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Preparing for Obstetrical Emergencies in the Emergency Department

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Abstract

Emergency Department nurses must maintain the skills to manage OB emergencies in the ED, especially in hospitals with no OB unit. Limited contact with OB patients diminishes the self-confidence, knowledge and skill of ED nurses, which may minimize their ability to recognize OB problems in a timely manner. As increasing numbers of patients with OB emergencies are expected to seek care in rural EDs due to closure of rural OB units and rising OB risk factors, maintenance of OB skills by ED nurses is critical. Simulation has been identified in the literature as an effective strategy to help nurses advance their OB skills. A global pandemic precluded implementation of simulation training in the ED, resulting in implementation of an online simulation with baccalaureate nursing students. Results of the project indicated online didactic followed by online simulation pertaining to care of a patient with an OB emergency in the ED yielded a high level of satisfaction in learning and self-confidence among nursing students.

Keywords: nurses, simulation, obstetrics, emergency department

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Preparing for Obstetrical Emergencies in the Emergency Department

Introduction

As part of the requirements for the Doctor of Nursing Practice (DNP) degree at Eastern Kentucky University (EKU), completion of a project is required. The problem identified was the need for solutions to assist emergency department (ED) nurses in rural hospitals with no obstetrical (OB) unit maintain OB nursing skills. The Covid-19 pandemic necessitated a quick transition from the project's intended participants and originally planned mode of implementation. The intended population was ED nurses who practiced in a rural hospital with no OB unit. High-fidelity simulation (HFS) preceded by academic detailing was the intended intervention. Baccalaureate nursing students enrolled in an OB nursing course were the eventual participants in this project. The intervention was reformatted as an online simulation comprised of an unfolding case study preceded by online academic detailing. This project paper will summarize the collective body of work reflective of the original project and the project that was implemented.

Background and Significance of Original Project

Emergency department nurses must be prepared to encounter any type of emergency, including OB emergencies (Fitzgerald, 2014). This need can be especially critical for ED nurses practicing in a hospital with no OB unit, because staff well-versed in OB are not readily available to assist with an OB emergency, should one occur in the ED. Diminished interaction with OB emergencies could result in decreased skill, knowledge, and confidence of ED nurses confronted with OB emergencies (Gupta & Adler, 2016). This limited contact can reduce the capability of ED nurses to detect early signs of problems in OB patients, conceivably

jeopardizing outcomes for pregnant women and newborns (Homan & Chichester, 2016). Obstetric complications are more likely to occur when health care workers have little experience with OB emergencies (Shannon, 2017), such as in the ED (Cooper, et. al., 2016).

Obstetric patients arrive and deliver in EDs infrequently (Cooper, Papanangou, Meguerdichian and Baja, 2016), but their numbers are expected to increase (Shannon, 2017) as many rural hospitals in the US close their OB units (Lockwood, 2018). Obstetric units across the rural US are rapidly closing, leaving the majority of rural residents in the US with much longer distances to travel when seeking OB care. Eighty percent of rural residents in the US do not have an OB unit as part of their nearest hospital (Shannon, 2017). As OB services in rural areas become fewer, the likelihood increases that patients may seek emergency OB care in an ED, due in part to the decreased accessibility of hospitals with OB units.

The National Rural Health Association (2017), in partnership with the University of Minnesota, reported that rural OB units have been closing across the United States (US) for decades, leaving 28 million women of childbearing age without OB services nearby. Pregnant women in very rural areas may travel 100 to 200 miles to OB services and subsequently attend fewer prenatal visits. Inconsistent or absent prenatal care can contribute to OB complications. Furthermore, these women may need to take time off work to travel for OB services, which leaves them economically vulnerable.

Many factors lead to these closures, including insurance reimbursements and the cost of operating an OB unit, which typically requires a large amount of specialized staff and equipment (Lockwood, 2018). Additionally, the 1986 enactment of the Emergency Medical Treatment and Active Labor Act (EMTALA) (Zubilewsky, 2001), which is part of the Consolidated Omnibus Reconciliation Budget Act (COBRA) of 1985, makes it illegal to transfer women in active labor

(Shannon, 2017), so a woman arriving in active labor at an ED in a hospital with no OB unit must labor and deliver in the ED.

At the same time OB units are closing in the rural US, OB complications are rising (CDC, 2018). These dual trends increase the likelihood that ED nurses will encounter higher numbers of OB patients in the ED, with more of those patients at risk for OB complications (Cooper, et. al., 2016). OB complications increase the likelihood of maternal and newborn morbidity and mortality (Fransen, 2017; Suzuki, 2015).

Instances of pre-eclampsia and post-partum hemorrhage (PPH) have risen steadily in the last decades (Stevens, et. al., 2017; CDC, 2018). Preeclampsia has increased over the past 30 years, from 2.4% in 1980 to 3.8% in 2010 (Stevens, et. al., 2017). The incidence of PPH increased from 4.3 in 10,000 births in 1993 to 21.2 in 10,000 births in 2014, with more pronounced increases in later years (CDC, 2018).

The incidence of shoulder dystocia (SD) and precipitous delivery have proven more difficult to estimate. Santos (2018), in a review of the literature, found the exact rate of SD is not exactly known but estimates it occurs in 0.26% to 4.4% of births. Likewise, clear records of how many precipitous deliveries are encountered in the ED are not readily available. Cooper et al. (2016) estimate that approximately 1.5% of newborns are not delivered in OB units, with numbers continuing to rise in recent years.

Moussa, Alrais, Leon, Abbas & Sibai, (2018), in a review of the literature, found that rising obesity rates are associated with increases in many obstetrical complications. Obese women have higher rates of complications in pregnancy including hypertension, diabetes, PPH and SD as compared to normal weight women. Higher rates of SD occur in obese women regardless of whether they have diabetes. However, obesity has not been found to increase the

risk of precipitous delivery (Mission, Marshall & Caughey, 2015; Ellekjaer, Bergholt & Løkkegaard, (2017).

According to the Centers for Disease Control (CDC), data for Kentucky, the location of this intervention, showed 36.6 % of the population was obese in 2018, compared to 30.4% in 2011. The NCHS (2017) reported the 2015-2016 rate of obesity for women of childbearing age (20-39 years old) in the US was 35.7%. This is up from 2011-2012, where 31.8% of women between the ages of 20-39 in the US were obese (Ogden, et. al., 2014).

Purpose of Original Project

The purpose of this project was to determine the effect of simulation preceded by didactic on the ability of ED nurses to deliver safe care while improving their skills and confidence in the care of patients experiencing an OB emergency. The project targeted ED nurses practicing in a hospital with no OB unit. Participants were slated to attend a didactic session delivered through academic detailing followed by a high-fidelity simulation (HFS). The simulation, called an "OB mock emergency" was to occur during the workday at a time unknown to participants. Emergency Medical Systems (EMS) personnel and providers were encouraged to participate in the OB mock emergency as well, making the intervention more realistic and interprofessional. The setting of the proposed project was a rural ED in the Southeastern US that does not have an OB unit as part of the hospital. The director of nursing and ED staff nurses at the facility had identified OB education for ED nurses as a concern, due to the lack of OB units in the region.

The literature demonstrates that nurses and interprofessional teams who participate in either low-fidelity simulation (LFS) or HFS involving high-risk obstetrical situations have increased knowledge, confidence, and improved perinatal outcomes. Simulation has been established as a beneficial method for enhancing the knowledge and performance of nurses and

the interprofessional team (Jacobs, 2017; Kato & Kataoka, 2017; Rutherford-Hemming, Kelsey, Grenig, Feliciano, Simko & Henrich, 2016).

