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Postpartum Hemorrhage Evidenced-Based Registered Nurse Staff Education Project

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
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Walden University
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Abstract

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MS, Walden University, 2010

BS, Brigham Young University, 2001

Project Submitted in Partial Fulfillment

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Abstract

Despite medical technology and research advances postpartum hemorrhages (PPH) continue to be a leading cause of morbidity and mortality for pregnant women, even in developed countries. One possible explanation for PPHs continuing to be a leading cause of maternal death is inconsistent recognition and timely treatment of women experiencing a PPH. This doctor of nursing practice project attempts to improve labor and delivery nurse knowledge through an educational intervention which will contribute to rapid identification and treatment of PPH. Knowledge change was demonstrated though change in pretest and posttest scores. The educational information and process was guided by adult learning theory and content was based on current research and evidence-based practice guidelines on PPH. Ninety six participants were assessed using a PPH pretest posttest design. The tests consisted of 15 questions. Correct scores were added and a percent correct score was calculated. The data demonstrated that 63% of the participants passed the pretest with an 80% or higher and 90% of the participants passed the posttest with an 80% or higher. The difference was statistically significant, indicating there was an increase in knowledge after the educational materials were presented. This DNP project contributes to social change by ensuring women receive excellent and timely PPH care by nurses who have a strong understanding of PPH and can apply that knowledge through rapid identification and treatment.

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Dedication

I would like to dedicate this doctoral project to my family who has always supported me in my educational endeavors. You are always enthusiastic and compassionate, of which I can't even begin to thank you enough. A special dedication to my parents, Kerry and Angela Powell, for unconditional love and helping me know that I can do hard things. Thank you so much for everything. I love you!

I also wish to dedicate this project to my friend, Susan Fautin, who was with me every step of the way and never let me lose hope. This journey would have been so much more difficult without her support and cheerleading. Thank you!

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Section 1: Nature of the Project

Introduction

The goal of any birth is a healthy outcome for mother and her baby; however, the rate of maternal mortality has increased worldwide. The World Health Organization (WHO) (2017) defined maternal mortality as the death of a woman while pregnant or within 42 days of the end of her pregnancy from any cause related to or aggravated by the pregnancy or its management. Callaghan (2011) explained that in the United States (US) maternal mortality rate decreased significantly after the 1900s with the introduction of improved medical science and technology; however, maternal mortality is again on the rise in the 21st century. The Centers for Disease Control and Prevention (CDC) (2013) reported that the US maternal mortality rate per 100,000 births was 17.3, which is an increase from 2012 with a rate of 15.9. Callaghan (2011) suggested that some of the increase may be due to better data collection, but better reporting mechanisms do not account for all causes of the rising rate of maternal mortality. The most common causes of maternal death are as follows: hemorrhage, hypertension, sepsis, obstructed labor, and unsafe abortions (Lawson & Keirse, 2013).

Postpartum hemorrhage (PPH) is one of the leading causes of maternal death and morbidity in developed and developing countries (Oberg, Hernandez-Diaz, Palmsten, Almqvist, & Bateman, 2014). In the US PPH has continued to be one of the most common causes of maternal death, with research supporting that more than 50% of those deaths could have been prevented (Berg, Callaghan, Syverson, & Henderson, 2010). Additionally, a large number of women who have experienced a PPH do not die, but may

suffer long term affects following the hemorrhage. In 2006 about 2.9% of the women who gave birth experienced a PPH or about 124,708 in the US (Callaghan, Kuklina, & Berg, 2010). Callaghan et al. (2010) reported that the number of women in the US experiencing a PPH, who did not die, increased 27.5% from 1995 to 2004.

This doctor of nursing practice (DNP) project was focused on educating staff nurses about PPH. The intended practice setting for this doctoral project was a 22 hospital healthcare organization in Utah. The organization is a non-for-profit company that employs around 37,000 individuals, including 481 labor and delivery nurses. Helping nurses understand the physiology of a PPH, identifying risk factors, and ensuring they are following the most current evidence for their interventions can help to provide a positive change in patient outcomes through increased knowledge and improved timeliness of response to PPH.

Problem Statement

The practice problem that was the focus of this DNP project was improving nurses' identification and responsiveness to a PPH through education focusing on consistent use of interventions based on evidence-based practice (EBP) standards. In 2015, the Utah Department of Health (UDOH) was given funding from the Association of Maternal and Child Health Programs to develop strategies to decrease Utah's maternal mortality rate. PPH was the third leading cause of maternal deaths in Utah during the years of 2005-2012 and Utah's postpartum transfusion rates are twice the national average (UDOH, 2015). Clark (2016) reported that the overall PPH rate for Utah was 3.2%. The project site has a 4.2% PPH rate and a 1.4% maternal mortality rate related to

PPH (Intermountain Healthcare, 2017). UDOH (2015) worked with hospitals, health organizations, and health care professionals to create a statewide collaborative group to discuss ways to implement a maternal safety intervention protocol for PPH. The challenge was to help labor and delivery nurses understand risk factors, physiology, and utilize the DNP site's PPH maternal safety protocol algorithm.

The DNP project held significance for the field of nursing practice by helping nurses to gain and apply knowledge to improve patient outcomes. Obstetrical emergencies, including PPH, are often unexpected, require clinical thinking, quick response time, are highly stressful, and can be challenging (Daniels, 2010). Nurses who have a strong knowledge base of risk factors and consequences of a PPH can then apply that knowledge by recognizing occurrences of PPH and intervening quickly and appropriately. Nurses have the ability to help keep patients safe, promote individualized treatment and prevention of illness, educate, and advocate for patients (American Nurses Association [ANA], 2017). This DNP project strived to promote the profession of nursing through the ANA's characteristics with the patient as the center of focus. In addition, the proposed DNP project was aligned with the American Association of Colleges of Nursing's project expectations. The AACN (2006) explained that the final DNP project helps students to synthesize what they have learned academically and through the practicum experience.

Purpose

The gap in nursing practice that was the focus of this doctoral project was the inconsistency and inaccuracy of early identification of PPH and subsequent application of

evidence-based interventions to treat PPH. This PPH education project was chosen because PPH continues to be a significant cause of mortality and morbidity in Utah with increasing maternal morbidity and mortality rates, similar to the overall national increase. A PPH is an obstetric emergency where rapid identification and responsiveness have a significant effect on patient outcomes. There is widespread variation in how nurses identify and respond to a PPH. One cause of variation is inconsistent application of treatment methods. Bateman (2014) reviewed several hospitals and found no recognizable nursing or care provider pattern regarding the use of medications for PPH and concluded that his research demonstrated a lack of standardization in how to treat these patients. Along with inconsistency in practice another variation is in blood loss estimation. The Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) (2015) reported that visual estimates of blood loss most often results in underestimation. Underestimation of blood loss can lead to a delay in recognizing an actual occurrence of a PPH and, subsequently, AWHONN recommended blood be weighed or quantified after delivery for a more accurate estimate of blood loss. These dissimilarities between nurses' and care providers' practices affects the care the patient receives. The DNP site's organization has 22 hospitals and there was a wide range of PPH rates and maternal mortality rates between each facility. One possible reason for this large variation is inconsistent identification and treatment of PPH patients.

The organizational level practice-focused question is as follows: For labor and delivery registered nurses employed within an inpatient hospital setting in western United States, does an evidence-based postpartum hemorrhage education module (as

recommended by AWHONN, 2016) improve nursing knowledge after participating in the education module?

This proposed PPH education project used an updated PPH protocol in the development of staff education that provided nurses with the knowledge needed for early identification and intervention that would hopefully positively influence consistent care and improve patient outcomes.

Nature of the Doctoral Project

There were several sources of evidence and data that was used to address the practice-focused question. The first source of evidence came from current published literature and professional nursing organizations guidelines, such as AWHONN, regarding PPH. AWHONN (2016) is a nursing organization that promotes women's health and has provided PPH related research-based education, guidelines, and position statements to guide nursing practice. National and regional statistics were obtained through online searching from credible sources.

In carrying out this PPH education project, I organized and presented current research on PPH identified in the literature to form an educational module about identifying and responding to a PPH. Labor and delivery staff nurses were asked to complete a pretest before attending a PPH education session and were asked to complete a posttest after the session. Data was reviewed, statistically analyzed, and organized into pre and post session information. This data was used to evaluate the education session to determine if knowledge and nurse confidence levels changed. The outcome data was also

used to identify changes and improvements that need to be made to the education module.

This DNP project's purpose was to help improve nurse identification and responsiveness to a PPH through education; thus, helping to decrease variation and inconsistency in nursing practice. Currently, there is variation in identification and reaction time to treating a PPH among the obstetric nurses and only low to moderate understanding of PPH physiology and standard guidelines. However, following nursing education it was hypothesized that nurses will have an improved understanding of PPH and consistently follow EBP guidelines, as set at the DNP site.

Significance

Change often affects people or groups differently and in planning to implement PPH education it is important to take stakeholder's views into consideration. This DNP project had many stakeholders, such as: nurses, physicians, midwives, hospital administration, patients, pharmacists, and community members. Nurses, physicians, pharmacists, and midwives may at first be hesitant to change practices to follow EBP; however, hopefully with education and data these care providers will be supportive and interested in learning more about PPH. Hospital administration, patients, and community members will be positively impacted by promoting consistent PPH treatment and identification, through the improvement of patient outcomes, improvement of patient satisfaction scores, decreased lengths of stay, and decreased healthcare costs.

This DNP project had potential implications for positive social change by increasing nursing knowledge and confidence in treating PPH patients, which

subsequently has the potential to improve patient care and safety. This project also had the potential to help the emergency department and postpartum departments who have similar practice populations that may care for PPH patients. This project had potential transferability to other labor and delivery units within the DNP project site's organization that are not included in this PPH education project. In a more global view, this DNP project may help to decrease maternal mortality and morbidity from PPH in the state of Utah.

Summary

A PPH is a true obstetric emergency requiring quick identification and treatment. There is widespread variation in how nurses identify and respond to a PPH. This variation in how healthcare providers respond and treat PPHs can affect maternal morbidity and mortality rates. This proposed PPH education project provided labor and delivery nurses with education to help nurses utilize EBP guidelines to improve identification and responsiveness to PPHs as a method of improving patient outcomes. In the following section the theoretical framework, prevalence, etiology, prevention of PPH, and local background and role of the student in this project was presented.

Section 2: Background and Context

Introduction

The practice problem that was the focus of this DNP project was the increasing rate of PPH patients and the associated maternal deaths. The purpose of this PPH education project was to improve nurse identification and responsiveness to a PPH through education focusing on consistent use of interventions based on EBP standards. The organizational level practice-focused question is as follows: For labor and delivery registered nurses employed within an inpatient hospital setting in western United States, does an evidence-based postpartum hemorrhage education module (as recommended by AWHONN, 2016) improve nursing knowledge after participating in the education module? The purpose of this doctor of nursing (DNP) project was to use an updated PPH protocol to provide nurses with the knowledge needed for early identification and intervention that would hopefully positively influence consistent care and improve patient outcomes. In this section concepts, models, and theories; relevance to nursing practice; local background and context; role of the DNP student, and role of the project team was presented.

