making the patient unstable, e.g. hemorrhage and/or ectopic pregnancy, interrupt the learner or undermine new nurse.

### Appendix N: Video Recorded Simulation Script
Postpartum Hemorrhage

Primary RN, Secondary RN, and ED Tech enter room

Primary RN: Hi Maria my name is Raquel, and I’m going to be your nurse today. 
Secondary RN: My name is Gabe, and I’ll be helping Raquel. 
ED Tech: And my name is Mayra. I’ll be your ED Tech. 
Primary RN: So, can I ask you: what brings you in today? 
Patient: Yeah. I’ve been bleeding a lot recently 
Primary RN: And how much is your bleeding? 
Patient: I changed my pad right before I got here, but I would say at least one pad every hour starting today. 
Primary RN: Oh ok. And are you being followed by an OBGYN? 
Patient: No. I haven’t had any contact with them 
Primary RN: Any history of hypertension during your pregnancy or before your pregnancy? 
Patient: Um… No history of hypertension during pregnancy, but I do have asthma. 
Primary RN: Ok, so we’re going to go ahead and assess your bleeding area. Ok? 
ED Technician: I’m going to place your cardiac monitor on right now, and I’m going to take your blood pressure. 
Secondary RN: I’m going to check your temperature really quick. 
Primary RN: Ok. She is bleeding a lot. Ok Maria. I’m going to go and do a fundal massage. Your fundus is soft and boggy. I’m going to make sure to get your fundus firmed up. 
ED Technician: Ok. Her blood pressure is 85/65, pulse is 115, her oxygen is 98, and her respirations 20, and her temperature is 36.9. 
Secondary RN: Alright, I’ll go ahead and call the ED physician. Hi Dr. Talsky. This is Gabe calling from the ED. I have Maria in room 35. She’s a 27-year-old female complaining of increased vaginal bleeding. She’s soaking 1 peripad every hour. She’s a G3P2. Has a history of spontaneous vaginal delivery a week ago at 39 weeks. Her BP is currently 89/58, heart rate is 114, respiration rate is 20, temp 36.9 Celsius, and she’s sating at 98%. I think she may be hemorrhaging based on her spontaneous delivery one week ago. She has no history of hypertension but does have asthma. I am concerned about her bleeding and vital signs. Are you able to come in soon and evaluate her? 
ED Physician: Yes, I’m right around the corner. I’ll be right in. 
Secondary RN: Thank you. 
*ED Physician enters room* 
Primary RN: Gabe, can we start an IV access as well? 
Secondary RN: Yes. 
ED Physician: Hi Maria. My name is Max Talsky. I’m the ED Doc here. I’ll be helping you out today, ok? 
Patient: Ok. 
ED Physician: Can you tell me what brought you in today? 
Patient: Yeah. I’ve just been bleeding a lot recently. 
ED Physician: Bleeding a lot? When did it start? 
Patient: The bleeding started a couple of hours ago. 
ED Physician: How much have you been bleeding? How many pad changes have you done? 
Patient: At least 4 or 5 pads. 
ED Physician: Have you noticed any clots or anything like that on the pads?
Patient: No, I haven't.
ED Physician: How about any dizziness or light headedness right now?
Patient: I definitely feel woozy and a little dizzy.
ED Physician: Ok. Do you have any complications during your pregnancy or during your labor or right after?
Patient: No. no complications.
ED Physician: Have you had any kind of history of asthma or hypertension or anything like that?
Patient: No history of hypertension, but I do have a history of asthma.
ED Physician: Alright, so, we’re going to get a CBC, type and screen for possible transfusion, also going to get a CMP, and Gabe I’m going to have you start 10mg Pitocin IM.
Secondary RN: Ok. I’ll start the 10mg Pitocin.
ED Physician: We’re also going to start monitoring the estimated blood loss, and I’m going to call the OB provider.
OB Physician: Hi this is Dr. Kelsey.
ED Physician: Hi This is Dr. Talsky in Emergency. I have a 27-year-old 1-week postpartum patient. She’s soaking a peripad about every hour. I’ve started her on Pitocin IM. She had a spontaneous delivery at 39 weeks and has been bleeding at home and has a history of asthma. I’m worried about blood loss from postpartum hemorrhage. I’m requesting a consult and direction.
OB Physician: You will need to order Methergine 0.2mg IM every 2-4 hours. Do not give Misoprostol due to the asthma history, and also initiate bimanual massage of the fundus and keep getting vitals every 15 minutes.
ED Physician: Alright, so were also going to do 0.2mg of Methergine IM and initiate bimanual fundal massage. We’re also going to do vital signs every 15 minutes and recycle those right now.
Secondary RN: I’ll go ahead and get that started.
ED Tech: I’ve recycled the blood pressure. Recycling blood pressure.
Primary RN: Do you want to do the bimanual massage?
ED Tech: Blood pressure is 59/39, Pulse 115.
ED Physician: We’ll also call blood blank and activate mass transfusion protocols or the “Keep Ahead” in Concord. Let’s take a look and do the bimanual. Alright, Maria I’m going to have to reach inside you to do a bimanual fundal massage to try to stop the bleeding ok?
*15 minutes later*
ED Technician: Recycling blood pressure. It’s 62/42, Pulse is 113, temperature 36.9, oxygen pulse ox is 100%, respirations 20.
Secondary RN: Alright. I’ll go ahead and call the blood bank.
**END**