High-fidelity simulation involves simulators (previously called manikins) that have the electronic capability to generate measurable blood pressure, temperature, pulse, and speech (Munshi, F., Labadi, H.,& Alyousef, S., 2015). Low-fidelity manikins are static manikins that have none of these electronic capabilities (Jacobs, 2017). Simulation sessions are sometimes called mock emergencies or mock codes, especially if they take place during the workday. Mock code often refers to a cardiac event, therefore, this project will be called an OB mock emergency.

Theoretical Foundation

Patricia Benner's (1982) Novice to Expert Theory guided this intervention because it proffers a framework for identifying nurses at various levels of competency, illustrating the qualities of practice and nursing judgment at different levels, while providing direction for educational strategies. As nurses gain experience, they increasingly deviate from following strict guidelines. Instead, they combine textbook knowledge with ever-advancing clinical judgment in an intuitive manner and thereby progress from novice to expert.

Experience is essential to advance nurses' competency, skills, and clinical judgment as they progress through five levels of expertise: novice; advanced beginner; competent; proficient; and expert (Benner, 1984). Novice nurses do not have experience and adhere strictly to rules and book learning. They provide basic nursing care but have difficulty anticipating and planning for problems. Advanced beginners have enough experience to put textbook knowledge into practice and have better organization and planning skills than novices but are still very rule-oriented. Proficient nurses begin to rely more on clinical judgment and less on formal rules and are able to plan for care and anticipate problems in a way that novice and advanced beginners cannot.

Expert nurses epitomize the apex of nursing practice. These nurses use intuition combined with clinical judgment to pinpoint problems that might not be apparent to other nurses, arriving at a place of excellence in nursing care.

Even experienced ED nurses are considered novice nurses when facing a new specialty, according to Benner's theory (Benner, 1984). The limited experience of novice nurses leads to difficulties with prioritization and recognition of complications. They compensate by strictly following rules, protocols, and task lists. Deliberate guidance and opportunities for experience can help rule-adhering novice nurses refine their skills and knowledge and proceed toward better nursing care. Benner specifically described simulation as a way to help propel nurses toward excellence in patient care. Providing a didactic session with clear, concise guidelines followed by the opportunity to care for a patient through simulation meets the needs of novice nurses and helps them advance to the next level of proficiency, according to Benner's theory.

Literature Review

An initial systematic literature search was conducted asking, "In emergency department nurses, does simulation increase confidence and competence in caring for patients with OB emergencies?" Databases utilized included Medline, the Cochrane Collaboration, the Cumulative Index of Nursing and Allied Health Literature (CINAHL), and Google Scholar. Evidence Based Practice (EPB) and quality improvement projects taking place in EDs involving simulation of OB emergencies and skills were available, but random controlled trials (RCT) and cohort studies were not readily available during the last five years. The search was expanded to include the key words *childbirth, birth, obstetrical, emergency, emergencies, maternal,* and *maternity*. Subsequent searches yielded studies with OB interprofessional teams and nursing students focused on simulation involving OB skills. Additional searches queried mock codes in

OB, although the results were almost exclusively related to cardiac arrest of an OB patient rather than OB emergencies. Studies that included midwives, nursing students, and interprofessional teams that incorporated nurses were included for review. Six studies were retained for this review, all of which demonstrated the effectiveness of simulation to teach OB skills. These works were reviewed and appraised.

Impact of OB Simulation on Knowledge and Performance

Kato and Kataoka (2017) conducted a random controlled trial (RCT) to examine the effectiveness of a simulation program on midwives' performance and knowledge in the management of postpartum hemorrhage (PPH). Eighty-one midwives, working at one obstetrical unit in an urban area of Japan, were randomly divided into an intervention group (n = 40) and a control group (n = 41) after being asked to volunteer for participation via written letters. To be included in the study, midwives had to have two to three years of clinical experience, have worked on an OB unit, and had experience assisting with births. Midwives who had previous experience with PPH simulation were excluded from participation. Knowledge was measured with a 25-item Multiple Choice Questionnaire (MCQ) that allowed for a maximum of 34 points, with a higher score indicating higher knowledge. The MCQ was administered before intervention and one month after the intervention and had been previously piloted by the authors. Performance change was evaluated with a PPH scenario performance test one month post-intervention (Interclass Correlation Coefficient: ICC 0.954).

Kato & Kataoka, (2017) created a Scenario Performance Test, a 17-item checklist with 0-2 points on a Likert-type scale and 34 points possible (ICC 0.954). The same examiner measured participants' performances each time. The intervention consisted of an e-learning program (piloted by the authors before use) and a low-fidelity simulation (LFS) combined with

patient actors. The authors had previously validated both activities. Knowledge scores in the intervention group were significantly higher than the control group (MD 5.84, 95% CI 4.58-7.12, $t = 9.17$, $p < 0.001$). Performance scores were also significantly higher in the intervention group (MD 3.67, 95% CI 2.25-5.10, $t = 5.14$, $p < 0.001$).

Impact of OB Simulation versus Self-Study

Rutherford-Hemming, Kelsey, Grenig, Feliciano, Simko and Henrich (2016) conducted a two-group single-blinded randomized controlled longitudinal study comparing skill acquisition and knowledge in basic neurologic examination among OB nurses who participated in simulation as compared with those participating in an a large teaching hospital in the Midwest US were recruited to participate. The nurses were online self-study module. OB nurses (N = 60) employed at four community hospitals affiliated with then randomly assigned to either the simulation group (n = 30) or the self-study module (n = 30).

Knowledge and performance were assessed pre-intervention (time 1), within seven days after intervention (time 2), and two months after intervention (time 3). Knowledge was assessed with a 10-item multiple-choice Neurologic Knowledge Assessment (NKA) developed by the authors and piloted prior to the study. Ten was the highest score possible, with a higher score indicating more knowledge and was a mean score, rescaled from 0-100 for statistical purposes. Performance was assessed with a 14-item Performance Observation Measurement Tool (POMT) developed by the authors, with face and content validity established by graduating medical students and neurologists. Trained assessors marked “yes” or “no” by each of the 14 items to evaluate performance. A greater number of “yes” scores marked indicated a higher level of performance, and a mean score of 3.5 was considered high performance.

No statistical difference was found in knowledge between the two groups [at time 2 ($p = 0.86$) and time 3 ($p = 0.59$)]. However, performance was significantly increased in the simulation group versus the online study module group in both the short-term (time 2) [mean (SD), 67.6 (20.2) vs. 29.6 (19.0); p G 0.001] and long-term (time 3) [mean (SD), 46.1 (17.6) vs. 27.5 (15.9); p G 0.001]. This study is of importance in the literature because it demonstrates long-term skill retention and transference in practicing nurses, illustrating the importance of using simulation for nurses currently in practice, and not just reserving use of simulation for students.

Team Satisfaction with OB Mock Code

Jacobs (2017) performed HFS using a mock OB code format involving PPH. Eighty-four nurses, nurse technicians, and unit secretaries participated in 16 HFS/mock OB codes at a hospital in the Midwestern US. Groups of five to six nurses, nurse technicians, and unit secretaries were rotated through an HFS simulation/mock code featuring a patient with PPH. The study was a descriptive, one-group post-test design. The purpose of the study was to examine the perception of nurses regarding the benefit of HFS during mock code training involving PPH and to use video-assisted debriefing to assist staff in evaluating communication and teamwork during a simulated OB emergency. Eight open ended questions, used to guide debriefing, and a four-item, four-point Likert-type scale questionnaire, developed by the researcher, were used to assess staff satisfaction with the use of HFS in PPH mock code training and self-assessment of teamwork and communication. Self-reflection and group-focused reflection of teamwork and communication was enhanced by reviewing video-footage of the simulation. Ninety-three percent of participants felt that the HFS/mock code format improved their education teamwork and communication regarding PPH (Appendix A).