Concepts, Models, and Theories

The concept of staff education, the whole-part-whole model, and Knowles theory of adult learning was used to inform this DNP project. Each of these elements helped to provide the foundation and development of this staff education project. In this section each concept, model, and theory was described, along with a rationale for its use, and how it applies to the DNP project was presented.

Concept

Staff education. Nurse staff educational opportunities are geared toward helping nurses gain knowledge, skills, and critical thinking ability as a means of improving patient outcomes (McHugh & Lake, 2010). Beal, Riley, and Lancaster (2008) stated that a healthy nurse work environment supports professional nurse development that in turn helps promote improved outcomes. The American Nurses Association (2017) stated that professional nurse development is a nurse's ability to build on their basic education and experiences to provide quality care. Education can influence a nurse's expertise by providing a theoretical and clinical knowledge base that can be evaluated and refined (McHugh & Lake, 2010). Benner (as cited in McHugh & Lake, 2010) explained that a nurse's expertise affects their decision making when faced with an actual clinical situation. Furthermore, Yakusheva, Lindrooth, and Weiss (2014) investigated what nursing characteristics positively affected patient outcomes. Yakusheva et al. (2014) found that overall nurses had a significant impact on patient outcomes and had an even greater effect if the nurse held a baccalaureate degree and high expertise level. These positive impacts toward patient care were shown to shorten patient length of stays and lower costs (Yakusheva et al., 2014). Labor and delivery is a critical care area of nursing that requires quick assessment and decision making skills. Developing expertise in PPH detection and treatment to improve patient outcomes was the goal of this PPH education project.

Staff education can be provided in a variety of methods. Didactic learning by itself may not be enough to affect a nurses' expertise; therefore, it is often combined with mentoring and skill practicing (McHugh & Lake, 2010). Similarly, Sprang (2010) reported that adding case studies in the instruction of staff helped to improve critical thinking and problem solving abilities. Simulation has also been used successfully to help educate staff on PPH. Nelissen et al. (2015) utilized PPH simulation and found that nurses had an immediate increase in knowledge and skills; however, it was noted that after nine months the knowledge and skills had declined. However, simulation remains a viable option for staff education. As mentioned above, education methods are often combined and tailored to the group of nurses being taught. Case studies and skill practice will be utilized in this PPH education project. Improving patient outcomes by helping to increase nurse understanding and expertise is an important objective of staff education development.

Model

The model that has been chosen for this PPH education project is the whole-part-whole (WPW) learning model (Knowles, Holton, & Swanson, 2015). This model has been shown to be helpful in the development of education programs, with its base in learning psychology (Knowles et al., 2015). The rationale for using this model was that it utilized the principles of adult learning and guided the creation and organization of education programs. This model helps provide learners with cognitive and behavioral components (Knowles et al, 2015). The WPW model was first described in 1972 (as cited in Knowles et al., 2015) as a model for corporate education and throughout the

years has been used by many disciplines. The learner is exposed to the whole learning concept, then the parts are broken down individually, and then the whole concept is brought back together again. The first "whole" in the model is where the learner is exposed to the learning experience (Kobayashi et al., 2008). Knowles et al. (2015) further explained that this first part of the model helps motivate learners to what to learn by making the content relevant and meaningful. The second section of the model is the "part" phase. This section of the model is where the education concept is broken down into parts and the new education is discussed individually. This section can also include repetitive practice of the parts through task training or simulation (Kobayashi et al., 2008). Knowles et al. (2015) stated that in order for the second "whole" to be effective the learners must have first mastered the "parts." The second "whole" is the section where the parts are integrated back into the whole education concept. Knowles et al. (2015) believed that this is the section where complete education happens. In this section education is linked to previous experiences and understanding of the concept overall is gained (Kobayashi et al., 2008).

In this DNP project the first "whole" was introducing the concepts of PPH in the context of how the concepts will affect the nurses' practices. The "part" section was where the individual concepts were broken down, taught, and practiced. The final "whole" brought the content back together and allowed the nurses to apply what they had learned by utilizing the nurses' previous experiences and the new knowledge they had gained. The WPW learning model helps provide a framework for the education program on PPH being designed for this DNP project (see Figure 1).

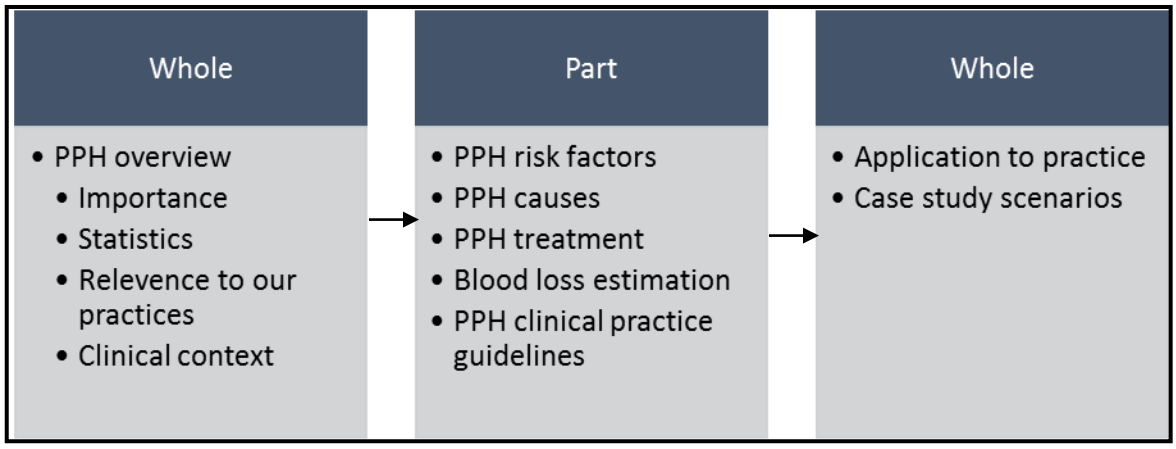

Figure 1. PPH learning model visual representation based on Knowles et al. (2015) WPW learning model.

Theory

The theory that will be used to inform this DNP project is Knowles theory of adult learning (Knowles et al., 2015). While there are many theories related to how adults learn, Knowles' theory was chosen because the elements of the theory align well with how nurses, as adults, learn and can be applied to staff education development. The theory of adult learning helps educators understand how adult's best learn and that understanding can be used to develop more meaningful educational opportunities.

Knowles at al. (2015) explained the core adult learning theory principles as (a) learner's need to know, (b) self-directed learning, (c) previous experiences of the learner, (d) readiness to learn, (e) problem solving learning, and (f) motivation to learn. The principle of learners needing to know emphasizes the desire of learners to know the "why" behind education. Adult learners need to know the "why" the education is needed, how it will be conducted, and why it is important (Knowles et al., 2015). The

principle of self-directed learning is explained as adults taking responsibility for their learning. This could be adults independently seeking out learning opportunities, but may also mean the learner takes ownership of what they are learning (Knowles et al., 2015).

The principle of previous experiences to the adult learner relates to the importance previous experiences play in how adults learn. Previous experiences create who the learners are and how they connect to educational content; additionally, experiences related to learning new concepts can help or hinder new learning (Knowles et al., 2015). The principle of readiness to learn helps educators understand that life situations are often the motivating factor of adults wanting to learn something new. These life situations may be required education from their corporation or may be the need to return to school to start a new career. The circumstances of these life situations affect the learner's readiness to learn and can be important for the educator to understand (Knowles et al., 2015). The principle of problem solving highlights the importance of adults wanting to learn information they can directly apply to their roles. Problem solving learning helps focus the education towards real-life context (Knowles et al., 2015). The final principle of motivation to learn means that each adult learner has a different motivation to learn new information. Knowles et al. (2015) explained that adult learners seem to be more motivated to learn when the information helps them solve problems in their lives or the information being learned brings internal satisfaction.

Nurses' professional development through education pairs well with the adult learning theory. Nurse professional development for the purposes of this DNP project was defined as those activities that support the nurse in gaining knowledge, experience,

and practice refinement as a means of improving personal practices and outcomes (Knowles et al., 2015). The priniples explained above can be applied to how nurses learn and can be utilized in the development of nurse staff education. These principles were used to inform this DNP project.

Relevance to Nursing Practice

PPH Review of Literature

In this literature review the existing scholarship on PPH cause and treatment, including a brief history of the broader problem in nursing practice and identifying gaps in practice was reviewed and discussed. Experiencing a PPH can have life altering consequences for a woman, but understanding the underlying causes of a PPH can help improve rapid identification. PPH is one of the leading causes of complications in childbirth and is also one of the most preventable (Bingham & Jones, 2012; Main et al., 2015). In 2006 about 2.9% of the women who gave birth experienced a PPH or about 124,708 in the US (Callaghan, Kuklina, & Berg, 2010). In the US PPHs account for about 11-12% of maternal deaths (Goffman, Nathan, & Chazotte, 2016). Not all women who experience a PPH die. In addition, those women who do not die are at an increased risk of serious morbidity. Patients with severe PPH may require blood transfusions, surgical interventions, and potentially may need a hysterectomy (Bateman et al., 2014).

The most common causes of a PPH are uterine atony, retained products of conception, and lacerations; in fact, uterine atony is responsible for about 70% of PPH cases (Oberg et al, 2014; Simpson & Creehan, 2014). Uterine atony is defined as the inability of the uterine muscle to contract (Simpson & Creehan, 2014). When the uterus

does not contract down, following the delivery of the placenta, and continues to contract significant blood loss can occur from the area of placental separation (Simpson & Creehan, 2014). Bingham and Jones (2012) stated that it is important to grasp the etiology of PPHs to help guide quality improvement initiatives. Understanding the risk factors and common causes of PPHs can help nurses improve outcomes through rapid identification of symptoms.

There are some risk factors that have been identified as putting some woman at a higher risk of having a PPH, such as: an over-distended uterus, induction of labor, previous cesarean section, pregnancy hypertension, fibroids, coagulopathy, placenta previa, and obesity (Oberg et al., 2014). Gaining a greater understanding of the risk factors and possible causes of a PPH can help care providers in their care of laboring and delivering women. Risk factors continue to be identified, for example, Oberg et al. (2014) conducted a retrospective study of 914,939 deliveries between 1997 and 2009 in order to determine if having a PPH increased the risk of having a PPH in subsequent births. Oberg et al. (2014) discovered that women who had experienced a PPH with their first birth had a 3-fold increased risk of having a PPH with their next delivery and 6-fold after their second birth with a PPH. Risk factors for PPH continue to be investigated. Following PPH risk factors further, a recent study by Palmsten et al. (2013) investigated the role antidepressant medication had on PPH rates. Palmsten et al. (2013) conducted a cohort study of 106,000 pregnant women who were taking serotonin, non-serotonin reuptake inhibitors, or tricyclic antidepressants during pregnancy within one month of delivery. This study found that women taking these medications had about a 1.4 to 1.5-fold

increased risk of having a PPH (Palmsten et al., 2013). This study is one of the first to investigate this type of medication as a risk factor for PPHs.