Preeclampsia

Primary RN, Secondary RN, and ED Tech enter room
Primary RN: Hi Maria. My name is Raquel and I’m going to be your nurse today.
Secondary RN: My name is Gabe, and I’ll be helping Raquel. I’ll be checking your legs.
ED Technician: And my name is Mayra. I’ll be your ED Tech.
Primary RN: So, can I ask you: what brings you in today?
Patient: I’ve had such a bad headache.
Primary RN: Can you rate your pain from your headache from a 0-10 for me?
Patient: Probably around an 8 or 9.
Primary RN: Ok, and when did your headache start?
Patient: For a couple of hours now.
Primary RN: Have you had any changes in your vision or any light sensitivity?
Patient: Yeah. I have some spots in my vision.
Primary RN: Have you taken any medication for your headache?
Patient: I’ve taken over-the-counter Advil, but it hasn’t helped much.
Primary RN: Are you currently having any stomach pain or abdominal pain?
Patient: No. No stomach pain.
ED Technician: I’m placing you on a cardiac monitor right now.
Primary RN: I’m going to go ahead and start your IV access.
Secondary RN: Do you mind just relaxing your legs really quick? She has +4 pitting edema and +3 DTRs and clonus.
Primary RN: Ok Gabe. Can you start some NS?
Secondary RN: Maria, do you have a history of hypertension or any pregnancy related complications?
Patient: No. I don’t have any history of hypertension or any complications.
ED Technician: Her blood pressure is 189/114, pulse is 113, respirations 20, pulse ox is 97, and the temperature is 36.7.
Secondary RN: And have you taken any blood pressure medications while you were pregnant?
Patient: No. No blood pressure medication while I was pregnant or now.
Secondary RN: Ok, and lastly, have you gotten in contact with your OBGYN since you’ve given birth?
Patient: No, I haven’t been in contact with them. I just have this headache,
Primary RN: Ok, Maria. I’m going to go ahead and call the ED doctor, ok?
Hi Dr. Talsky. This is Raquel calling from the ED. I have Maria in room 37, She is a 27-year-old female complaining of a severe headache. She took Ibuprofen 800 mg for severe headache prior to coming into the ER. She rates her headache an 8/10 with nausea. She has a history of spontaneous vaginal delivery at 39 weeks, BP currently is 189/114, heart rate 114, respiration 20, O2 at 98, temp 98.4. No history of hypertension, she has no history of asthma. She has a history of GERD post vaginal delivery 1 week ago. She also complains of visual changes along with her dangerously high blood pressure. +3 DTR, pitting edema present in the lower extremities. I am concerned about her vital signs and her physical complaints. Are you able to come evaluate her?
And what blood pressure medications would you like me to start?
ED Physician: Yeah, let’s start Labetalol 20mg IV push over 2 minutes, and I’ll be right in.
Primary RN: Confirming Labetalol IV push 20mg.
*ED Physician enters room*
ED Physician: Yes. Hi Maria, I’m Dr. Talsky. I’m a doctor in the ED here. Can you tell me:
when did your headache start?
Patient: I’ve had this headache for a couple of hours and it hasn’t been relieved with Advil or anything. It hurts.
ED Physician: Ok. Do you have any changes in your vision or dizziness or are you seeing any stars or anything like that?
Patient: No, I don’t have any abdominal pain but I have had some spots in my vision.
ED Physician: Ok. So no abdominal pain. No kind of any upper right side pain or chest pain or anything like that?
Patient: No. I don’t have any trouble breathing or any abdominal pain.
