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Postpartum Hemorrhage Management: Improving Quality And Patient Safety Through Multidisciplinary Simulation Training

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POSTPARTUM HEMORRHAGE MANAGEMENT:

IMPROVING QUALITY AND PATIENT SAFETY THROUGH MULTIDISCIPLINARY SIMULATION TRAINING

by

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A Scholarly Project Presented in Partial Fulfillment

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Abstract

Purpose: To evaluate the effectiveness of a multidisciplinary moderate fidelity simulated postpartum hemorrhage (PPH) educational intervention on accurate and timely adherence to a standard PPH protocol during simulated PPH events.

Methods: The study design was a quasi-experimental one group pretest- posttest time series utilizing a convenience sample of multidisciplinary nurses, nursing assistants, laboratory, and physician staff working at one rural hospital with an annual birthrate less than 100. The intervention was an educational in situ PPH moderate fidelity scenario with pre-brief and debrief. Change in performance was evaluated using unannounced PPH simulation drills at three one-month intervals following the intervention. Performance accuracy and timeliness were measured using a standard facility PPH protocol and time metrics record (time to obtain PPH cart after diagnosis, time to administer second uterotonic, time to insert balloon tamponade). The institutional review board at Southern Adventist University granted approval.

Results: 65 multidisciplinary subjects participated. Performance accuracy was significantly better following the intervention; mean baseline score was 83.82 (*SD* = 17.367) while mean three-month post score was 100.0 (*SD* = .000). There were no statistically significant reductions in the mean times of the metrics: PPH cart procurement mean time decreased by 13.93 seconds [F (3, 25) = 0.308, p = .820]; Time to second uterotonic mean time increased by 19.00 seconds [F (3,25) = 1.68, p = .196]; Balloon tamponade mean insertion time increased by 26.51 seconds [F (3,25) = 1.93, p = .150]

Conclusion: The intervention was associated with improved PPH management accuracy but not timeliness.

Keywords: postpartum hemorrhage management, multidisciplinary, simulation

Dedication

This scholarly project is humbly dedicated to my wonderful loving father, Ron Turk, who inspired my career in healthcare. His personal career as a hematology oncology internal medicine physician spanned nearly five decades, during which he combined clinical and educational roles. He modeled compassionate care for clients, lifelong learning, and teaching, all the while providing a strong spiritual heritage to his family. Although I had determined I would never be a nurse but would be a teacher instead, I changed my mind and took the nursing route. I have spent 36 years as a nurse with clinical, managerial, and educator roles, and this project represents the synthesis of my love for clinical nursing as well as teaching.

Soon after I began my doctoral studies, my father was diagnosed with lung cancer. This was rather ironic for a retired oncologist with no obvious risk factors. Dad assured me ,"I am living for your graduation." He also assured me that as long as God had work for him to do here on earth, he would keep on working for the Lord. When the work was finished, he would go to sleep, knowing he will be raised at the second coming and we will all be reunited. After Dad had surgical intervention and chemotherapy, he continued his rigorous exercise routine as well as regular visitation of shut-ins and delivery of meals-on-wheels. The cancer was kept relatively in check for three years. Five months before my anticipated completion of studies, Dad's cancer decided it did not want to be held at bay any longer. Since then, Dad and I have spent some very special time together, and he continues to assure me, "I am living for your graduation."

When I have felt that I cannot possibly finish this project, and when I grieve about the forthcoming time without Dad, I am motivated by Dad's perseverance to keep moving forward, one day at a time.

Dad, thank you for demonstrating a life of selfless service to your Lord, your family, your patients, and your community. You inspire me to do likewise. I look forward to sharing my graduation day with you!

Acknowledgements

First and foremost, I want to acknowledge my Lord and Savior Jesus Christ for giving me a heart for service and the ability to carry out this project with the goal of preserving the life and health of childbearing women in rural America.

No individuals have been more important to me in the pursuit of this project than my family. My wonderful husband, Matt, supported my educational progress, encouraged me, and managed many household tasks while I studied. Our children Alan, Joseph, Katie, and Emily, as well as their families, were my cheerleaders. My parents, Ron and Mary Lou Turk, provided emotional support and have been my lifelong role models.

This project would not have been possible without the support of my obstetric staff team members who recognized its need and helped facilitate its implementation. Candis Bayes, Deb Heberer, Heather Huff, Lisa Malakowsky, Melissa Rose, and Pam Kauffman unselfishly adjusted their work schedules to accommodate my academic course load and project deadlines. Melissa Rose worked tirelessly with me as my simulation assistant and *standardized OB nurse*, and also helped schedule training sessions. Dr. Tessa Reinke, Obstetric Director, promoted the project to fellow physicians and administrators.

Non-obstetric colleagues recorded timeliness and accuracy of PPH management during simulation training and drills included three dedicated nurses, Jen Allbee, Gary Dean, and Regan Ireland, as well as several non-licenses individuals.

Finally, I want to acknowledge my academic professors who worked most closely with me and encouraged me with this scholarly project. Dr. Frances Johnson taught my graduate research course and later guided me through writing of chapters one and two of this project. Dr. Jill Buchholz, my academic advisor throughout my DNP program, completed the important task of Scholarly Project Second Reader. Dr. LaShawn Horton, my Scholarly Project Advisor, encouraged and mentored me throughout the process.

My heartfelt thanks are given to each one who has assisted me in my DNP journey.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction

The setting is 2005 at a rural hospital labor and delivery unit. (Note: Details have been modified to ensure privacy to all parties involved.) It is 2:30 a.m., and a 20-year veteran obstetric registered nurse (RN) with experience in both tertiary and low volume delivery settings is providing vaginal delivery postpartum recovery care and transitional care to a first-time mother and infant. The primary-care family practice physician who is also the director of obstetric services left 45 minutes ago, and couplet-care is in progress after the second registered nurse relinquished responsibility for the neonate. Although the physician had been notified of the patient's moderately heavy bleeding during the first hour of recovery, the physician expressed lack of concern and declined ordering any interventions besides standard postpartum recovery assessments, fundal massage, and intravenous oxytocin 20 units per 1000 mL lactated ringers at 125 mL per hour. In the dimly lit room, as the obstetric nurse performs the sixth quarter-hour postpartum fundal and lochia assessment, a boggy uterus and blood-soaked under pad are found. After application of vigorous fundal massage, verification of an empty bladder, and vital sign assessment which reveals a systolic blood pressure 20 mmHg below admission baseline, the concerned nurse calls the physician. Orders are given to "keep an eye on her," with the added comment, "I think you are just worrying too much." On return to the patient's room, the nurse finds the patient to be apneic. A jaw thrust is quickly performed which results in spontaneous respiration. The patient remains unresponsive, so the RN directs the patient's spouse to push the emergency call button. One acute care RN, one emergency department RN, and a mid-level practitioner respond. Calls are made to the attending physician, the surgical team including certified registered nurse anesthetist (CRNA), RN, and scrub technician, and the laboratory technician to report to duty immediately. Meanwhile, the obstetric nurse is criticized by the response team for having allowed the patient to bleed so much "without doing anything about it." Ultimately, the patient receives multiple blood products, a dilatation and curettage which does not diminish rate of bleeding, and is air transported in unstable condition to a tertiary facility 60 miles away. The patient is fortunate to experience only the severe maternal morbidity of massive blood transfusions and the surgical dilatation and curettage while surviving with an intact uterus and no cognitive deficits.

Was this event just a normal occurrence in obstetrics, or is there a better way to assess and manage postpartum hemorrhage which can improve patient outcomes?

Background and Significance

In the United States, hemorrhage is the fifth leading cause of maternal death during pregnancy, childbirth, and the postpartum period, accounting for 1.9 deaths per 100,000 live births (CDC, 2020). Nearly 17% of pregnancy related maternal deaths occur on the day of delivery. Of these deaths, most (24.3%) are related to PPH (Peterson et al., 2019). Even when maternal hemorrhage does not result in death, severe maternal morbidity may ensue. Severe maternal morbidity is described as unexpected outcomes of labor and delivery that result in significant short- or long-term consequences to a woman's health (CDC, 2020). Interventions identified with severe maternal morbidity in the case of PPH include blood transfusions, invasive procedures such as uterine tamponade, and surgical procedures such as uterine repair, uterine artery embolization, and hysterectomy (Ahmadzi et al., 2016). Additional morbid sequelae can include adult respiratory distress syndrome, shock, disseminated intravascular coagulation, acute renal failure, loss of fertility, and pituitary necrosis (ACOG, 2017).

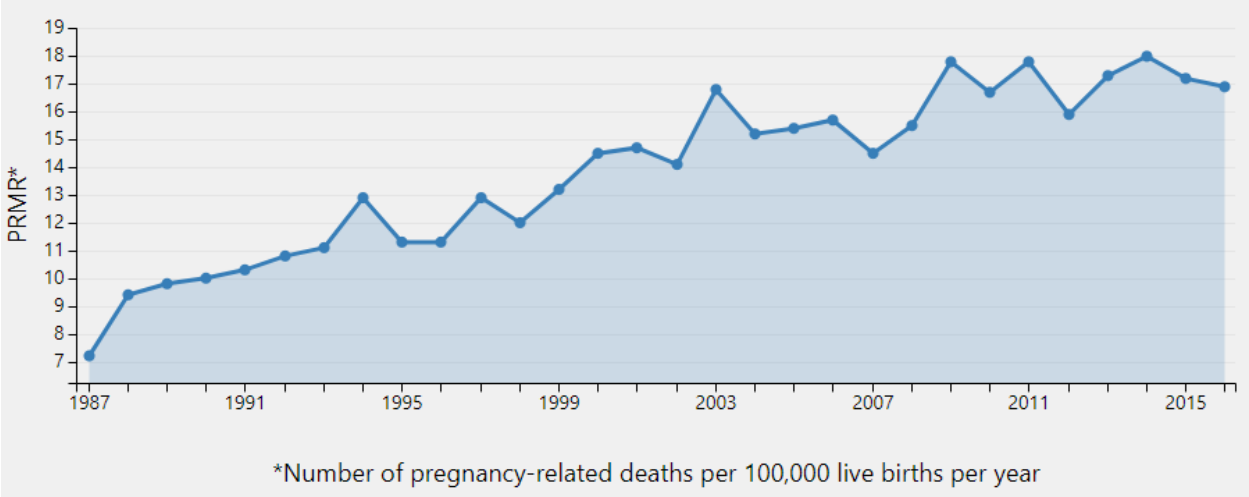
Over the past three decades, the United States has seen a trend in increased rate of maternal deaths (Figure 1.1), defined as,

> deaths of women while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes. (CDC, 2018)

The maternal death rate from all causes has increased by 85.1%. During a similar time period, severe maternal morbidity has increased by 22.4% (CDC, 2020). [Note: This reported rate excludes blood transfusions since current standard practice is to administer blood in order to decrease maternal morbidity and mortality.] Inconsistencies in reporting have concerned some statisticians regarding the accuracy of these reported rates due to changes in data collection that began in 2003 and did not become standard in all states until 2017 (CDC, 2020). Even when adjusting for variances in data collection, maternal morbidity and mortality rates continue to increase (CDC, 2017). The national increase in maternal morbidity and mortality, including cases caused by postpartum hemorrhage, may be related in part to a trend toward increased maternal age, pre-existing chronic diseases, pre-pregnancy obesity, and an increased cesarean section rate which predisposes women to infection, hemorrhage, future placentation abnormalities, and uterine rupture. Lack of standard evidence-based practice systems in place to identify and manage obstetric complications have also been suggested as contributors to increased national maternal mortality and morbidity (Collier & Molina, 2019).

Figure 1.1

Trends in Pregnancy-Related Mortality in the United States: 1987-2016



(CDC, 2020)

Postpartum hemorrhage complicates an estimated three to five percent of deliveries in the United States each year, a 30.4% increase over the past 25 years (Evensen et al., 2017; Callaghan et al., 2010). Experts consider PPH to be the most preventable cause of severe maternal morbidity and mortality (Main et al., 2015). Standardization of PPH management to improve safety and quality is foundational for reducing maternal morbidity and mortality in the hospital setting. Implementation of evidence-based obstetric safety toolkits and team communication training have been identified as the most common mechanisms to build safety culture (ACOG 2017; Brennan & Keohane, 2016). Periodic drills following a standard PPH protocol may improve an obstetric team's ability to respond and reduce adverse outcomes (ACOG, 2016).

Problem Statement

In a rural critical access hospital with a low-volume obstetric unit, multidisciplinary staff whose specialties include obstetrics, acute care, emergency department, surgery, and laboratory infrequently perform emergency interventions for the obstetric complication of postpartum hemorrhage. The American College of Obstetricians and Gynecologists (2017) and the Association of Women's Health, Obstetric and Neonatal Nurses (2018), professional societies for obstetric physicians and nurses, recommend education of multidisciplinary staff regarding PPH recognition and the use of a PPH protocol along with simulated PPH drills to yield best outcomes for clients. Although simulation-related patient outcomes cannot be directly compared with actual patient outcomes due to confounding factors, research suggests a strong correlation between simulation training and improved safety culture and outcomes in obstetrics (Elhakm & Elbana, 2018). Multidisciplinary interdepartmental staff involvement in a moderate fidelity simulation intervention should result in a

sustained improved safety culture and adherence to protocol when managing postpartum hemorrhage. This project sought to implement a moderate fidelity postpartum hemorrhage simulation intervention followed by three monthly postpartum hemorrhage drills during which timely and accurate adherence to postpartum hemorrhage protocol was evaluated.

Clinical Question

Does a multidisciplinary simulated PPH educational intervention promote timely and accurate adherence to an evidence-based practice postpartum hemorrhage protocol during unannounced monthly PPH simulation drills in a low-volume obstetric setting?

Purpose

The purpose of this project was to evaluate the effectiveness of a multidisciplinary moderate fidelity simulated PPH educational intervention on accurate and timely adherence to a standard PPH protocol during simulated PPH events. This occurred 18 months following an organizationally initiated multidisciplinary online modular PPH self-study intervention followed by a moderate fidelity simulation educational experience which was suspended due to COVID-19 restrictions and staffing challenges.

Theoretical Framework

Identified Concepts

1. Low-volume obstetric setting
2. Moderate Fidelity Simulation
3. Postpartum Hemorrhage
4. Recognition
5. Standard management

Theory

Nursing and educational theories are useful in systematically guiding researchers' methods and interventions. The Adventist Framework for Nursing Education Practice is an appropriate foundation for this project since it incorporates professionalism, quality and safety, teamwork and collaboration, patient centered care, evidence-based practice, and health promotion into a caring, connecting, and empowering environment for learning. It identifies that both learners and patients are individuals who interact with their environment. As this project was developed and implemented, the educator/researcher recognized that learners would respond differently to interventions due to their personal life experiences. Likewise, patients would respond in a somewhat different manner based on their unique physical, psychological, social, and cultural selves.

Kolb's Learning Model recognizes that learners have learning style preferences yet use all four identified learning styles at least some of the time. This four-step learning cycle of concrete experiences, reflective observation, abstract conceptualization, and active experimentation guides understanding of how each multi-disciplinary staff member responds to a teaching intervention and learns how to identify and manage PPH (Billings & Halstead, 2016; McLeod, 2017). The cycle demonstrates the continuous nature of learning and suggests efficacy of repeated and sustained educational interventions. The four-steps included in Kolb's Learning Model are aptly addressed with simulated educational experiences (Waldner & Olson, 2007).

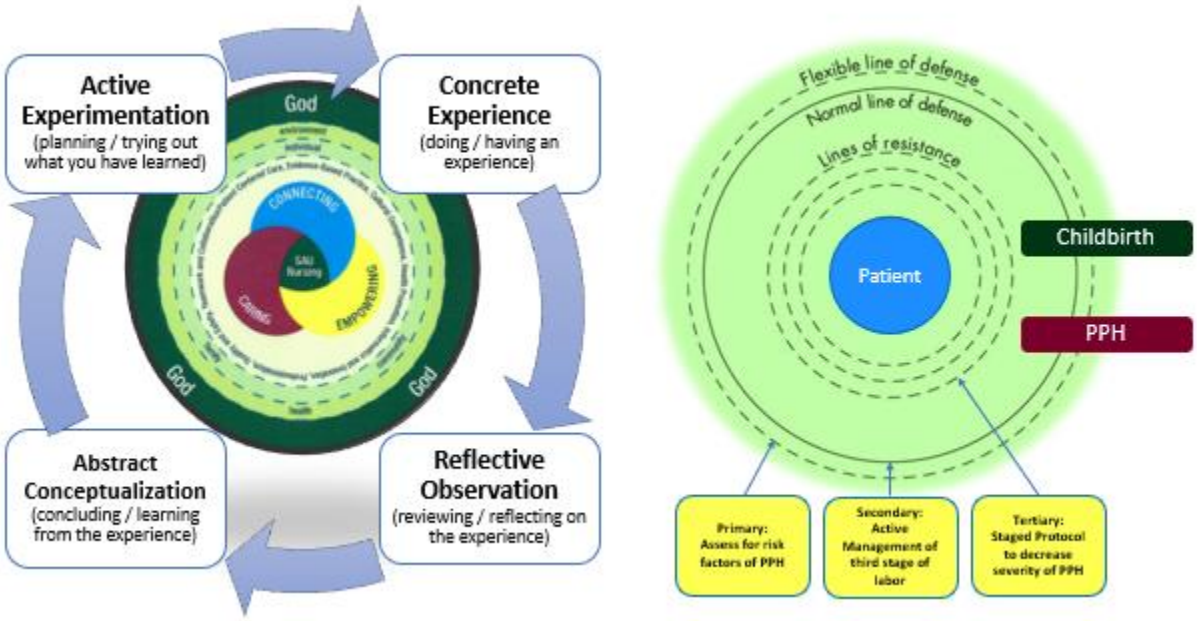
The Neuman Systems Model emphasizes flexible lines of defense influencing health. Childbirth is a stressor that impacts the normal line of defense as well as the lines of resistance. These lines of defense and resistance can be strengthened through primary, secondary, and tertiary prevention (Neuman, 2016). Primary prevention of PPH includes assessment of risk factors. Secondary prevention is implemented through active management of second stage of labor. Tertiary prevention is carried out through activation of a stage-based PPH protocol in order to decrease the severity of PPH. As multidisciplinary staff members receive repeated learning and practice opportunities, they should develop increased competence with teamwork and protocol implementation to affect all three levels of prevention and strengthen the patient's lines of defense.

The theoretical framework for this project is depicted in Figure 1.2.

Figure 1.2

Proposed Theoretical Framework

Does a multi-disciplinary moderate fidelity simulated PPH educational intervention result in sustained timely and accurate adherence to a PPH protocol during simulated PPH in a rural low-volume obstetric setting?



Definition of Terms

Fundal Massage

In the obstetric setting, fundal massage is repetitive rubbing of the top part of the uterus through the abdominal wall in order to promote contraction of the uterus (Saccone et al., 2017).

Low-volume obstetric setting

A low-volume obstetric setting has less than 100 births per year (Kozhimannil et al., 2015).

Moderate Fidelity Simulation

Moderate fidelity simulation is a series of procedures combined to imitate a scenario in the clinical setting, yet the mannequin is unable to interact with the learners (Munshi et al., 2015; INACSL, 2016a).

Postpartum Hemorrhage

Postpartum hemorrhage is maternal blood loss of greater than or equal to 1,000 milliliters in the first 24 hours following childbirth (ACOG, 2017).

Standard management

Standard management is the use of unit-standardized stage-based obstetric hemorrhage emergency management algorithms with checklist and guidelines for escalation of care (ACOG, 2017; Main et al., 2015)

Chapter 2: Literature Review

Literature Review

Literature Search Methods

The purpose of this formal literature review is to answer the question, "Does a multidisciplinary moderate fidelity simulated postpartum hemorrhage (PPH) educational intervention promote sustained timely and accurate adherence to an evidence-based practice PPH protocol during unannounced PPH simulation drills in a rural low-volume obstetric setting?"

Selected databases for this review included Cumulative Index to Nursing and Allied Health Literature (CINAHL Complete), Elton B. Stephens Company (EBSCO), Medline, PubMed, and Google. Searches were conducted between September 15 and October 3, 2020, and between January 14, and January 29, 2021. Search criteria was limited to English language and peer reviewed articles published 2015 to 2021. All levels of evidence were included. Search terms used in all databases included the following phrases used solely or in combination with one another: "*postpartum hemorrhage or postpartum bleeding or PPH or postpartum haemorrhage,*" *"simulation training or simulation learning or simulation education,"* and *"management or treatment or intervention."* MeSH terms also included solely or in combination were "postpartum hemorrhage," "patient simulations," and "outcomes of education." The initial searches were entered and tracked resulting in a total of 899 results. Duplicates were removed resulting in 386 articles. The results were further narrowed by exclusion criteria of *"student"* (undergraduate nursing student, midwifery student, medical student, or resident training programs as well as training for unlicensed birth attendants). After applying those limitations, 49 titles and abstracts were reviewed for relevance. In the resulting 19 articles, reference sections that included studies and relevant peer reviewed articles were then hand-searched for additional eligible studies. Three were deemed relevant, resulting in a total of twenty-two studies selected for review. The second search was implemented to locate relevant literature published subsequent to the initial search. Identical phrases were utilized with the delimiters of publication date October 2020 through January 2021, which resulted in two relevant articles. Subsequently, a focused search included the following phrases used solely or in combination with one another: *"postpartum hemorrhage or PPH," "cart," "risk assessment," "active management of third stage of labor or AMTSL," "early cord clamping," "controlled cord traction," "traumatic birth, "emotional health or depression or post-traumatic stress or PTSD," "huddles or debriefs or review," "outcomes or process metrics."* This focused search was not tracked for total number of results. Abstracts and full texts were reviewed for relevance. In the resulting 35 articles, reference sections that included studies and relevant peer review articles were then

hand-searched for additional eligible studies. Three were deemed relevant, resulting in thirty-eight focused studies, and a total of sixty-two studies selected for review. A graphic depiction of the search flow and is presented (Fig. 2.1).

Literature Quality

Studies were evaluated for quality of evidence (Fig. 2.2). The majority were of low quality, including observational, single descriptive, and quasi-experimental studies, quality improvement projects, or expert opinions and reports (n=30). Studies of moderate quality including systematic review of descriptive studies and case control or cohort studies (n=12) were similarly represented by high quality studies including randomized control trials and systematic reviews (n=15). Specific studies are listed by level of quality for reference purposes (Fig. 2.3).