Just as risk factors are continuing to be identified for PPH, PPH treatment methods continue to be evaluated. The treatment of PPHs can take the form of proactive management, medication use, or surgical interventions. Care providers often practice active management in the 3rd stage of labor. This means that proactive measures are taken to prevent a PPH through administration of Oxytocin at the delivery of newborn, cutting the umbilical cord within 2-3 minutes of birth, and actively working to deliver the placenta once the baby is born (Simpson & Creehan, 2014). Oxytocin is the most common first-line medication used to both prevent and treat uterine atony (Bateman et al., 2014). This medication can be given as an intermuscular injection or intravenously.

If Oxytocin does not work, the second-line uterotonic medications include methylergonovine maleate, carboprost, and misoprostol (Simpson & Creehan, 2014). Methylergonovine maleate is given intramuscularly to increase uterine atony, but should not be administered to patients with the diagnosis of hypertension. Carboprost is a medication given intramuscularly, but should not be given to patients with asthma. Misoprostal can be administered orally, rectally, and vaginally. Each of these medications helps to improve uterine atony but each have differing onset and re-dosing times. In conjunction with these uterotonics, if a patient continues to bleed heavily an intrauterine balloon catheter may be placed (Bingham & Jones, 2012). The balloon is placed in the uterus, filled with normal saline, and provides a uterine tamponade to reduce bleeding. This method can be used for patients who have had a vaginal birth or a cesarean section.

Surgical options include dilation and curettage (D&C), B-Lynch suture technique, and hysterectomy. A D&C may be performed to remove any remaining placental tissue in the uterus. A B-Lynch suture technique can be performed to surgically suture the uterus to keep it compressed (Price & B-Lynch, 2005). This procedure requires specialized training, but has been used successfully to prevent a hysterectomy (Price & B-Lynch, 2005). A hysterectomy is the surgical removal of the uterus. This is usually an emergency measure used to control severe bleeding and has an incidence rate in the US of about 2.28 per 1,000 births (Rossi, Lee, & Chmait, 2010). Nurses need to understand treatment options for a PPH so they can respond quickly when a PPH is identified.

In an effort to further evaluate PPH treatment methods, Bateman et al. (2014) conducted a cohort study of 2,180,916 women who delivered between the years of 2007 to 2011 to investigate patterns related to second-line uterotonic administration. Bateman et al. (2014) found that despite evidenced-based guidelines that should have been used to determine how and when second-line uterotonic medications should be given, there was wide spread variation between hospitals and care providers in their pattern of caring for PPH patients. Bateman et al. (2014) hypothesized that patients could benefit from evidenced-based practices that are consistently followed. Along these same lines, Dahlke et al. (2015) conducted a descriptive analysis of four different national PPH guidelines from the following groups: the American College of Obstetricians and Gynecologists practice bulletin, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, the Royal College of Obstetrician and Gynaecologists (RCOG), and the Society of Obstetricians and Gynaecologists of Canada. Disconcertingly, Dahlke et al.

found that all four guidelines defined PPH differently, included different information, and had variation in treatment options. Dahlke et al. concluded that more research is needed to establish consistent guidelines.

As a strategy to address the mentioned inconsistencies, Main et al. (2015) explained the importance of standardized, inclusive, interdisciplinary programs to help improve patient outcomes. In an effort to address this a work group of the Partnership for Maternal Safety, within the Council on Patient Safety in Women's Health Care developed an obstetric hemorrhage safety bundle (Main et al., 2015). This bundle outlines four domains with accompanying areas of focus to help hospitals as they develop policies and procedures for how to care for PPH patients. Similarly, AWHONN (2015) has an established PPH project that provides tools, resources, and research to support creating consistent practices and nursing care.

One of the gaps in PPH management research is EBP guidelines that are followed inconsistently. Upadhyay and Scholefield (2008) investigated factors that contribute to severe PPH cases and reported the following elements: misdiagnosis, delay in diagnosis, not following established protocols, lack of communication, underestimating the severity of the PPH, inadequate documentation, and systems failure. Likewise, Rath (2011) also designated delay in diagnosis, delay in treatment, underestimation of blood loss, ineffective communication, and organizational deficits as significant issues affecting the outcomes of PPH. In addition, Audureau et al. (2009) stated that there was a lot of variation between polices for identifying and treating PPH between hospitals and countries despite consistent scientific evidence. Audureau et al. (2009) evaluated the

effectiveness of implementing PPH clinical guidelines and education to help with consistent diagnosis and management at several hospitals and found the intervention was successful in improving practice and outcomes. These inconsistencies can have serious adverse effects on maternal outcomes. Considering that inconsistencies exist in the identification and treatment of PPH and research has been shown that developing consistent practices can help improve PPH outcomes, the literature supported the proposed DNP PPH education project.

Staff Education Strategies

The literature regarding nurse staff education strategies provides a variety of education methods with varying advantages and disadvantages. Selecting the appropriate teaching strategy for an educational opportunity is an important part of program design (Xu, 2016). Choosing the most effective nurse educational strategy can ultimately help improve patient safety and care (Sherman, Comer, Putnum, & Freeman, 2012). The most traditional and common medical education method is a lecture format (Sangestani & Khatiban, 2013; Sherman et al., 2012; Xu, 2016). This method is sometimes referred to as teacher-centered learning (TCL). The advantages of this method is that it is cost effective, a good way to introduce new material, and can cover a lot of information quickly (Xu, 2016). Sherman et al. (2012) stated that face-to-face interaction that is available in lecture format allows the instructor to monitor the student's visual cues and address issues or questions that come up quickly. Sherman et al. completed a randomized controlled trial to determine if blended versus lecture learning for clinical pharmacology nursing students was a more effective learning mode. Sherman et al. (2012) found that there was no

significant difference between the two learning methods regarding knowledge gained and student satisfaction. Likewise, Kordi et al. (2016) found no significant difference in knowledge gained and blood loss visual estimation skills between a web-based program, simulation, and a lecture format in their three-group randomized clinical trial. These articles support the use of lectures as an effective education strategy.

Despite the lecture method being used regularly in educational settings, the practice has been heavily criticized in the literature. Sangestani and Khatiban (2013) referred to this method as one-way communication where the student is supposed to passively absorb lecture information. If the lecture education strategy is TCL than the converse would be learner-centered learning (LCL). Learner-centered teaching has the goal of helping develop students into life-long learners and promoting critical thinking (Bishop et al., 2014). In fact, students are guided to discover new ways of solving problems by using previous and newly learned knowledge or principles (Williams & Beattie, 2008). There are several studies investigating the differences between teacher-centered and learner-centered education strategies.

Tayyeb (2013) conducted a quasi-experimental study of 200 medical students to determine the effectiveness of problem-based learning (PBL) on critical thinking and problem solving skills versus traditional lecture methods. PBL is a LCL educational strategy that utilizes different learning methods to actively engage students and promote critical thinking (Tayyeb, 2013). Tayyeb reported that traditional lecture methods were successful in improving content knowledge when compared with PBL; however, the PBL method increased critical thinking and problem solving skills where traditional lecture

methods did not. One of the limitations of this study is that the researcher does not describe the PBL learning methods used. In a like manner, Sangestani and Khatiban (2013) conducted a quasi-experimental study investigating PBL and traditional lecture methods used to teach pregnancy and childbirth to 56 midwife students. Sangestani and Khatiban (2013) found that students in the PBL student group demonstrated increased learning progress, reported improved ability to apply what they learned in the clinical setting, and reported increased learning motivation and satisfaction. In contrast, Higgins, Kfouri, Biringer, Seaward, and Windrim (2015) investigated the use of a traditional lecture method and a PBL using interactive exercises and video simulation to teach nurses, midwives, and physicians about PPH. Higgins et al. (2015) conveyed that the participants reported satisfaction with both methods, but indicated that they would like both methods combined to maximize their experience.

Another LCL education method is simulation. Simulation is an education strategy that attempts to replicate clinical situations for learners (Buckley & Gordon, 2011). Simulation allows learners to practice skills and apply their knowledge to problem solving through specific clinical scenarios (Stayt, Merriman, Ricketts, Morton, & Simpson, 2015). Stayt et al. conducted a randomized controlled trial of 170 undergraduate nursing students to determine the effectiveness of simulation training versus a traditional lecture method. Stayt et al. discovered that the simulation group performed better on the clinical examination; however, there was no difference between the groups in relation to student reported self-efficacy and competency. The simulation group did report increased satisfaction with their teaching method when compared to the lecture group (Stayt et al.,

2015). There are a variety of LCL education strategies that are valid educational methods that can be used in the nurse staff education setting.

The literature suggests that in general traditional lecture methods are a valid education strategy that is still readily used (Xu, 2016); however, this method is more passive and may not be as conducive to critical thinking (Sangestani & Khatiban, 2013). Research has demonstrated that LCL education strategies can help improve problem-solving and critical thinking (Bishop et al., 2014). The LCL education strategies may help improve critical thinking and problem solving skills, but most importantly seem to increase education satisfaction and desire to learn. The gap in literature noted from this review is that there is not one correct staff education strategy that can ensure learning. However, the literature does demonstrate that LCL strategies are effective and more desirable for students (Bishop et al., 2014). The LCL literature fits well with Knowles theory of adult learning, the theory this DNP project is based on, because it supports the idea of adults being autonomous learners, promotes life-long learning, supports the concept of adults valuing their past experiences, and supports the need adults have to learn applicable information that can readily be applied back to their practices (Knowles et al., 2015). In conclusion, LCL staff education strategies will be utilized in the development of this DNP education program.

Local Background and Context

The practice-focused question that this DNP project addressed is as follows: For labor and delivery registered nurses employed within an inpatient hospital setting in western United States, does an evidence-based postpartum hemorrhage education module

(as recommended by AWHONN, 2016) improve nursing knowledge after participating in the education module? This is an important topic because current literature has demonstrated an increase in PPHs over the last few years, including rates in Utah. PPH was the third leading cause of maternal deaths in Utah during the years of 2005-2012 and Utah's postpartum transfusion rates are twice the national average (UDOH, 2015). One of the gaps in PPH management is inconsistent identification and treatment. Upadhyay and Scholefield (2008) investigated factors that contribute to severe PPH cases and reported the following elements: misdiagnosis, delay in diagnosis, not following established protocols, lack of communication, underestimating the severity of the PPH, inadequate documentation, and systems failure. Likewise, Rath (2011) also designated delay in diagnosis, delay in treatment, underestimation of blood loss, ineffective communication, and organizational deficits as significant issues affecting the outcomes of PPH. These inconsistencies can have serious adverse effects on maternal outcomes. In addition, Audureau et al. (2009) stated that there was a lot of variation between polices for identifying and treating PPH between hospitals and countries despite consistent scientific evidence. Audureau et al. (2009) evaluated the effectiveness of implementing PPH clinical guidelines and education to help with consistent diagnosis and management at several hospitals and found the intervention was successful in improving practice and outcomes. Considering that inconsistencies exist in the identification and treatment of PPH and research has been shown that developing consistent practices can help improve PPH outcomes, there was sufficient evidence to support the justification of this DNP project.