ED Physician: Have you taken any medications for your headache and any kind of antihypertensive medications or anything like that?
Patient: No. No meds.
ED Physician: Did you have any complications during your pregnancy, did you have preeclampsia or hypertension during your pregnancy or any complications during your labor?
Patient: No. No complications.
ED Physician: Do you have asthma or a history of asthma or anything like that?
Patient: No history of asthma.
ED Physician: Let’s recycle her vital signs and I’ll call the OB for a consult.
Primary RN: Ok. Recycling blood pressure.
ED Technician: Ok her blood pressure is 162/106, pulse is 94.
ED Physician: Hi this is Dr. Talsky, down in the ED.
OB Physician: Hi, this is Dr. Kelsey.
*OB Physician enters room*
ED Physician: We have a 27-year-old woman complaining of a persistent 8/10 headache. It’s been unresponsive to over-the-counter medications. She came in with a BP of 189/114, I’ve started labetalol and it’s come down to 160/105. She gave birth uncomplicated labor one week ago. She has no history of hypertension. She is showing signs of Preeclampsia with severe features, changes in her vision. I’m requesting OB consult and some more direction.
OB Physician: Yeah. So you’ll need to order magnesium sulfate loading dose of 4mg over 30 minutes with a maintenance dose of 2mg per hour. This will be for prophylactic measures to help prevent seizures. You’ll also want to order labetalol 40mg IV push over 2 minutes and keep having the vitals obtained every 15.
ED Physician: So Raquel, we’re going to start mag sulfate 4gm over 30 minutes and then go to 2mg every hour as a maintenance dose, and we’re going to do another dose of labetalol to bring her hypertension down. 40mg over 2 minutes IV push.
Primary RN: I’m going to go ahead and put the magnesium loading dose. Ok Maria, I’m also going to give you another dose of labetalol. This is a blood pressure medication that’s going to help to decrease your blood pressure, ok?
Patient: Ok.
*15 minutes later*
Primary RN: Can we recycle the blood pressure?
ED Technician: Recycling blood pressure. Ok. Blood pressure is 147/97, pulse is 89.
Primary RN: Ok. Looks like our blood pressure is now reduced and patient is stabilized.
ED Physician: Alright Maria. We’re going to transfer your up to the L&D floor now that you’re stabilized, ok?
Patient: Ok.
**END**
Project: Statement of Determination and Non-Research Determination Form

Student Name: Raquel Andreina Torres

Title of Project: Stop the Bleed and HELLP Moms: The use of simulation and simulation videos in educating staff regarding preeclampsia and postpartum hemorrhage.

Brief Description of Project: Developing and implementing simulation training and a recording simulation video to train emergency department staff in the early recognition and treatment of preeclampsia and postpartum hemorrhage to satisfy new Joint Commission Standards.

- Data that Shows the Need for the Project: OB hemorrhage is the leading cause of maternal mortality in California from 2002-2004 (Lyndon et. al., 2015), while PreEclampsia is the second leading cause of pregnancy-related mortality in California from 2002-2007, over 60% of those deaths were deemed preventable (Shields et. al., 2021). Early recognition and timely, appropriate treatment of these two pathologies can greatly reduce mortality and morbidity rates (Simpson, 2010). Frequent simulation training decreases the time of staff response rates and increases treatment information retention (Sullivan et. al., 2015).