Figure 2.1

Literature Selection Flow Diagram

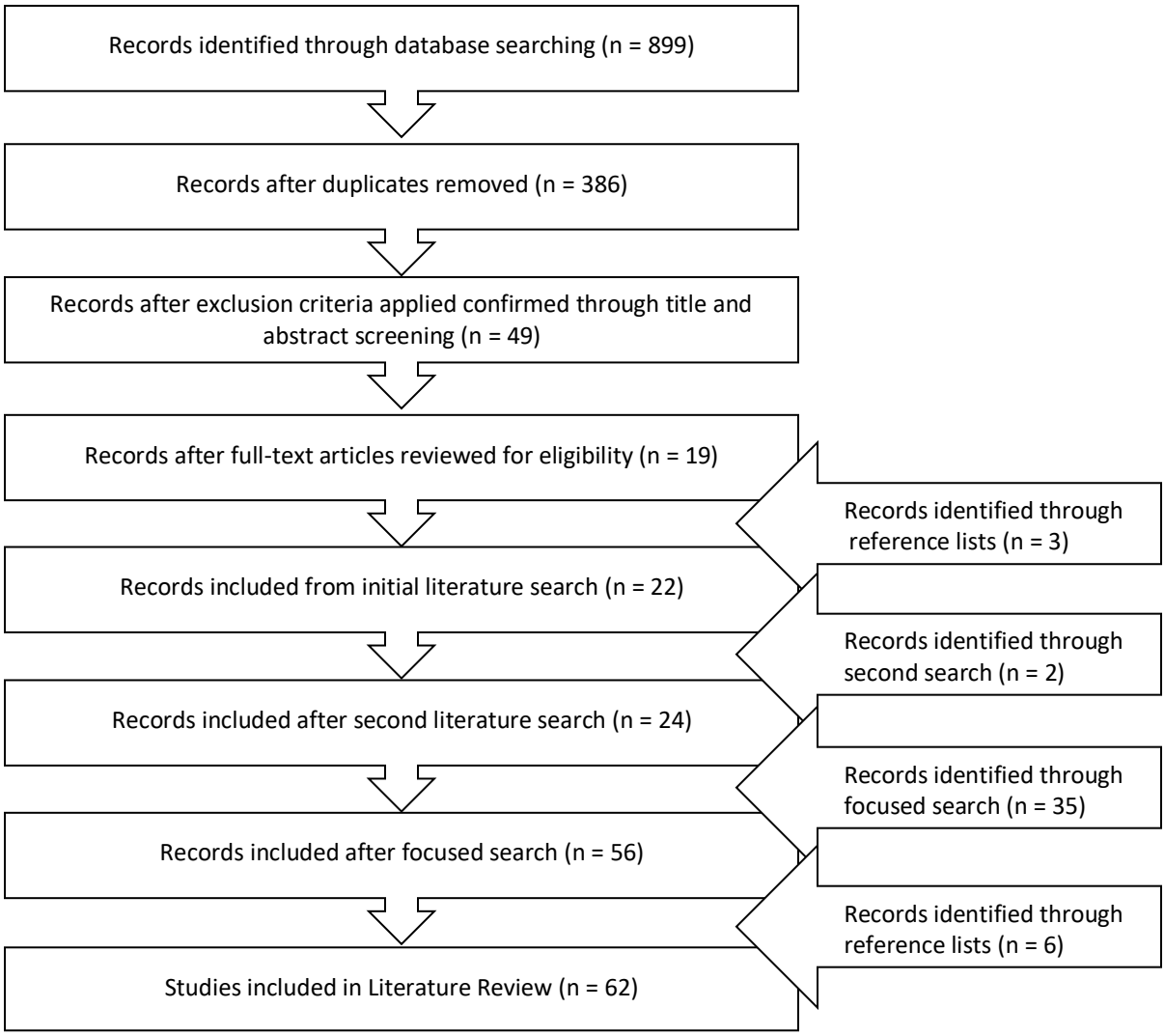


Figure 2.2

Quality of selected studies

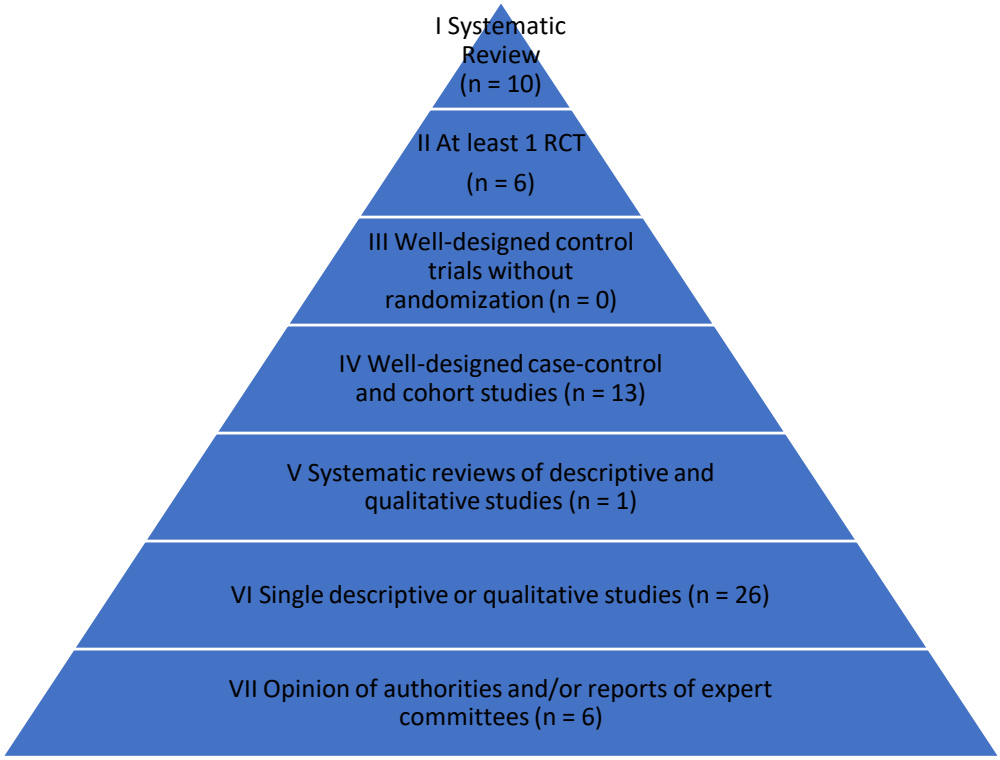
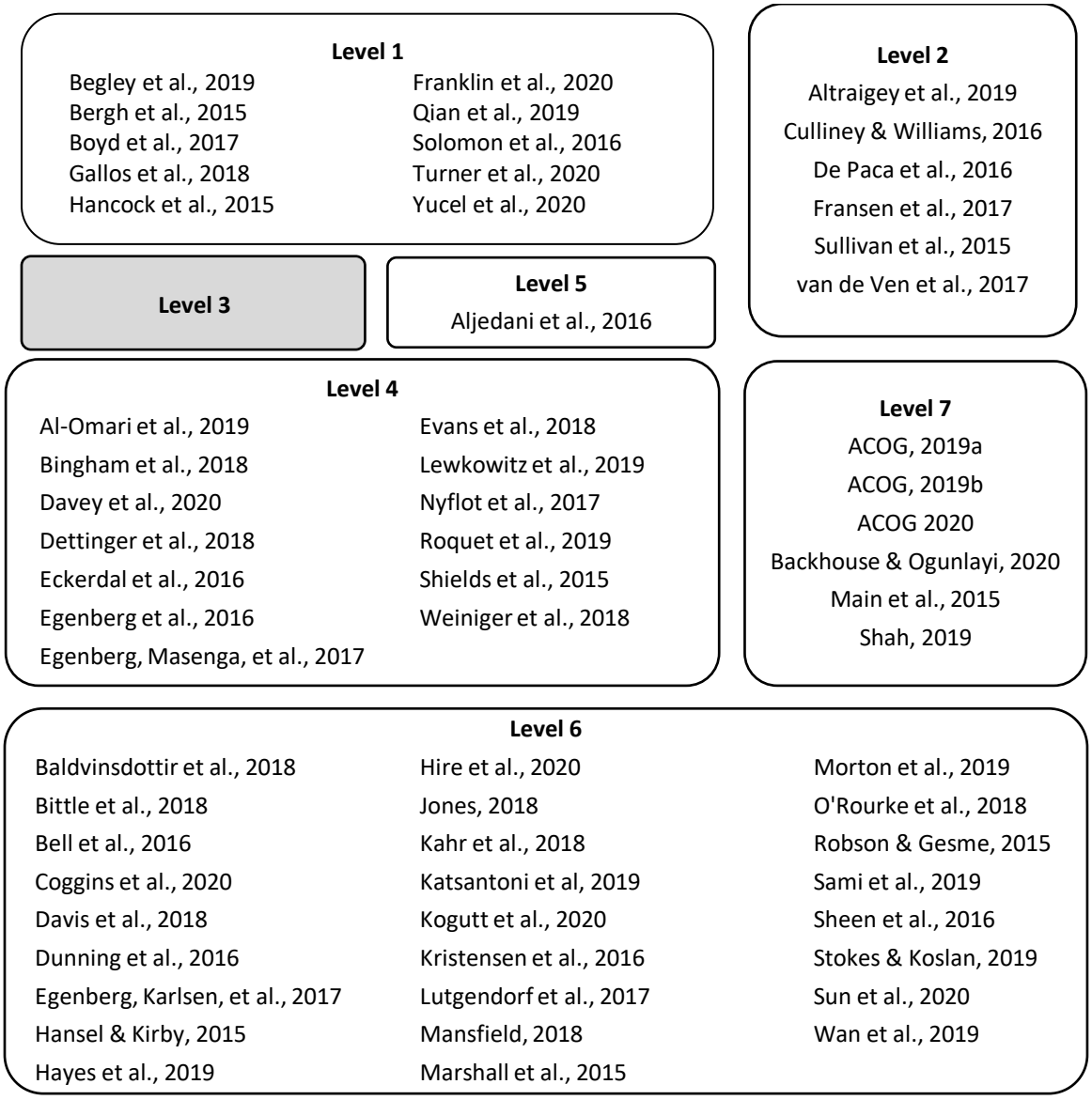


Figure 2.3

Specific Studies by Level of Quality



Presentation of Literature

Four main themes were identified during this formal literature review and will be the basis of the discussion. Because simulation education is the focus of this scholarly project, protocol education, and regular drills with debriefs will be heavily addressed.

Theme 1: Readiness for Postpartum Hemorrhage Management

PPH Cart and Medications (immediate access to supplies and medications). The Association of Women's Health and Neonatal Nurses (AWHONN) and the National Partnership for Maternal Safety - Consensus Bundle on Obstetric Hemorrhage both include the need for a PPH cart with medical supplies and ready access to emergency medications for treatment of PPH (Bingham et al., 2018; Main et al., 2015). However, a paucity of literature exists on the subject.

Kogutt et al. (2020) used a generalizable PPH simulation to evaluate elapsed time from diagnosis of PPH to collection of supplies and medications pre- and post- intervention of PPH cart and PPH medication kit. Response time was reduced by 77% (from 11 minutes 3 seconds to 2 minutes 14 seconds) following the intervention. Although not reported, it was anticipated that the decreased time from diagnosis to treatment could reduce associated morbidity and mortality.

Core Response Team. There was a 47% reduction in blood transfusion rates following a multi-professional, scenario based PPH training, suggesting that improved teamwork may have contributed to the outcome (Egenberg, Masenga, et al., 2017). In a simulation-based multi-professional obstetric emergency team training intervention including 80% teamwork skills and 20% medical and technical skills, the reduction in obstetric complications was reported as non-statistically significant. However, an increased use of invasive treatments for PPH was observed (OR 2.2, 95% CI 1.2-3.9). The authors noted that the increased use of PPH interventions such as blood transfusions, embolization, and hysterectomy, although reported as an obstetric complication, may have reflected an improved team response since these interventions had been encouraged during the training course (Fransen et al., 2016).

Non-obstetric research supports efficacy of core response teams. Multi-disciplinary rapid response teams (RRT) intervening with rapidly deteriorating medical ward patients reduced hospital mortality and non-intensive care unit cardiac arrests in both high and low-resource countries (Al-Omari et al., 2019). Implementation of a RRT was associated with both a significant decrease in hospital mortality (RR 0.88, 95% CI: 0.83-0.93) and a significant decrease in the number of non-intensive care unit cardiac arrests (RR 0.62, 95% CI: 0.55-0.69) (Solomon et al., 2016).

Protocols for Emergency Blood Release and Massive Transfusion. The National Partnership for Maternal Safety in their Consensus Bundle on Obstetric Hemorrhage advises that policies for obstetric hemorrhage must address emergency release of blood products and massive transfusion protocols (MTP) in order to facilitate rapid release of packed red blood cells (PRBC), fresh frozen plasma (FFP), and platelets in predefined ratios (Main et al., 2015). Trauma informed hemorrhage research prompted application of MTP into the obstetric setting. Early administration of blood components in fixed ratios

during hemorrhage has been correlated with decreased morbidity and mortality in trauma, non-trauma, and obstetric hemorrhage (Aljedani & Anwar, 2016; Roquet et al., 2019; Sun et al., 2020). No difference was found in frequency of women managed with 1:1 PRBC:FFP ratio before and after implementation of a MTP (Weiniger et al., 2018). In both the pre- and post MTP implementation periods, blood products were not transfused according to exact ratios. However, as the number of blood products transfused increased, the ratios became closer to 1:1.

Protocol Education, Regular Drills with Debriefs. A plethora of research has been conducted in both high and low resource settings regarding interprofessional simulation for education on PPH skills and protocols. Studies that utilized self-report for efficacy of the educational intervention unanimously reported improvement of self-efficacy and confidence, knowledge, and perceived teamwork skills (Bergh et al., 2015; Bittle et al., 2018; Davis et al., 2018; Dettinger et al., 2018; Egenberg et al., 2016; Egenberg, Karlsen, et al., 2017; Hayes et al., 2019; Jones, 2018; Lutgendorf et al., 2017; Sami et al., 2019; Stokes & Koslan, 2019; Yucel et al., 2020).

Since PPH is a low-frequency event with high rates of maternal morbidity and mortality, AWHONN instituted the *Postpartum Hemorrhage Project* as a multi-state pilot quality improvement project, including implementation of multi-disciplinary PPH education and drills. Findings subsequently steered standardized Patient Safety Bundle development (Bingham et al., 2018). Translation of research-based best practices into clinical practice, known as research-practice-gap and evidence-practice-gap, can have a lag-time of more than a decade. One of the reasons for this delay is that healthcare decision and policy makers often do not give attention to evidence-based knowledge (Kristensen et al., 2016).

Marshall et al. (2015) evaluated the impact of simulation and team training on management of PPH in non-academic community hospitals. The initial simulation intervention was followed by standardized debriefing and team training, as well as brief video instruction and provision of written materials on both subjects. Teams participated in a second simulation intervention nine to twelve months after the initial intervention. The scenario included PPH complicated by maternal history of chronic hypertension. In order to correct the PPH, teams must administer three indicated uterotonic medications and provide uterine massage. Teams had opportunity to incorrectly administer a contraindicated medication, which was done both before and after interventions, ten and two times, respectively. A statistically significant reduction in time (seconds) for all measured variables was reported: recognition of PPH (30.3 ± 57.7, p = .02), use of first medication (48.1 ± 65.9, p = .003), performance of uterine massage (28.5±50, p=0.01), use of second medication (69.0 ± 71.9, p = .0003) was reported, although there was a non-statistical reduction in time to correct the PPH (55 ± 191.9, p = .19).

Ultimately, the question must be answered as to whether or not simulation education positively affects clinical patient outcomes, yet fewer studies address actual patient outcomes following PPH team training and skills. During the three years following a PPH simulated practical skills team-training (PROBE) interdisciplinary simulation intervention, women experienced no difference in volume of PPH, post hemorrhage hemoglobin levels, nor blood transfusion rate (Baldvinsdottir, 2018). However, significant changes in clinical management of PPH were observed: securing intravenous access, monitoring vital signs, intravenous fluid resuscitation, use of uterine massage, increase in number of uterotonic medications given. Authors suggested that PROBE actually prevented some cases of PPH even though this was not revealed by statistics because patient and labor demographics changed in the pre- and post-intervention women. Length of labor greater than 10 hours increased by 50%, and maternal obesity tripled, both of which have been identified as increasing risk for uterine atony.

A non-statistically significant yet clinically significant decrease in severe PPH necessitating transfusion of five or more blood products was observed (population decrease from 11% to 6%, $p = .39$) following a repeated measure interprofessional PPH intervention (Egenberg et al.,2016). The authors suggested that the reduction in severe PPH may be attributed to a more rapid and coordinated team response to PPH. In contrast, PPH volumes of 500 to 1,000 milliliters were reduced from 2.1% to 1.3% without reduction in severe PPH greater than 1,000 milliliters nor on maternal deaths following a didactic and simulation intervention (Evans et al., 2017).

Data of patient outcomes following an obstetric emergency simulation team training intervention was grouped quarterly in order to assess for decreased performance possibly related to skills depreciation. Improvements of increased invasive treatment for severe PPH were exhibited only during the first quarter. The authors concluded that benefits of training seem to decline after three months, so repetitive training sessions every three months may prove beneficial (van de Ven et al., 2017).

Non-obstetric research also informs the efficacy of simulation, drills, and debriefing on patient outcomes. The efficacy of emergency drills accompanied by debriefing in a medical inpatient setting was evaluated through mock code small group performance pre- and post- a debriefing and review of American Heart Association basic life support algorithms (Morton et al., 2019). The primary outcome measure of time to defibrillation was reduced from 134.7 seconds to 63.4 seconds ($p = .001$). Effectiveness of Basic Life Support simulation training on elapsed time from call for help to initiation of chest compressions and successful defibrillation revealed no difference between six-month and two-year interval groups.

However, a significant decrease in time was evident when frequency of training increased to three- and two-month intervals (Sullivan et al., 2015). There was no difference reported in the incidences of urgent intubation, yet decreased incidence of unexpected cardiac arrest (0.04% to 0.02%; p = .09) in repeated measure simulation team training (Wang et al., 2019). Although this was not a statistically significant change, the authors felt it was clinically significant. This decrease in cardiac arrest was hypothesized to be associated with nurses' improved recognition of signs of deterioration and early reporting and communication between nurses and physicians.

Effective implementation logistics for education, simulation, drills, and debriefs must be considered. Williams et al. (2019) sought to determine facilitating factors and barriers to participation in low-dose, high-frequency simulation-based training practice sessions in 125 low-resource maternity units. The presence of someone to schedule and lead practice sessions was beneficial since at least two people were needed in order to utilize some of the birth simulators. It was often challenging to bring two different staff members together to practice simultaneously. Participants were more likely to practice when time was scheduled for them, and when they were given verbal or phone reminders. A desire to be ready to face obstetric emergencies motivated some participants to practice. Barriers to consistent practice included heavy patient volume and low staffing, as well as lack of any type of compensation for extra practice. Lack of supportive supervision or support with birth simulators also contributed to inconsistent practice. Finally, some birth attendants indicated that they had already learned the skills so did not need to practice.

Theme 2: Recognition of Postpartum Hemorrhage

PPH Risk Assessment. Both Davey et al. (2019) and Nyflot et al. (2017) identified risk factors for severe PPH - greater than 1,500 milliliters blood loss in the first 24 hours following birth (Table 2.2). Additional medical and pregnancy complications associated with increased risk for severe PPH included anticoagulant medication, anemia, severe preeclampsia or HELLP syndrome and uterine fibromas (Nyflot et al., 2017), as well as placental abruption, placenta previa, and antepartum hemorrhage (Davey et al., 2019).

Despite identification of common risk factors associated with increased odds for having a severe PPH, Davey et al. (2019) reported that 0.7% of women in their cohort who had no identified risk factors also experienced severe PPH, constituting 2% of all cases of severe PPH.

Table 2.1

Risk Factors for Severe PPH

	Davey et al. (2019)			Nyflot et al. (2017)		
Risk Factors	aOR	95% CI	p-Value	aOR	95% CI	p-Value
Previous severe PPH	§			8.97	5.25-15.33	<0.001
Multiple pregnancy	2.84	2.3-3.5	<0.001	2.11	1.39-3.22	<0.001
Macrosomia *	1.88	1.7-2.0	<0.001	1.46	1.01-2.12	0.046
Instrumental vaginal delivery	§			1.5	1.17-1.93	0.001
Forceps vaginal delivery	2.04	1.8-2.3	<0.001	§		
Vacuum vaginal delivery	1.26	1.1-1.4	<0.001	§		
Oxytocin infusion in labor	1.20	1.1-1.3	<0.001	§		
Labor induction	§			1.69	1.39-2.05	<0.001
Labor augmentation	§			1.59	1.32-1.91	<0.001
BMI ≥ 30	1.39	1.3-1.5	<0.001	§		

§ Risk factors not assessed are left blank

*Davey ≥ 4 kg; Nyflot >4500 g

Measurement of Cumulative Blood Loss. The National Partnership for Maternal Safety Consensus Bundle on Obstetric Hemorrhage and the Association of Women's Health and Neonatal Nurses PPH Quality Improvement Project advised that all maternity units strive for accurate cumulative blood loss assessment for every delivering mother, with quantitative measurement being utilized as much as possible (Bingham et al., 2018; Main et al., 2015). The American College of Obstetricians and Gynecologists (ACOG) Committee Opinion #794 advises that when quantitative blood loss (QBL) is included with other practices which focus on PPH prevention and early diagnosis, "it may improve situational awareness and thereby improve hemorrhage diagnosis and response time" (2019b).

The accuracy of a quantitative method of blood loss calculation was validated by Kahr et al. (2018) using a modified *Brecher's* formula which is based on pre-birth and postpartum hemoglobin values. QBL measurement was accomplished by utilizing calibrated under buttocks drapes for collecting blood during vaginal deliveries and calibrated canisters for blood collection during cesarean births. Additionally, blood-soaked items were weighed, and the pre-determined dry weight of items subtracted. With this system, one gram of blood was considered to equate with one milliliter of blood. Objective measurement of blood loss for 921 patients had a moderately high correlation of $r(459) = .683$, $p < .001$ and $r(458) = .402$, $p < .001$ (vaginal and cesarean section deliveries, respectively). Hire et al. (2020) utilized the Triton L&D System, a computerized system that measures hemoglobin content of collected fluid and hemoglobin mass on blood-soaked items to compare estimated blood loss (EBL) to QBL for activation of a PPH protocol. In the surgical setting, visual blood loss estimates were more likely to trigger PPH protocol activation than would have been necessitated if the Triton L&D System had been utilized. Among 42 cesarean births, more than 50% of PPH diagnosed based on EBL did not

meet PPH criteria (blood loss greater than 1,000 mL) based on the QBL measurement that was calculated after the surgical case was concluded. It was noted that discrepancies were most frequent when blood loss volumes were less than 1,500 milliliters. In contrast, Hire et al. (2020) suggests that QBL versus EBL would results in fewer diagnosis of PPH and reduced number of interventions.

Hancock et al. (2015) found that speed and nature of blood flow were more likely to elicit a prompt response from providers than QBL. Authors reported that QBL played only a small part in decisions on PPH management, and having and implementing an efficient PPH protocol may have greater importance on improving patient outcomes.

Active Management of Third Stage of Labor Standard Protocol. Active management of third stage of labor (AMTSL) involves administration of a prophylactic uterotonic, early cord clamping, and controlled cord traction to deliver the placenta, while expectant management awaits spontaneous separation of placenta. Begley et al., (2019) compared active versus expectant management on the third stage of labor. Low quality evidence indicated that AMTSL reduces the average maternal blood loss at birth and probably reduces the risk for blood loss greater than 500 milliliters. Uncertain evidence from three studies including over four thousand women indicated that AMTSL reduces the risk for severe maternal PPH of greater than 1,000 milliliters (average RR 0.34, 95% CI [0.14, 0.87]). Additionally, AMTSL may reduce the number of women with anemia after childbirth requiring blood transfusion (defined as hemoglobin less than 9 g/dL).

All uterotonic agents were effective for preventing PPH greater than 500 milliliters when compared with placebo or no treatment. The three single or combination agents ranked highest in prevention of PPH greater than 500 milliliters were compared with single agent oxytocin administration: ergometrine plus oxytocin (RR 0.70, 95% CI [0.59, 0.84], moderate certainty), carbetocin (RR 0.72, 95% CI [0.56, 0.93], moderate certainty) and misoprostol plus oxytocin (RR 0.70, 95% CI [0.58, 0.86], low certainty) (Gallos et al., 2018).

Early cord clamping is a practice of clamping the cord less than one minute after birth, while delayed cord clamping (DCC) occurs when the cord is clamped any time from one minute after birth and beyond. When evaluating the effects of DCC on maternal blood loss, De Paco et al. (2016) found that there were no statistical differences in maternal 48-hour postpartum red blood count, hemoglobin, or hematocrit ($p = .25$, $p = .08$, $p = .15$ respectively) among 97 women with healthy, full-term pregnancies who were randomized into ECC and DCC groups. Likewise, Qian et al. (2019) found no increased risk of excessive PPH following a delay in cord clamping of at least 30 seconds during singleton vaginal deliveries. Authors reported inconclusive evidence for best time of cord clamping in cesarean, preterm, and multiple pregnancies.