The institutional context for this DNP PPH education project was a 22-hospital healthcare organization in Utah. The organization is a non-for-profit company that employs around 37,000 individuals, with 481 of those employees being labor and delivery nurses. The healthcare organization has the following mission statement, "helping people live the healthiest lives possible" (Intermountain Healthcare, 2017). The vision of the organization is to become a model healthcare system by providing outstanding care at an affordable cost (Intermountain Healthcare, 2017). The hospital system is accredited through The Joint Commission. This DNP project was implemented in three of the 22 hospitals within the organization, where about 150 labor and delivery nurses are employed. The three hospitals were chosen because they are geographically close and have similar nurse demographics. These three hospital perform approximately 8500 births annually.

The definitions and terms relevant to understanding the PPH education project was explained here. The actual definition of a PPH is difficult to define because there are many varying opinions. This DNP education project used the historic definitions of a PPH, as defined as blood loss greater than 500 mL after a vaginal birth and greater than 1000 mL after a cesarean birth (Main et al., 2015). These numbers were chosen because obstetrical leaders at the DNP site felt that women with this much blood loss needed increased observation and interventions. These are the definitions used in the project site's PPH EBP protocol and algorithm.

This DNP PPH education project utilized the site's PPH clinical guideline that is referred to as a PPH algorithm. This algorithm, in combination with the most recent

literature, provided the scientific basis for the staff education program. PPH treatment and management definitions are consistent with nationally recognized definitions. This algorithm was created as a part of a statewide initiative to address evidenced-based ways of treatment and management of PPH.

Role of the DNP Student

The professional context for this DNP project was obstetrics, with a specific focus on labor and delivery. I have been a labor and delivery nurse for 16 years and have personally cared for many patients who have experienced a PPH. I was fortunate to not have one of my PPH patients die, but have had patients who have needed emergency hysterectomies and blood transfusions. According to the research at least 50% of PPHs are preventable (Agrawal, 2015). This statistic in conjunction with my passion for helping laboring women created the relationship and foundation for my DNP project. The project was implemented in 3 of the 22 hospitals within the organization. The three hospitals were chosen because they were geographically close and have similar nurse demographics. I have a past working relationship with these sites and have worked in one of the hospital's labor and delivery units for 16 years. I am the unit education consultant for the labor and delivery unit I work on. I provide education and mentoring for employees on my unit; however, I am not in a supervisory role and do not have input into staff evaluations. I have a working relationship with the labor and delivery unit educators at the two other hospitals, but do not have a supervisory relationship with their unit staffs. The relationships I have formed within this organization will be extremely helpful in the completion of this project because those associations will assist in promoting trust and

fostering collaboration needed to move this project forward. My role as a DNP student was well received with labor and delivery nurse leadership from these three hospitals and they were supportive of this DNP project. For this DNP project I acted as the principle investigator, including project development, implementation, and evaluation.

The motivation for this DNP project was the increased PPH rate in Utah, the location of the project site, which is similar to the overall national increase. Clark (2016) reported that the PPH rate was 3.2% and was the third leading cause of maternal deaths in Utah. In addition, another motivation for this DNP project was my personal experience with PPH patients. Through staff education I wanted to positively influence consistent care and improve patient outcomes. I believe my professional and scholarly experiences have provided perspectives that will help in the development of this staff education program.

My personal experience with PPH could be a potential area of bias. Pratt (2008) reported on issues that affect qualitative research bias; however, the issues described could be related to this DNP project. Pratt (2008) suggested that studies should be strongly embedded in theory, provide enough data for readers to draw their own conclusions, and researchers should try to be objective and transparent with their methods. My project was based on Knowles theory of adult learning and the most current research in developing the staff education program (Knowles et al., 2015). It was important to try and remain objective throughout this project. I believe the use of my project team reviewing the project helped the project to be objective.

Role of the Project Team

This DNP project utilized a project team. The project team consisted of the DNP student and organizational leadership in labor and delivery. The organizational leadership consisted of the unit education consultants, unit managers, and regional education consultant over labor and delivery at these three hospitals, with a total team of seven individuals who were all registered nurses. Initially the DNP project was presented to the team by the DNP student in order to obtain a commitment of support. The team was presented with background information, evidence, and other forms of information at this time. The team was given multiple opportunities to share their expertise and contextual insight relative to the DNP project by providing formative evaluations throughout the creation of the education program and development of an outcome questionnaire. The timeline and responsibilities of team members to review and provide feedback on the DNP project in in Table 1.

Table 1

Timeline of Project Team Responsibilities

Timeline			
	Initial Review	Second Review	Final Review
PPH Education Program	Obtain team members support and feedback	Team members review and provide feedback	Team members review, provide feedback, and provide final approval

PPH Questionnaire	Obtain team members support and feedback	Team members review and provide feedback	Team members review, provide feedback, and provide final approval

Summary

Nursing education is an essential component of professional development and can be accomplished through well-developed staff education programs. In the process of creating staff education it is important understand how nurses learn and strategies to support that learning. Knowles theory of adult learning and the WPW learning model were used as the framework for this DNP project in conjunction with a review of applicable literature. In the following section a description of the planning process for this DNP project was presented.

Section 3: Collection and Analysis of Evidence

Introduction

The practice problem that was the focus of this DNP project was the increasing rate of PPH patients and the associated maternal deaths. The purpose of this PPH education project was to improve nurse identification and responsiveness to a PPH through education focusing on consistent use of interventions based on EBP standards. This proposed PPH education project used an evidenced-based PPH protocol to provide nurses with the knowledge needed for early identification and intervention that would hopefully positively influence consistent care and improve patient outcomes. The concepts of PPH and staff education, the WPW model, and Knowles theory of adult learning were used help to provide the foundation for the development of this staff education project. In this section a practice-focused question, sources of evidence, published outcomes and research, archival and operational data, evidence generated for the doctoral project, and an analysis and synthesis were presented.

Practice-Focused Question

In Utah the rate of maternal mortality and morbidity is increasing, similar to that of the US. PPH was the third leading cause of maternal deaths in Utah during the years of 2005-2012 and Utah's postpartum transfusion rates are twice the national average (UDOH, 2015). Clark (2016) reported that the overall PPH rate for Utah was 3.2%. The project site has a 4.2% PPH rate and a 1.4% maternal mortality rate related to PPH (Intermountain Healthcare, 2017). UDOH (2015) has worked with hospitals, health organizations, and health care professionals to create a statewide collaborative group to

discuss ways to implement a maternal safety intervention protocol for PPH. The challenge was now to help labor and delivery nurses understand risk factors, physiology, and utilize the DNP site's PPH maternal safety EBP protocol.

The gap in nursing practice that was the focus of this doctoral project was the inconsistency and inaccuracy of early identification of PPH and subsequent application of evidence-based interventions to treat PPH. This project was chosen because PPH continues to be a significant cause of mortality and morbidity in Utah with increasing maternal morbidity and mortality rates, similar to the overall national increase. A PPH is an obstetric emergency where rapid identification and responsiveness have a significant effect on patient outcomes (Audureau et al., 2009). There is widespread variation in how nurses identify and respond to a PPH. These dissimilarities between nurses' and care providers' practices affects the care the patient receives and has been noted as a concern at the DNP project site through the wide range of PPH rates and maternal mortality rates throughout the organization (Bateman et al., 2014).

The organizational level practice-focused question is as follows: For labor and delivery registered nurses employed within an inpatient hospital setting in western United States, does an evidence-based postpartum hemorrhage education module (as recommended by AWHONN, 2016) improve nursing knowledge after participating in the education module?

The purpose of this DNP project was to use current evidence and an updated EBP PPH protocol to provide nurses with the knowledge needed to improve their ability to quickly recognize and provide interventions for a PPH. This purpose was directly aligned

with the practice focused question. My practice question was focused on helping nurses gain improved understanding of PPH by evaluating knowledge level pre and post educational intervention. The ultimate goal of improving PPH understanding was to help nurses rapidly identify and treat a PPH and improve patient outcomes.

The definitions and terms used in this proposal will be explained here. The actual definition of a PPH is difficult to define because there are many varying opinions. This DNP project will use the historic definitions of a PPH with blood loss being greater than 500 mL after a vaginal birth and greater than 1000 mL after a cesarean birth (Main et al., 2015). These numbers were chosen because obstetrical leaders at the DNP site felt that women with this much blood loss needed increased observation and interventions. These are the definitions used in the project site's PPH EBP protocol and algorithm.

Sources of Evidence

There are several sources of evidence and data that will be used to address the practice-focused question. The first source of evidence came from current published literature and professional organization's guidelines, such as AWHONN, regarding PPH. AWHONN (2016) is a nursing organization that promotes women's health and has provided PPH related research-based education, guidelines, and position statements to guide nursing practice. National and regional statistics were also be obtained through online searching. The DNP site reports PPH rates overall for the organization and also per each hospital. This report provided valuable organizational information regarding maternal mortality rates, PPH rates, and blood transfusion rates.

An internet search using PubMed and EBSCO databases was utilized to find the most current literature on PPH, nursing staff education, adult learning theory, and WPW learning model. The following search words and phrases were used: postpartum hemorrhage, hemorrhage bundles, hemorrhage treatment, maternal mortality, staff-nurse education, nurse education, adult learning theories, nurse learning models, and whole-part-whole learning model. The literature was reviewed and evidence gleaned from the research to address the practice-focused question.

The evidence obtained through the sources stated above had a strong relationship to the purpose of this DNP project. The evidence helped to identify the gap in practice, theoretical underpinning, and provides the most up-to-date research for the development of the proposed PPH education project. The aim of this project was to help improve labor and delivery nurse's understanding of PPH and evidence is necessary in this education planning. Evidence helped to support and inform the aspects of this DNP project.

The collection and analysis of this evidence provided an appropriate way to address my practice focused question. The evidence established there is a problem to be addressed and the local ramifications. The literature provided EBP data that can be used in the development of a PPH education module. All of these methods combined to help address my practice focused question of improving knowledge in labor and delivery nurses regarding PPH.