Impact of OB Simulation on Patient Outcomes

Fransen, et. al. (2017) conducted a multicenter, open, cluster, parallel randomized controlled trial to examine whether or not simulation-based OB team training improves patient outcomes. Twenty-four obstetric units (N = 24) in the Netherlands were randomly assigned to receive either a one-day, multi-professional, simulation-based team training with focus on crew resource management (CRM) in a simulation center (n = 12) or to no team training (n=12). Staff members from each unit were randomly divided into teams comprised of nurses, an OB/GYN, a midwife and or resident. Participation was mandatory. Each team received eight hours of HFS based training in five scenarios: shoulder dystocia; eclampsia; umbilical cord prolapse; postpartum hemorrhage; and resuscitation of a pregnant woman.

Researchers had previously demonstrated the effectiveness of this simulation-based training program with significantly improved teamwork skills (7.5 versus 6.0 on the Clinical Teamwork Scale; p = 0.014), and an increase in usage of essential medical technical skills (83% versus 46%, p = 0.009; RR 1.8, 95% CI 1.1–3.0). During the year after the training, data was collected on the number of OB complications involving cephalic presentation, singleton pregnancies greater than 24-week gestation, with researchers studying 14,500 such pregnancies in the simulation group compared with 14,157 in the control group. The data was compared to statistics kept for the year prior to the intervention as well. The median unit size was comprised of 1224 women [inter-quartile range (IQR) of 845 to 1509 women]. Complications considered were low Apgar score; severe PPH; trauma due to shoulder dystocia; eclampsia; and hypoxic-ischemic encephalopathy (HIE). Results showed composite outcomes for OB complications were not reduced [odds ratio (OR) 1.0, 95% confidence interval (CI) 0.80–1.3], but injury from shoulder dystocia was reduced (OR 0.50, 95% CI 0.25–0.99), and a four-fold increase in

treatment with packed red blood cells for PPH was identified (OR 2.2, 95% CI 1.2–3.9). This study is important to the body of literature on simulation because it demonstrated the use of simulation to significantly improve treatment of PPH and reduce injury in shoulder dystocia.

OB Virtual Simulation Compared to HFS

Cobbett and Snellgrove-Clark (2016) used a randomized experimental pretest-post-test research design to evaluate the effectiveness of two simulation methods: virtual clinical simulation (VCS) and a high-fidelity simulation (HFS). Fifty-six third-year nursing students (N=56) were recruited from enrollees in a maternity nursing course at a public research university in Canada to complete two simulations, one on pre-eclampsia and one on group beta strep in either the VCS or HFS format. Participants were randomly assigned to either the VCS (n=27) group or the HFS (n=28) group, and then randomly assigned to dyads within those groups to perform the simulations. The simulations took place in the clinical learning and simulation lab of the university.

Data collection for knowledge was performed using a pre and post-test 10-item multiple-choice questionnaire. The tool had face and content validity established and was created by the faculty for the study. Self-confidence was assessed by the Nursing Anxiety & Self-Confidence with Clinical Decision Making Scale (NASC-CDM), which was not developed by the researcher and had established validity (α = 0.96/anxiety; α = 0). The NASC-CDM, is a 27-item 6-point Likert-type, self-report instrument used for data collection of self-confidence and anxiety.

Higher scores indicated either increased anxiety or self-confidence, respectively. Both groups attained increased knowledge and self-confidence, with no significant differences between the two groups. Knowledge of pre-eclampsia scores, post intervention, was (M = 4.80, SD = 1.19) for the HFS group and, for the VCS group, [M = 4.12, SD = 1.54; t (48) = 1.75, p = 0.09, (two-

tailed)]. For knowledge of GBS, HFS data was (M = 6.82, SD = 1.25) while VCS data was [M = 6.40, SD = 1.73) t (51) = 1.02, p = 0.31, (two-tailed)]. No significant difference in self-confidence was found between the two groups (t=1.93, p=0.059, with M=115.25) for the HFS group and (M=104.89) for the VCS group. Self-reported anxiety was statistically higher in the VCS group (M = 73.26) than the HFS group (M=57.75); (t= -3.2; p=0.002). This study is important because it demonstrates simulation, both high-fidelity and virtual, increases knowledge and self-confidence in obstetrical care, particularly care of the patient with pre-eclampsia and group beta strep (GBS)

Virtual OB Simulation Clinical Compared to Hospital OB Clinical

In another study, Veltri, Kaakinen, Shillam, Arwood and Bell (2016) sought to discover if simulation had the same impact as a traditional clinical rotation in gaining maternal-newborn knowledge and skills. If students participating in maternal-newborn simulation scored as high in knowledge and skills testing as did students who participated in a traditional hospital-based maternal-newborn clinical rotation, then researchers could make the argument that simulation could be substituted for a traditional maternal-newborn clinical rotation and achieve the same results. Researchers used a nonequivalent comparison group, post-test only quasi-experimental design with a convenience sample (N = 80) of nursing students enrolled in a maternal-pediatric course (n = 41) students in the group completing pediatric clinical with maternal-newborn (MN) simulations and (n = 39) completing MN clinical with the same simulations.

Faculty researchers developed four data collection tools and piloted them before the study (ICC 0.91). Examiners used The Postpartum (PP) Assessment Form and Newborn (NB) Assessment Form to rate participant's skills, with zero being marked by the examiner for uncompleted items. Further information about the checklist was not given. A situation background, assessment, recommendation (SBAR) Report Form and a Written Reflection

Question Form were used to measure appropriate interventions and critical thinking. The Written Reflection Form consisted of three questions scored from three to six. The answers were compared with a standardized key. Participants participated in one MN simulation. They received separate scores for PP and NB, with 100 points total possible in each area. Eighty-five points were possible from the respective assessment forms and SBAR form and 15 points were possible from the written reflection questions.

Results showed no significant differences between participants in the two groups, with both groups demonstrating equal levels of assessment skills [PP assessment ($t(79) = -0.516$, $p = .609$); NB assessment ($t(79) = -0.483$, $p = .632$); ability to determine appropriate interventions ($t(79) = -0.838$, $p = .405$) and ability to think critically ($t(79) = -0.481$, $p = .632$). Overall scores, comprised of combined assessment plus SBAR (85 points and written scores (15 points), showed no statistical difference [PP total score ($t(79) = -0.361$, $p = .719$) and NB total score ($t(79) = 0.087$, $p = .931$)]. The effect size was small but significant (0.02-0.05) for PP and NB total scores. This study demonstrated that simulation was as effective as traditional clinical in developing the assessment skills, ability to think critically and intervene appropriately in MN nursing students.

Synthesis of Relevant Research

The studies included in the literature review are strong because they represent a high level of evidence. Of the five studies analyzed, four were Level II evidence: a randomized experimental pretest- posttest design (Cobbett & Snellgrove-Clark, 2016); a randomized controlled trial (RCT) with pretest posttest comparison of two groups (Kato & Kataoka, 2017); a multicenter, open, cluster, parallel RCT (Fransen, et. al., 2017); and the study by Rutherford-Hemming, et. al., (2016) was a two-group single blinded, randomized controlled longitudinal

design. One study, (Veltri, et. al., 2017), was Level III evidence, with researchers using a nonequivalent comparison group, post-test only quasi-experimental design (Melnyk, & Fineout-Overholt, 2019). Only one study was Level VI (Jacobs, 2017). This study was included because it was a study involving OB mock code of an OB emergency that was not a cardiac arrest.