Based on the reported benefits of DCC to most newborns and the lack of increased risk for PPH, ACOG released a committee opinion (2020) recommending, "a delay in umbilical cord clamping in vigorous term and preterm infants for at least 30 to 60 seconds after birth," thus eliminating ECC from AMTSL (p. e100).

Controlled cord traction (CCT) during AMTSL involves two maneuvers instituted by the practitioner after delivery of the baby: maintenance of traction to the umbilical cord accompanied by counter pressure applied to the uterus beneath the pubic bone until the placenta delivers. Culliney and Williams (2016) reviewed three randomized trials comparing CCT with no controlled cord traction for outcomes of maternal blood loss, morbidity, mortality, and length of third stage of labor among healthy women with vaginal deliveries. CCT reduced the risk of PPH greater than 500 milliliters but less than 1,000 milliliters and slightly reduced the incidence of manual placenta removal. However, there was no evidence for decreasing the risk of PPH greater than 1,000 milliliters, nor was there a difference in blood transfusions, severe maternal morbidity, or mortality. Similarly, a statistically significant yet clinically insignificant difference in perioperative blood loss was reported between CCT and manual removal of placenta during elective cesarean deliveries (Altraigey et al., 2019).

Theme 3: Response to Postpartum Hemorrhage

PPH Emergency Management Plan/Protocol with Checklists. The efficacy of protocols and checklists to reduce patient harm through evidence-based care standardization and improved communication has been affirmed through research for over 20 years (ACOG, 2019a; Boyd et al., 2017; Turner et al., 2020). When a comprehensive protocol for treatment of maternal hemorrhage was implemented within a large health system, compliance with the protocol was reported as increasing throughout the study period, but no statistics were reported. Total number of units of blood transfused per 1,000 deliveries decreased by 25.9% ($p < .01$) and postpartum hysterectomies decreased by 14.8% ($p = .2$) from pre- protocol to second post-protocol assessment (Shields et al., 2015).

Support Program for Patients, Families, and Staff. A paucity of literature exists regarding efficacy of support programs for patients, families, and staff who have experienced or managed PPH. However, the emotional impact of exposure to severe maternal morbidity experiences has been described. Stress due to lack of communication from the healthcare team during severe PPH was found to cause significant stress to both women and their partners (Dunning et al., 2016). Negative birth experiences have also been associated with postpartum depression and psychiatric illness, with the most vulnerable time period being four months following hospital discharge (Eckerdal et al., 2016; Lewkowitz et al., 2020). Additionally, traumatic perinatal events have been found to be associated with compassion fatigue and secondary

traumatic stress by healthcare workers. (Katsantoni et al., 2019; Sheen et al., 2016). Implementation of a program for the prevention of post-traumatic stress disorder (PTSD) among midwives resulted in early recognition of trauma responses in both themselves and their colleagues as well as a reduced level of PTSD (Slade et al., 2018).

Theme 4: Reporting of PPH and Systems Learning

Culture of Huddles and Debriefs. Use of huddles during handoffs, changes in patient status, and with process improvement projects has been associated with improved team member engagement, communication, and patient safety (Bell et al., 2016; O'Rourke, 2018). This success has been best demonstrated in unit-based settings rather than hospital-wide or multi-unit contexts (Franklin et al., 2020). Debriefing within one hour following critical clinical events in an emergency department was found to be beneficial for communication and identification of system and process deficiencies when using a standard debrief tool (Coggins et al., 2020). Similarly, team huddles held immediately following postpartum hemorrhage resolution and using a standardized form provided an opportunity for event participants to identify what went well and opportunities for improvement. The debrief forms were then reviewed by managers within two days in order to support system improvement (Hansell & Kirby, 2015).

Multidisciplinary Review of Serious PPH for Systems Issues

As described above, a culture of huddles and debriefs can help to inform multidisciplinary review of serious PPH for systems issues. Reviews of severe maternal morbidity cases resulted in identification of contributing factors, both non-preventable and preventable, which resulted in employment of a safety nurse, and implementation of team training and obstetric safety bundles (Ogunyemi et al., 2019). During a similar review process, The Chief of Obstetrics and administrative team collaborated with nursing staff to enhance communication by devising a hemorrhage risk notification system visible to all staff entering any patient room (Robson & Gesme, 2015).

Monitor Outcomes & Process Metrics. Process metrics are measures that are intended to guide care in order to achieve desired outcomes. Monitoring of process metrics provides data as to how well the processes, such as protocols, have been followed. Outcomes reflect how well the processes and system have impacted the clients, such as PPH rate and number of blood components transfused. This is a part of the quality improvement process. If process metrics are not resulting in desired outcomes, there is either a problem with the metrics themselves or a problem with their implementation (Backhouse & Ogunlayi, 2020; Shah, 2019).

Mansfield (2018) described a midwife-led birthing unit where the practitioners themselves conducted an audit of patient records, a literature review, and subsequently revised unit policies to reflect standards. Collegial discussions

transpired among the midwife group until consensus was achieved to practice by the evidence-based standards (*objectives*). An audit conducted two years after baseline revealed a decrease in PPH from 4% to 2.8%. Blood loss of ≥ 2,000 mL was reduced from 1% to 0.6% of the total PPH incidents (*outcomes)*.

Literature Gaps

There existed a paucity of literature generalizable to non-developing countries regarding the sustainability of actual PPH management skills (rather than rote knowledge or self-efficacy) at extended intervals following training. Additionally, patient outcomes following training largely focused on QBL and number of blood transfusions. It was noted that QBL is only one indicator of PPH assessment, so it may be an unreliable indicator of the quality of PPH management. Additionally, number of blood transfusions may increase if PPH protocols are being correctly implemented. Thus, a gap exists in measurement of standard PPH management including time-lapse from recognition of incident to implementation of interventions from a PPH protocol.

Summary of Literature Review

The literature review presented a consensus on interventions for management of PPH through readiness, recognition and prevention, response, and systems learning. It supported use of focused team training and skills simulation for high acuity low-frequency events. Research findings frequently focused on learners' self-efficacy rather than team performance or clinical outcomes following educational interventions. Table 2.2 provides a summary of the themes of PPH management discussed in this literature review.

Table 2.2

4 R's for PPH Management

Readiness – every facility • PPH cart containing necessary supplies, checklist, and instructions • Immediate access to PPH medications • Core response team • Protocols for emergency release of blood products and massive transfusion • Protocol education, regular drills with debriefs
Recognition & Prevention – every patient • PPH risk assessment • Measurement of cumulative blood loss, as quantitative as possible • Active management of third stage of labor unit standard protocol
Response – every hemorrhage • PPH emergency management plan/protocol with checklists • Support program for patients, families, and staff
Reporting & Systems Learning – every unit • Culture of huddles for high-risk patients and post-event debriefs • Multidisciplinary review of serious PPH for systems issues • Monitor outcomes & process metrics

(Adapted from Main et al., 2015)

Chapter 3: Methodology

Purpose

The purpose of this project was to evaluate the effectiveness of a multidisciplinary simulated postpartum hemorrhage (PPH) educational intervention on timely and accurate adherence to an evidence-based practice PPH protocol during unannounced monthly PPH drills in a low-volume obstetric setting with fewer than 100 births per year. (This project was being implemented 18 months following an organizationally instituted independent modular study and team simulation intervention that had been implemented by this same investigator.)

Objectives

This project had five objectives that were assessed in a simulation environment. Due to time constraints of this project, it was not possible to evaluate clinical outcomes for actual women subsequent to the intervention.

1. Multidisciplinary team will obtain standard PPH management supplies and medications within 120 seconds from identification of PPH.
2. Second uterotonic medication will be administered within 60 seconds of obtaining medication (within 180 seconds from identification of PPH).
3. In the presence of uterine atony, uterine massage will be performed continuously unless physician directs its cessation (Arafeh, 2015).
4. Uterine tamponade device insertion will be completed within 6 minutes from time request was made (McNulty & Main, 2015).
5. Multidisciplinary teams will demonstrate a minimum of 80% accuracy in adherence to PPH protocol.

Hypotheses

H_1 = A multidisciplinary simulated PPH educational intervention promotes timely and accurate adherence to an evidence-based practice PPH protocol during unannounced monthly PPH simulation drills in a low-volume obstetric setting.

H_0 = A multidisciplinary simulated PPH educational intervention does not promote timely and accurate adherence to an evidence-based practice PPH protocol during unannounced monthly PPH simulation drills in a low-volume obstetric setting.

Design

This quality improvement project utilized a quasi-experimental research design which is characterized by the absence of randomization and provides flexibility for design alternatives (Polit & Tatano, 2017). A one-group pretest-posttest time series was selected which allowed for quality improvement inferences between the intervention and outcomes of interest (Ambroggio et al., 2018). However, it was not possible for the project leader to have an exact control pretest comparison from the organizationally instituted independent PPH modular study and team simulation intervention 18 months previous since data collected at that time included only knowledge assessment and accuracy of adherence to protocol. Thus, the performance of multidisciplinary teams at the time of this project educational intervention implementation was compared with the subsequent time series performance data. The educational intervention was provided multiple times during the first month of implementation in order to facilitate scheduling of all potential sample members for an opportunity to participate, with only one educational experience per person. The educational intervention was followed by unannounced PPH drills that were conducted at three intervals approximately four-weeks apart. A minimum of four and maximum of twelve PPH drills were conducted at each interval in order to accommodate both day and night shifts and multiple staff. Subjects included in the unannounced drills were a random sample of all subjects based on staff scheduled at the time of the drills.

Additionally, the two pre-intervention outcome measures data collected by the organization eighteen months prior to this project (knowledge assessment and accuracy of adherence to protocol) were included for reference purposes. Finally, although findings would not be dependent on this project, since a PPH cart was instituted by the organization within a month prior to project implementation, an incidental analysis of time to collect PPH supplies and medications pre- and post PPH cart was reported.

Setting

The setting for this project was a rural hospital district obstetric department in the northwestern United States which had an average of 60 to 90 deliveries annually.

Sample

The target population for this project was a convenience sample of all multidisciplinary staff at the target institution who may need to manage postpartum hemorrhage. The sample included both participants who were required to participate (per institutional requirements) and those who voluntarily participated (Table 3.1).

Table 3.1

Subjectivity Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
• Employed at the specified study institution • Job includes working within the hospital at the specified study institution • Job requires participation in quality improvement projects • Registered Nurse • Certified Nursing Assistant • Job discipline includes one or more of the following: Obstetrics, Acute Care, Emergency Department, Surgery, Laboratory • Phlebotomist • Medical Lab Technician • Certified Registered Nurse Anesthetist • Surgical Scrub Technician The following may voluntarily be included: • Emergency Room Technician • Physician, Emergency Department • Physician, Family Medicine OB Provider • Physician, General Surgeon • Physician, OBGYN Surgeon	• Non-employee of the specified study institution • Job duties limited to non-hospital entities of the specified study institution • Job does not require participation in quality improvement project and individual does not wish to participate • Sick or on FMLA during implementation • Scheduled retirement or change in job description that would meet exclusion criteria within 90 days post implementation of project

Educational Intervention

A PPH simulation scenario created by the project leader was utilized for the educational intervention (see Appendix A). Adherence to International Nursing Association for Clinical Simulations and Learning (INACSL) standards were met with the exception of the second point of Facilitation Criterion 1 – "The facilitator acquires specific initial education on use of simulation through formal coursework/ training and participates in ongoing continuing educational offerings, and/or targeted work with an experienced mentor" (INACSL, 2016b). The project leader who facilitated the simulation received simulation training through a three-credit graduate course, *Clinical and Simulation Instruction in Nursing*, which included 30 hours of simulation instruction/observation. This practical experience took place in February 2020 at Washington State University under the direction of Kevin Stevens, RN, MSN, MS, RD, CHSE, Director of Clinical Performance and Simulation. However, the extent the project leader was allowed to provide instruction was limited to assisting with simulation set-up, provision of pre-brief, provision of orientation to room and manikin, and when asked by the facilitator, provision of

feedback during debriefs. The project leader had not participated in ongoing continuing educational work with an experienced mentor since completion of the practicum in March of 2020.

The initial educational intervention along with the simulation drills were designed as formative evaluation assessments which occur while learning is taking place. Debriefing and feedback were utilized in order to assist participants to recognize knowledge/skill deficits and progress toward achieving objectives (Kirkpatrick & DeWitt, 2016). Although this project could be considered a summative assessment since it measured the degree to which timely and accurate adherence to a PPH protocol occurred during drills, the ultimate goal was quality improvement which occurs in a formative learning environment (INACSL, 2016c).

Measures and Instruments

PPH Knowledge Assessment

A 10-point multiple-choice knowledge assessment developed by the project leader had been utilized by the organization during the initial 2020 Obstetric Emergency Quality Improvement Project. Although this was an unvalidated instrument, it was selected for time series assessment in order to maintain consistency (see Appendix B). Participants were asked to complete the *PPH Knowledge Assessment* prior to participating in the *Educational Intervention*.

Uterine Atony Metrics - Modified

The California Maternal Quality Care Collaborative (CMQCC) Obstetric Hemorrhage Toolkit which is available free of cost includes a *Simulations and Drills Educational Tool #2 Uterine Atony Metrics* (Arafeh, 2015). The four Metrics that measure time elements were included in the modified Uterine Atony Metrics utilized for this project. Additionally, since the organization instituted a PPH cart with emergency supplies and medications in the second quarter of 2021, an additional time measured Metric was added: PPH Identified / paged to time PPH Cart arrived in room (see Appendix C). A trained observer documented start and completion times for each element.

Institution Specific PPH Protocol

The Institution Specific PPH Protocol was developed in 2018 modeled after the CMQCC *Obstetric Hemorrhage Emergency Management Plan: Table Chart Format* (Lyndon et al., 2015). The Institution Specific PPH Protocol was designed as a checklist so that a recorder could mark times when each intervention was implemented and report stage of PPH and next interventions to be instituted. This protocol also escalates urgency to prepare for transfer to higher level of care since the project site blood bank has limited supplies of packed red blood cells and fresh frozen plasma and must requisition

platelets from a supplier with one hour transport timeframe. The most recent revision of the Institution Specific PPH Protocol (February 2021) was utilized by a trained observer during each simulation. A check mark was placed by interventions that were met. A zero was placed by interventions that were not met (see Appendix D).

Simulation Effectiveness Tool – Modified (SET-M)

INACSL standards require learner evaluations of simulation-based experiences (INACSL, 2016b). The SET-M evaluates learners' impressions regarding perceived effectiveness of the simulation at meeting their learning needs in both face-to-face and virtual environments. Four subscales, including Prebriefing, Learning, Confidence, and Debriefing, elicit responses on a three-point agreement scale as *strongly agree* (3), *somewhat agree* (2), or *do not agree* (1). The developers of this tool report a Cronbach's alpha reliability analysis with an acceptable internal consistency for each subscale ($\alpha \geq 0.833$ on each) and a high overall reliability ($\alpha = .936$) (Leighton, Ravert et al., 2021). The tool is reported to be both valid and reliable for use in nursing education, medical education, and clinical settings (see Appendix E).

Facilitator Competency Rubric (FCR)

INACSL standards require an evaluation of the facilitator (INACSL, 2016b). The FCR was designed for evaluating various levels of competency of simulation facilitators. It can be completed by experienced simulation observers or by the facilitator him/herself as a self-evaluation. Five major concepts of simulation facilitation with four to eight items included in each concept are evaluated on a Likert-like scale as *Beginner* (1), *Advanced Beginner* (2), *Competent* (3), *Proficient* (4), or *Expert* (5). Each concept has a total score interpretation which identifies the facilitator's competency on a continuum from beginner to expert, thus informing educational needs or ability to mentor novice facilitators. Developers of this tool report an excellent context validity index greater than 0.80 on all items and acceptable interrater variance not exceeding 35% (Leighton, Mudra et al., 2021). One FCR was completed weekly by each intervention assistant and the project leader (see Appendix F).

PPH Supply Checklist

A PPH Carts, Kits, Trays Checklist, available with the CMQCC Obstetric Hemorrhage Toolkit version 2.0 was utilized to familiarize obstetric and non-obstetric participants with the location of PPH supplies and medications available at the project site. The organization had received a State Hospital Association FLEX Grant funding for a PPH cart with emergency supplies and medications which was instituted within two months prior to implementation of this project 2021. The FLEX Grant requires documentation of quality improvement associated with the device purchased. This was documented in part by the difference in time required to procure PPH emergency supplies and medications. The *PPH Supply Checklist* was

utilized for collection of pre- PPH Cart implementation timeliness information and was also utilized to evaluate similar data post- PPH Cart. Since this data is being referred to in this project, the PPH Supply Checklist is included (see Appendix G).

Timeline of Project Phases

The actual project simulation educational intervention took place from May 26 through June 23, 2021, with unannounced drills commencing on June 29, 2021. The sequence of project phases is illustrated in Figure 3.1. Refer to appendices H and I for recruitment tools.

Figure 3.1

Project Phases Timeline

Resources Personnel

The project leader extended invitations to several project site leaders who were involved in education and quality improvement in order to develop a team which could facilitate effective implementation of this quality improvement project (Table 3.2).

Table 3.2

Project Implementation Team

Team Member & Qualifications	Project Role
Bev Mayfield, BSN, RNC-OB,ONQS, *Investigator*	Project Leader: Educate Team members; Facilitator
Melissa Rose, MSN, RN, *OB Simulation Assistant*	Simulation Assistant: Assist with Set-up & Perform MD role as needed
Jen Allbee, MSN, RN, *QA/PI Manager*	Time Recorder: Uterine Atony Metrics-Modified
Gary Dean, RN, *Clinical Educator*	Adherence Recorder: Institution Specific PPH Protocol
Regan Ireland, RN, *Manager of Informatics*	Varied: Time or Adherence Recorder, as needed
Tessa Reinke, MD, *OB Department Director*	Project Advocate: Promote to Management & Physicians

Technology

Only technological equipment already owned by the project site was appropriated for this educational intervention project. A Noelle S550 maternal care patient simulator with PPH features was utilized for moderate fidelity simulation. Sigma Spectrum intravenous infusion pumps were utilized for administration of intravenous fluids and medication infusions. A Bakri Postpartum Balloon with rapid instillation components that is past shelf expiration date was actually used as the tamponade device. A Philips Avalon FM 30 was utilized for simulating vital sign assessments, but laminated vital sign cards were placed on the monitor screen to provide information cues.

Budget

Staff Compensation

Since the initial educational intervention as well as the PPH drills were all facilitated during staff regularly scheduled work hours, the project did not incur extra labor expenses. The project leader and simulation assistant necessarily scheduled some sessions during their off hours, yet this had already been included as a part of the obstetric department's education budget.

Simulation and Office Supplies

Since the project site had implemented PPH simulation in 2020, most supplies were adequately available. Office supplies included printing of assessments and data collection forms. Table 3.3 presents the budget.

Table 3.3

Project Budget

Supply	Cost
Simulated Blood: *red & yellow food coloring, corn syrup, chocolate syrup*	$ 50.00
Peri Pads and Chux	$ 35.00
Printing: *paper and ink*	$ 30.00
TOTAL	**$ 115.00**

Protection of Human Subjects

The project site Medical Staff and Institutional Review Board (IRB) gave project approval on February 18, 2021. Once IRB approval was received from Southern Adventist University and scheduling had been discussed with nursing management, all multidisciplinary staff who met inclusion were informed about the intent of the DNP project. All participants were guaranteed confidentiality during completion of the knowledge assessment questionnaires through the use of an identification number known only to the participant and the project leader. Organizationally archived knowledge

assessment data (collected by the same researcher in first quarter of 2020) were similarly coded with participant identification numbers in order to facilitate paired knowledge assessment evaluation. These identification numbers were also utilized when documenting participation in simulation interventions, timely retrieval of PPH supplies, and for subject completion of SET-M, and were for the sole purpose of categorizing discipline of participants. The knowledge assessment questionnaires, evaluation documents, and data collection instruments were kept in a locked drawer in the obstetric department office during working hours, then were transported by personal vehicle to the project leader's home office where data was entered and analyzed on a password protected laptop to preclude unauthorized access to data. Original paper documents were scanned and stored on the same laptop system, and papers were subsequently shredded. After data had been de-identified, reports necessary for project site quality improvement projects were transferred to the site's secure intranet system. As per Southern Adventist University's requirements, all data will be kept for seven years. Then, electronic data will be deleted.

Although participants were required by the project site to participate in the quality improvement project as a portion of their continuing education and emergency drill program, and organization had indicated that a verbal consent was adequate, participants were provided with a printed informed consent to communicate agreement or declination of participation in the DNP project data collection as required by Southern Adventist University IRB (see Appendix J).

Justification for Intervention

Feasibility

It has already been demonstrated through problem analysis and literature review that a need exists for timely and standard management of PPH. A feasibility analysis for project implementation was conducted and is illustrated in Figure 3.2.

Figure 3.2

Feasibility Analysis

Sustainability

If findings from this project suggest an association between simulation team training and timely, accurate adherence to PPH protocol, then it will be recommended that quarterly multidisciplinary PPH team training be scheduled. Additionally, unannounced PPH drills will be included in the organization's emergency drill schedule.

Statement of Mutual Agreement with Agency

A statement was provided by the study institution Quality Improvement manager of agreement for this project to be conducted at the organization (see Appendix K). The project was presented to the study institution Medical Staff team and received IRB approval on February 18, 2021 (see Appendix L).

Evaluation Plan

Outcome Evaluation

Two primary endpoint outcomes of interest included timeliness and accuracy of adherence to PPH protocol during monthly unannounced PPH drills following the educational simulation intervention. Data analysis focused on a one-group pre- and post- test comparison for difference.

Timeliness data, collected with the *Uterine Atony Metrics – Modified* tool at four-time periods (intervention plus unannounced drills at three intervals approximately four-weeks apart), constituted interval data and was analyzed using one-way ANOVA with post hoc testing using the Bonferroni Correction. Accuracy of adherence to protocol data, collected

with the *Institution Specific PPH Protocol* checklist at four-time periods, was also composed of interval data and was analyzed using a one-way repeated measures ANOVA.

Timeliness of collecting PPH supplies and medications pre- and post- implementation of a PPH Cart comprised interval data which was analyzed with a Paired Samples t-test.

Other Metrics

Several other metrics were also evaluated and analyzed. Since the organization had implemented an initial 2020 Obstetric Emergency Quality Improvement Project that included a PPH basic knowledge assessment, baseline PPH knowledge was re-assessed prior to implementation of the educational simulation. Data was analyzed for any differences since the intervention 18 months prior using a Paired Samples t-test.

In adherence to INACSL standards, simulation efficacy, quality, and facilitator competence was evaluated and analyzed. Simulation efficacy for meeting learner's needs, assessed with the SET-M instrument, yielded ordinal data that was statistically analyzed using the Kruskal Wallis H test. The Mann Whitney U was utilized for post hoc testing. . Quality of the simulation and competence of the facilitator, assessed by the FCR instrument, also yielded ordinal data, and was analyzed with the Kruskal Wallis H test.

Scientific Merit

This project was designed to implement the three of the four evidence-based practice PPH Management themes which were identified by the National Partnership for Maternal Safety including Readiness (Recognition and Prevention, and Response). It also addresses a gap in literature regarding sustainability of PPH management skills following a simulation educational intervention in a low-volume obstetric setting in the United States.

Conclusion

Ultimately, will this simulation educational intervention promote timely and accurate adherence to PPH protocol in actual PPH cases, and will this result in reduction in maternal morbidity and mortality? Since PPH is a low-frequency event, it may take years to find out. Ongoing organizational audits of maternal records, and debriefs with root cause analysis of all PPH Stage 3 or greater was encouraged. If PPH rates and severity decrease following the intervention, the improvement in maternal health may be associated with the educational intervention.

Chapter 4: Results

Data Analysis

IBM SPSS Statistics (Version 28) was used by a statistician to analyze data provided by the researcher. Missing information in the Simulation Effectiveness Tool-Modified (SET-M) data was discussed between the statistician and the researcher since 13 of 53 participants had not rated at least one item on the evaluation tool. Multidisciplinary participants had indicated to the researcher that they chose not to answer some questions they believed did not apply to their discipline. It was mutually determined that rather than excluding the 13 respondents' evaluations, the sample mean would be entered for each of the missing data. Excel (Version 2017) was utilized by the researcher for data analysis of specific timeliness measures and for distinct facilitator competency concepts.