Evidence Generated for the Doctoral Project

Evidence generated for the DNP project came from the pretest and posttest data. Institutional review board (IRB) approval was obtained and then participants were

recruited from three different labor and delivery units. The education program included a didactic and skills portion presented by the DNP student at a labor and delivery staff meeting. Consent was obtained and participants were completed a pretest before the educational opportunity and completed a posttest one month after. Data collected was analyzed to determine if nurse knowledge was improved regarding PPH.

Participants

Purposive sampling took place to include labor and delivery nurses from three of the hospitals within the DNP project site's corporation. Nurses who currently worked as a labor and delivery nurse and who were not on orientation had the opportunity to participate. These nurses were the best option for participating in this project because of their clinical expertise and the patient population they serve. Grove, Burns, and Gray (2013) suggested using at least 30 participants per variable when collecting quantitative data. The research variable for this project was knowledge comparison of nurses before and after the educational intervention. Including three hospitals provided the potential for about 80-100 participants, which was enough nurses to cover a 20% attrition rate.

Procedures

Data were obtained using a one-group pretest-posttest design. The independent variable was the staff education program. The dependent variable was nurse knowledge. Nurses were asked to complete a pretest before attending a PPH educational session and were asked to complete a posttest immediately following the session that is directly related to the identified learning objectives. This method was aligned with the constructs

of the doctoral project through the fulfillment of an educational intervention that determines knowledge levels before and after the intervention.

Development and review of educational maternal. The initial step of developing the educational program and materials was to obtain a commitment of support from organizational leadership. Organizational leadership were one of the groups of stakeholders who had a vested interest in this DNP project as a means to improve patient outcomes. Obtaining their support throughout the project built trust and ensured the educational program met the corporation's needs. Once support was obtained, learning objectives were formulated and current literature reviewed for relevant teaching materials and content that addresses the program goals. The staff education program was developed utilizing a lecture format, skills practice, and a theoretical framework, with knowledge content based on EBP guidelines and current literature. The education program was reviewed by organizational leadership through a formative review and revisions were made according to their recommendations. A final review with organizational leaders and end-users was completed before implementation.

Development of questionnaire. It would have been preferable to adapt or utilize a previously developed questionnaire; however, I was unable to find an existing measurement instrument that would work for this DNP project. Therefore, a tool needed to be developed. The degree of learning that will result from the PPH educational intervention was assessed with a pretest and posttest that included three demographic questions and 15 knowledge based multiple choice questions. Questions more general in nature were included first and progressed toward more specific and complex questions.

The questions were developed using the most current PPH literature, practice guidelines, and the DNP site's EBP PPH protocol. The posttest was identical to the pretest.

Strategies to assure the test's validity of the information produced were used. The first was to have my preceptor and faculty mentor review the first draft of the test. The next draft was reviewed by organizational leadership, with resulting feedback being implemented into the questionnaire. This leadership group consisted of all the labor and delivery unit educators for the corporation, regional educators, and corporate leadership. The final draft was reviewed again by organizational leadership, but also pretested on a sampling of labor and delivery floor nurses. These reviews served to help ensure the questions are interpreted the desired way and are not leading in nature (Grove et al, 2013).

Educational program administration. Registered nurse participants were recruited from three regional labor and delivery units from within the DNP site's corporation. The DNP student attended labor and delivery staff meetings at the participating hospitals to advertise the educational opportunity and created advertising flyers to be hung on the nursing units. Participants were asked to complete a pretest on PPH. The staff educational program followed the pretest completion in a staff meeting. Participants were then requested to complete a posttest immediately following the educational program.

Protections

In the process of recruiting and utilizing participants for this DNP project careful attention was paid to ensuring the ethical protection of the participants. Before beginning

the session, I explained my project and provided informed consent. In support of the participants' autonomy they had a choice to participant or not. Staff responses were kept confidential, but not anonymous. The pretest and posttest, as a set, will be numbered identically. Participants were given a numbered packet that included the consent, pretest, and posttest in its own envelope. The DNP student explained the consent and those interested signed the form. Participants were then asked to complete the pretest, which took about eight to ten minutes, after which time the pretests and consents were collected. The education session was provided and following the presentation the participants were asked to complete the posttest before leaving their staff meeting. The DNP student also had self-addressed stamped envelopes for participants unable to finish the posttest by the end of their staff meeting.

The institutional review board (IRB) approval through Walden University (approval number 07-12-17-0084895) and the DNP project site (IRB# 1050543) was obtained. These IRB boards help to ensure that ethical standards are met and the project complies with all rules and regulations regarding data collection and project participants. IRB approval must be obtained before any data is collected or analyzed.

Analysis and Synthesis

The data collected for this project was recorded, tracked, organized, and analyzed using SPSS software. To ensure the integrity of the evidence procedures to enhance reliability and validity should be used (Kossman et al., 2006). One method used to help enhance reliability was that I was the sole educational session provider, which helped ensure all teaching sessions were taught that same way. Another procedure was to

critically review data outliers. Outliers are data points that are at least three standard deviations from the mean (Meghani, Byun, & Chittams, 2014) Meghani et al. (2013) explained it is important to determine if the outliers were caused from errors or random variations in the data. If outliers occur during the analyses of the data I first looked to see if it is a coding error. If the outlier was not a coding error then I determined if there was a correlation between the outlier and demographic information, such as years as a nurse, and attempted to explain what the outliers may mean for my project.

Descriptive analyses for the dependent variable was collected, with means and standard deviations calculated for demographic information and test scores. The test score were calculated as a percentage of the number of questions answered correctly out of the number of questions answered. Test percentages, with passing being considered 80%, was reported for pre and posttests. Data was then further broken down by comparing percentages and years as a labor and delivery nurse.

Summary

PPH has significant mortality and morbidity concerns for woman in developed countries. Higgins, Kfouri, Biringer, Seaward, and Windrim (2015) stated that PPH affects about 1 in 5 deliveries and is a major cause of postpartum hysterectomies. As PPH continues to be a concern in the US, helping to improve nurses' understanding of this condition and EBP interventions may help to improve patient outcomes. This DNP project included the development of a PPH education program and then evaluation of knowledge levels before and after the education intervention. The next section of this

paper presents the findings and recommendations from the completion of this DNP project.

Section 4: Findings and Recommendations

Introduction

In Utah the rate of maternal mortality and morbidity is increasing, similar to that of the US. PPH was the third leading cause of maternal deaths in Utah during the years of 2005-2012 and Utah's postpartum transfusion rates are twice the national average (UDOH, 2015). Clark (2016) reported that the overall PPH rate for Utah was 3.2%. The project site has a 4.2% PPH rate and a 1.4% maternal mortality rate related to PPH (Intermountain Healthcare, 2017). UDOH (2015) has worked with hospitals, health organizations, and health care professionals to create a statewide collaborative group to discuss ways to implement a maternal safety intervention protocol for PPH. The challenge was now to help labor and delivery nurses understand risk factors, physiology, and utilize the DNP site's PPH maternal safety EBP protocol.

The gap in nursing practice that was the focus of this doctoral project was the inconsistency and inaccuracy of early identification of PPH and subsequent application of evidence-based interventions to treat PPH. This project was chosen because PPH continues to be a significant cause of mortality and morbidity in Utah with increasing maternal morbidity and mortality rates, similar to the overall national increase. A PPH is an obstetric emergency where rapid identification and responsiveness have a significant effect on patient outcomes (Audureau et al., 2009). There is widespread variation in how nurses identify and respond to a PPH. These dissimilarities between nurses' and care providers' practices affects the care the patient receives and has been noted as a concern

at the DNP project site through the wide range of PPH rates and maternal mortality rates throughout the organization (Bateman et al., 2014).

The organizational level practice-focused question is as follows: For labor and delivery registered nurses employed within an inpatient hospital setting in western United States, does an evidence-based postpartum hemorrhage education module (as recommended by AWHONN, 2016) improve nursing knowledge after participating in the education module?

The purpose of this DNP project was to use current evidence and an updated EBP PPH protocol to provide nurses with the knowledge needed to improve their ability to quickly recognize and provide interventions for a PPH. This purpose was directly aligned with the practice focused question. My practice question was focused on helping nurses gain improved understanding of PPH by evaluating knowledge level before and after the educational intervention. The ultimate goal of improving PPH understanding was to help nurses rapidly identify and treat a PPH and improve patient outcomes.

Findings and Implications

The practice problem that was the focus of this DNP project was to improve labor and delivery nurse identification and treatment of a PPH through EBP education. The educational information was organized utilizing Knowles adult learning theory and the WPW model, while being based on PPH EBPs, current research, and a PPH algorithm. The information was developed into a PowerPoint (PPT) presentation (see Appendix A for the PPT presentation). This PPT contained PPH statistics, risk factors and educated labor and delivery nursing staff on how to use the PPH algorithm in their practices. The

doctoral project team was involved in reviewing and providing feedback on the educational content of the PPT.

The PPH algorithm was developed by the DNP site's obstetrical medical and nursing corporate leadership and is based on EBP guidelines and current research (see Appendix B for algorithm). This algorithm helps care providers identify which women are more at risk for a PPH. The algorithm guides the user through three differing levels of interventions based on patient acuity, signs, symptoms, and active blood loss.

In order to identify if the PPH education intervention improved participant's knowledge of PPH, participants were asked to initially complete a knowledge survey, followed by the educational session. Following the presentation participants were asked to complete another knowledge survey. These knowledge surveys were identical and consisted of 15 knowledge based multiple choice questions. Three demographic questions were added to the knowledge survey completed before the education session. Questions more general in nature were included first and progressed toward more specific and complex questions. The questions were developed using the most current PPH literature, practice guidelines, and the DNP site's EBP PPH protocol (see Appendices C and D for the pretest and posttest). The doctoral project team provided feedback and testing to improve the validity of the questions.

Purposive sampling took place to include labor and delivery nurses from three of the hospitals within the DNP project site's corporation. Nurses who currently worked as labor and delivery nurses and who were not on orientation had the opportunity to participate. The DNP student arranged with the unit educators of the included labor and

delivery units for a time to attend their staff meeting. Participants were not aware before their staff meeting that they would be asked to participate in the project. However, some participants were aware that their staff meeting would include some information on PPH management.

This project consisted of 96 registered nurse participants, with 24% of the sample coming from American Fork Hospital, 28% coming from Orem Community Hospital, and 44% coming from Utah Valley Hospital. Utah Valley Hospital is a tertiary facility, with the other two hospital being level two facilities, and employs more labor and delivery nurses allowing for an increased sample coming from that hospital. While 96 participants completed the pretest and posttest, only 92 participants completed the demographic portion of the survey. Table 2 presents the age distribution and Table 3 presents the employment distribution of the sample.

An interesting characteristic of the sample's demographics is that the majority of nurses participating in the project were between 30 and 40 years of age, comprising 70% of the sample. In addition, 60% of the sample were nurses with more than 5 years' experience, however, only 55% of the 92 respondents had been a labor and delivery nurse for more than five years. The data indicates that over that last few years experienced nurses have changed career paths and moved into labor and delivery nursing.