All of the studies reviewed demonstrated the effectiveness of simulation in maternal-newborn (MN) care (Cobbett & Snellgrove-Clark, 2016; Kato & Kataoka, 2017; Rutherford-Hemming, et. al., 2016; Veltri, et. al. 2017) or MN patient outcomes (Fransen, et. al., 2017). Also, in all of the studies, nurses (Jacobs, 2017; Rutherford-Hemming, et. al., 2016), midwives (Kato & Kataoka, 2017), or nursing students (Cobbett & Snellgrove-Clark; Veltri, et. al. 2017) were the main subjects. Or, nurses were part of a multi-disciplinary team participating in simulation, with patient outcomes as the subject, gauging the effects on patient outcomes of the simulation education experience (Fransen, et. al., 2017). In all six of the studies, subjects participated in simulation.

The studies collectively included measurement of skill performance (Kato & Kataoka, 2017; Veltri, et. al., 2016; Rutherford-Hemming, et. al., 2016), self-confidence (Cobbett & Snellgrove-Cark, 2016), knowledge (Cobbett & Snellgrove-Cark, 2016; Kato, & Kataoka, 2017; Rutherford-Hemming, et. al., 2016); satisfaction and perceptions of teamwork and communication (Jacobs, 2017); PPH (Fransen, et. al., 2016; Jacobs, 2017; Kato, & Kataoka, 2017); pre-eclampsia (Cobbett,& Snellgrove-Clark, 2016); and immediate postpartum (Kato & Kataoka, 2017; Veltri et. al., 2016); and newborn care (Veltri, et. al., 2016). These topics all represent emergency care in OB that ED nurses may face, especially immediate nursing care of the mother and newborn (Gupta & Adler, 2016).

Overall findings demonstrated the effectiveness of simulation in several areas of OB care and MN patient outcomes. Simulation was demonstrated to increase knowledge (Cobbett & Snellgrove-Clark, 2016; Kato & Kotaoka, 2017), with HFS as effective as VCS (Cobbett & Snellgrove-Clark, 2016). HFS and VCS were found to equally increase self-confidence (Cobbett & Snellgrove-Clark, 2016), while Jacobs (2017) found HFS increased satisfaction with PPH hemorrhage mock code training along with improved teamwork and communication. LFS with SPs were also demonstrated to increase skill over a control group with no intervention (Kato & Kataoka, 2017) and were found to be superior to an online module in increasing skill. Patient outcomes in treating PPH with packed red blood cells were increased fourfold after simulation, while injury from shoulder dystocia was found to decrease in the year after team training with HFS, as compared to data on PPH and shoulder dystocia in the year preceding the intervention (Fransen, et. al., 2017).

Limitations of the body of literature included small convenience samples in three of the studies, although participants were randomly assigned in the Cobbett & Snellgrove-Clark (2016) and Veltri, et. al. (2016). The Jacobs (2017) study was also a convenience sample. No randomization was involved because it was a one group post-study design. Cobbett & Snellgrove-Clark (2016), established face and content validity in their self-developed tool, but the tool was not tested. Veltri, et. al.'s (2016) self-developed data collection tool had face and content validity established, but the tool lacked external and inter-rater reliability. Jacobs (2014) established content validity with the tools used. Continuing education in the control group in the year after the longitudinal study could have interfered with results as well and accounted for no change in composite OB complications (although injury from shoulder dystocia and postpartum

outcomes were improved) (Fransen, et. al., (2017). Another limitation is that the Jacobs (2017) study was descriptive.

Strengths of tools was evident in the body of literature. The NASC-CDM use by Cobbett & Snellgrove-Clark (2016) was valid and reliable and not developed by the authors. Rutherford et. al., (2016) used valid and reliable tools, as the knowledge tool had been previously tested, while the POMT was validated by content experts. The tools in the research of Kato & Kataoka, (2017) were tested and piloted. Other strengths, besides the strong design of all the studies, were sample size in three of the studies (Fransen, et. al., 2017; Kato & Kataoka, 2017; Rutherford-Hemming, et. al., 2016). Also, 95% of the staff participated in simulation in the study by Fransen, et. al. (2017). See Appendix B for Evidence Synthesis Tables.

Application to Evidence-Based Nursing Practice

ED nurses must have the knowledge, skill, and, confidence to administer safe, effective care to OB patients (Gupta & Adler, 2016). Simulation has been demonstrated to be an effective evidence-based practice in the delivery of OB nursing care (Cobbett & Snellgrove-Clark, 2016; Fransen, et. al., 2017; Veltri, et. al., 2016). Readiness of OB skills for ED nurses is essential, especially in rural areas, where OB services are rapidly declining (Lockwood, 2018) at a time when OB emergencies are increasing (CDC, 2018; Stevens, et. al., 2018). Mock OB Code is a type of simulation that can be employed as part of the staff workday, adding to the realism of the experience (Jacobs, 2017).

Support of simulation as an intervention has been demonstrated in the literature and in nursing theory (Benner, 1984). Nurses confronted with a new specialty, such as ED nurses caring for an OB patient, are novice nurses according to Benner (1984). Novice nurses lack experience and adhere to rules, protocols, and guidelines. Simulation can advance skills,

knowledge, and judgment through experience. Therefore, an OB simulation presented as a mock OB code, featuring OB complications, preceded by a didactic session, will be provided as an intervention to nurses of a rural ED in a hospital in the southeastern US. Implementation of this project will put forward an evidence-based solution to the need for ED nurses to be prepared for OB emergencies.

Original Agency Description

Original Setting and Target Population

The agency where the original project was planned is a 25-bed hospital located in a rural area of Western Kentucky. The hospital has an ED, an operating room (OR), a medical surgical (MS) unit, and an Intensive Care Unit (ICU). The facility has an 8 bed ED that provides Level IV care. The original project targeted ED nurses and emergency medical services (EMS) personnel.

The COVID-19 Pandemic prevented implementation of the project at the original facility. Students, including the PI, were not allowed in the facility due to safety concerns. Staff were understandably focused on the demands of the pandemic. Therefore, a quick shift was made to locate a new agency and target population for the project. As such, nursing students became the target population for an online version of the project. Eastern Kentucky University (EKU), a midsize public institution in Richmond, Kentucky, hosted implementation of the online project. The new target population for the project was changed to EKU nursing students, who were second-degree students working toward a Bachelor of Science in Nursing (BSN) degree and enrolled in a junior level family health course.

Original Stakeholders

Stakeholders for the original project included the hospital and nursing management, the ED nurses, EMS personnel, emergency medical service management, and patients experiencing an OB emergency who may be treated at the hospital and emergency medical services. The DNP project is congruent with the organization, because the organization is in a rural area, has no OB unit, and is a 45-minute drive to the nearest hospital with an OB unit. Moreover, the organization requested that an OB intervention be performed with the ED nurses, because the ED nurses themselves have identified OB as an area where they would like to increase skills and confidence. The DNP project is also congruent with the mission of the facility, "to raise and maintain the standards of community health through education, prevention, and treatment of illness" ("Our Mission." 2018).