Description of Subject Sample

The sample for this project was 65 participants. 55 (84.6%) participants identified as female and 10 (15.4%) identified as male (Table 4.1). The age of most participants was reported as being 30-39 years old (*n* = 26, 40.0%) followed by 40-49 (*n* = 14, 21.5%), 50-59 (*n* = 10, 15.4%), 60-70 (*n* = 7, 10.8%), 20-29 (*n* = 6, 9.2%), and 18-19 (*n* = 2, 3.1%). All participants reported being Non-Hispanic White ethnicity/race (*n* = 65, 100.0%). Multiple disciplines were represented with many participants reported being Acute Care Registered Nurse (*n* = 18, 27.7%) followed by Laboratory personnel (*n* = 13, 20.0%), Emergency Room Registered Nurse (*n* = 12, 18.5%), Acute Care Nursing Assistant-Certified (*n* = 8, 12.3%), Emergency Room Technician (*n* = 5, 7.7%), Obstetric Registered Nurse (*n* = 5, 7.7%), Emergency Room Physician (*n* = 2, 3.1%), Certified Registered Nurse Anesthetist (*n* = 1, 1.5%) and Quality Assurance RN (*n* = 1, 1.5%). Surgical Registered Nurses did not participate due to scheduling conflict so are not included in the demographics.

Table 4.1

Demographics

Question	N	% Total Participants	% Possible
Gender			
Female	55	84.6%	93.2%
Male	10	15.4%	55.6 %
Age in Years			
18-19	2	3.1%	100.0%
20-29	6	9.2%	100.0%
30-39	26	40.0%	78.8%
40-49	14	21.5%	77.8%
50-59	10	15.4%	90.9%
60-70	7	10.8%	100.0%
Ethnicity/Race			
White	65	100.0%	100.0%
Discipline			
AC RN	18	27.7%	94.4%
AC NAC	8	12.3%	100.0%
ER RN	12	18.5%	100.0%
ER Tech	5	7.7%	100.0%
OB RN	5	7.7%	100.0%
OR CRNA	1	1.5%	50.0%
Lab Personnel	13	20.0%	100.0%
QA RN	1	1.5%	100.0%
MD	2	3.1%	16.7%

Description of Key Terms and Variables

The independent variable in this project is a multidisciplinary simulated postpartum hemorrhage (PPH) educational intervention. Several independent variables are included in the project, some of which are related to the research question, some were required by International Nursing Association for Clinical Simulation and Learning (INACSL), and some help to better understand the setting and participants (Table 4.2).

Table 4.2

Key Variables

Independent Variable	Dependent Variable
Multidisciplinary Simulated PPH Educational Intervention	<u>Related to Research Question</u> • Time to obtain PPH cart after diagnosis of excessive bleeding • Time to administer second uterotonic following obtaining of PPH cart • Amount of time uterine massage was stopped unless directed by a physician • Time to insert and inflate balloon tamponade from time of request to completion; accuracy of adherence to PPH protocol • Percent accuracy of adherence to PPH protocol <u>Required by INACSL</u> • Learners' reported perceived effectiveness of the intervention for meeting personal learning needs • Facilitator competence as reported by project team
*Independent Study PPH Module *(completed by multidisciplinary RN's, 18-months prior to project implementation)*	Percent correct on 10-question knowledge assessment
*PPH Cart Implementation for supplies and medications	Time to procure PPH emergency supplies and medications

*Variables Unrelated to Research Question: Inform about Research Setting and Participants

Analysis of Project Questions

Does a multidisciplinary simulated PPH educational intervention promote timely and accurate adherence to an evidence-based practice postpartum hemorrhage protocol during unannounced monthly PPH simulation drills in a low-volume obstetric setting? This one research question is expanded into several research questions to be answered by the various independent variables utilized in the project.

Timeliness

Timeliness data was collected with the *Uterine Atony Metrics – Modified* tool at four-time periods (baseline intervention, then subsequently at unannounced drills conducted at three intervals approximately four-weeks apart).

PPH Cart

Does a multidisciplinary simulated PPH educational intervention promote timely obtaining of PPH cart following diagnosis of excessive postpartum bleeding? The time required to obtain the PPH Cart ranged from a mean of 56.18 seconds during the intervention to 42.25 seconds during the third unannounced drill (Figure 4.1). This revealed a 13.93 second improvement. A one-way ANOVA was used to analyze the four means of this timeliness data to see if the intervention had a statistically significant impact. It was found that there was no statistically significant difference in the means of timeliness in seconds at any of the four times the data was gathered, $F(3, 25) = 0.308$, $p = .820$ (Table 4.3). The null hypothesis is accepted. However, a confounding variable may contribute to the lack of difference in the means of timeliness. The implementation of this PPH cart on the obstetric unit one month prior to the intervention facilitated rapid procurement of all the supplies regardless of whether or not the project intervention had been conducted. The timeliness of all means was well below the target maximum of 120 seconds, revealing that the procurement of supplies was consistently done in a timely manner.

Figure 4.1

Means Plot for Timeliness of Obtaining PPH Cart

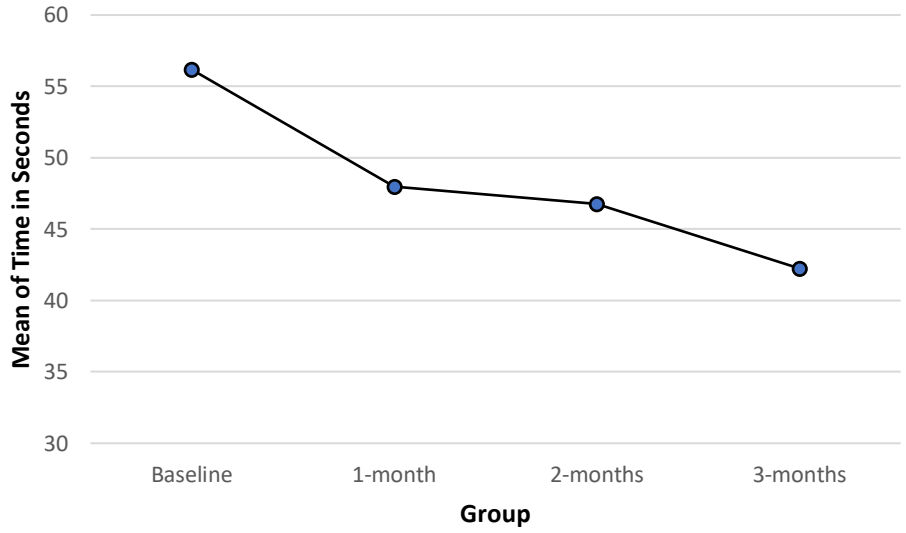


Table 4.3

Time to Obtain PPH Cart with Medications and Supplies

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Baseline	17	955	56.17647	1127.154
1-month	4	192	48	793.3333
2-months	4	187	46.75	576.25
3-months	4	169	42.25	294.9167

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	850.1673	3	283.3891	0.307657	0.819604	2.991241
Within Groups	23027.97	25	921.1188			
Total	23878.14	28				

Second Uterotonic

Does a multidisciplinary simulated PPH educational intervention promote timely administration of a second uterotonic after procurement of PPH Cart? (Goal ≤ 60 seconds). The mean time to administration of a second uterotonic ranged from a mean of 105.82 seconds during the intervention to a maximum mean of 172.75 seconds during the first unannounced drill. Subsequently, the mean time decreased, reaching 138.75 seconds during the third unannounced drill (Figure 4.2). This revealed a maximum increase in time of 66.93 seconds, and a final increase from baseline of 32.93 seconds (a decrease of 34.0 seconds from the highest mean time). A one-way ANOVA was used to analyze the four means of this timeliness data to see if the intervention had a statistically significant impact. It was found that there was a statistically significant difference in the means of timeliness in seconds at one or more of the four times the data was gathered, F (3, 25) = 0.306, p = .047 (Table 4.4). Post Hoc testing using the Bonferroni Correction found that the baseline mean of 105.8 seconds (SD = 46.934) was not significantly lower (p < .008) than the mean of 1-month (M = 172.8, SD =

50.710), 2-months (*M* = 161.0, *SD* = 22.405), or 3 months (*M* = 138.8, *SD* = 66.2). Additionally, there were no significant differences found between the means of 1-month, 2-months, and 3-months. The timely goal of less than or equal to 60 seconds was not achieved and there was no statistically significant difference between the means.

Figure 4.2

Means Plot for PPH Cart Arrival to Second Uterotonic Timeliness

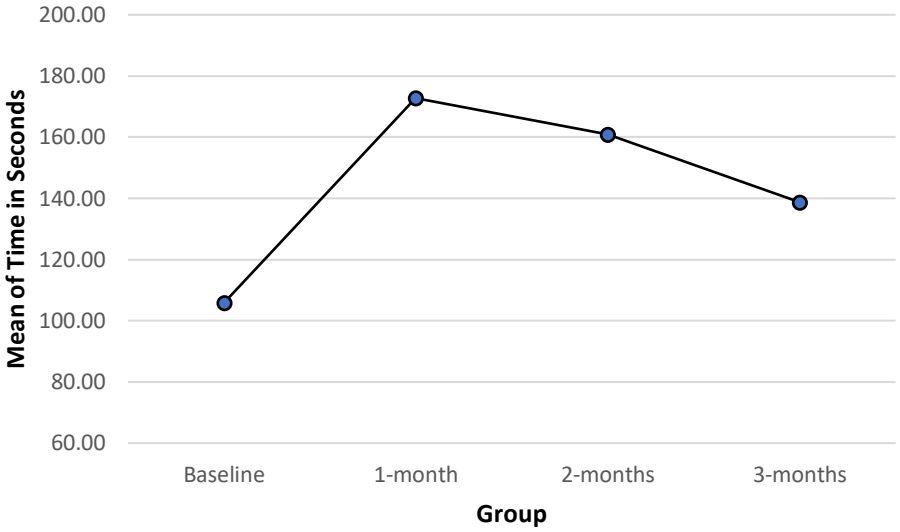


Table 4.4

Time PPH Cart Arrived to Second Uterotonic

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Baseline	17	1799	105.8235	2202.779
1-month	4	691	172.75	2571.583
2-months	4	644	161	502
3-months	4	555	138.75	4376.917

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	21170.79	3	7056.929	3.063118	0.046513	2.991241
Within Groups	57595.97	25	2303.839			

Since an overall goal for timeliness of second uterotonic administration from diagnosis of PPH was within 180 seconds, a second data analysis was conducted to see if there was a statistically significant difference in the means of timeliness in seconds at one or more of the four times the data was gathered for this composite metric. It was found that there was no statistically significant difference in the means of timeliness in seconds at any of the four times the data was gathered, F (3, 25) = 1.68, p = .196 (Table 4.5). However, it was noted that after the initial increase in the statistical mean time in seconds from baseline (M = 162) to 1-month (M = 220.75) , the mean time in seconds decreased at both 2-months (M = 207.75) and 3-months(M = 181) (Figure 4.3). Thus, although no statistical significance was found and the null hypothesis is accepted, clinical significance may actually be present with the final measurement approximating the goal of 180 seconds.

Table 4.5

Time of PPH Diagnosis to Second Uterotonic

SUMMARY

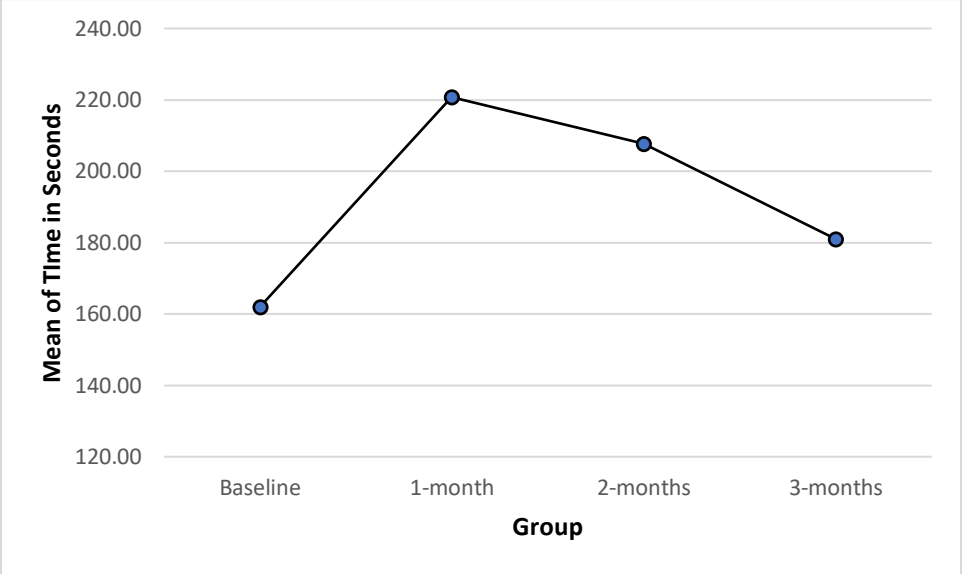
Groups	*Count*	*Sum*	*Average*	*Variance*
Baseline	17	2754	162	2705.75
1-month	4	883	220.75	5180.25
2-month	4	831	207.75	1804.917
3-month	4	724	181	3680.667

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	15207.47	3	5069.155	1.683221	0.196083	2.991241
Within Groups	75289.5	25	3011.58			
Total	90496.97	28				

Figure 4.3

Means Plot for PPH Diagnosis to Second Uterotonic Timeliness



Uterine Massage Stopped

This dependent variable was unable to be assessed because of the loss of originally trained time-metrics recorders at the conclusion of the baseline time period (due to resignation from employment at the facility). The subsequently trained timekeepers did not have a nursing background so were unable to understand how to assess interruptions in fundal massage.

Tamponade Device

Does a multidisciplinary simulated PPH educational intervention promote timely insertion and inflation of a balloon tamponade device from time of request to completion (Goal: ≤360 seconds)? Time for complete insertion and inflation of balloon tamponade device ranged from a mean of 245.24 seconds during the intervention, to 271.75 seconds (Figure 4.4) during the final unannounced drill. A one-way ANOVA was used to analyze the four means of this timeliness data to see if the intervention had a statistically significant impact. It was found that there was no statistically significant difference in the means of timeliness in seconds at any of the four times the data was gathered, F (3, 25) = 1.93, p = .150 (Table 4.6). However, the means at 1-month, 2-months, and 3-months all remained less than the 360 seconds target, so the null hypothesis is rejected.

Figure 4.4

Means Plot for Timeliness of Balloon Tamponade

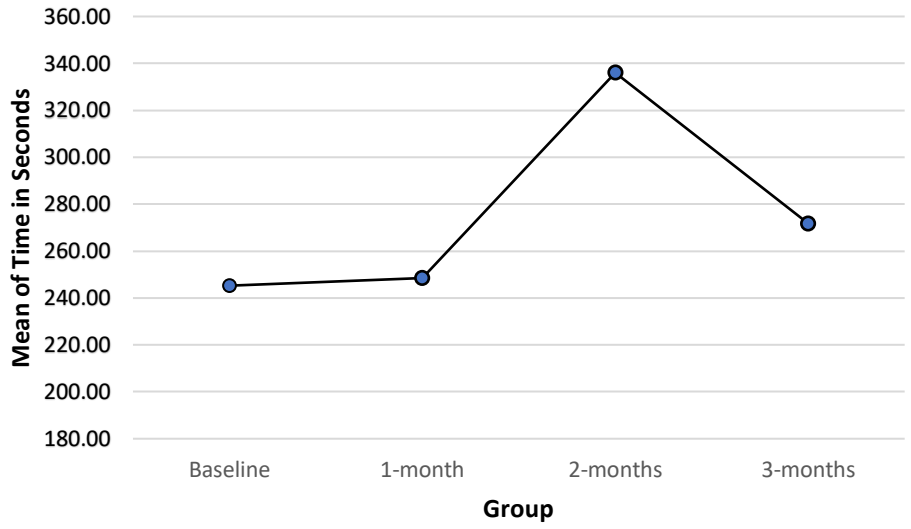


Table 4.6

Time to Insert and Inflate Balloon Tamponade from Time Order Given

SUMMARY

Groups	*Count*	*Sum*	*Average*	*Variance*
Baseline	17	4169	245.2353	5437.066
1-month	4	994	248.5	7176.333
2-months	4	1344	336	286
3-months	4	1087	271.75	3496.25

ANOVA

Source of Variation	*SS*	*df*	*MS*	*F*	*P-value*	*F crit*
Between Groups	27790.64	3	9263.546	1.932018	0.150228	2.991241
Within Groups	119868.8	25	4794.752			
Total	147659.4	28				

Accuracy

Does a multidisciplinary simulated PPH educational intervention promote accuracy in adherence to a PPH protocol? (Goal: ≥80%). Accuracy of adherence to protocol data was collected with the *Institutional PPH Protocol* checklist at four-time periods (baseline, followed by unannounced drills at three intervals approximately four-weeks apart). A one-way ANOVA was used to analyze the four means of this accuracy data (percentage correct) to see if the intervention had a statistically significant impact (Table 4.7). It was found that there was a statistically significant difference in the means of percentage correct for accuracy at $F(3, 92) = 18.422$, $p < .001$ (Table 4.8). Post Hoc testing using the Bonferroni Correction found that the baseline mean of 83.82 ($SD = 17.367$) was significantly lower ($p < .001$) than the mean of 1-month ($M = 100.0$, $SD = .000$), 2-months ($M = 98.95$, $SD = 5.103$), and 3 months ($M = 100.0$, $SD = .000$). There were no significant differences found between the means of 1-month, 2-months, and 3-months (Figure 5). The results indicate that the intervention did have a statistically significant impact in raising the percentage correct in accuracy for the means of 1-month, 2-months, and 3-months from baseline. The null hypothesis is rejected.

Table 4.7

Percentage Correct for Accuracy

				95% Confidence Interval for Mean		Min	Max
	N	*M*	*SD*	Lower Bound	Upper Bound		
Baseline	24	83.82	17.367	76.48	91.15	47.06	100.00
1-month	24	100.000	.000	100.00	100.00	100.00	100.00
2-months	24	98.95	5.103	96.80	101.11	75.00	100.00
3-months	24	100.00	.000	100.00	100.00	100.00	100.00
Total	96	95.69	11.269	93.41	97.97	47.06	100.00

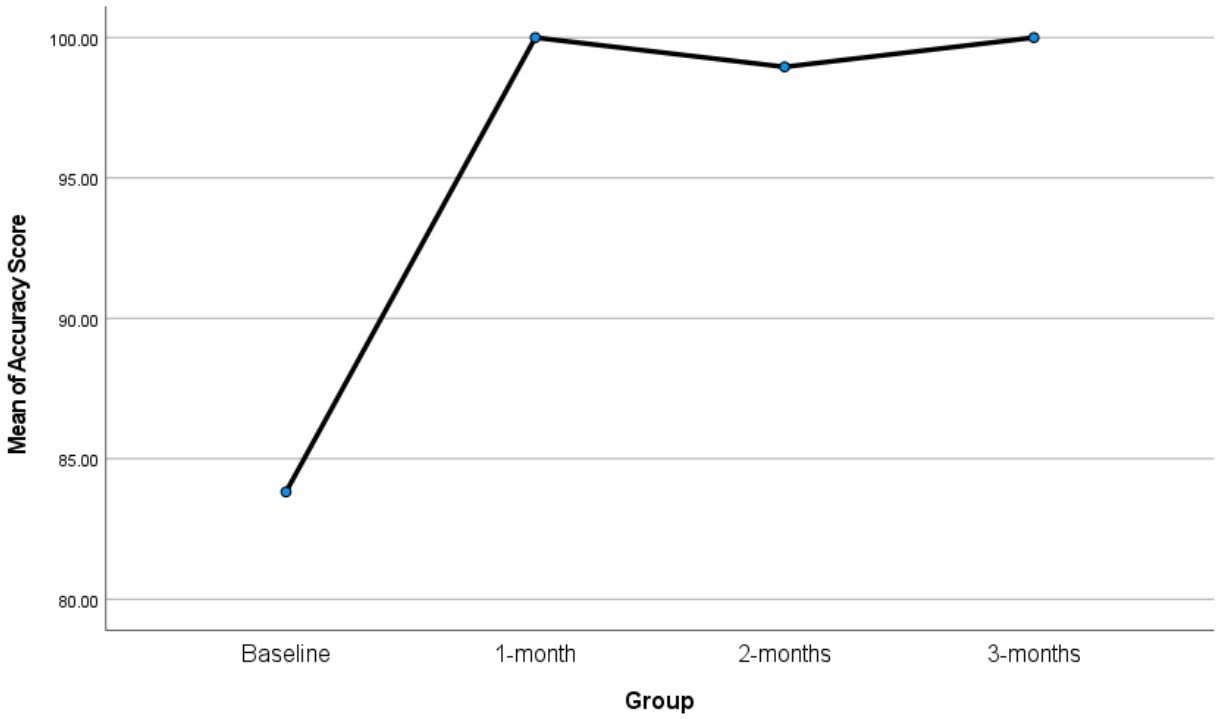
Table 4.8

One-Way ANOVA for Accuracy

	Sum of Squares	*df*	Mean Square	*F*	*p*
Between Groups	4527.533	3	1509.178	18.422	.000
Within Groups	7536.675	92	81.920		

Figure 4.5

Means Plot for Accuracy



Note. This means plot illustrates the four means for percentage correct in accuracy.

Additional Statistical Analyses

Effectiveness of Intervention

Participants' perceived effectiveness of the intervention was evaluated utilizing the *Simulation Effectiveness Tool-Modified (SET-M)* which was administered to eight disciplines. Learning and confidence was reported on a 3-point Likert Scale. The higher the score, the more confident the participants were with PPH management knowledge and skills. A Kruskal Wallis H test was used to see if there were significant differences among the grouped median scores (Table 4.9). The Kruskal Wallis H test showed that there was a statistically significant difference in confidence levels given the seven disciplines, $X^2(6) = 29.820$, $p < .001$ (Table 4.10). Further, post hoc testing, using the Mann Whitney U, found a significant difference with group 4, ER Technicians, (grouped median = 2.75, $p < .001$) being significantly lower than all the other six groups. Groups 1-3 and 5-7 were not statistically different from each other. Thus, confidence level was found to be high and impacted by the intervention in six of the administration groups (Figure 6).

Table 4.9

Case Summaries for SET-M

Group	N	Grouped Median
1 AC RN	19	2.9474
2 AC NAC	19	2.9444
3 ER RN	19	3.0000
4 ER Tech	19	2.7500
5 OB RN	19	3.0000
6 CRNA	19	3.0000
7 Lab	19	3.0000
Total	133	2.9603

Table 4.10

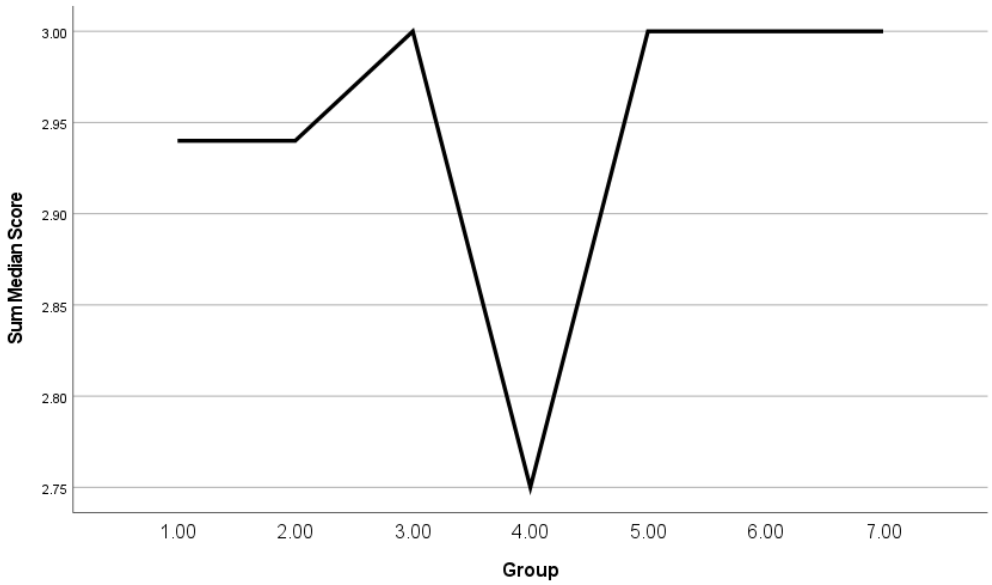
Test Statistics[a,b] for the SET-M

Statistic	Score
Chi-Square	29.820
df	6
p	.000

Note. a. Kruskal Wallis Test; b. Grouping Variable: Group

Figure 4.6

Median Plots for SET-M



Note. Line graph illustrating the grouped median plots for SET-M.