Table 2

Sample Age Demographics

Age	Frequency	Percentage
20-25 Years	9	9%
25-30 Years	16	17%
30-40 Years	33	34%
40+ Years	34	35%
Total	92	95%

Table 3

Sample Years Working Demographics

	Years as a Nurse		Years Working in Labor and Delivery	
Years	Frequency	Percent	Frequency	Percent
< 5 Years	35	37%	53	55%
5-10 Years	19	20%	10	10%
10-20 Years	19	20%	18	19%
20+ Years	19	20%	10	10%
Total	92	96%	91	95%

All three labor and delivery units utilized the same pretest and posttest. The tests consisted of fifteen questions scored as either correct (Score of 1) or incorrect (Score of 0). Correct scores were added and a percent correct score was calculated. 96

participants completed both the pretest and posttest. Only one instance of missing data was noted on one item on the pretest and was scored as incorrect in the analysis. A percentage score of 80% was considered a passing score. Pretest and posttest scores are included in Table 4.

The data was analyzed using IBM's SPSS software, version 21. The test scores were calculated as a percentage of the number of questions answered correctly out of the number of questions answered. The data showed that 63% of the participants passed the pretest with an 80% or higher and 90% of the participants passed the posttest with an 80% or higher. A paired *t*-test was calculated using the percentage of correct answers on the pretest and the percentage of correct answers on the posttest, demonstrating a statistically significant increase in correct percentages scores $t = -6.183$, $df = 95$, and $p = <.00$. The data demonstrate that there was an increase in knowledge after the educational materials were presented.

However, in reviewing the data for specific test questions, pretest and posttest question two was problematic (not a PPH risk factor). In fact participants did worse on the posttest then they did on the pretest for this question. This may indicate the question was not written well or confusing. It may also indicate this information was not discussed as thoroughly as it could have been in the education session. It does provide good information that PPH risk factors may need to be better emphasized in orientation and reviewed regularly.

Table 4

Pretest and Posttest Correct Answer Percentages

	Pretest Question Data				Posttest Question Data			
	Correct		Incorrect		Correct		Incorrect	
Questions	N	Percent	N	Percent	N	Percent	N	Percent
Q1	72	25	24	75	94	98	2	2
Q2	48	50	48	50	17	18	79	82
Q3	81	84	15	16	90	94	6	6
Q4	61	64	35	37	75	78	21	22
Q5	93	97	3	3	94	98	2	2
Q6	67	70	29	30	68	71	28	29
Q7	86	90	10	10	95	99	1	1
Q8	96	100	0	0	96	100	0	0
Q9	95	99	1	1	94	98	2	2
Q10	75	79	21	22	87	91	9	9
Q11	41	43	55	57	86	90	10	10
Q12	91	95	5	5	95	99	1	1
Q13	67	70	29	30	74	77	22	23
Q14	85	89	11	12	87	91	9	9
Q15	82	85	14	15	89	93	7	7

Note. N = 96. See Appendix C and D for complete test questions.

Recommendations

While PPH is recognized as a true obstetric emergency, these hemorrhages are not always recognized and treated in a timely manner which can increase a women's risk of morbidity and mortality. The gap in nursing practice that was the focus of this DNP project was the inconsistency and inaccuracy of early identification and treatment of

PPHs. The results of this DNP project indicated that an educational intervention utilizing Knowles adult learning theory and the whole-part-whole model was able to increase the participants' knowledge of how to recognize and apply an EBP PPH algorithm to treat PPHs. The recommended solution that would potentially address the gap in nursing practice, as informed by the findings discussed above, include implementation of the EBP PPH algorithm into clinical practice throughout the DNP site organization and provide the educational intervention in the form of a PowerPoint (PPT) presentation to all labor and delivery units throughout the DNP site organization. The product can be easily shared electronically within the DNP site organization for use in labor and delivery units.

The recommended implementation and evaluation procedures for these two products include sharing the PPH education PPT with all labor and delivery educators and managers with the DNP site organization. Implementation would include the actual education of registered nurses in these labor and delivery units using the PPH PPT, including how to use the PPH algorithm. Once education has been completed evaluation can occur in three ways. The first evaluation method would be to determine if all labor and delivery nurses had received this educational training. The second evaluation method would be to have the DNP site organization trend rates of PPH identification and patient outcomes measures. This evaluation method would provide valuable information regarding how well the organization is doing in recognizing PPHs and outcomes would help to determine if care providers are identifying and treating PPHs more quickly by decreasing blood utilization, length of stays, and admissions to intensive care units. A third evaluation method would be to evaluate the DNP site organization's overall

maternal mortality rate related to PPHs. This evaluation method could be an annual statistic that would be trended over time to determine if education and algorithm use helped to decrease PPH maternal mortality within the organization.

Contribution of the Doctoral Project Team

This DNP project utilized and benefited from the contribution of a doctoral project team. The project team consisted of the DNP student and organizational leadership at the DNP site's labor and delivery units. The organizational leadership was comprised of the unit education consultants, unit managers, and regional education consultant over labor and delivery at the three participating hospitals, with a total team of seven individuals who were all registered nurses. This team initially reviewed and approved the proposed project. The primary responsibility taken by the team members was to review the education information and the pretest and posttest questions. The team provided unique views and feedback that was helpful in adjusting the project to meet the needs of their specific frontline nurses. This team was supportive of the DNP project and was actively engaged throughout the entire process. Meetings were conducted primarily through email and telephone conferences.

The unit education consultants played an important role in the project team in developing the final recommendations for the education, pretest, and posttest questions. The unit education consultants provided pretesting of the test questions, in addition to two labor and delivery frontline nurses from American Fork Hospital. Pretesting was needed to ensure validity of the proposed test questions. The feedback provided valuable information that lead to changing the wording on question ten on both the pretest and

posttest to make the question easier to understand. The unit education consultants also provided specific unit details that were incorporated into the education to help increase the applicability of the information to the frontline nurses. The comments from the project team was reviewed and incorporated into the education and test questions. The doctoral project team conducted a final review and approved the education information and test questions, allowing the project to move forward.

The DNP project scope was limited to nurses working in three labor and delivery units in the DNP site healthcare organization. The labor and delivery regional education consultant, a member of the doctoral project team, has recommended to the corporation that the DNP project education materials should be shared with the other nineteen hospitals in the organization. There are plans to provide the education information to the unit education consultants for each labor and delivery unit. The information will be shared at the unit education consultant's labor and delivery practice team. In addition, the corporation has also discussed sharing the DNP education information with postpartum units as well; however, no firm plans are in place as yet.

Strength and Limitations of the Project

This DNP project practice focus was to determine if an EBP educational intervention could help improve registered nurses' knowledge level of PPHs. The results of the project indicated that the intervention was successful in improving nursing knowledge of PPHs. One possible strength of this project was that all three education session presentations were provided solely by the DNP student. This helped ensure the content of the sessions were consistently delivered in a similar manner. Another strength

is the use of a doctoral project team. This team helped to scrutinize the content of the education, the pretest, and posttests. The teams review and feedback helped to ensure the education and tests met the needs of the stakeholders and end-users. Another strength is that the posttest was administered following the educational session. Grove et al. (2013) explained that one of the limitations of pretest and posttest design is that events can occur between the pretest and posttest that can alter the posttest responses. However, in this project the participants completed the posttest directly after the education intervention. This method was used to help decrease extraneous variables that could have affected the posttest scores and also to increase the probability of obtaining a pretest and posttest from as many participants as possible.

This DNP project had a few limitations. Despite a systematic review process of the pretest and posttest, the demographic page of the pretest did not have correct age and years working number ranges, for example 20-30 and 30-40 were used instead of 20-30 and 31-40. This error may have affected the interpretation of the participants' demographic information. Another limitation of the descriptive statistics may be missing data, as four participants did not fill out the demographic portion of the pretest. Because this project used purposive sampling to obtain participants there is the possibility of bias in the sample. Steps were taken to limit potential bias by limiting participants to registered nurses who were working in labor and delivery at the time of the project. The participants were a homogeneous group for registered nurse status and being all female. Grove et al. (2013) stated that homogeneous samples help to decrease the extraneous

variables that could affect the findings. However, the homogeneous group could also limit the generalization of the project's results.

Section 5: Dissemination Plan

Dissemination of a study or project findings is an important step in the research process. Fritz (2016) suggested that dissemination of research is an active process that is necessary to bridge the gap between EBP and care as usual. He continued by stating that study information cannot benefit anyone if the information is not shared. The information and data obtained from this DNP study will be disseminated to the institution experiencing the problem in practice through three different venues. The first venue will be to report the findings in the DNP site's corporate labor and delivery practice team. This team consists of labor and delivery nurse educators from each hospital in the organization. This team would benefit from these findings because they can be used to help in planning future education sessions and demonstrates the need for further PPH education. The information can be presented at one of their monthly meetings.

The second venue would be to present the findings in the staff meetings of the three hospitals where the data was collected. The participants may be interested in the data outcomes from the information they provided. This information is applicable to their practices as it helps demonstrate understanding of PPHs. The third venue would be to present the findings at the DNP site's annual women's and newborn's conference. The information could be shared through a poster presentation or as one of the break-out session presentations.

The information obtained from this DNP project is also relevant to audiences and venues related to the broader nursing profession. One option for dissemination of the project information would be to submit an abstract for a poster presentation at the

AWHONN annual convention. The poster presentation would fall under the research study or the innovative program submission option (AWHONN, 2017). Another possible route of dissemination would be to submit the project findings for publication in the Association for Nursing Professional Development (ANPD) peer-reviewed nursing journal, "Nurses in Professional Development (NPD)." ANPD (2017) seeks to help improve healthcare outcomes by defining and promoting staff development. This DNP project focuses on nurse education and fits the qualifications for manuscript submission under the designation of "planning, implementing, and evaluating professional development and in-service activities" (NPD, 2015). Publishing in this journal would allow the DNP project information to be disseminated to a broader nursing population, which in turn would help inform staff education initiatives beyond the labor and delivery scope.

Analysis of Self

As the DNP student for this project, I was able to take on the roles of practitioner, scholar, and project manager. In the roles of practitioner and scholar I was able to use my educational background and clinical expertise to utilize EBP guidelines and develop education that front-line nurses will use in their practices. In these roles, I felt that this was one of the ways a DNP prepared nurse helps bridge the gap between research and practice. I was able to take research and break it down into usable elements that nurses can use to improve patient care. The data I analyzed from my project will help me as I plan other education events and train new nurses in my current role as unit education consultant. In my long-term professional goals, I plan on continuing down the education

path for both staff nurses and nursing school students. I believe that through this DNP experience I have gained the knowledge and skills necessary to prepare me to plan, implement, and evaluate programs and base my conclusions on scholarly information.