When the project agency changed, the stakeholders became EKU, the nursing students, EKU course faculty, and EKU nursing and University administrators. The project also met course objectives as students were studying OB nursing in their course. Also, project implementation served to meet online clinical needs for the students, as they were limited in their access to hospitals due to the COVID-19 Pandemic.

Original Project Design

The original project was framed to utilize a pre-test post-test design, primarily. A qualitative aspect of data collection and dissemination regarding the discussion themes that emerge in post-conference was also planned with the original project. The design that was utilized for actual implementation was a single group post-test only design.

Original Project Methods

Original Evidence-Based Intervention

A high-fidelity-simulation (HFS) of a precipitous delivery, in the form of an OB mock code/mock emergency on the unit during participant workday, preceded by a didactic session in the weeks before the OB mock emergency, is the evidence-based intervention proposed. The literature indicates that staff have experienced increased skill and confidence after HFS preceded by a didactic session for precipitous delivery (Febbraro & Arnold, 2012; Homan & Chichester, 2016).

In order to develop the skills and leadership needed to implement this project, the principal investigator (PI), Tracy Littlehale, completed Advanced Life Support in Obstetrics (ALSO) certification, offered by the American College of Family Physicians. This certification, which emphasizes a team-based approach to managing OB emergencies, involved an extensive online course and an eight hour in-person training session which included hands-on competency testing. Concepts from this program are incorporated throughout this intervention.

Internal Review Board (IRB) for Original Project

The project was approved as described below by the IRB of Eastern Kentucky University (EKU) in the spring of 2020. The facility does not have a formal IRB process. Therefore, the partnering facility agreed to obtain IRB approval through EKU.

Instruments

Several data collection instruments will be used. Two of the data-collection instruments, the Self-Confidence in Learning Instrument (SCLI) and the Creighton Competency Evaluation Instrument (CCEI) are previously published with demonstrated validity. The other instruments that will be used were created by the PI. These instruments are the demographic questionnaire

and the program evaluation. All of the instruments will be completed by participants except the CCEI. The CCEI will be completed by the PI on each group of participants rotating through simulation. On the SCLI (pre-simulation and post-simulation copies), the demographic questionnaire, and the program evaluation, participants will be asked to create and write the same four-letter code on each form they complete. It will be suggested to participants that the code consist of the first two letters of their mother's first name and the first two letters of their father's first name. However, participants may use any four letters they choose, provided the code does not identify them personally and is the same on every form they complete.

Self-Confidence in Learning Instrument. The Self-Confidence in Learning Instrument (SCLI), developed to evaluate learner self-confidence in simulation, will be used to assess self-confidence in ED nurses and EMS personnel before the didactic session and after obstetrical (OB) simulation. The SCLI is comprised of Likert-scale responses ranging from one to five, with one being *"Strongly Disagree"* and five being *"Strongly Agree."* The original eight-item instrument tested self-confidence only and was piloted by Jeffries and Rizzolo (2006). The instrument has been amended to include five questions measuring satisfaction by the National League for Nursing (NLN) ("NLN," 2019). These researchers found a high degree of internal consistency, Cronbach's alpha 0.87, establishing validity of the instrument. The SCLI is a Likert-type tool, which comprises ordinal level data (Gravetter & Wallnau, 2017). The SCLI may be used free of charge without permission, provided that the NLN copyright of the tool is acknowledged ("NLN," 2019). Researchers may modify the tool as desired without permission. No specific training is required to implement the SCLI.

Creighton Competency Evaluation Instrument. The Creighton Competency Evaluation Instrument (C-CEI) will be used to assess competency of ED nurses in providing OB

care during the simulation. The C-CEI evaluates four categories of competency based on observable behaviors: assessment, communication, clinical judgment, and patient safety. The C-CEI encompasses 23 items within the four categories of competency. For each item, one point is assigned for demonstrated competency, zero is assigned for no demonstration of competency, and not applicable is assigned if the criterion was not assessed. The C-CEI has an inter-rater reliability of .952 and an internal consistency (Cronbach's alpha) of .979, as reported by Adamson & Kardong-Edgren (2012). Hayden, Keegan, Kardong-Edgren & Smiley (2014) reported content validity on a four-point Likert scale ranging from 3.78 to 3.89 and Cronbach's alpha > 0.90. Those wishing to use the tool must complete and submit an online form found on the Creighton University website and agree to the terms and conditions outlined ("Creighton," 2019). Also, those using the C-CEI must commit to completing online training before using the instrument. All four categories will be used in the project with 23 points possible.

Demographic Questionnaire. All participants in the project will also be asked to complete a demographic questionnaire. The principal investigator will develop the questionnaire. Participants will be asked to complete the questionnaire prior to the didactic session. The questionnaire will ask the participants occupation and for how long they have practiced. Nurses will be asked how long they have worked in the ED and if they have ever worked in OB, and if so, when and how long. Age and gender will also be asked. The questionnaire will not ask the participants name.

Debriefing Questionnaire. Immediately after each simulation is completed, subjects will participate in a debriefing session in a private room led by the PI in order to reflect about their experience and reinforce concepts. The PI will lead the discussion with scripted questions approved by the IRB. The debriefing questionnaire was created by the PI based on the G.A.S.

(Gather, Analyze, Summarize) model of debriefing. The discussion will begin with the PI leading subjects in an exploration of their feelings regarding the simulation, how the experience went for them, and what happened in the simulation. Further reflection will take place when the PI asks the subjects about specific actions they took during specific events in the simulation, as well as what they thought they performed well, what could be improved upon, and how the experience might impact their practice.

Program Evaluation. After debriefing from the simulation, participants will be asked to complete a brief program evaluation form. No identifying information is on the form. The program evaluation form asks the participants to rate four questions on a five-point Likert-type scale. The scale is as follows: 1 (Strongly Disagree), 2 (Disagree), 3 (Neither Agree nor Disagree), 4 (Strongly Agree), and 5 (Agree). Subjects are asked to rate statements about the perceived benefit of the didactic session and the simulation and whether they thought the didactic and simulation would help them care for patients experiencing OB emergencies. A place for written comments is also provided.

Original Implementation Plan

Academic detailing will be provided by the PI, followed by simulation and debriefing. ED nurses and ED providers will be required by the facility to participate in the didactic and OB mock emergency as part of facility competencies. However, participation in the PI's project by completing the forms is completely voluntary. Participation by EMS personnel is completely optional in every aspect. They are not required to participate as part of a competency. Groups of four to six participants will be scheduled by the ED nurse manager. Groups of four to six subjects will be scheduled two hours apart on two separate days for the simulation, with up to two members of each group from EMS. The remaining participants will be ED personnel. If

enough EMS personnel do not wish to participate in the project, the group will be comprised entirely of ED personnel. The nurse manager will make the schedule to include interested subjects from EMS. She will be made aware of those who wish to participate by the EMS manager. Participants will report at their scheduled time for academic detailing, followed by simulation. The time frame for the experience is 90 minutes total.

The PI will complete C-CEI tool during the simulation. One paper/pencil copy of the C-CEI tool will be completed for each group, as the tool is appropriate for both individual and group evaluation (Hayden et al., 2014). Worksheets for the instrument will also be utilized to specify criteria that participants should perform to meet competencies ("Creighton," 2019; Elder, 2015). Volunteers experienced in simulation will assist as needed and operate the high-fidelity manikins but will not be involved in collecting data.