Facilitator Competency

The Facilitator Competency Rubric (FCR) was administered at four-time periods (baseline-following each of the 3 weeks of intervention, then at three intervals approximately 4-weeks apart following subsequent unannounced drills). A Kruskal Wallis H was used to see if there were significant differences among the grouped median scores (Table 4.11). The Kruskal Wallis H test showed that there was not a statistically significant difference in facilitator competence levels given the six administrations, $X^2(3) = 6.739$, $p = .081$ (Table 4.12). The groups were not statistically different from each other. So, facilitator competence level was not impacted by the intervention in the 4 administration groups (Figure 7). However, according to the *Facilitator Competency Rubric* scoring guide, these small changes would be interpreted as improvement from a "Competent" to a "Proficient" facilitator which may have clinical significance (Figure 8).

Table 4.11

Case Summaries for FCR

Group	N	Grouped Median
Baseline	29	3.8696
1 month 1 week	29	4.1667
1 month 3 weeks	29	4.1111
1 month 5 weeks	29	4.1154
Total	116	4.0592

Table 4.12

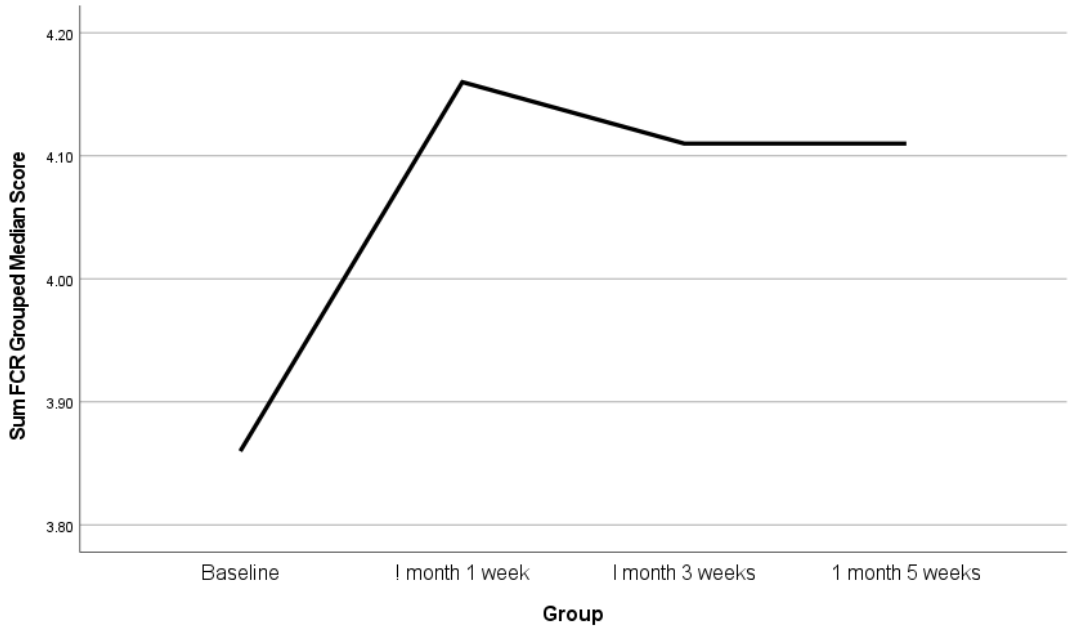
Test Statistics[a,b] for the FCR

Statistic	Score
Chi-Square	6.739
df	3
p	.081

Note. a. Kruskal Wallis Test; b. Grouping Variable: Group

Figure4. 7

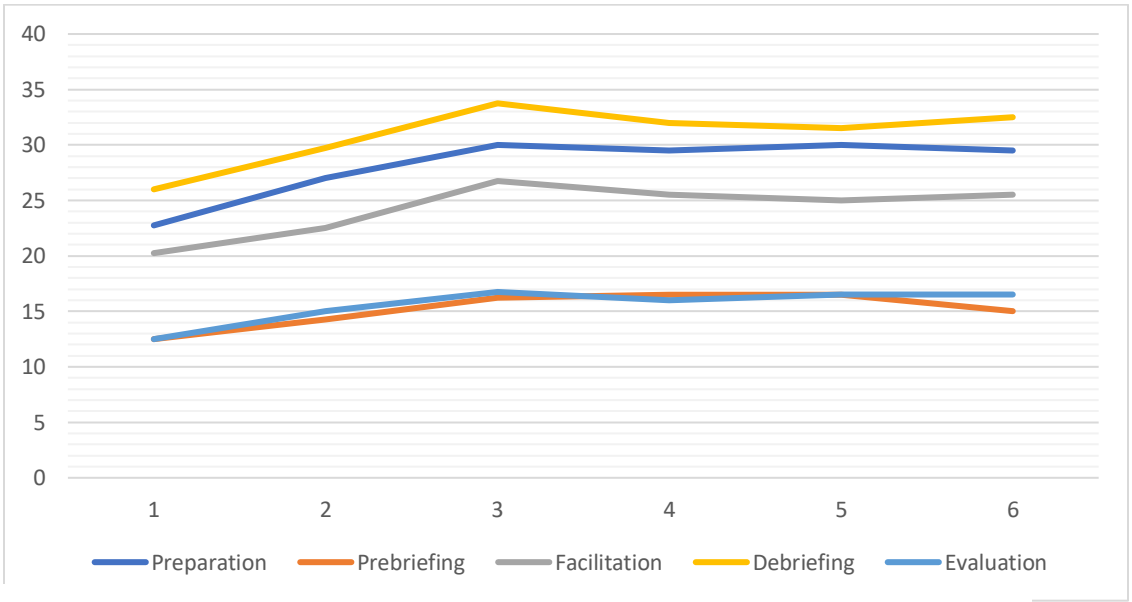
Median Plots for FCR



Note. Line graph illustrating the grouped median plots for FCR

Figure 8

FCR: Evolution of 5 Specific Concepts



Beginner/Adv. Beginner	0-14	0-8	0-12	0-16	0-8
Competent	15-27	9-15	13-23	17-31	9-15
Proficient to Expert	28-35	16-20	24-30	32-40	16-20

Participant Knowledge

Registered nurse (all disciplines) basic PPH knowledge data was collected 18-months prior to project baseline and again immediately prior to the project intervention. A Paired Samples t-test was used to analyze data. There was a statistically significant mean difference of 9.630 between the baseline mean of 63.70 (*SD* = 27.727) and the 18-month mean of 73.33 (*SD* = 21.122) at *t* (26) = -2.401, *p* = .024 (Tables 4.13 and 4.14). This suggests that the *PPH Independent Study Module* which had been completed immediately following the initial *PPH Knowledge Assessment* had a statistically significant impact in raising the post-intervention mean of basic PPH knowledge (Figure 9). This finding informs the baseline PPH knowledge of the multidisciplinary nurses who were participants in this DNP project intervention.

Table 4.13

Paired Samples Statistics for Basic PPH Knowledge

	M	*N*	*SD*
Baseline	63.70	27	22.727
Post-Intervention	73.33	27	21.122

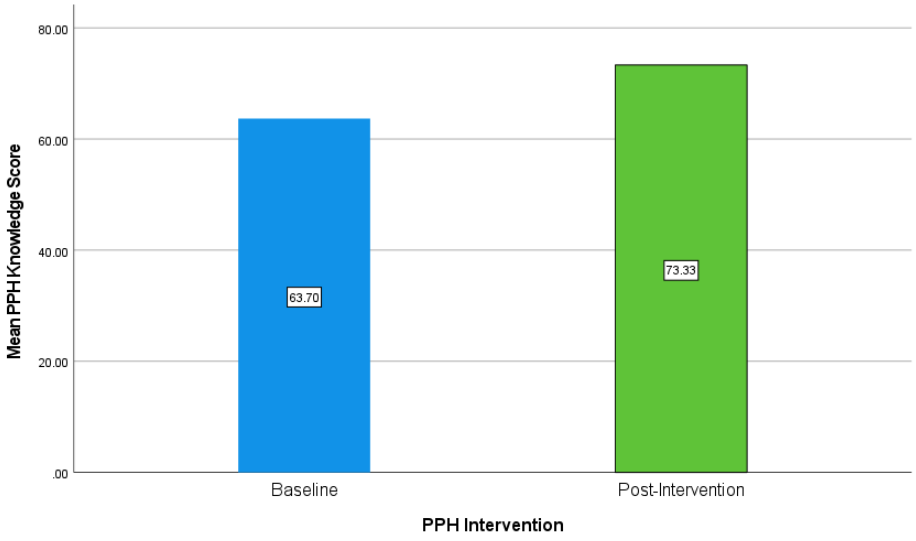
Table 4.14

Paired Samples T-Test for Basic PPH Knowledge

			95% Confidence Interval of the Difference				
	M	*SD*	Lower	Upper	*t*	*df*	*p*
PPH Knowledge	-9.630	20.844	-17.875	-1.384	-2.401	26	.024

Figure 4.9

PPH Basic Knowledge Means



Note. Bar graph illustrating PPH basic knowledge means at baseline and post-intervention.

Procurement of PPH Supplies and Medications

Timeliness (in seconds) of collecting PPH supplies and medications pre- and post- implementation of a PPH Cart was collected utilizing the *PPH Supply Checklist*. A paired samples t-test was performed. A statistically significant mean difference of 170.81 seconds existed between the pre-intervention mean of 369.55 (*SD* = 126.525) seconds and the post-intervention mean of 198.73 (*SD* = 99.998) seconds at t (10) = 3.563, p = .005 (Tables 4.15 and 4.16). These findings suggest that the implementation of a PPH Cart had a statistically significant impact in lowering the mean in seconds for procurement of PPH supplies and medications (Figure 4.10). Clinically, the implementation of a PPH Cart was probably more significant in reducing the timeliness of procuring supplies than the project intervention.

Table 4.15

Paired Samples Statistics for Procurement of PPH Supplies Timeliness in Seconds

	M	*N*	*SD*
Pre-Intervention	369.55	11	126.525
Post-Intervention	198.73	11	29.849

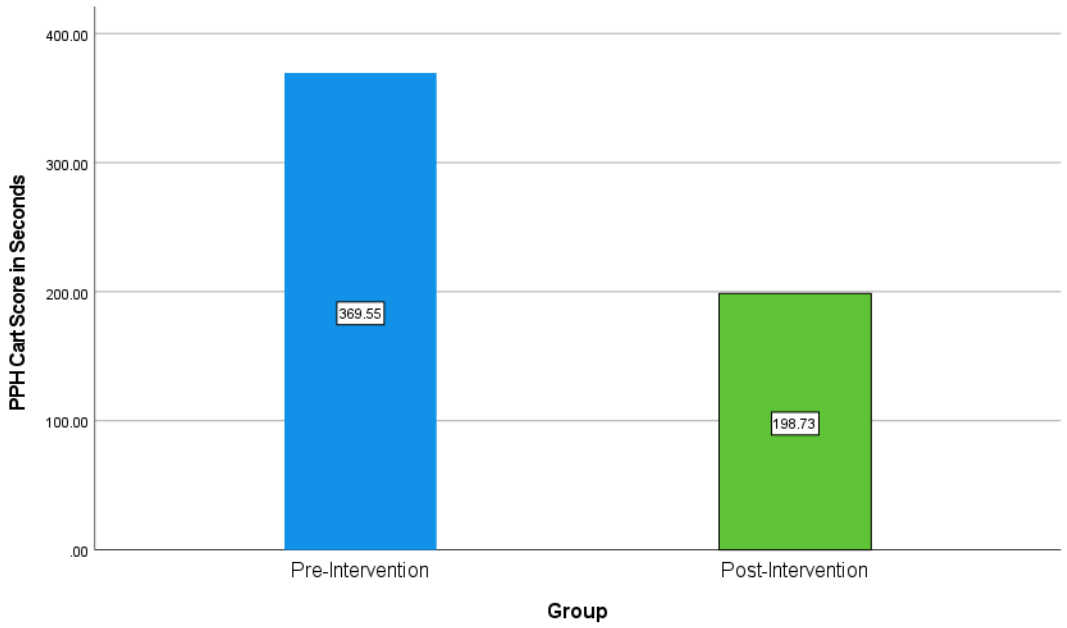
Table 4.16

Paired Samples T-Test for Procurement of PPH Supplies Timeliness

	M	*SD*	95% Confidence Interval of the Difference Lower	Upper	*t*	*df*	*p*
PPH Cart	170.81	158.99	64.00	277.63	3.563	10	.005

Figure 4.10

Procurement of PPH Supplies Means in Seconds



Note. Bar graph illustrating the mean in seconds for obtaining supplies in both pre- and post- PPH Cart intervention.

Unintended Consequences

Positive

This project resulted in some positive consequences that had not been specifically expected. The collaboration of multidisciplinary teams during the intervention period resulted in additions of specific supplies to the PPH Cart, addition of labels to drawer fronts, and the purchase of a baby scale dedicated to the PPH Cart for weighing of blood-soaked materials. Teamwork skills were strengthened as staff identified roles they could assume that were within their scope of practice but outside their normal discipline.

Negative

A negative unintended consequence was the negative response of some staff members. It was verbalized that since they had been through the simulation educational intervention, they should not have to participate in the unannounced drills. This caused some friction between departments when some did not respond to the drills. Another unexpected finding was that following a drill, the refrigerator drawer on the PPH Cart took an hour or more to have its temperature stabilize. Actual medications could not be returned to the drawer until the temperature excursion was resolved. Although this was a negative finding, it will help to inform need for astute monitoring of drawer temperature following actual PPH events.

Chapter 5: Discussion

Relationship of Outcomes to Research

The purpose of this project was to evaluate the effectiveness of a multidisciplinary moderate fidelity simulated postpartum hemorrhage (PPH) educational intervention on accurate and timely adherence to a standard PPH protocol during simulated PPH events. It was found that the intervention effectively promoted accurate adherence to a standard PPH protocol and increased adherence accuracy from a mean of 83.8% to 100%. Timely procurement of PPH supplies and medications was maintained below the goal of 120 seconds, but it was uncertain if this was due to the project intervention or the recent implementation by the institution of a PPH Cart. Timely administration of a second uterotonic and timely insertion of a tamponade device were also not clearly associated with the project intervention.

Six of seven multidisciplinary groups indicated that the intervention had highly impacted their confidence and knowledge of how to manage PPH, while the seventh group indicated a moderate impact. Additionally, facilitator competence increased from "Competent" to "Proficient" in four of five concept areas.

Research Findings Compared with Previous Research

Specific research questions will be discussed as to how the findings either supported or refuted previous research findings.

PPH Cart. Does a multidisciplinary simulated PPH educational intervention promote timely obtaining of PPH cart following diagnosis of excessive postpartum bleeding? One scholarly article was found to report timeliness of procuring PPH supplies and medications pre- and post- implementation of a PPH Cart. Kogutt et al. (2020) reported a reduction in response time by 77% (from 11 minutes 3 seconds to 2 minutes 14 seconds) following the intervention. This project intervention was not found to have a statistically significant impact on the difference in the means of timeliness for procurement of the PPH Cart containing supplies and medications. The mean time to obtain the cart was consistently less than one minute. However, a likely reason why the intervention did not significantly reduce the time to procure supplies was because of the institution's implementation of a PPH Cart one month prior to this project intervention. It was found that there was a 46% reduction in mean response time (from 6 minutes 10 seconds to 3 minutes 19 seconds) following the implementation of a PPH Cart. Every minute in reduced time is clinically equal to approximately 600 mL potential blood loss since that is the minute perfusion of the uterus at term (CMQCC, 2015).

Second Uterotonic. Does a multidisciplinary simulated PPH educational intervention promote timely administration of a second uterotonic? Only one recent scholarly article was found that reported timely administration of a second uterotonic following a simulated PPH educational intervention. Marshall et al. (2015) reported that 9-12 months after the initial simulation intervention, a reduction existed in time from diagnosis of PPH to administration of second uterotonic by 69.0 ± 71.9 seconds (147.0 ± 48.2 seconds total elapsed time). This current project intervention revealed an unexpected result when it was found to be associated with a relative increase followed by progressive reduction in time to administration of second uterotonic, with the final time period reaching 181 ± 60.7 seconds. There are several possible reasons for the unexpected findings. It should be noted that the baseline mean was derived from 17 separate simulation interventions which included 57 participants, while the three post-intervention monthly drills consisted of only four separate interventions each, including a maximum of 23 participants per time period. Fewer separate events could have contributed to less accurate results. It is also possible that given more time (such as the 9-12 months reported by Marshall et al.) and opportunities for application in clinical practice, the mean time might vary from that which was reported with this intervention. Noteworthy is the fact that an obstetric nurse was never assigned the task of medication administration during any of the events throughout any of the time periods. Teams appeared to make assignments in the simulation learning environment based on each participant's greatest learning needs rather than greatest expertise. In this institution with limited staff resources, an obstetric labor and delivery nurse would always be present during at least the first two hours of recovery following delivery, and would administer emergency medications during an early PPH. However, if a PPH did not begin until after that time period, the labor and delivery nurse may be caring for a laboring patient, and an acute care postpartum nurse might be assigned the responsibility of administering PPH emergency medications. Perhaps timeliness of administration of second uterotonic would have been improved if an obstetrically trained nurse had been responsible for medication administration. Nonetheless, the project findings indicate a second uterotonic was administered less than four minutes after diagnosis of excessive bleeding during a time period when other interventions were also being implemented. Although the project goal was stated as "within 180 seconds," based on historical timeliness obtained from an institutional grant report, the researcher was unable to locate scholarly documentation of an evidence-based targeted time frame in which to administer the second uterotonic.

Tamponade Device. Does a multidisciplinary simulated PPH educational intervention promote timely insertion and inflation of a balloon tamponade device from time of request to completion (Goal: ≤360 seconds)? An intrauterine

balloon tamponade device can typically be inserted in five to eight minutes (McNulty & Main, 2015). Throughout the time periods of this research project, the mean time to insertion of the uterine tamponade device was consistently less than the project target of six minutes. Since no statistical differences were found between the intervention and any of the subsequent time periods, it is not possible to discern whether or not the intervention promoted timely insertion. However, it is evident that the intervention did not promote prolongation of the time to insert the device.

Accuracy. Does a multidisciplinary simulated PPH educational intervention promote accuracy in adherence to a PPH protocol? No research was found reporting a relationship between PPH simulation intervention and accuracy of adherence to PPH protocol. Morton et al. (2019) reported an increase in algorithm adherence from 83.6% to 95.5% following a cardiopulmonary resuscitation simulation intervention. Koers et al. (2020) reported an increased adherence to critical management steps in treatment of deteriorating surgical patients from 67% to 90% following a simulation intervention. Findings from this project intervention demonstrated a mean improvement in accuracy adherence from 83.8% to 100% which aligns with results reported in non-obstetric related research. The author suspects that protocol familiarity and use promoted increased accuracy of adherence.

Additional Findings. The self-reported high confidence and knowledge for managing PPH supports the findings of a plethora of research studies that utilized self-report for efficacy of a PPH educational intervention which unanimously reported improvement of self-efficacy and confidence, knowledge, and perceived teamwork skills.

Project Results within Context of Nursing Knowledge

This project demonstrated that a multidisciplinary PPH simulation educational intervention can successfully be implemented in a rural low-volume obstetric setting. Additionally, it demonstrated sustained timely management of PPH throughout the research time period and improved accuracy of adherence to a standardized PPH protocol. The results suggest that periodic multidisciplinary PPH simulation drills may be beneficial in the rural setting for promoting timely and accurate management of PPH.

Observations

Noteworthy

It was noteworthy that multidisciplinary staff members who participated in the intervention readily collaborated during the debrief sessions, attempting to develop time-saving steps, tip-cards, and other resources that could help improve team management of PPH. Participants expressed gratitude for the opportunity to participate in the training

experience. It was also interesting to note the lack of voluntary physician participation. Only two emergency department physicians out of the entire staff of providers participated, each attending two of the unannounced drills. All obstetric providers (five family practice physicians) and emergency department physicians had been provided with a schedule of PPH training and were invited to voluntarily participate, yet the only physician participation occurred during unannounced drills when the emergency physicians were not busy with actual patient within their department. This emergency physician response was appropriate based on institutional guidelines for emergency drills. Perhaps the obstetric providers did not deem the multidisciplinary training to be beneficial since they had participated in a collaboratively scheduled "OB Emergencies Simulation for Physicians" training session conducted by the researcher only eight months previous. Additionally, the scheduled training may have been inconvenient due to their clinical obligations or personal time off.

Expanded Understanding of Topic

Throughout this study, the project leader learned the importance of PPH preparation and teamwork as well as gained an understanding of multidisciplinary roles. An integral part of PPH management is ready access to needed supplies and medications. Since the institution's PPH Cart had been implemented only one month prior to this project, the project implementation sessions became an opportunity to evaluate the organization of supplies within the cart. Many items were packaged together into kits with labels and instructions in order to facilitate use by team members whose expertise is not obstetrics. Thus, although the project focused on timeliness and accuracy of PPH management, an essential common denominator for effective PPH management was found to be effective teamwork and communication, neither of which was evaluated by either quantitative or qualitative methods.

Study Instruments

The *Institutional PPH Protocol* was easy to use for assessing accuracy of adherence to PPH protocol. However, the *Uterine Atony Metrics-Modified* tool was not user friendly for data collection. The original *Uterine Atony Metrics-Modified* data collection tool designed for this project had been only slightly modified from the California Maternal Quality Care Collaborative *Uterine Atony Metrics* tool (2015). Assistance was received from the simulation *Standardized OB RN* who analyzed and revised the form to make it easier to use for collection of the required time metrics. Metric items were re-arranged into a linear order that should be occurring in the simulation. Also, if initiation time for multiple metrics was identical, "time started" was listed only once. Finally, specific words such as "methergine" and "Bakri" replaced "second uterotonic" and "tamponade device" so that the recorder would be cued to interventions. The *Simulation Effectiveness*

Tool-Modified (SET-M) had been validated as a tool to be used for nursing participants' perception of effectiveness of simulation in meeting personal learning and confidence needs. In this project, the SET-M was completed quite easily by all multidisciplinary staff including non-nurses. However, up to 12 out of 19 evaluation points were deemed not applicable by a portion of the non-nursing participants (such as a better understanding of medications and teaching patients about their illnesses). Although item averages were substituted for missing data, the findings may not be as accurate as had been anticipated. The researcher had not anticipated that this tool would inaccurately assess non-nursing participants' perceptions of met learning needs. It is uncertain if a validated tool exists to be utilized with non-nursing professionals.

The validated *Facilitator Competency Rubric* tool performed as expected for evaluating facilitator competency. Results aligned with the facilitator competency level verbalized by the implementation team.

Interpretation of Outcomes

The PPH accuracy outcomes were reassuring since they suggested that the intervention had been effective in promoting improved accuracy. However, the project leader was disappointed that the time metrics provided inconclusive results. Since the baseline time metrics were all within the desired limits, it was impossible to extrapolate whether or not the intervention had been effective in promoting timeliness.