In terms of project manager, I have gained new insights into my leadership skills. Taking the lead in this project at the DNP site helped me to gain confidence in myself and my leadership abilities. I believe in the past I have been more of a task oriented leader; however, throughout my DNP project course I have realized the importance of being a transformational leader. Ross, Fitzpatrick, Click, Krouse, and Clavelle (2014) stated that a transformational leader inspires a shared vision, challenges the process, enables others to act, encourages the heart, and models the way. As the lead I tried to inspire a shared vision, challenge the current process through organizational statistics and current EBP, and empower nurses to provide the best care possible for PPH patients. The principles of Knowles theory of adult learning applied here as well (Knowles et al., 2015). Understanding how adults learn and want information presented to them, helped me as a leader to better relate to and empower frontline nurses.

The completion of this scholarly project has provided me the opportunity to gain insights about myself and the profession of nursing. One of the challenges was ensuring the education I developed was aligned with the DNP site's policies, procedures, and usual practices. The information shared with the nursing staff needed to apply directly to their practices and work flow. Working with the project team was instrumental in addressing this challenge and with their insights and feedback, I believe, the end product did meet the needs of frontline labor and delivery nurses. Ultimately, the completion of this

product allowed me to practice to the fullest extent of the DNP prepared nurse role. I have a better understanding of the importance the DNP role has in translating EBP into information that a frontline nurse can practically use in his or her practice. Through this role I can make a difference in the lives of patient's by helping to ensure our clinical practices are based on scientific evidence. This scholarly journey further confirmed my passion for the profession of nursing.

Summary

PPH is a significant maternal issue that affects women around the world. This doctoral project's goal was to develop education for frontline labor and delivery nurses to help increase their understanding about PPH to improve timeliness of recognition and treatment. The education was presented and retention was studied using a pretest and posttest method. The data demonstrated that the education intervention was successful in improving knowledge of PPHs. The results of this project can be used to help educate other labor and delivery nurses throughout the DNP site organization. There is even the possibility that information from this project could be beneficial to other nursing units, such as postpartum or the emergency department. Nurses have the opportunity to provide safe, EBP care to patients and having a better understanding of how to recognize and treat PPHs in a consistent manner can help to improve patient outcomes.

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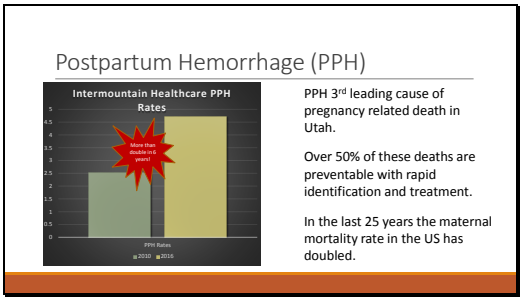
Appendix A: Postpartum Hemorrhage PowerPoint Presentation

Slide 1

Slide 2



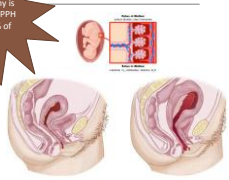
Slide 3

PPH

Uterine Atony is the cause of PPH in over 70% of cases!

Possible Causes:

- Uterine Atony
- Laceration
  - Risks: macrosomia, OP, operative vaginal delivery
- Retained Placenta
- Coagulopathies



Slide 4

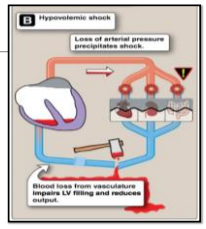
Risk Factors

Repeat Cesarean Section	Intra-amniotic infections/sepsis
Obesity	Preeclampsia
Multiple gestations	HELLP
Polyhydramnios	On Oxytocin > 18 hours
Fibroids	Second stage of labor > 3 hours
≥ 5 prior vaginal births	Cesarean section in 2nd stage
History of PPH	Operative vaginal delivery
TOLAC/VBAC	Positive antibody screen
Hemoglobin < 10	Placenta accreta/Previa
Hematocrit < 30	Uncorrected coagulopathy or platelets < 70

Slide 5

Hypovolemic Shock

Active and ongoing vaginal bleeding & Clots
Boggy uterus
↓ blood pressure
↑ heart rate
↓ temperature, clammy skin
Pale/ashen color
Nausea/vomiting
↑ respiratory rate
↓ O2 saturation
↓ urine output
Confusion/disorientation/light-headedness
Organ damage



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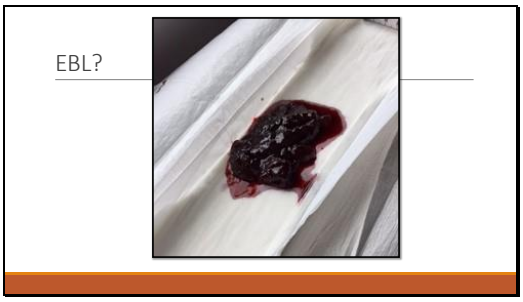
Slide 7



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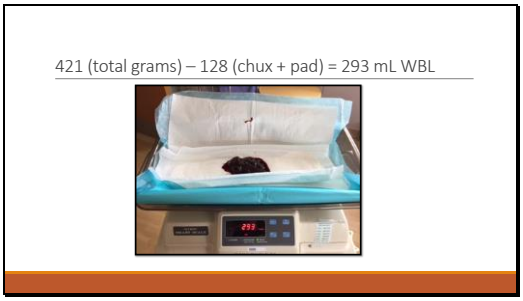
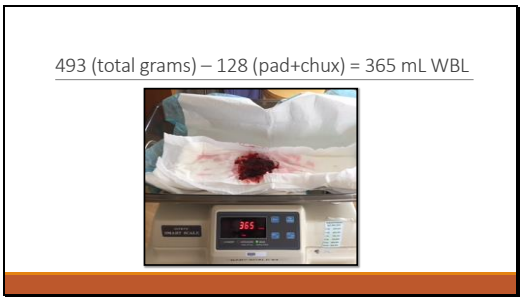


Slide 9

Slide 10



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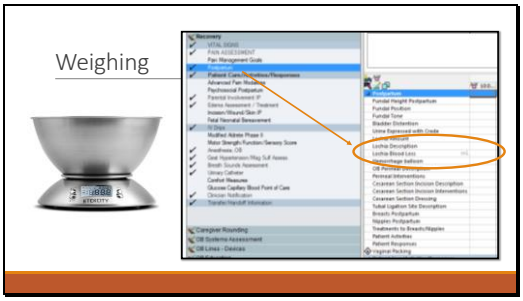
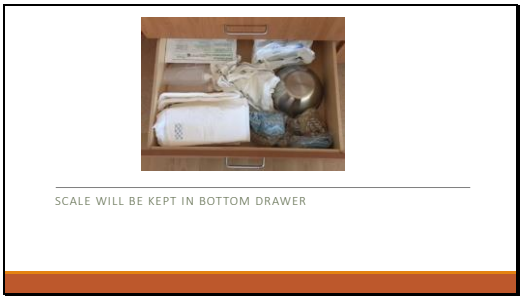
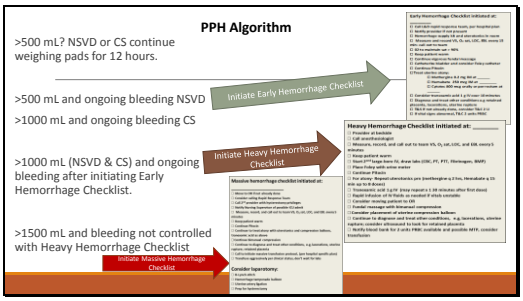