Original recruitment strategy. Recruitment activities will begin six weeks prior to scheduling of the simulations. Each nurse and provider of the emergency department as well as the EMS emergency personnel will be provided with a cover letter. The PI will also approach prospective subjects on their down times at their units and talk to them informally about the project. A flyer will also be posted at Caldwell County EMS. If EMS personnel decide to participate, they will inform their manager, who will forward their names to the charge nurse at CMC to be scheduled.

Original pre-simulation activities. The PI will arrange a 40-minute pre-simulation session that will include orientation, completion of pre-SCLI forms and demographic forms, as well as a 30-minute didactic session on OB emergencies prior to the OB mock/emergency. The PI will greet participants in the simulation area of the hospital at their scheduled time and provide each of them with a numbered packet comprised of a cover letter explaining the project,

a demographic questionnaire and color-coded copies of the pre-test and post-test, and an evaluation form. Color-coding copies of the of the pre and post-test SCLI will allow for the two not to be confused with one another.

Also, the PI will review the packet with participants and thank them for participating. Participants will fill out the pre-assessment form of the SCLI and place it in an envelope. They will place consent forms in a second envelope and demographic questionnaires in a third envelope. The PI will be out of the room at this point. Approximately 7 minutes will be allowed for this portion. After all documents are placed in the respective envelopes, the project leader will seal the envelopes.

The PI will then present participants with an in person didactic session regarding a review of OB complications, including brief essentials of the pathophysiology, risk factors, clinical manifestations, treatment, and management of postpartum emergencies. The didactic will last 30 minutes and will be accompanied by a PowerPoint. Participants will receive academic detailing live or via video.

Participants will then be oriented to what will happen in the OB mock emergency, but the exact nature of the patients OB problems will will not be divulged. They will then participate in the OB mock emergency. Following the OB mock code, participants will be debriefed by the PI, who will use the debriefing questionnaire to guide discussion.

Original simulation/OB mock emergency. The OB mock code will begin when a pregnant patient, complaining of contractions, arrives at the ED after driving herself to the facility. The nurses then begin care of the patient, admitting her to the ED and assessing her status. The first stage will last approximately 10 minutes. All care in each stage will be guided

by evidence-based protocols of the hospital, which will have been reviewed or developed by the project leader prior to implementation of the project as part of clinical hours.

The second stage of the OB mock code, lasting approximately five minutes, is comprised of the delivery complicated by shoulder dystocia and postpartum hemorrhage. The patient states she has to push and screams the baby is coming. The head of the newborn emerges but the shoulders do not follow. The team will have to implement McRobert's maneuver, which does not result in delivery. When suprapubic pressure is administered correctly by the team, the baby will deliver. The placenta follows rapidly. The high-fidelity manikin will deliver a static newborn manikin. The static newborn mannequin will be switched out with a high-fidelity manikin. This switch will be explained to the nurses during orientation. Switching of the manikins will occur when the nurse attending to the mother cuts the cord of the static manikin and places the static manikin in a waiting blanket that covers the hands of another nurse. That nurse, who will provide newborn care, will put the bundled static manikin beneath the warmer, and pretend the high-fidelity newborn manikin in the infant warmer is the baby just delivered.

After the nurse switches the newborn manikins, the last stage of the simulation will begin. While the newborn is being cared for, the mother is simultaneously being cared for. The mother should receive 20 mg of Pitocin in 1000 cc of LR at a rate of 125cc/hr, according to hospital protocol. She should have her uterine fundus, lochia, and vital signs assessed according to hospital protocol. She will have a boggy uterus and excessive lochia, which responds to fundal massage. Simultaneously, the newborn will be dried, have his mouth and nose bulb-suctioned, and have APGAR scores assigned at one and five minutes. The nurses will administer Vitamin K intramuscularly in the vastus lateralis of the infant and administer erythromycin ointment to the infant's eyes. The nurses will also take the baby's temperature, assuring that it is

over 97.2 degrees Fahrenheit. The nurses will provide for bonding by allowing the mother to hold the infant. Breastfeeding will be initiated and documentation completed. At the time of birth, EMS will need to be called. The emergency medical technicians (EMTs) arrive, receive report and paperwork from the nurses, and transfer the patients to the ambulance. The EMTs placing the patients in the ambulance is the end of the simulation. This last stage will last approximately 10 minutes.

Original post-simulation activities. After every simulation, debriefing will take place by the PI, which will last approximately 25 minutes. All participants will participate in the debriefing session that immediately follows the simulation session in which they participated. The PI will utilize the debriefing questionnaire to guide questions and comments during the debriefing session. The PI will take field notes during the debriefing sessions.

After debriefing, the PI will leave the room for approximately five minutes, allowing participants to complete the post-intervention SCLI and program evaluation. All participants will place their completed copies of the SCLI and program evaluation in designated envelopes in the debriefing room and be dismissed upon post-test completion. The PI will seal and retain the envelopes.

Original Data Collection/Outcome Measures Plan

Data will be collected prior to the didactic session, during the OB mock emergency/simulation, and during and after debriefing. Prior to the didactic session, participants will complete the pre-intervention copy of the SCLI and the demographic questionnaire. During each OB mock emergency/simulation, the PI will complete a separate copy of the C-CEI. During each debriefing session, the PI will take field notes. After the debriefing, participants will complete the post-intervention copy of the S-CLI and the Program Evaluation.

The pre-intervention and post-intervention SCLI forms, demographic questionnaire forms, and Program Evaluation forms will be completed by participants in the didactic/debriefing classroom with the project leader out of the room, which will allow for confidentiality and anonymity. Immediately upon completion, forms will be placed by participants in large labeled envelopes. The envelopes will be sealed by the PI when she re-enters the room after all forms have been completed and placed by participants in the envelopes.

Each copy of the C-CEI, completed by the PI during the simulation, will be placed by the PI in a labeled envelope immediately upon completion. The envelope will be immediately sealed by the project leader when all simulations are complete. The same procedure will be followed with the field notes taken by the PI during debriefing sessions.

The sealed envelopes will be retained by the PI and transported via private vehicle to the residence of the PI where they will be locked in a safe until data analysis is complete. After data analysis is complete, the envelopes containing the forms will be securely stored at the Eastern Kentucky University Department of Baccalaureate and Graduate Nursing.

Original Data Analysis Plan

Data for both the SCLI and the C-CEI will be analyzed using the Statistical Package for Social Sciences (SPSS) Version 26. A paired t-test (two-tailed) will be used to evaluate the influence of the simulation on the self-confidence of ED nurses in caring for a patient with an OB emergency. The significance threshold of the t-test will be set at .05. Pre and post-tests of the SCLI will be evaluated in this manner (Gravetter & Wallnau, 2017). Confidence levels will be tested at 95% and an eta-squared statistic will be performed to estimate the effect size. Mean increase or decrease in pre and post scores will also be calculated. Data from the test will be coded using the numerical values that were assigned to responses on the tool by the creators:

strongly disagree = 1; disagree = 2; undecided = 3; agree = 4; and strongly agree = 5. Every copy of the SCLI completed by each participant has a maximum value of 40 points, because there are eight questions on a five-point Likert scale. The type of data is ordinal data, because it is a Likert-scale.

Competency of the ED nurses and EMTs will be evaluated with the C-CEI. To calculate competency, the number of scores marked one (one = competency demonstrated) on the scale will be calculated, as will the number of scores marked zero (zero = competency not demonstrated). These totals will be compared to show the total percentage of nurses achieving competency in each of the four assessment areas. Every copy of the C-CEI completed by each participant will have a maximum value of 23, as there are 23 areas of assessment worth a maximum of one point each. The data is ordinal: one = competency demonstrated and zero = competency not demonstrated (Gravetter & Wallnau, 2017).