Limitations

Sampling Limitations

The sample of all multidisciplinary staff who might have to participate in team management of PPH and who were also required to participate in quality improvement projects provided nearly 100% of the potential population. However, although physicians would be included as part of PPH management teams, only two out of 12 (16.7%) of family medicine and emergency department physicians voluntarily participated. This resulted in 86% of all events occurring with an obstetric nurse rather than a physician leading the team. It is unknown what effect, if any, this had on the outcomes. Since the physician participation only occurred during the three 1-month interval sessions and not during the baseline period, some bias or error in results may have existed.

Instrument Limitations

The *Uterine Atony Metrics-Modified* was not convenient to use until after modification as described above. Data for all time metrics, other than fundal massage, were readily obtained following the modification. It was identified that video recording of each event would have provided opportunity for higher accuracy in data collection of all metrics since

this could then have been accomplished by one trained observer, or even corroborated by a second trained observer. Additionally, the fundal massage time metric required either a dedicated trained observer or video recording. Because all participants were working together in close proximity to the patient's bed, it was difficult for a casual observer to visualize whether or not fundal massage was uninterrupted. In order to accurately document any time lapses in fundal massage, someone would need to continuously observe hand motion at the patient's fundus.

Time Limitations

Project implementation being limited to on-duty staff provided some challenges to the project team. Since only five to eight multidisciplinary nurses were scheduled on duty throughout the hospital at any one time, patient census and acuity within the institution during times for scheduled implementation and unannounced drills affected the ability to conduct educational interventions and drills. Sometimes they had to be rescheduled. Ultimately, only one registered nurse (RN), who was from acute care and one nurse anesthetist were never able to attend a training session or drill. A second significant time limitation was noted. Completion of the entire project within a three-month period prohibited an analysis of long-term effectiveness of the intervention.

Resource Limitations

Limited number of obstetrically trained staff nurses necessitated that time metrics recorders be nurses with non-obstetrical background. Special training was required to perform the task of timing multiple metrics: time from PPH paged to help arrived, time of second uterotonic administration, lapses in continuous fundal massage, and time from beginning of Bakri insertion to completion. It was immediately apparent that the non-obstetric nurses were unable to accurately evaluate whether or not fundal massage was being performed continuously, so that variable was unable to be included in this research project. Attrition of trained nurse time metrics and accuracy recorders (human resources) also affected the project data collection process. Available non-nursing staff were ultimately recruited and trained to fulfill the time metrics and accuracy recorder role. Video recording of the simulation sessions and drills would have provided the ability for the researcher to evaluate each time metric, but this had not been included in the project methodology or informed consent.

All other resources necessary for the project were readily available. An outdated balloon tamponade device was utilized which broke three quarters of the way through the project. Fortunately, an identical outdated device was procured from the surgery department which was utilized during the remainder of the project.

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Implications for Future Projects

Next Steps for Practice Improvement

The PPH simulation unannounced multidisciplinary drills will be continued quarterly within the institution. Prior to the first quarterly drill, the obstetrics and emergency department physician directors will be consulted regarding how to best include physicians in the multidisciplinary PPH drills. The *Institutional PPH Protocol* and revised *Uterine Atony Time Metrics-Modified* tool will be utilized for documentation of identical time and accuracy metrics. Non-nursing staff time metrics recorders will receive training as necessary. If the project leader is able to have an additional assistant or videographer, the fundal massage time metric could also be assessed. Surgical nurses who were unable to participate in this project should be included in future PPH simulation interventions.

Design Improvement

The project design should be improved by incorporating video recording of simulations so that all timeliness and accuracy metrics are evaluated by one researcher. The time frame should include simulation events every three months following the training rather than monthly and should be extended to at least one year. PPH training and drills should take place in both the labor and delivery unit and the mother-baby unit to replicate early and delayed PPH management. Emergency physicians and obstetric providers should all participate with multidisciplinary team training and drills rather than allowing for voluntary attendance. A different tool for evaluating simulation effectiveness for non-nursing participants should be utilized (either a pre-existing tool, or a designed and validated new tool).

Replication

Replication of the project with multidisciplinary teams in other rural, low-volume obstetric settings would help inform if findings are generalizable. Facilitators should communicate with all multidisciplinary leaders, including physicians, to ensure scheduling to accommodate full participation. Addition of video recording or additional trained observer for assessment of fundal massage would allow for evaluation of this critical intervention. A different tool for assessing simulation efficacy in meeting non-nursing learning needs must be utilized. If such a tool does not exist, it should be developed and validated. It would also be highly recommended that the PPH independent study module that had been utilized by the facilitator for all nursing staff prior to this project be included as RN preparation prior to implementation of simulation training and drills.

Needed Knowledge / Practice Application

This project focused only on PPH management 30 minutes after birth in an obstetric setting, controlled with balloon tamponade intervention. It is necessary to evaluate if a PPH simulation intervention could also promote timely and accurate management of PPH in a surgical setting with the utilization of dilatation and curettage, balloon tamponade, and/or B-Lynch suture interventions as well as a standardized PPH Protocol. It is also necessary to evaluate effectiveness of a PPH simulation in a postpartum mother/baby unit for management of delayed PPH.

Implications for Practice and Education

Clinical significance of findings from this project includes effectiveness for increasing accuracy of adherence to a standardized PPH Protocol. This is anticipated to reduce maternal morbidity based on need for blood transfusions as reported by Shields et al. (2015). Additionally, although there was an uncertain association between the simulation intervention and timeliness of treatments, participants reported an increase in knowledge and confidence in PPH management. Several correctable system level issues with clinical implications were identified and resolved. Although not demonstrated by the project, it is anticipated that the drills promoted imprinting of the protocol and helped develop long-term team skills as described by Main et al (2015).

Because of the demonstrated successful implementation of a multidisciplinary rather than obstetric nurse focused PPH simulation educational intervention, it should be suggested that a multidisciplinary educational approach become standard for institutional clinical education. Evidence-based standardized protocols should be utilized whenever available, and obstetric units (including rural obstetric units) should implement an immediately available cart containing all supplies and medications necessary for management of PPH as recommended by the National Partnership for Maternal Safety, the Association of Women's Health, Obstetric, and Neonatal Nurses, and the American College of Obstetricians and Gynecologists (Main et al., 2015; ACOG, 2017).

Conclusion

The aim of this study was to evaluate the effectiveness of a multidisciplinary simulated PPH educational intervention on accurate and timely adherence to a standard PPH protocol during simulated PPH events. Project outcomes have contributed to nursing education knowledge by demonstrating that a multidisciplinary PPH educational intervention can successfully be implemented in a rural, low-volume obstetric setting. Findings confirmed previous reports that protocol adherence and participant knowledge and confidence can be increased through multidisciplinary PPH simulation

experiences. Since most research regarding PPH management in rural settings has been conducted outside the United States, this study contributed new knowledge regarding outcomes in rural America.

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Noelle Duck Simulation (8 pages)

Formatted per NLN Simulation Design Template (2019)

Date: 2/10/2021

Discipline: Multidisciplinary

Expected Simulation Run Time: 10 min.

Location: Study Institution-

OB department

Today's Date::

File Name: DNP Project QI
Student Level: N/A

Guided Reflection Time: 20 min.

Location for Reflection:

Brief Description of Client

Name: Noelle Duck

Date of Birth: 03/22/1988 (3/22/19xx)

Gender: Female **Age**: 33 **Weight**: 135 **Height**: 5 ft 3 in

Race: Caucasian **Religion**: Christian

Major Support: Husband (Don) **Support Phone:** 509-671-0000

Allergies: NKDA **Immunizations:** Current

Attending Provider/Team: Dr. T. Reinke

Past Medical History: Exercise Induced Asthma (unknown last inhaler use)

History of Present Illness: G4P4004 @ 39+3/7 weeks gestation

Social History: smokes 3 cigarettes/day; occasional marijuana use

Primary Medical Diagnosis: Term OB, delivered

Surgeries/Procedures & Dates: None

Admission Labs: Hgb: 11.3; Hct: 34.0; PLT: 182,000; WBC: 11,000; Blood Type: A; Rh: Neg

Psychomotor Skills Required of Participants Prior to Simulation

As listed in the specified study institution job description for each discipline

Cognitive Activities Required of Participants Prior to Simulation

None (May review the study institution electronic learning PPH Module if desired)

Simulation Learning Objectives

General Objectives (Note: The objectives listed below are general in nature and once learners have been exposed to the content, they are expected to maintain competency in these areas. Not every simulation will include all of the objectives listed.)

1. Practice standard precautions.
2. Employ strategies to reduce risk of harm to the patient.
3. Conduct assessments appropriate for care of patient in an organized and systematic manner.
4. Perform priority actions based on assessment and clinical data.
5. Reassess/monitor patient status following interventions.
6. Communicate with patient and family in a manner that illustrates caring, reflects cultural awareness, and addresses psychosocial needs.
7. Communicate appropriately with other health care team members in a timely, organized, patient-specific manner.
8. Make clinical judgments and decisions that are evidence-based.
9. Practice within discipline's scope of practice.
10. Demonstrate knowledge of legal and ethical obligations.

Simulation Scenario Objectives (Complete the following within 10 minutes)

1. Recognize uterine atony as the etiology for PPH.
2. Perform uterine massage.
3. Administer 2 different uterotonic medications correctly.
4. Place intrauterine balloon tamponade device.
5. Call for blood.

For Faculty: References, Evidence-Based Practice Guidelines, Protocols, or Algorithms Used for This Scenario:

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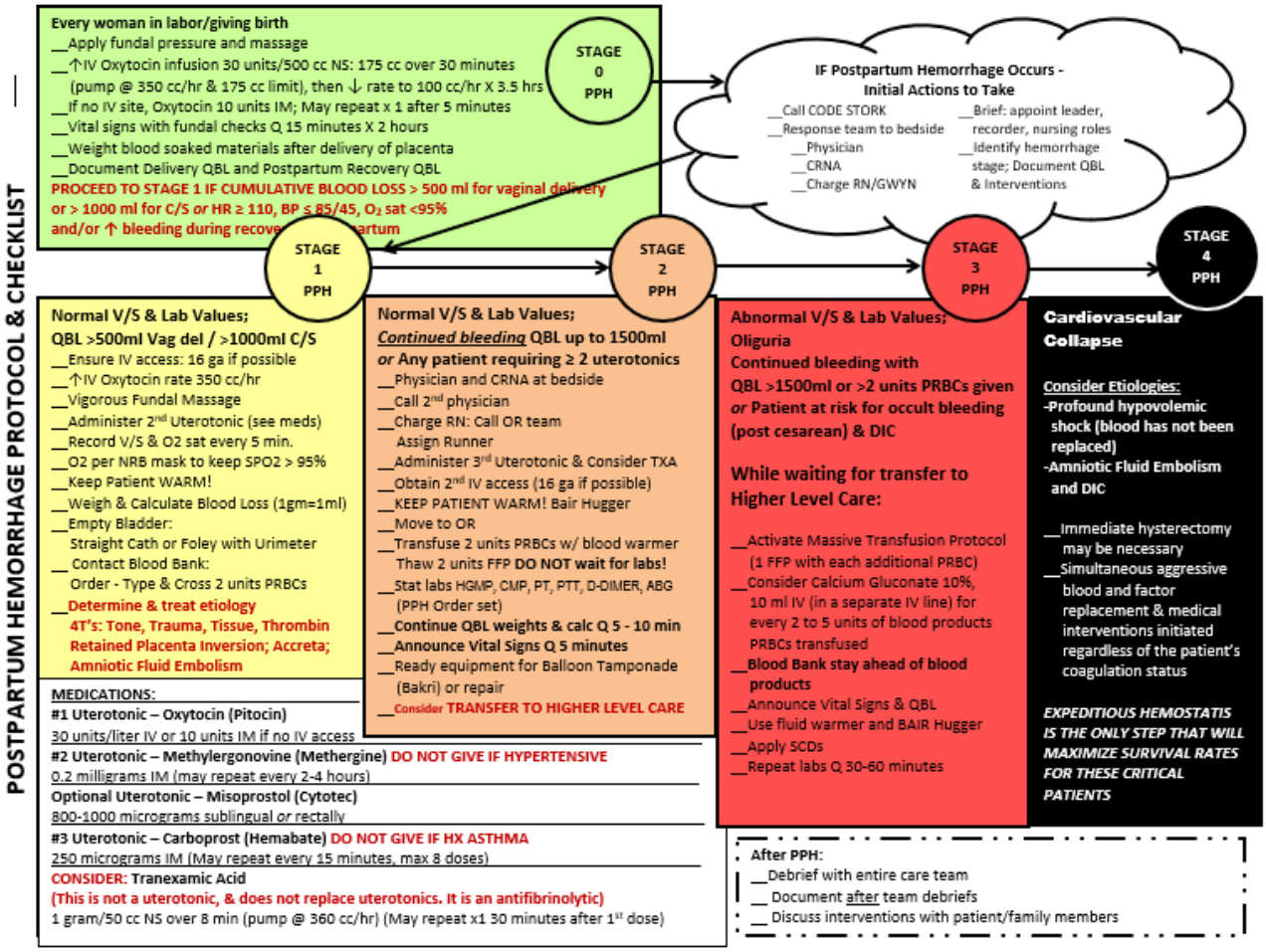


Setting/Environment

☐ Emergency Room ☐ Medical-Surgical Unit ☐ Pediatric Unit ☒ Maternity Unit ☐ Behavioral Health Unit	☐ ICU ☐ OR / PACU ☐ Rehabilitation Unit ☐ Home ☐ Outpatient Clinic ☐ Other:

Equipment/Supplies (choose all that apply to this simulation)

Simulated Patient/Manikin/s Needed: Noelle S550 Maternal Care Simulator

Recommended Mode for Simulator: PPH components installed

Other Props & Moulage:

Equipment Attached to Manikin/Simulated Patient:	**Equipment Available in Room:**
☒ ID band ☒ IV tubing with primary line fluids running at 100 mL/hr ☐ Secondary IV line running at ___mL/hr ☐ IVPB with _____ running at mL/hr ☒ IV pump ☐ PCA pump ☐ Foley catheter with ___mL output ☐ 02 ☒ Monitor attached (BP and SpO2) ☐ Other: **Other Essential Equipment:** **Medications and Fluids:** ☒ Oral Meds: (Misoprostol) ☒ IV Fluids: (NS and LR) ☒ IVPB: (TXA) ☐ IV Push: ☒ IM or SC: (Pitocin, Methergine, Hemabate)	☐ Bedpan/urinal ☒ 02 delivery device (type) NRB Mask ☒ Foley kit ☒ Straight catheter kit ☐ Incentive spirometer ☒ Fluids ☒ IV start kit ☒ IV tubing ☒ IVPB tubing ☒ IV pump ☐ Feeding pump ☒ PPH cart with emergency medications and supplies ☐ Defibrillator/pacer ☒ Suction ☒ Other: • Bakri Uterine Tamponade Device & insertion supplies • Blood administration tubing • D & C Tray • Speculum • Scale & QBL dry weight chart • Simulated blood and blood-soaked items

Roles

☒ Nurse 1 Primary Nurse ☒ Nurse 2 GWYN or Charge Nurse ☐ Nurse 3 ☒ Provider (physician/advanced practice nurse) ☒ Other healthcare professionals: (Laboratory Technician and/or Phlebotomist; NAC)	☐ Observer(s) ☒ Recorder(s) ☐ Family member #1 ☐ Family member #2 ☐ Clergy ☐ Unlicensed assistive personnel ☒ Other: CRNA

Guidelines/Information Related to Roles Per Scenario Progression Outline.

Pre-briefing/Briefing

- Welcome, ensure environment conducive to learning & engaged participation.
- Discuss the fiction contract and confidentiality.
- Orient participants to the environment
    - The Noelle Birth simulator will be your patient. ID bracelets are utilized as with actual patients. Equipment and medications are to be used as you would in an actual emergency setting.
    - When performing an assessment, what you see is what is present. If assessing something that the manikin is not able to provide information about, you may ask (such as pulses, response to questions, etc.)
    - Communicate with your team and perform interventions the same as you would in an actual patient situation. This includes administration of medications and IV fluids. If you need more help from other departments, actually call them. Document interventions like you would in any emergency situations.
    - Vital signs will be provided on laminated cards placed on the monitor and will evolve in response to the care you provide.
    - Assign team leader and roles
    - Time allotment: You will have a maximum of 10 minutes to resolve the emergency
- Scenario Objectives: Timely and accurate adherence to PPH protocol
- Evaluation Process
    - Timing of interventions
    - Accuracy of adherence to protocol
    - Learner's will be asked to complete a brief evaluation (SET-M) expressing impressions regarding perceived effectiveness of the simulation at meeting their learning needs.

Report Students Will Receive Before Simulation

(Use SBAR format.)

Time: 16 hours after admission; 30 minutes post spontaneous vaginal delivery

Person providing report: Facilitator

Situation: Patient states “I don’t feel good.”

Background: Noelle Duck is a 33-year-old G4P4004 at 39 +3/7 weeks gestation who was admitted 16 hours ago for medically indicated induction of labor for diet controlled gestational DM. Pitocin induction commenced. Epidural anesthesia was instituted, and SVD occurred 30 minutes ago with a QBL of 400cc. Placenta was delivered spontaneously, and practitioner reported it to be intact. No lacerations were noted.

Assessment: Fundus boggy; “too much bleeding” on the peri pad.

Recommendation: Initiate PPH protocol

Scenario Progression Outline

Patient Name: **Noelle Duck** **Date of Birth:** **03/22/1988**

Timing (approx.)	Manikin/SP Actions	Expected Interventions	May Use the Following Cues
0-1 min	Noelle: "I just don't feel good. I can't hold my baby anymore. What's wrong?"	**Learners should begin by:** • Performing hand hygiene • Introducing selves • Confirming patient ID • Assess 4 T's (etiology) • Assess Fundus; begin fundal massage	**Cue:** V/S Card T 98.1 HR 118 R 18 B/P 110/70 SpO2 98% Room Air * Continuous trickle bleed (500 cc on chux)
1-2 min	Noelle: "Ouch! That hurts. Can you stop doing that!"	**Learners are expected to**: • Initiate Stage 1 PPH • Check IV • V/S Q 5 minutes • 2nd Uterotonic • Empty bladder	**Cue:** Continuous trickle Bag A: clots and soaked peri-pad (225 gm)
3-5 min	Noelle (decreased consciousness): "Am – I – go-ing – to – die?"	**Learners are expected to**: • Progress to Stage 2 PPH • 3rd uterotonic • Oxygen • Type & Cross • Warm Blanket • Start 2nd IV line & Labs	**Cue:** V/S Card HR 125 R 24 B/P 90/65 SpO2 94% Room Air * Continuous trickle bleed Bag B: Clots (150 gm)
5-7 min	Noelle (decreased consciousness): *Moans*	**Learners are expected to**: • Blood Transfusion • Call for Bakri set-up • Consider TXA • OR team Called • Lifeflight Called	**Cue:** V/S Card HR 140 R 12 B/P 80/56 SpO2 97% if on O2 89% if on Rm Air * Continuous trickle bleed Bag C: Soaked Peri-Pad (200 gm)
7-10 min		**Learners are expected to**: • Bakri inserted & inflated	**Cue:** V/S Card HR 105 R 16 B/P 100/70 SpO2 97% if on O2

Debriefing/Guided Reflection

Themes for this scenario:

- Deteriorating Patient physical and mental status (concern for newborn's well-being also)
- Unresponsive to medications
- Stop bleeding and keep warm; prevent DIC

We do not expect you to introduce all of the questions listed below. The questions are presented only to suggest topics that may inspire the learning conversation. Learner actions and responses observed by the debriefer should be specifically addressed using a theory-based debriefing methodology (e.g., Debriefing with Good Judgment, Debriefing for Meaningful Learning, PEARLS).

1. How did you feel throughout the simulation experience?
2. Give a brief summary of this patient and what happened in the simulation.
3. What were the main problems that you identified?
4. Discuss the knowledge guiding your thinking surrounding these main problems.
5. What were the key assessment and interventions for this patient?
6. Discuss how you identified these key assessments and interventions.
7. Discuss the information resources you used to assess this patient. How did this guide your care planning?
8. Discuss the clinical manifestations evidenced during your assessment. How would you explain these manifestations?
9. Explain the nursing management considerations for this patient. Discuss the knowledge guiding your thinking.
10. What information and information management tools did you use to monitor this patient's outcomes? Explain your thinking.
11. How did you communicate with the patient?
12. What specific issues would you want to take into consideration to provide for this patient's unique care needs?
13. Discuss the safety issues you considered when implementing care for this patient.
14. What measures did you implement to ensure safe patient care?
15. What other members of the care team should you consider important to achieving good care outcomes?
16. How would you assess the quality of care provided?
17. How would you assess the team communication and teamwork?
18. What could you do improve the quality of care for this patient?
19. If you were able to do this again, how would you handle the situation differently?
20. What did you learn from this experience?
21. How will you apply what you learned today to your clinical practice?
22. Is there anything else you would like to discuss?

Appendix B: Postpartum Hemorrhage Knowledge Assessment

Participant Identification Number: _____

Your answers to this assessment will help guide the postpartum hemorrhage (PPH) quality improvement project by informing the facilitator of participants' basic knowledge of PPH.
Please answer questions independently without consulting any other person or source.
Your anonymity is guaranteed by use of an identification number known only to you and the project leader.

Select and circle the correct answer. There is only one (1) correct answer for each question.