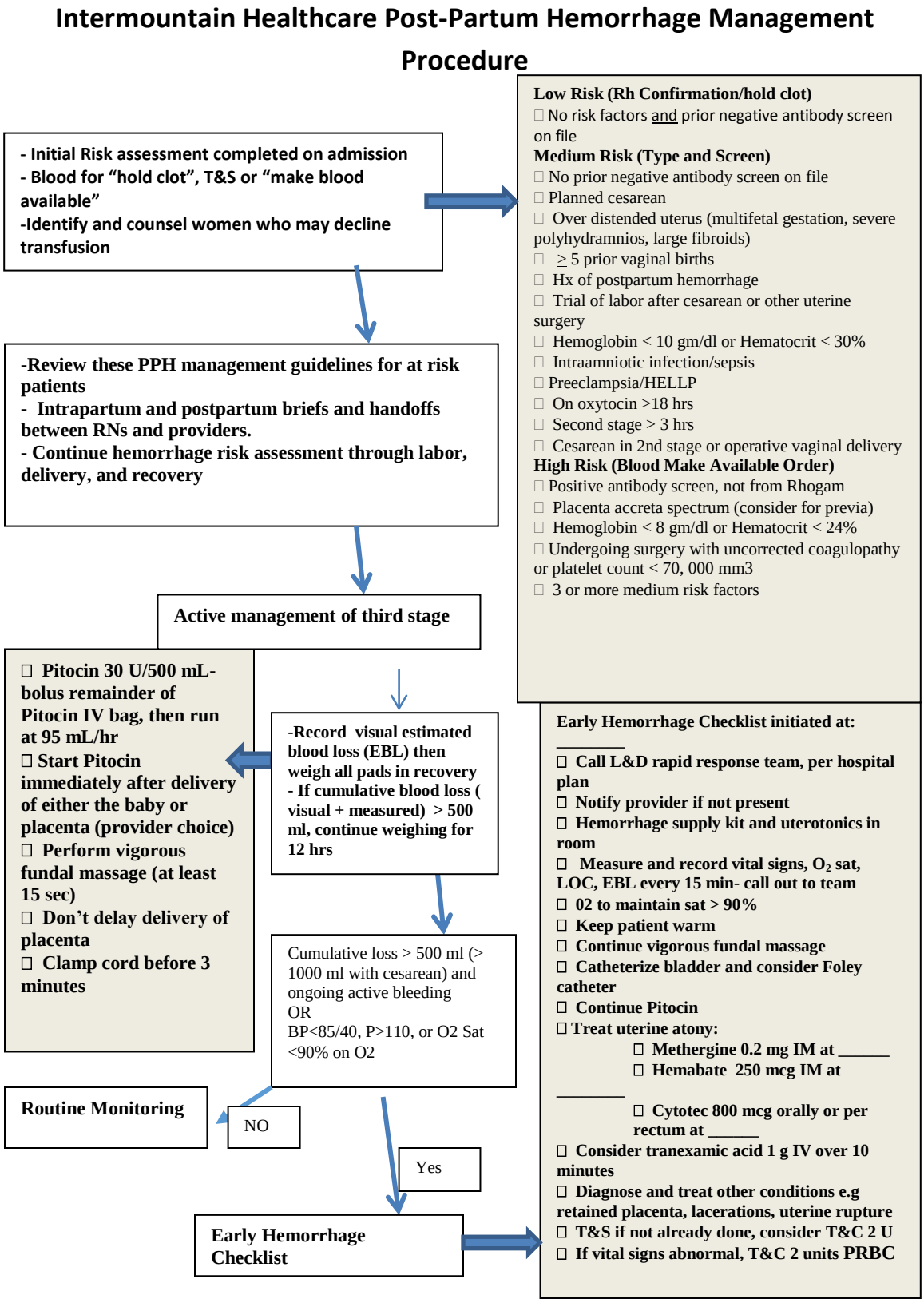
Slide 12

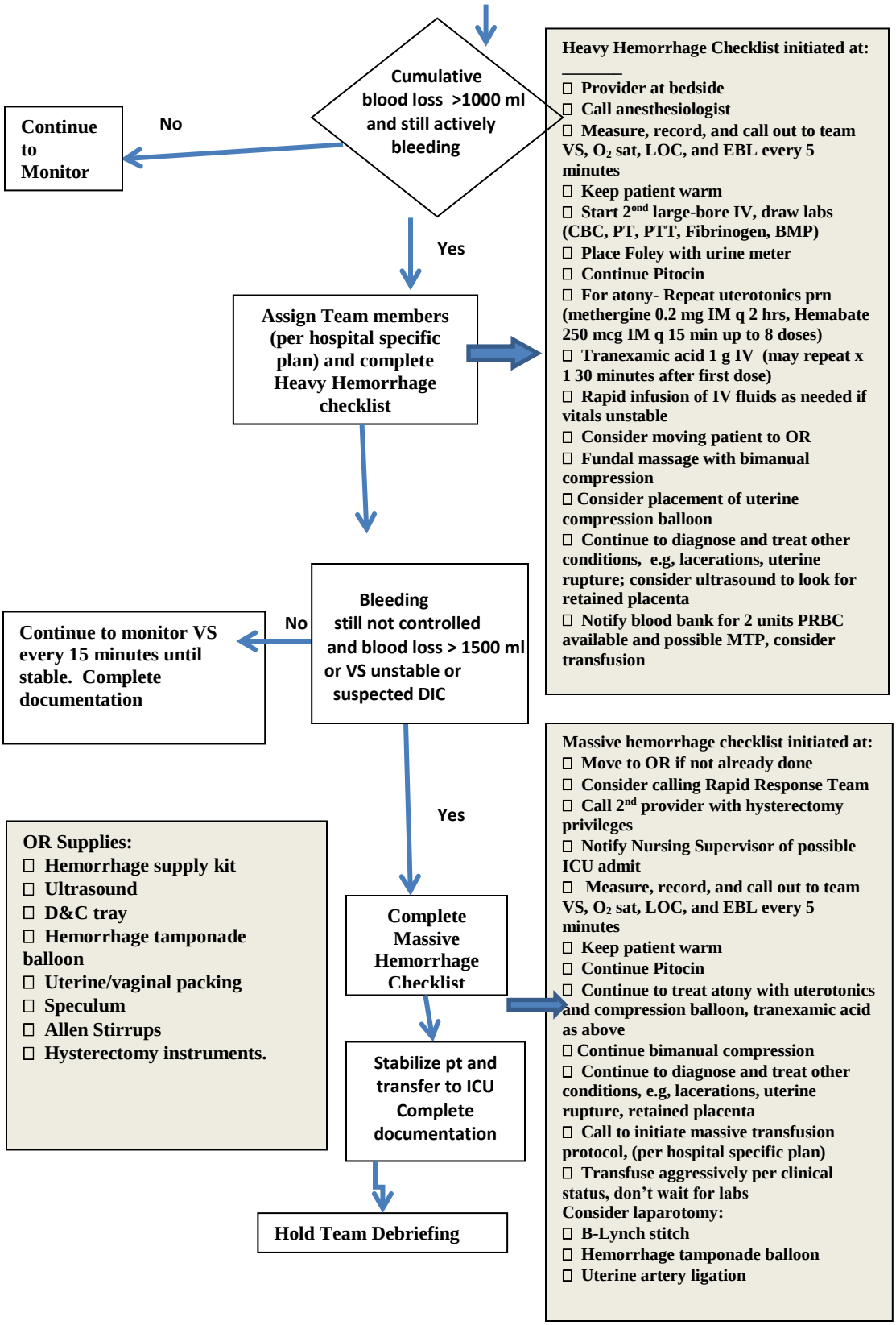


Slide 13



Appendix B: Postpartum Hemorrhage Algorithm




Cumulative blood loss >1000 ml and still actively bleeding
No
Continue to Monitor
Yes
Assign Team members (per hospital specific plan) and complete Heavy Hemorrhage checklist
Heavy Hemorrhage Checklist initiated at: _____
☐ Provider at bedside
☐ Call anesthesiologist
☐ Measure, record, and call out to team VS, O2 sat, LOC, and EBL every 5 minutes
☐ Keep patient warm
☐ Start 2nd large-bore IV, draw labs (CBC, PT, PTT, Fibrinogen, BMP)
☐ Place Foley with urine meter
☐ Continue Pitocin
☐ For atony- Repeat uterotonics prn (methergine 0.2 mg IM q 2 hrs, Hemabate 250 mcg IM q 15 min up to 8 doses)
☐ Tranexamic acid 1 g IV (may repeat x 1 30 minutes after first dose)
☐ Rapid infusion of IV fluids as needed if vitals unstable
☐ Consider moving patient to OR
☐ Fundal massage with bimanual compression
☐ Consider placement of uterine compression balloon
☐ Continue to diagnose and treat other conditions, e.g, lacerations, uterine rupture; consider ultrasound to look for retained placenta
☐ Notify blood bank for 2 units PRBC available and possible MTP, consider transfusion
Bleeding still not controlled and blood loss > 1500 ml or VS unstable or suspected DIC
No
Continue to monitor VS every 15 minutes until stable. Complete documentation
Yes
OR Supplies:
☐ Hemorrhage supply kit
☐ Ultrasound
☐ D&C tray
☐ Hemorrhage tamponade balloon
☐ Uterine/vaginal packing
☐ Speculum
☐ Allen Stirrups
☐ Hysterectomy instruments.
Complete Massive Hemorrhage Checklist
Massive hemorrhage checklist initiated at:
☐ Move to OR if not already done
☐ Consider calling Rapid Response Team
☐ Call 2nd provider with hysterectomy privileges
☐ Notify Nursing Supervisor of possible ICU admit
☐ Measure, record, and call out to team VS, O2 sat, LOC, and EBL every 5 minutes
☐ Keep patient warm
☐ Continue Pitocin
☐ Continue to treat atony with uterotonics and compression balloon, tranexamic acid as above
☐ Continue bimanual compression
☐ Continue to diagnose and treat other conditions, e.g, lacerations, uterine rupture, retained placenta
☐ Call to initiate massive transfusion protocol, (per hospital specific plan)
☐ Transfuse aggressively per clinical status, don't wait for labs
Consider laparotomy:
☐ B-Lynch stitch
☐ Hemorrhage tamponade balloon
☐ Uterine artery ligation
Stabilize pt and transfer to ICU Complete documentation
Hold Team Debriefing

Appendix C: Pretest

Principal Investigator: Jessica Powell
Cell: (801) 602-0574
Hospital:

Date:
Study Identification Number:
Result:

INSTRUCTION

Please complete the pretest, place in manila envelope, and return to principal investigator or research associate.

PART 1

1. What is the most common cause of a PPH?
   a. Cervical laceration
   b. Coagulopathy
   c. Uterine atony
   d. Retained placenta
2. Which answer is not a risk factor for a PPH?
   a. Over-distended uterus
   b. Obesity
   c. Previous history of a PPH
   d. Preterm delivery
3. What is the first line medication for treating a PPH?
   a. Methergine
   b. Oxytocin
   c. Hemobate
   d. Cytotec
4. What is normal blood loss after a cesarean section?
   a. 1000
   b. 700
   c. 1200
   d. 900
5. What is a symptom of uterine atony?
   a. Firm uterus on palpation
   b. An unrepaired laceration seen at the perineum
   c. Boggy uterus on palpation
   d. Retained placental tissue

6. Which item is not a risk factor for a laceration?
   a. Macrosomia
   b. OP position
   c. Trial of labor after a cesarean section
   d. Operative vaginal delivery

7. What volume of blood loss after a vaginal delivery is considered a PPH?
   a. > 200 mL
   b. > 300 mL
   c. > 500 mL
   d. > 450 mL
8. What is the most accurate way to estimate blood loss?
   a. Weighing
   b. Visualization
   c. Guessing
   d. Heaviness when picking up pads/chux
9. What is the first nursing intervention for treating a PPH?
   a. Pad count
   b. Patient teaching
   c. Uterine massage
   d. Have patient empty their bladder
10. Identify the incorrect signs and symptoms of a patient experiencing a PPH
    a. Light headed, nausea, visual disturbances
    b. Increasing pulse, respirations, BP same or lower
    c. Unable to walk
    d. Anxiety, pale/ashen color, clammy skin, excessive bleeding
11. In the last 25 years the maternal mortality rate has?
    a. Tripled
    b. Stayed the same
    c. Doubled
    d. Quadrupled
12. What route can't misoprostal (Cytotec) be administered?
    a. Rectally
    b. Vaginally
    c. Orally
    d. IV
13. What are the most common adverse effects for carboprost tromethamine (Hemobate)?
    a. N/V/Diarrhea
    b. Flushing
    c. Fever
    d. All of the above
14. Treatment options for a PPH may include:
    a. Uterotonics, bedrest, transfusion, and repair of lacerations
    b. Uterotonics, repair of lacerations, removal of retained placental tissue
    c. Uterotonics, increased length of hospital stay, hysterectomy
    d. Uterotonics, initiation of breast feeding, infrequent fundal massage
15. Surgical PPH treatments include all but one of the following:
    a. B-Lynch suture
    b. Hysterectomy
    c. Uterine artery ligation
    d. Ultrasound

Part 2

1. What is your age?
    a. 20-25 years of age
    b. 25-30 years of age
    c. 30-40 years of age
    d. 40+ years of age
2. How many years have you been a nurse?
    a. <5 years
    b. 5-10 years
    c. 10-20 years
    d. 20+ years
3. How many years have you been a labor and delivery nurse?
    a. <5 years
    b. 5-10 years
    c. 10-20 years
    d. 20+ years
4. What hospital do you work at?
    a. AFH
    b. OCH
    c. UVH

Appendix D: Posttest

Principal Investigator: Jessica Powell
Cell: (801) 602-0574
Number:
Hospital:

Date:
Study Identification
Result:

INSTRUCTION

Please complete the posttest, place in manila envelope, and return to principal investigator or research associate.

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   f. Visualization
   g. Guessing
   h. Heaviness when picking up pads/chux
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   h. Have patient empty their bladder
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   f. Increasing pulse, respirations, BP same or lower
   g. Unable to walk
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   h. Uterotonics, initiation of breast feeding, infrequent fundal massage
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