Qualitative data gleaned from the debriefing will be organized according to themes. The project leader will transcribe the recording. After transcription, the project leader will make note cards of common themes that emerge from the discussion and categorize comments under those headings.

Revised Methods

Due to the COVID-19 pandemic, the proposal was revised to implement the project online to baccalaureate nursing students enrolled in an OB course at Eastern Kentucky University. The facility was unable to host the project because students were not allowed in the facility, and the uncertainty of the pandemic left them unable to reschedule. Focused on the demands of providing care during a pandemic, the project was not a priority for the approved facility, even in an online format. Other facilities were not hosting students either, leaving

nursing students with the need for online clinical experiences. These circumstances left an opening for the project to be implemented as a much needed online clinical experience for nursing students.

Consultation and collaboration among the PI, project faculty advisors, and EKU course faculty resulted in a strategy to implement the didactic, simulation, and debriefing online as a required clinical day assignment. The didactic and simulation would be administered asynchronously, followed by a scheduled synchronous debriefing. The entire experience would last approximately six hours, including time to complete the forms for the projects, should the students be willing to volunteer for the project.

IRB Revision

Form R was filed with the EKU Internal Review board to amend the original IRB, and IRB approval was granted to implement the simulation in an online format and with EKU baccalaureate nursing students. Permission was also granted to modify the Cover Letter used for recruitment and to drop the use of the demographic survey as well as the C-CEI, since students would not be enacting a live simulation. The content of the online simulation would be the same as what was proposed for the original project. Students would assume the role of an ED nurse working in a hospital with no OB unit and provide care for an OB patient who comes to the ED with an OB problem. Dr. Angela Clark, the OB course instructor, was also added as an investigator in order to facilitate the data collection process.

Revised Implementation

Academic detailing was provided by the PI, followed by simulation and debriefing, all online. Academic detailing and the online simulation were asynchronous, independent student activities, while the debriefing was synchronous. Course requirements mandated student

participation in academic detailing, completion of the online simulation, and participation in the debriefing as a clinical day assignment. All activities related to the clinical assignment and project took place over the course of one day. Participation in the PI's project by completing the post-intervention SCLI and program evaluation was completely voluntary. The decision was made to drop implementation of the pre-intervention SCLI, as it was recognized to be of no use as a pre-intervention assessment tool. The post SCLI and the program evaluation were the tools implemented in the actual study.

Revised Recruitment

Recruitment activities were implemented at the beginning of the OB course. Each of the eight students in the course was e-mailed a revised copy of the cover letter, explaining the project and asking for their participation. Dr. Angela Clark, co-investigator and faculty for the course, e-mailed a copy of the cover letter to each student's individual EKU email address, ensuring the PI did not know the students' names.

Revised Pre-Simulation Activities

Students remotely accessed a folder containing directions and materials for the virtual clinical experience via Blackboard (Bb) at the beginning of their assigned clinical day. Blackboard is the online platform utilized for course delivery by EKU. After reading the directions, students accessed a link on Bb to a YouTube video of the didactic session. The didactic session, created by the PI, discussed OB complications and briefly discussed the circumstances whereby ED nurses may encounter patients with OB emergencies in the ED. The didactic was created by the PI and was comprised of a voice over PowerPoint converted into a movie (.mp4 file). After the didactic, the directions instructed students to complete the online simulation.

Revised Online Simulation

The OB/Mock Emergency simulation that was originally planned was converted by the PI into an online simulation/unfolding case project (online simulation). The format of the online simulation was a Microsoft Word document accessible to the students in a folder on Bb. Students typed their answers directly on the Word document and were required to list a citation for every answer. Submission of the completed online simulation on Bb was required prior to the scheduled debriefing session at the end of the clinical day. Students had five hours to view the didactic session and to complete and submit the online simulation prior to debriefing.

The online simulation began when a pregnant patient, complaining of contractions, arrived at the ED, having been brought to the facility by her mother. The nurse began care of the patient, prioritizing assessment of the patient and positioning the patient for optimal uterine blood flow. The patient was in active labor, which legally precluded the patient from being transferred to a facility with an OB unit. Students were asked to describe how they would help the patient cope with the demands of labor and how they would approach pain management of a patient laboring in the ED. They described how they would assess for contractions and fetal heart activity, referring to their texts for guidance. Students also had an exercise that led them through communication with the provider.

The second stage of the OB mock code/online simulation was comprised of the delivery complicated by shoulder dystocia and excessive postpartum bleeding. The patient stated she had to push and screamed, “the baby is coming.” The head of the newborn emerged, but the shoulders did not follow. The student described what steps were needed, hopefully identifying McRobert’s maneuver. When McRobert’s maneuver was unsuccessful, the provider asked the

nurse to perform suprapubic pressure. The students described the steps in the maneuver. The baby was born, and the placenta followed rapidly.

In the last stage of the online simulation, students provided care for the mother and newborn and reported to emergency medical system (EMS) personnel as the patients were transferred to a facility with an OB unit. Students were required to recognize the need to implement postpartum medication. Students described the immediate postpartum care the patient should receive, prioritizing interventions. The patient had a boggy uterus and excessive lochia, which required the student to identify the need for fundal massage and describe the procedure. The boggy uterus firmed with massage. Care of the newborn was limited due to time constraints. Students assigned APGAR scores at one and five minutes, based on scenarios. The students described the necessity of providing for bonding. Also, students described steps to assist the mother with breastfeeding and reviewed when and why breastfeeding should be initiated postpartum in the breastfeeding mother and newborn. The simulation concluded when EMS personal arrived, received report, and transferred the mother and newborn via ambulance to a hospital with an OB unit.

Revised Post-Simulation Activities

Debriefing was completed synchronously via Zoom at an appointed time, five hours after the students' clinical day began. Students submitted the completed online simulation via Bb prior to the debriefing session, as required by their instructor. Students accessed the link to Zoom via Bb. Attendees had microphone and camera capabilities in order to converse with one another as realistically as possible. The PI used the debriefing questionnaire to lead the session. The co-investigator was present during the debriefing session, which lasted approximately 45 minutes. Field notes were taken by the investigators.

At the end of the debriefing session, the students who wished to participate in the project immediately completed the SCLI and the program evaluation and e-mailed them to their faculty. Students were assured that faculty would not review their answers and that their answers would be anonymously forwarded to the PI. Faculty e-mailed the forms from each student in pairs to the PI. Each pair contained a completed SCLI and completed program evaluation from one student.

Results

Data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 26. A convenience sample of seven students were recruited as participants from a total of eight students who were enrolled in the course. All eight students participated in the didactic, online simulation and debriefing. For implementation of the project, only post-simulation copies of the SCLI were administered, resulting in a one group post-test only design for the project. Both program evaluations and the SCLI were administered after debriefing was complete.

Satisfaction and Self-Confidence in Learning Instrument

Descriptive statistical analysis was used to exam both the Satisfaction with Current Learning (Satisfaction) and the Self-Confidence in Student Learning (Self-Confidence) scales of the SCLI instrument. The Satisfaction scale is comprised of five questions while the Self-Confidence portion is comprised of eight questions. All questions on the SCLI are on a five-point Likert-type scale ranging from 4 (*Agree*) to 5 (*Strongly Agree*).