- Aim Statement: We aim to increase ED staff awareness and comfort in recognizing and responding to PHDs and PPH by 10%, by increasing the amount of training ED staff receives via simulation by April 2022. As well as implementing a video as a new training modalities by January 2023.

- Description of Intervention(s): Simulation scenarios developed by hospital ED and L+D education development teams as well as the simulation lab manager and a separately recording acted simulation to be uploaded to the Knowledge Center education training by early 2023.

- Desired Change in Practice: An increased awareness and comfort with recognizing and treating PreE and PPH in the emergency department.

- Outcome measurement(s): Staff surveys ascertaining their exposure to, and comfort with addressing PreE and PPH in the ED.

Resources


To qualify as an Evidence-based Change in Practice Project, rather than a Research Project, the criteria outlined in federal guidelines will be used: [http://answers.hhs.gov/ohrp/categories/1569](http://answers.hhs.gov/ohrp/categories/1569)

☑ This project meets the guidelines for an Evidence-based Change in Practice Project as outlined in the Project Checklist (attached). Student may proceed with implementation.

☐ This project involves research with human subjects and must be submitted for IRB approval before project activity can commence.

Comments:

**EVIDENCE-BASED CHANGE OF PRACTICE PROJECT CHECKLIST**

*Instructions: Answer YES or NO to each of the following statements:*

<table>
<thead>
<tr>
<th>Project Title: Stop the Bleed and HELLP Moms: The use of simulation and simulation videos in educating staff regarding preeclampsia and postpartum hemorrhage.</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>☒ The aim of the project is to improve the process or delivery of care with established/accepted standards, or to implement evidence-based change. There is no intention of using the data for research purposes.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>☒ The specific aim is to improve performance on a specific service or program and is a part of usual care. ALL participants will receive a standard of care.</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>☒ The project is NOT designed to follow a research design, e.g., hypothesis testing or group comparison, randomization, control groups, prospective comparison groups, cross-sectional, case control). The project does NOT follow a protocol that overrides clinical decision-making.</td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
The project involves implementation of established and tested quality standards and/or systematic monitoring, assessment or evaluation of the organization to ensure that existing quality standards are being met. The project does **NOT** develop paradigms or untested methods or new untested standards.

<table>
<thead>
<tr>
<th>The project involves implementation of care practices and interventions that are consensus-based or evidence-based. The project does <strong>NOT</strong> seek to test an intervention that is beyond current science and experience.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The project is conducted by staff where the project will take place and involves staff who are working at an agency that has an agreement with USF SONHP.</td>
</tr>
<tr>
<td>The project has <strong>NO</strong> funding from federal agencies or research-focused organizations and is not receiving funding for implementation research.</td>
</tr>
<tr>
<td>The agency or clinical practice unit agrees that this is a project that will be implemented to improve the process or delivery of care, i.e., <strong>not</strong> a personal research project that is dependent upon the voluntary participation of colleagues, students and/or patients.</td>
</tr>
<tr>
<td>If there is an intent to, or possibility of publishing your work, you and supervising faculty and the agency oversight committee are comfortable with the following statement in your methods section: “This project was undertaken as an Evidence-based change of practice project at X hospital or agency and as such was not formally supervised by the Institutional Review Board.”</td>
</tr>
</tbody>
</table>

**ANSWER KEY:** If the answer to **ALL** of these items is yes, the project can be considered an Evidence-based activity that does **NOT** meet the definition of research. **IRB review is not required.** Keep a copy of this checklist in your files. If the answer to **ANY** of these questions is **NO**, you must submit for IRB approval.

*Adapted with permission of Elizabeth L. Hohmann, MD, Director and Chair, Partners Human Research Committee, Partners Health System, Boston, MA.

**STUDENT NAME (Please print):**
Raquel Andreina Torres

**Signature of Student:** Raquel A. Torres  **DATE:** 04/01/2022 __

**SUPERVISING FACULTY MEMBER NAME (Please print):**
Lisa Brozda RN, MSN, CNS  **5/14/2022**

**Signature of Supervising Faculty Member:**