1. A mother is experiencing excessive bleeding after a vaginal delivery when blood loss has exceeded _____ cc.
   a. 350
   b. 500
   c. 750
   d. 1000
   e. 1250

2. If a mother is diagnosed with PPH when blood loss exceeds _____ cc with any type of delivery, vaginal or cesarean section.
   a. 350
   b. 500
   c. 750
   d. 1000
   e. 1250

3. What is the first line uterotonic medication for PPH?
   a. Cytotec
   b. Hemabate (Carboprost)
   c. Methergine (Methylergonovine)
   d. Pitocin (Oxytocin)
   e. Tranexamic Acid

4. Which uterotonic medication is contraindicated if patient is Hypertensive?
   a. Cytotec
   b. Hemabate (Carboprost)
   c. Methergine (Methylergonovine)
   d. Pitocin (Oxytocin)
   e. Tranexamic Acid

5. Which uterotonic medication is contraindicated if patient has a history of Asthma?
   a. Cytotec
   b. Hemabate (Carboprost)
   c. Methergine (Methylergonovine)
   d. Pitocin (Oxytocin)
   e. Tranexamic Acid

6. What are possible causes of PPH?
   a. Uterus with poor tone, Retained tissue, Birth trauma to mother, Problems with blood clotting affecting thrombin
   b. Uterus with poor tone, Elevated blood glucose, Retained tissue, Birth trauma to mother
   c. Uterus with poor tone, Retained tissue, Inability to breastfeed, Problems with blood clotting affecting thrombin
   d. Hypertonic uterus, Retained tissue, Birth trauma to mother, Problems with blood clotting affecting thrombin

7. True or False Patient experiencing a PPH should have cooling measures instituted in order to lessen loss of blood.

8. Which of the following is not a uterotonic? It is an antifibrinolytic that should be considered for persistent PPH.
   a. Cytotec
   b. Hemabate (Carboprost)
   c. Methergine (Methylergonovine)
   d. Pitocin (Oxytocin)
   e. Tranexamic Acid

9. What is the ratio of packed red blood cells (PRBCs) and fresh frozen plasma (FFP) that should be administered during a PPH?
   a. 2 units PRBCs + 1 unit FFP + 2 units PRBCs + 1 unit FFP (continue 2:1 ratio)
   b. 3 units PRBCs + 1 unit FFP + 2 units PRBCs + 1 unit FFP + 1 unit PRBCs + 1 unit FFP (continue 1:1 ratio)
   c. 2 units PRBCs + 1 unit FFP + 1 unit PRBCs + 1 unit FFP (continue 1:1 ratio)
   d. 3 units PRBCs + 1 unit FFP + 1 unit PRBCs + 1 unit FFP (continue 1:1 ratio)

10. This device can be used to attempt to tamponade a PPH that is caused by uterine atony:
    a. Gaskins Balloon Tamponade
    b. Bakri Balloon Tamponade
    c. Bovi Balloon Tamponade
    d. Zavanelli Balloon Tamponade

Answers: 1=B; 2=D; 3=D; 4=C; 5=B; 6=A; 7=FALSE; 8=E; 9=C; 10-B

Appendix C: Uterine Atony Metrics – Modified

This tool is a modification of the CMQCC Obstetric Hemorrhage Toolkit *Simulations and Drills Educational Tool #2 Uterine Atony Metrics* which is available for download from the CMQCC website with the following user information:

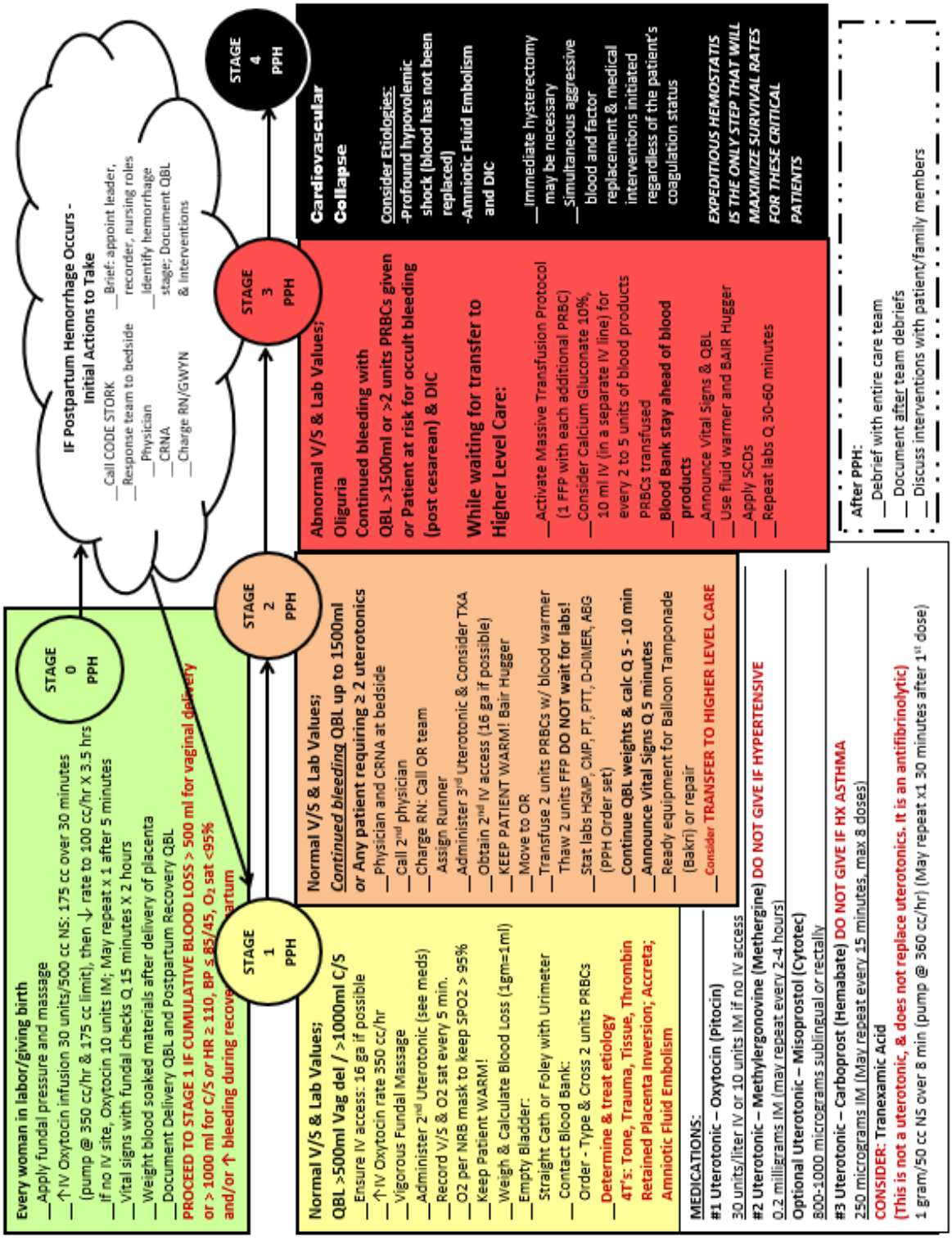
> The California Toolkit to Transform Maternity Care called "Improving the Health Care Response to Obstetric Hemorrhage Version 2.0" was reviewed by the California Department of Public Health; Maternal, Child and Adolescent Health Division. This toolkit is considered a resource but does not define the standard of care in California. Readers are advised to adapt the guidelines and resources based on their local facility's level of care and patient populations served and are also advised to not rely solely on the guidelines presented here. (Lyndon et al., 2015)

Uterine Atony Metrics – Modified

Metric measurements completed by: _____ Date _____
Position Time Series (select 1)**: __ Initial __ Drill #1 __ Drill #2 __ Drill #3**
How many participants are included in this scenario? _____
Participants' Identification numbers: A_____ B_____ C_____ D_____ E_____ F_____

Please Enter times to two (2) decimal places

Metric Item	Measurement	Measurement	Comment
Time of diagnosis of hemorrhage to the administration of first medication (Usually this is the second uterotonic since oxytocin is already infusing)	**Time Started:**	**Time Complete:**	
Time help paged to time help arrived in room	**Time Started:**	**Time Complete:**	
Time PPH diagnosed/paged to time PPH Cart arrived in room	**Time Started:**	**Time Complete:**	
Amount of time uterine massage stopped unless directed by physician (this might be recorded in multiple episodes then added	**Time Started: A**	**Time Stopped: B**	# seconds between:
	Time Started: C	**Time Stopped:D**	B and C
	Time Started: E	**Time Stopped: F**	D and E
	Time Started: G	**Time Stopped:H**	F and G
	Time Started: I		H and I
			Total time:
Time from request for tamponade device to completion of insertion	**Time Started:**	**Time Complete:**	


POSTPARTUM HEMORRHAGE PROTOCOL & CHECKLIST
Every woman in labor/giving birth
__Apply fundal pressure and massage
__↑IV Oxytocin infusion 30 units/500 cc NS: 175 cc over 30 minutes (pump @ 350 cc/hr & 175 cc limit), then ↓ rate to 100 cc/hr X 3.5 hrs
__If no IV site, Oxytocin 10 units IM; May repeat x 1 after 5 minutes
__Vital signs with fundal checks Q 15 minutes X 2 hours
__Weight blood soaked materials after delivery of placenta
__Document Delivery QBL and Postpartum Recovery QBL
PROCEED TO STAGE 1 IF CUMULATIVE BLOOD LOSS > 500 ml for vaginal delivery or > 1000 ml for C/S or HR ≥ 110, BP ≤ 85/45, O2 sat <95% and/or ↑ bleeding during recovery postpartum
STAGE 0 PPH
STAGE 1 PPH
Normal V/S & Lab Values;
QBL >500ml Vag del / >1000ml C/S
__Ensure IV access: 16 ga if possible
__↑IV Oxytocin rate 350 cc/hr
__Vigorous Fundal Massage
__Administer 2nd Uterotonic (see meds)
__Record V/S & O2 sat every 5 min.
__O2 per NRB mask to keep SPO2 > 95%
__Keep Patient WARM!
__Weigh & Calculate Blood Loss (1gm=1ml)
__Empty Bladder:
__Straight Cath or Foley with Urimeter
__Contact Blood Bank:
__Order - Type & Cross 2 units PRBCs
__Determine & treat etiology
4T's: Tone, Trauma, Tissue, Thrombin
Retained Placenta Inversion; Accreta;
Amniotic Fluid Embolism
MEDICATIONS:
#1 Uterotonic – Oxytocin (Pitocin)
30 units/liter IV or 10 units IM if no IV access
#2 Uterotonic – Methylergonovine (Methergine) DO NOT GIVE IF HYPERTENSIVE
0.2 milligrams IM (may repeat every 2-4 hours)
Optional Uterotonic – Misoprostol (Cytotec)
800-1000 micrograms sublingual or rectally
#3 Uterotonic – Carboprost (Hemabate) DO NOT GIVE IF HX ASTHMA
250 micrograms IM (May repeat every 15 minutes, max 8 doses)
CONSIDER: Tranexamic Acid
(This is not a uterotonic, & does not replace uterotonics. It is an antifibrinolytic)
1 gram/50 cc NS over 8 min (pump @ 360 cc/hr) (May repeat x1 30 minutes after 1st dose)
STAGE 2 PPH
Normal V/S & Lab Values;
Continued bleeding QBL up to 1500ml
or Any patient requiring ≥ 2 uterotonics
__Physician and CRNA at bedside
__Call 2nd physician
__Charge RN: Call OR team
__Assign Runner
__Administer 3rd Uterotonic & Consider TXA
__Obtain 2nd IV access (16 ga if possible)
__KEEP PATIENT WARM! Bair Hugger
__Move to OR
__Transfuse 2 units PRBCs w/ blood warmer
Thaw 2 units FFP DO NOT wait for labs!
__Stat labs HGMP, CMP, PT, PTT, D-DIMER, ABG (PPH Order set)
__Continue QBL weights & calc Q 5 - 10 min
__Announce Vital Signs Q 5 minutes
__Ready equipment for Balloon Tamponade (Bakri) or repair
__Consider TRANSFER TO HIGHER LEVEL CARE
STAGE 3 PPH
Abnormal V/S & Lab Values;
Oliguria
Continued bleeding with
QBL >1500ml or >2 units PRBCs given
or Patient at risk for occult bleeding
(post cesarean) & DIC
While waiting for transfer to
Higher Level Care:
__Activate Massive Transfusion Protocol (1 FFP with each additional PRBC)
__Consider Calcium Gluconate 10%, 10 ml IV (in a separate IV line) for every 2 to 5 units of blood products PRBCs transfused
__Blood Bank stay ahead of blood products
__Announce Vital Signs & QBL
__Use fluid warmer and BAIR Hugger
__Apply SCDs
__Repeat labs Q 30-60 minutes
STAGE 4 PPH
Cardiovascular Collapse
Consider Etiologies:
-Profound hypovolemic shock (blood has not been replaced)
-Amniotic Fluid Embolism and DIC
__Immediate hysterectomy may be necessary
__Simultaneous aggressive blood and factor replacement & medical interventions initiated regardless of the patient's coagulation status
EXPEDITIOUS HEMOSTATIS IS THE ONLY STEP THAT WILL MAXIMIZE SURVIVAL RATES FOR THESE CRITICAL PATIENTS
IF Postpartum Hemorrhage Occurs - Initial Actions to Take
__Call CODE STORK
__Response team to bedside
__Physician
__CRNA
__Charge RN/GWYN
__Brief: appoint leader, recorder, nursing roles
__Identify hemorrhage stage; Document QBL & interventions
After PPH:
__Debrief with entire care team
__Document after team debriefs
__Discuss interventions with patient/family members

Appendix E: Simulation Effectiveness Tool – Modified (SET-M)

The SET-M is available for download from the Evaluating Healthcare Simulation website with the following user information:

> I understand that I have been granted permission by the creators of the requested evaluation instrument to use it for academic and/or research purposes.
>
> I agree that I will use the evaluation instrument only for its intended use, and will not alter it in any way.
>
> I will share findings as well as publication references with the instrument creator(s).
>
> I am allowed to place the evaluation instrument into electronic format for data collection.

https://sites.google.com/view/evaluatinghealthcaresimulation/set-m-download

Simulation Effectiveness Tool - Modified (SET-M)

After completing a simulated clinical experience, please respond to the following statements by circling your response.

PREBRIEFING:	**Strongly Agree**	**Somewhat Agree**	**Do Not Agree**
Prebriefing increased my confidence (PREBRIEFING)	3	2	1
Prebriefing was beneficial to my learning. (PREBRIEFING)	3	2	1
SCENARIO:			
I am better prepared to respond to changes in my patient's condition. (LEARNING)	3	2	1
I developed a better understanding of the pathophysiology. (LEARNING)	3	2	1
I am more confident of my assessment skills. (LEARNING)	3	2	1
I felt empowered to make clinical decisions. (LEARNING)	3	2	1
I developed a better understanding of medications. (Leave blank if no medications in scenario) (LEARNING)	3	2	1
I had the opportunity to practice my clinical decision making skills. (LEARNING)	3	2	1
I am more confident in my ability to prioritize care and interventions (CONFIDENCE)	3	2	1
I am more confident in communicating with my patient. (CONFIDENCE)	3	2	1
I am more confident in my ability to teach patients about their illness and interventions. (CONFIDENCE)	3	2	1
I am more confident in my ability to report information to health care team. (CONFIDENCE)	3	2	1
I am more confident in providing interventions that foster patient safety. (CONFIDENCE)	3	2	1
I am more confident in using evidence-based practice to provide care. (CONFIDENCE)	3	2	1
DEBRIEFING:			
Debriefing contributed to my learning. (DEBRIEFING)	3	2	1
Debriefing allowed me to communicate my feelings before focusing on the scenario*(DEBRIEFING)	3	2	1
Debriefing was valuable in helping me improve my clinical judgment. (DEBRIEFING)	3	2	1
Debriefing provided opportunities to self-reflect on my performance during simulation. (DEBRIEFING)	3	2	1
Debriefing was a constructive evaluation of the simulation. (DEBRIEFING)	3	2	1
What else would you like to say about today's simulated clinical experience?			

*revised 4/3/20 for use in virtual debriefing

Leighton, K., Ravert, P., Mudra, V., & Macintosh, C. (2015). Update the Simulation Effectiveness Tool: Item modifications and reevaluation of psychometric properties. *Nursing Education Perspectives, 36*(5), 317-323. Doi: 10.5480/1 5-1671.

Original Simulation Effectiveness Tool (SET) developed by Medical Education Technologies, Inc (METI, now CAE Healthcare) for Program for Nursing Curriculum Integration (PNCI) (2005)

Appendix F: Facilitator Competency Rubric (FCR)

The FCR is available for download from the Evaluating Healthcare Simulation website with the following user information:

> I understand that I have been granted permission by the creators of the requested evaluation instrument to use it for academic and/or research purposes.
>
> I agree that I will use the evaluation instrument only for its intended use, and will not alter it in any way.
>
> I will share findings as well as publication references with the instrument creator(s).
>
> I am allowed to place the evaluation instrument into electronic format for data collection.

https://sites.google.com/view/evaluatinghealthcaresimulation/fcr-download

FACILITATOR COMPETENCY RUBRIC

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
Preparation	Scheduling	Identifies need for small groups at the bedside		Demonstrates creativity in scheduling approaches	Schedules participants for optimal learning experience	
		1	2	3	4	5
	Learning Objectives	Addresses cognitive, affective, and psychomotor domains of learning		Correlates objectives for all domains of learning to the level of the participants' education or experience	Incorporates objectives that integrate holistic patient-centered care	
		1	2	3	4	5
	Planning Process	Informs lab staff of plans to conduct simulation		Collaborates with lab staff to ensure learning objectives will be met	Reviews prior simulated clinical experiences (SCEs) to ensure improvements made in learning experience	
		1	2	3	4	5
	Fidelity Level (e.g. environment, simulation modality)	Intends to use materials/simulation modality based on own comfort/ease		Plans for a level of fidelity that will meet the desired outcomes	Designs experience to closely replicate environment of care in accordance with learning objectives	
		1	2	3	4	5
	Supply/Equipment Availability	Lists supplies and equipment needed for SCE		Organizes learning materials according to priority of need	Develops or enhances materials to allow learners to critically think	
		1	2	3	4	5
	Preparation Requirements	Informs participants of any preparation requirements prior to arrival to SCE		Determines whether participants are prepared for the SCE	Analyzes whether level of preparation is sufficient to optimize learning	
		1	2	3	4	5
	Evaluation Methods	Intends to evaluate whether the participants were satisfied with the SCE		Plans to gather data to evaluate the experience, facilitator, and/or learning outcomes	Plans to use psychometrically sound evaluation tools	
		1	2	3	4	5
	Scores	Total Column		Total Column	Total Column	

Preparation Section Score Guide for Total of All Three Columns:
0-14 = Beginner to Advanced Beginner (requires mentoring by Proficient to Expert facilitator)
15-27 = Competent
28-35 = Proficient to Expert (may provide mentoring to Beginner to Advanced Beginner facilitator)

FACILITATOR COMPETENCY RUBRIC

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
Prebriefing	Expectations (e.g. confidentiality, code of conduct, participation, respect)	Informs participants of what to expect during the SCE		Addresses any participant misconceptions regarding expectations	Provides rationale for the expectations of all participants	
		1	2	3	4	5
	Learning Objectives	Provides learning objectives to participants prior to scenario		Reviews learning objectives with participants prior to scenario	Clarifies misconceptions, ensuring participants understand the learning objectives prior to the scenario	
		1	2	3	4	5
	Role Identification	Assigns roles to participants		Provides thorough explanations and/or scripts for each role	Analyzes which role should be given to each participant, to optimize learning, based on identified strengths and weaknesses	
		1	2	3	4	5
	Learning Environment	Addresses participant concerns as a group without singling out one person		Role models positive, encouraging behaviors that promote learning	Monitors degree of emotions, throughout SCE, to determine if they interfere with learning process	
		1	2	3	4	5
	Scores	Total Column		Total Column	Total Column	

Prebriefing Section Score Guide for Total of All Three Columns:
0-8 = Beginner to Advanced Beginner (requires mentoring by Proficient to Expert facilitator)
9-15 = Competent
16-20 = Proficient to Expert (may provide mentoring to Beginner to Advanced Beginner facilitator)

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
Facilitation	Focus	Focused on self (phone, paperwork) or one component of SCE (skill, event)		Places full attention on participants and SCE	Switches tasks as needed to provide cues, evaluate comprehension, note behaviors	
		1	2	3	4	5
	Guidance	Rescues participants and does not allow scenario to be leaner led		Intervenes in SCE when appropriate based on level of participant and objectives	Allows SCE to progress through unexpected errors, allowing participants to problem-solve	
	Engagement of Participants	Recognizes when all participants are not involved in the SCE		Provides appropriate cues or prompts as part of the SCE in an effort to engage all participants	Uses a variety of methods to involve disengaged participants	
		1	2	3	4	5
	Performance	Identifies participants with poor performance		Identifies strengths and weaknesses of participants	Ascertains potential causes for both strengths and weaknesses	
		1	2	3	4	5
	Time/Length	Continues through scenario as written without regard to time management		Stops scenario prior to finish, if necessary, in order to have time for debriefing	Adapts, during the experience, to address all learning objectives within time constraints	
		1	2	3	4	5
	Evaluate	Determines whether the SCE progressed as intended		Identifies components of the SCE that need to be addressed during the debriefing	Develops a holistic reaction to the scenario that will guide debriefing	
		1	2	3	4	5
	Scores	Total Column		Total Column	Total Column	

Facilitation Section Score Guide for Total of All Three Columns:
0-12 = Beginner to Advanced Beginner (requires mentoring by Proficient to Expert facilitator)
13-23 = Competent
24-30 = Proficient to Expert (may provide mentoring to Beginner to Advanced Beginner facilitator)

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
Debriefing	Model/Plan	Discussion is randomly organized		Uses an established model or plan to facilitate debriefing	Uses the parts of a model or plan that are most useful for the current learning situation and participants	
		1	2	3	4	5
	Facilitate Reflection	Reviews simulation activity with participants		Explores with participants the rationale for their decisions	Facilitates in-depth analysis of decision-making processes and higher order thinking	
		1	2	3	4	5
	Engagement	Recognizes that not everyone is involved in discussions		Guides discussion to keep everyone engaged	Uses a variety of methods to engage all participants	
		1	2	3	4	5

FACILITATOR COMPETENCY RUBRIC

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
	Active Listening	Contributes more to discussion than the participants do		Provides prompts or cues only to obtain needed information	Demonstrates comfort with silence to allow participants to think and process	
		1	2	3	4	5
	Performance Feedback	Shares positive observations with participants		Guides discussion of positive performance and analysis of areas for improvement	Facilitates self-reflection and peer analysis of performance	
		1	2	3	4	5
	Learning Objectives	Focuses on scenario events		Determines whether learning objectives were met	Assists participants to determine level of attainment of learning objectives	
		1	2	3	4	5
	Transfer of Learning	Tells participants how SCE can be used in traditional clinical environment		Facilitates discussion of how SCE can be used to improve patient care	Guides participants to determine how both positive and negative lessons can be applied to patient care	
		1	2	3	4	5
	Summary	Abruptly ends SCE without summarizing learning experience		Summarizes the SCE for the participants	Supports the participants as they summarize the SCE	
		1	2	3	4	5
	Scores	Total Column		Total Column	Total Column	

Debriefing Section Score Guide for Total of All Three Columns:
0-16 = Beginner to Advanced Beginner (requires mentoring by Proficient to Expert facilitator)
17-31 = Competent
32-40 = Proficient to Expert (may provide mentoring to Beginner to Advanced Beginner facilitator)

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
Evaluation	Experience	Asks the participants if they liked/enjoyed the SCE		Uses methods designed to collect data from participants, staff, and faculty about the SCE	Incorporates feedback to improve future learning outcomes	
		1	2	3	4	5
	Participants	Asks simulation staff and faculty for observations about participants' learning outcomes		Uses methods designed to collect data about the participants and learning	Assists individual participants to create an action plan based on learning outcomes	
		1	2	3	4	5

FACILITATOR COMPETENCY RUBRIC

CONCEPTS	COMPONENTS	BEGINNER (1) TO ADVANCED BEGINNER (2)		COMPETENT (3)	PROFICIENT (4) TO EXPERT (5)	
	Curriculum	Unable to make connection between challenges in SCE and possible curriculum concerns		Recognizes that challenges identified during an SCE may be a result of curricular design	Collaborates with the curriculum team to ensure learning needs are met	
		1	2	3	4	5
	Facilitators	Does not seek feedback on own performance		Seeks feedback from students and peers about facilitator's skills	Incorporates feedback into self improvement plan	
		1	2	3	4	5
	Scores	Total Column		Total Column	Total Column	

Evaluation Section Score Guide for Total of All Three Columns:
0-8 = Beginner to Advanced Beginner (requires mentoring by Proficient to Expert facilitator)
9-15 = Competent
16-20 = Proficient to Expert (may provide mentoring to Beginner to Advanced Beginner facilitator)

Cite: Leighton, K, Mudra, V., & Gilbert, G. E. (2018). Facilitator Competency Rubric. Retrieved from https://sites.google.com/view/evaluatinghealthcaresimulation/fcr

Appendix G: PPH Supply Checklist

This tool is available as part of the CMQCC Obstetric Hemorrhage Toolkit V 2.0 and is available for download from the CMQCC website with the following user information:

> The California Toolkit to Transform Maternity Care called "Improving the Health Care Response to Obstetric Hemorrhage Version 2.0" was reviewed by the California Department of Public Health; Maternal, Child and Adolescent Health Division. This toolkit is considered a resource, but does not define the standard of care in California. Readers are advised to adapt the guidelines and resources based on their local facility's level of care and patient populations served and are also advised to not rely solely on the guidelines presented here. (Lyndon et al., 2015)

Participant Identification Number _____ Elapsed Time to collect supplies _____

CHECKLIST: CARTS, KITS, TRAYS

OB Hemorrhage Cart: Recommended Instruments

- ☐ Set of vaginal retractors (long right angle); long weighted speculum
- ☐ Sponge forceps (minimum: 2)
- ☐ Sutures (for cervical laceration repair and B-Lynch)
- ☐ Vaginal Packs
- ☐ Uterine balloon
- ☐ Banjo curettes, several sizes
- ☐ Long needle holder
- ☐ Uterine forceps
- ☐ Bright task light on wheels; behind ultrasound machine
- ☐ Diagrams depicting various procedures (e.g. B-Lynch, uterine artery ligation, Balloon placement)

OB Hemorrhage Medication Kit: Available in L&D and Postpartum Floor PYXIS/refrigerator

- ☐ Pitocin 10-40 units per 500-1000 mL NS 1 bag
- ☐ Hemabate 250 mcg/mL 1 ampule
- ☐ Cytotec 200 mcg tablets 5 tabs
- ☐ Methergine 0.2 mg/mL 1 ampule

OB Hemorrhage Tray: Available on Postpartum Floor

- ☐ IV start kit
- ☐ 16 gauge angiocath
- ☐ 1 liter bag lactated Ringers
- ☐ IV tubing
- ☐ Sterile Speculum
- ☐ Urinary catheter kit with urimeter
- ☐ Flash light
- ☐ Lubricating Jelly
- ☐ Assorted sizes sterile gloves
- ☐ Lab tubes: red top, blue top, tiger top

PPH Management: Improving Quality and Patient Safety through Multidisciplinary Simulation Training

An PI project funded in part by WSHA FLEX Grant and implemented by Bev Mayfield, BSN, RNC-OB/ONQS, NHHS OB Coordinator
(as a DNP Scholarly Project)

WHO: Nurses, NACs & Techs (OB, AC, ER, OR) CRNAs, Lab Techs, Phlebotomists, Family and Emergency Physicians, employed at NHHS

WHAT: Multidisciplinary simulation education event
Goal: Quality improvement and patient safety

WHEN: Prepare to manage PPH in a timely manner, adhering to EBP PPH Protocol

WHEN: May 17-June 11
30-minute sessions

HOW: **Refer to sign-up sheet for specific times available**
or contact Bev:
ext.

*Each session must have a minimum of 3 and a maximum of 6 participants

Together we can improve our community's health, one life at a time

Tuesday May 18

0400-0430	0445-0515	0530-0600

1000-1030	1045-1115	1400-1430

Appendix I: Recruitment Email Letter

Greetings,

My name is Bev Mayfield, and I am a Doctor of Nursing Practice student at Southern Adventist University. I am writing to invite you to participate in my scholarly project entitled, Postpartum Hemorrhage Management: Improving Quality and Patient Safety through Multidisciplinary Simulation Training. You are eligible to be in this study because you are employed by the specified study institution, work in the hospital in obstetrics, acute care, emergency department, surgery, or laboratory, and fulfill one of the following roles: Registered Nurse, NA-C, CRNA, Lab Tech, Phlebotomist, or Physician. Since I am employed by the study institution as the OB department Coordinator, I obtained your contact information from department staffing lists.

If you decide to participate in this study, you will take part in a 30-minute multidisciplinary simulation educational intervention in which you will work with a multidisciplinary team in managing a postpartum hemorrhage. This will take place in the obstetric department between May 17 and June 11, 2021, utilizing actual supplies and simulated medications. Simulation educational events will be scheduled periodically throughout the day and night in order to optimize availability for staff participation from all shifts. A sign-up schedule will be posted in Acute Care, or you can request a specific time as long as there is a minimum of three and a maximum of six participants. Attention will be given to timely and accurate adherence to the postpartum hemorrhage protocol, with critical elements measured in percentage completed and time to complete. This information will be used as a baseline for comparison with multidisciplinary performance in unannounced postpartum hemorrhage emergency drills conducted between June 14 and August 20, 2021.

Since the State Hospital Association FLEX Grant funding enabled the study institution to purchase the two refrigerated medication drawers (by Creche Innovations) which are installed in our PPH Carts, a report from this project will be provided to WSHA per FLEX Grant stipulations. Additionally, findings will be included in my DNP Scholarly Project presentation. The identity of all participants is protected, and performance in simulation will not affect employment.

Remember, your participation is completely voluntary. You can choose to be in the study or not. If you would like to participate or have any questions about the study, please email or contact me at bevmayfield@southern.edu or cell #509-671-0080.

Thank you very much.

Sincerely,

Bev Mayfield, BSN, RNC-OB/ONQS
DNP Student, Southern Adventist University
------- OB Coordinator

Introduction:
My name is Bev Mayfield. I am a doctoral student at Southern Adventist University. I am conducting a research study on Postpartum Hemorrhage Management (PPH): Improving Quality and Patient Safety through Multidisciplinary Simulation Training. I am completing this research as part of my doctoral degree. Your participation is completely voluntary. I am seeking your consent to involve you and your information in this study. Reasons you might ***not*** want to participate in the study include you are not interested in honing your skills with PPH management. Reasons you might want to participate in the study include increasing your knowledge and teamwork skills in management of PPH. An alternative to this study is simply not participating. I am here to address your questions or concerns during the informed consent process.

PRIVATE INFORMATION
Certain private information may be collected about you in this study. I will make the following effort to protect your private information, including deidentification through assigning you a number known only to me which will link your information to your discipline. Even with this effort, there is a chance that your private information may be accidentally released. The chance is small but does exist. You should consider this when deciding whether to participate.

Activities:
If you participate in this research, you will be asked to:
1. Complete a 10-item multiple choice assessment of basic PPH knowledge.
2. Participate with a multidisciplinary team of three to six members in a simulated PPH which will take about 30 minutes of your time.
3. Complete a standardized evaluation of simulation effectiveness after participating in the multidisciplinary simulation.

Eligibility:
You are eligible to participate in this research if you:
1. Are employed at the specified study institution and work within the hospital.
2. Work in a discipline that includes one or more of the following: Obstetrics, Acute Care, Emergency Department, Surgery, Laboratory.
3. Are required to participate in quality improvement projects or wish to participate.
4. Are an RN, NAC, phlebotomist, medical lab technician, CRNA, surgical scrub tech, ER tech, or a physician.

You are not eligible to participate in this research if you:
1. Are not employed at the specified study institution.
2. Have job duties limited to non-hospital the study institution entities.
3. Are not required to participate in quality improvement projects and do not wish to participate.
4. Are sick or on FMLA during implementation.
5. Have scheduled retirement or change in job description that would meet exclusion criteria within 90 days post implementation of project.

I hope to include at least 35 people in this research.

Risks:
There are minimal risks in this study. A possible risk includes mental discomfort from answering questions about a topic which is not your expertise.
To decrease the impact of these risks, you can: skip any questions and/or stop participation at any time.

Benefits:
If you decide to participate, there are no direct benefits to you. However, I expect you may benefit by increasing your knowledge and skill in managing PPH and increasing your teamwork skills. You will also receive credit within the hospital educational reporting system for your participation.
The potential benefits to others are: Research findings will help inform methods for maintaining the competency for PPH management of multidisciplinary staff in a hospital with a low-volume obstetric service.

Confidentiality:
The information you provide will be kept confidential to the extent allowable by law. Some steps I will take to keep your identity confidential are: On written assessments and evaluations, and simulation attendance record, I will use a number only known to myself to identify you, and all information will be reported by discipline rather than by individual.
The people who will have access to your information are: myself and my doctoral project advisor. The Institutional Review Board may also review my research and view your information. The specified study institution will have access to de-identified data
I will secure your information with these steps: Paper documents will be kept in a locked drawer in the obstetric department office during working hours, then will be transported by personal vehicle to the project leader's home office where data will be entered and analyzed on a password protected laptop to preclude unauthorized access to data. Original paper documents will be scanned and stored on the same laptop system, and papers will subsequently be shredded. After data has been de-identified, reports necessary for project site quality improvement projects will be transferred to the site's secure intranet system.
I will keep your data for 7 years, and then delete electronic data.

Contact Information:
If you have questions for me, you can contact me at: bevmayfield@southern.edu
or cell 509-671-0080

My doctoral project chair's name is LaShawn Horton, PhD, MSN, RN. Who works at Southern Adventist University and is supervising me on the research. Dr. Horton can be contacted at: lhorton@southern.edu or 423-326-2959.
If you contact us, you will be giving us information like your phone number or email address. This information will not be linked to your responses.
If you have questions about your rights in the research, or if a problem has occurred, or if you are injured during your participation, please contact the Institutional Review Board at: irb@southern.edu or 423-236-2285.

Voluntary Participation:
Your participation is voluntary. If you decide not to participate, or if you stop participation after you start, there will be no penalty to you. You will not lose any benefit to which you are otherwise entitled.

Future Research
Any information or specimens collected from you during this research may **not** be used for other research in the future, even if identifying information is removed.

Signature:
A signature indicates your understanding of this consent form. You will be given a copy of the form for your information.

Participant Signature	Printed Name	Date
_____	_____	_____
Researcher Signature	Printed Name	Date
_____	_____	_____

Appendix K: Statement of Mutual Agreement with Agency

February 10, 2021

Attn: Southern Adventist University School of Nursing

As Quality Assurance and Process Improvement Manager of

I agree to participate to allow and facilitate research within my organization to assist my colleague Bev Mayfield in her DNP project. As stated in Bev's project proposal, the purpose of the project is to evaluate effectiveness of a multidisciplinary simulated postpartum hemorrhage and review intervention on timely and accurate adherence to an evidence-based practice protocol in unannounced monthly drills in a low-volume obstetric unit. Within the proposed project Bev has listed the desired objectives, design of the quality improvement project, educational interventions, defined metrics, a timeline of the project, resources, technology, budgetary information, protection of human subjects, feasibility, sustainability, and outcome evaluation. Please allow this letter to suffice as a statement of mutuality between the Southern Adventist University School of Nursing and my organization. This project proposal will be submitted for IRB organization approval at the upcoming regularly scheduled Medical Staff meeting on Thursday, February 18, 2021. If there are any questions, please do not hesitate to contact me.

Kind Regards,

Jennifer R. Allbee MSN, RN

J. Allbee MSN. RN

(208) 304-2639
jenallbee@gmail.com

Appendix L: Agency IRB Approval

APPLICATION FOR APPROVAL OF HUMAN SUBJECTS RESEARCH

Please complete the following:

1. Research Study:

Application Title: PPH Management: Improving Quality and Patient Safety through Multidisciplinary Simulation Research. (Bev's DNP Scholarly Project)

Location for research:

- [X] Hospital- ____ Acute Care ____ Surgery ____ Emergency Department
- ____ Pharmacy X Labor & Delivery ____ Radiology ____ Laboratory
- ____ Physical Therapy
- [ ] Health Clinic
- [ ] Village
- [ ] Long Term Care

Is this project funded by External Funding? [ ] Yes [X] No If yes, please describe:
However, Refrigerated Medication drawers were approved for purchase with FLEX Grant.

2. Lead Investigator:

First Name: Bev Last Name: Mayfield Title: BSN, RNC-OB/GNQS OB Coordinator DNP student

Phone Number: 509-671-0080 Email address:

Are you an employee of [X] Yes- Department OB Position Coordinator
[ ] No- Affiliation with

3. Co-Investigators:

First Name: Last Name: (None) Title:

Phone Number: Email address:

An employee of : [ ] Yes- Department ____ Position ____
[ ] No- Affiliation with

First Name: Last Name: Title:

Phone Number: Email address:

An employee of ☐ Yes- Department_____ Position _____
☐ No- Affiliation with

First Name: Last Name: Title:

Phone Number: Email address:

An employee of ☐ Yes- Department_____ Position _____
☐ No- Affiliation with

First Name: Last Name: Title:

Phone Number: Email address:

An employee of ☐ Yes- Department_____ Position _____
☐ No- Affiliation with

4. Intent

Please select the intent of the study:

- ☒ Class project or other activity with educational purpose
- ☐ Part of institutions own operational monitoring
- ☒ Quality Improvement OB Department QI + Fulfillment of FLEX Grant stipulations
- ☐ Other, explain: _____

5. Purpose of Study:

Describe the purpose, the objectives or specific aim of study:

1. Multidisciplinary team members demonstrate basic knowledge of PPH;
2. Obtain supplies + medications within 120 seconds from identification of PPH
3. Second uterotonic medication will be administered within 60 seconds of obtaining medication
4. In the presence of uterine atony, uterine massage will be continuous unless otherwise ordered by Dr.
5. Uterine tamponade insertion will be completed within 6 minutes from time of request.

6. Description of study:

Describe procedure of study or please attach complete description:

See Attached. Chapter 3 p. 2-3

7. Population & Recruitment:

Describe Population of study including inclusion criteria, exclusion criteria, age range and estimated number of subjects, : See Attached for details Chapter 3 p.4

Multidisciplinary Nursing staff who work in hospital (OB, AC, ER, OR), CRNA's, Lab personnel, ER Providers and OB providers are invited

Does the study include any of the following population (*please check all that apply*):

☐ Pregnant women and/or fetuses ☐ Neonates(newborns) ☐ Minors(under 18 years)
☐ Prisoners ☐ Mentally impaired ☐ Physically disabled ☐ Residents (RMV,LTC)
☐ Vulnerable or at-risk groups (e.g. poverty, sustenance abuse) No unless ~~the~~ Staff is pregnant

Describe participant recruitment:

Sign up sheet for 30 minute Simulation training ; (Required for Nursing staff to fulfill FLEX Grant requirements) Invitation email will be sent to ER Providers and Chris Physicians

Please attach copies of any recruitment material used for this study See attached Appendix H + I

Will participants be compensated for this study (includes gifts, payments, services without charge, or monetary compensation-include dollar amount)? ☐ Yes ☒ No
If Yes, what is the source of funding for compensation?

Will there be any cost to the participants? ☐ Yes ☒ No If yes, please explain.

Are there any potential damage or adverse consequences to researcher, participants or environment with this project? This may include physical, psychological, social, or spiritual risks? ☒ Yes ☐ No
If yes, please describe: mental distress from answering questions on a topic which is not your expertise

Will cultural or moral sensitivity be addressed in this study? ___ Yes ☒ No If yes, please describe how it will be addressed:

8. Consent:

Describe Consent process:

Participants will have option to decline having their un-identified data included in the data analysis.

Please attach copies of any consent material (e.g. consent, oral consent script, information sheet given to subjects) Appendix J

Request for Waiver of Written Documentation of Consent or Waiver/ Alteration of Elements of Consent: X Yes ☐ No Reason for requesting waiver: I would request a waiver since all information will be un-identified and categorized by discipline only. However, my educational institution indicated that a consent is required

9. Data Collection

Describe types of data being collected and collection instruments or tools used (e.g. questionnaire, survey, measurements, etc.) Is this a credible tool?

Knowledge assessment - 10 questions - Not a validated tool

PPH Protocol checklist - NHHS protocol

Uterine Atony Metrics and PPH Cart checklist - developed by CMQCC

SET-M and FCR: Validated tools for evaluation of simulation experiences and Facilitator competency

Appendices B - G

Please attach copies of any collection instruments or tools.

10. Confidentiality of Research Data:

Will any direct identifiers be part of the data collection? ☐ Yes X No If yes, please describe:

Will identifying data be destroyed after study completion? X Yes ☐ No Projected date: December 2021

Will any recordings be made? ☐ Yes X No If yes, please describe:

Who will have access to data (Survey, questionnaires, recordings, interview records, etc.)? Please list

Bev Mayfield - Leader

Jen Mabee - QA/PI Manager

Will copy of research consent be included in subject's medical record? ☐ Yes ☐ No N/A

Will information be used for any other studies in future? ☐ Yes X No If yes, please describe: this would only be done if NHHS chose to continue research and use this as a pilot study for Critical Access Hospital's OB

Will medical records of subjects be reviewed? ☐ Yes X No

11. HIPAA Authorization:

Will HIPAA authorization be requested from subjects? ☐ Yes X No N/A

Please attach HIPAA authorization from

Is authorization of HIPAA requested to be waived? ☐ Yes ☐ No If yes, please describe:

12. Confidentiality Agreement:

Has confidentiality agreement been obtained for all Investigators? ☐ Yes X No

Please attach copies of signed agreement Bev Mayfield is the only Investigator.

13. Cooperating Institutions:

Will any institutions, individuals or organizations not part of NHHS cooperate in this research? X Yes ☐ No If yes, please provide following information:

Name of Organizations: Southern Adventist University School of Nursing	Address: PO Box 370 Collegedale, TN 37315
First Name: LaShawn Last Name: Horton, PhD, RN, MSN (Advisor)	Title: Bers DNP Project Advisor
Phone Number: ~~000~~-423-236-2959	Email address: lhorton@southern.edu
First Name: Holly Last Name: Gadd, PhD, RN, FNP-BC	Title: Dean of School of Nursing
Phone Number: 423-236-2973	Email address: hgadd@southern.edu
Has IRB approval from another institution been obtained? ☐ Yes ☒ No pending April 2021	
Please attach IRB approval from other institution	

14. Results:

To whom and how will the results be disseminated (check all that apply):
☐ Published Article ☒ Medical Staff ☐ Other or all Staff ☒ Board ☐ Conference
☒ Educational Institution ☐ Other-please specify: Publication if deemed appropriate by NJHS med staff

15. Attachments:

Please list all attached items:

Sent for interest
- Chapter 1 DNP Project Statement of Problem
- Chapter 2 DNP Project Literature Review
- X Chapter 3 DNP Project Description and Methodology with Appendices

Lead Investigator's Assurance Statement for Using Human Subjects in Research

✓ I certify that the information provided in this IRB application is complete and accurate.

✓ I understand that as Lead Investigator, I have ultimate responsibility for the conduct of IRB approved studies, the ethical performance of protocols, the protection of the rights and welfare of human subjects, and strict adherence to the study's protocol and any stipulation imposed by Medical Staff.

✓ I will submit modifications and/ or changes to the Medical Staff as necessary prior to implementation.

✓ I agree to comply with all policies and procedures, as well as with all applicable federal, state, and local laws regarding the protection of human participants in research.

Beverly J Mayfield BSN, RNC-OB/ONGS 2-12-2021
Lead Investigator Signature: Date:

Medical Staff Response

☒ Research Study Approved

☐ Research Study Approved with following stipulations: _____

written consent may be waived. Verbal consent is acceptable with a small oral script read to participants at start of activity

☐ Research Study Denied:

- Please make following changes and resubmit for reapproval:

- This study will not be approved at NHHS:

(Aaron Lowe, MD) 2/18/21

Chief of Medical Staff Signature: Date:

This application if approved will be good for one year from date of approval. If any changes are to be made to study, the lead investigator or their representative will need to submit another application for approval by NHHS Medical Staff with description of changes to study. If study is to be conducted for more than one year, an extension of approval shall be requested from Medical Staff prior to expiration of this approval. Applications will be reviewed once monthly at medical staff meetings.

Appendix M: Institutional Review Board Approval

SOUTHERN ADVENTIST UNIVERSITY
Power for Mind & Soul

IRB
Institutional Review Board

June 1, 2021

Principal Investigator: Beverly Jean Mayfield
Research Project: Postpartum Hemorrhage Management: Improving Quality and Patient Safety Through Multidisciplinary Simulation Training
IRB Tracking Number: 2020-2021-061

Dear Beverly Mayfield,

It is a delight to inform you that your research protocol titled "Postpartum Hemorrhage Management: Improving Quality and Patient Safety Through Multidisciplinary Simulation Training " has been approved by the Southern Adventist University Institutional Research Board according to the proposal. You are now authorized to proceed with the project as outlined. This approval expires June 1, 2022.
As a principal researcher, you have the ultimate responsibility for the conduct of the study, adherence to ethical standards, and protection of the rights and welfare of human participants. As you proceed with your research, you are expected to:

1) Conduct the study according to the approved protocol.
2) Make no changes to the approved study. If changes are necessary, proceed with one of the following:
   a) For minor changes to this protocol, please notify IRB by submitting an IRB Form B and proceed after its approval.
   b) For substantial changes, submit a new IRB Form A and proceed after its approval.
3) Use the approved procedure and forms for obtaining informed consent and data.
4) Promptly report any significant adverse events to the IRB within five working days of occurrence using an Adverse Report Form.

All forms must be submitted to irb@southern.edu.

We wish you many blessings as you move forward with this study and look forward to reading your findings when they are ready. If there is anything else we can do to assist you with this research study, please contact us.

Always in His service,

Robert L. Overstreet, Ph.D
Robert L. Overstreet
Director, Center for Teaching Excellence,
Southern Adventist University
4871 Taylor Circle, Collegedale, TN 37315
robertoverstreet@southern.edu
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SOUTHERN ADVENTIST UNIVERSITY
Individualization – Developer – Empathy – Achiever - Harmony

Appendix N: Scholarly Project EOP SLO Synthesis

This scholarly project has provided the author an opportunity for synthesis of Southern Adventist University School of Nursing Doctor of Nursing Practice program's end of program student learning objectives into the practice domain. These objectives reflect *Graduate Essentials* delineated by the American Association of Colleges of Nursing (2021).

Cultural Competence

Cultural competence by advanced practice nurses is demonstrated through sensitivity to a global culture of traditions and values, both for clients as well as other professionals. Southern Adventist University's School of Nursing adds a unique contribution to this objective with a focus on Christian responsiveness and caring. The author has had the opportunity to both demonstrate and mentor Christian responsiveness and cultural competence to learners as described in the project's theoretical framework. The educator has attempted to reflect God's unconditional love to all 65 participants as well as other team members, recognizing that each learner responds differently to interventions due to personal life experiences and his or their unique physical, psychological, social, and cultural self.

Evidence-based Practice

Translation of quality research findings and outcomes to solve problems and improve quality care in a specific practice setting was a primary focus of this project. Following a literature review on effective teaching strategies, instruction was provided to multidisciplinary teams for the implementation of a research and professionally supported evidence-based practice protocol for use with a target population. The project sought to ascertain if an association existed between the educational intervention and effective multidisciplinary protocol implementation in a low-volume obstetric setting.

Health Promotion

The author proposed an evidence-based method to prevent maternal morbidity (excessive blood loss) and promote human flourishing through the utilization of a wholistic theoretical framework. Education was provided to multidisciplinary teams in order to provided knowledge and experiential understanding of postpartum hemorrhage (PPH) management and thus empower effective teamwork for optimal patient health outcomes.

Patient-centered Care

Personalized, compassionate, and coordinated whole person care was facilitated through multidisciplinary simulation team training. Learners were guided to assess the simulated patient to determine specific needs based on stage

of PPH. Ongoing communication with the "patient" was also encouraged. Finally, exploration of individual patient needs and effectiveness of communication with the patient as well as colleagues was included in each simulation debrief experience.

Quality and Safety

This project was developed in cooperation with the target institution's quality assurance and project improvement manager in order to ensure a just culture that minimizes the risk of harm and promotes safety and quality of care to childbearing women in a rural, low-volume obstetric setting. Only the data from simulation performance was analyzed, but the institution has been encouraged to follow the recommendation to track and analyze actual PPH events and outcomes for systems learning opportunities. As mentioned in Chapter 3,

Informatics and Innovation

The project provided an opportunity to analyze outcomes from a simulated educational intervention using knowledge of nursing, computer, and information sciences. Data was collected and managed innovatively and ethically utilizing paper and ink, scanners, and computer data systems. As stated in Chapter 3 (Methodology), since PPH is a rare occurrence, it may be difficult to assess if actual healthcare outcomes are improved based on this specific project intervention.

Teamwork and Collaboration

Through this project, the author brought together multidisciplinary team members from Obstetrics (nurses), Acute Care (nurses and nursing assistants), Emergency Department (nurses, nursing assistants, and physicians), Laboratory (technicians and phlebotomists), and Surgery (certified registered nurse anesthetists). All disciplines were instructed in the protocol approach for management of PPH. During simulation debriefing, team members collaborated to identify roles specific to their specialties as well as other ways that they could contribute to effective teamwork in managing PPH emergencies. Improvement suggestions were analyzed by the multidisciplinary team and implemented or adapted as appropriate.

Professionalism

The author sought to mentor Christ-centered excellence in nursing roles and professional behaviors throughout the multidisciplinary team training. Nursing roles of integrity, accountability, critical thinking, collaborative relationships, clear communication, advocacy, and life-long learning were applied through caring, connecting, and empowering of

learners and the implementation team. This was especially accomplished with the OB Simulation Assistant with whom the greatest number of hours were spent in planning, implementing, and evaluating the educational intervention.