Satisfaction. Results of the mean of the cumulative answers for each question show the mean value for all questions is above four, mean score for Satisfaction ($M = 4.6$, $SD = 0.46188$). The cumulative mode for all responses to each question was 5 *(Strongly Agree)*. One hundred percent of all participants answered 4 *(Agree)* or 5 *(Strongly Agree)* to the questions related to

Satisfaction. On four out of five questions, the majority of students, 57% to 71%, answered 5 (*Strongly Agree*). On one question, "The way my instructor(s) taught the simulation was suitable to the way I learn," the majority of participants, 57%, or four students, answered 4 *(Agree)*. The remaining 43%, or three students, answered 5 *(Strongly Agree)* to this question.

Self-Confidence. Results of the mean of the cumulative answer for each question on the Self-Confidence scale show the mean value for all questions is above four, mean score for Self-Confidence (M = 4.5179, SD = 0.42956). Each individual question on the Satisfaction scale had a cumulative mean greater than 4. The cumulative mode for all responses on the Self-Confidence scale was five. In six out of eight questions regarding Self-Confidence, 100% of respondents answered 4 (*Agree*) or 5 *(Strongly Agree)*. One participant marked 3 *(Undecided)* on the question regarding confidence that the activity helped meet curriculum needs. On the question "It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time," one student marked 3 *(Undecided)* while another student chose 2 (*Disagree*).

The majority of the respondents show agreement with the statements on the Self-Confidence Scale. However, one student answered 3 *(Undecided* on the second statement, " I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum." Also, one respondent answered 2 "*Disagree*" and one answered 3 "*Undecided*" on the last statement "It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time."

Program Evaluation

Results of the mean of the cumulative answer for each question on the Program Evaluation show the mean value for all questions is above four, mean score for Program

Evaluation (M = 4.25, SD 0.38188), (Table 3). The majority of the respondents marked they agreed or strongly agreed with the Program Evaluation statements. One respondent marked 3 "*Undecided*" on the statement "The simulation was beneficial." All other students marked 4 "*Agree*" or 5 "*Strongly Agree*" on this statement. On the Program Evaluation's four other questions, 100% of students marked 4 "*Agree*" or 5 "*Strongly Agree*".

Discussion

The findings of this project demonstrate an online simulation activity pertaining to OB emergencies in the ED was effective in eliciting high levels of satisfaction and self-confidence in learning among undergraduate baccalaureate students. Also, low SD for both tools indicated minimal variation in responses, meaning students were consistent with their answers, which are very favorable overall.

The findings were expected, as the literature demonstrates high levels of self-confidence and satisfaction with simulation. Cobbett & Snellgrove-Clark (2016) determined that simulation resulted in high levels of self-confidence by nursing students. S-confidence is an important variable to consider, as diminished self-confidence has been linked decreased ability to recognize OB complications in patients and intervene in a timely manner (Gupta & Adler, 2016). Jacobs (2017) showed high levels of satisfaction with simulation as a training tool among practicing nurses. Moreover, the data also indicated that participants felt a high level of satisfaction with the intervention overall, based on the results of the Program Evaluation; this tool was also demonstrated to be have a high degree of statistical reliability.

Limitations

Limitations of the project were several. Most significantly, the project was implemented with nursing students instead of the originally intended ED nurses due to the COVID-19

pandemic. Nursing students assumed the role of the ED nurse caring for a patient with OB emergencies in the ED, but the originally intended audience, practicing ED nurses, were not reached. The change in subjects also eliminated participation of EMS in the project, as had been originally planned, thus thwarting an interprofessional component of the project. Online implementation rather than in-person implementation of the simulation, which was necessitated by the COVID-19 Pandemic, was also a limitation. The design of the project, a one group post-test only design was also a project limitation as were the limited tools utilized in the study.

Implication of Findings

Use of simulation as an educational tool for students as well as practicing nurses is recommended due to the high levels of satisfaction and self-confidence that were suggested by this intervention. Current practice can be impacted by implementation of the original project with practicing ED nurses. The body of literature regarding simulation combined with the findings of this project suggest ED nurses will benefit from OB simulation, improving quality and safety in patient care and providing up-to-date information for development of policies that address best practices in the care of patients with OB emergencies in the ED.

Creation of up-to-date policies regarding OB emergencies in rural EDs operating in hospitals with no OB unit is essential for improving the safety and quality of care received by OB patients in these facilities. It is recommended these policies be made in collaboration with the hospitals that these facilities transfer OB patients to in order to optimize quality and continuity of care. Furthermore, incorporation of simulation is highly recommended to maintain up-to-date skills in staff and optimize the quality of care patients receive and as well as ensure safe care of patients. The benefit of this project is that it contributes to the body of knowledge of the effectiveness of simulation as an effective means of learning in nursing.

In education, the use of simulation has been widely acclaimed in the literature. Having students assume the role of an ED nurse caring for an OB patient who has no access to an OB unit may help students realize the importance of maintaining OB skills and knowledge even if they do not practice on such a unit. Providing students with the opportunity to simulate care of a patient with an OB emergency outside of the traditional OB unit may encourage students to maintain knowledge and skill in this area to improve patient care and assist educators in truly integrating OB nursing knowledge into nursing curricula, as well as prepare nursing students for the realities of practice.

Sustainability

Sustainability of this project both as the project was originally proposed and as the project was implemented due to the COVID-19 Pandemic is feasible. Implementation of the educational components in this project will be available to the original facility through the mobile unit of the Baptist/Madisonville Community College Interdisciplinary Simulation Hospital (Simulation Hospital) when the demands of the pandemic have subsided. The PI is employed by Madisonville Community College (MCC) and has arranged to be dispatched with the mobile unit to implement training regarding OB emergencies in the ED as outlined in this paper's original proposal. This Simulation Hospital has a grant to assist outlying hospitals with simulation, and before the grant, MCC had a culture of working with area hospitals to share resources and increase knowledge and learning in health professionals. MCC's culture of working with outlying hospitals will resume should the grant end, making the liaison between MCC and the agency feasible after the grant has ended, thereby ensuring sustainability of the project. Moreover, the original agency is committed to maintaining the project after the initial implementation. Obstetrical course faculty at EKU have expressed interest in utilizing the

project materials again, and they are free to modify and implement them in any form needed to achieve the educational needs of their students.

Future Scholarship

Future steps of this PI will be to implement the project with the original facility after graduation as an independent practitioner. The project would necessarily be implemented at a time, in the indeterminant future, when the COVID-19 Pandemic is not a central focus of the facility. Furthermore, conducting a project comparing a group of ED nurses who experience in-person simulation to a group who experience virtual simulation would add to the body of literature on the efficacy of virtual simulation.

In educational settings, this project gives students a different perspective about where and how they will encounter OB patients when they become nurses. Areas for further study in education include whether simulation on OB in the ED motivates students to retain the OB knowledge they learn in nursing.

Conclusion

In conclusion, this project proposed a didactic and simulation to help nurses and an interprofessional team demonstrate competence and increase self-confidence in providing care for patients experiencing obstetrical emergencies in a rural ED. The project was actually implemented in an online format with baccalaureate nursing students due to the COVID-19 Pandemic and explored satisfaction and self-confidence post intervention. The findings demonstrated that the students expressed a high degree of satisfaction and self-confidence regarding care of the patient with an OB emergency in the ED after online didactic and online simulation. Also, participants reviewed the intervention favorably when evaluating the program. The need for ED nurses to maintain knowledge and skills regarding OB emergencies is

especially salient as OB services in rural areas rapidly decline (Lockwood, 2018) while OB complications rise (CDC, 2018; Stevens, et. al., 2018), increasing the likelihood that ED nurses will provide care to patients with OB emergencies (Shannon, 2017). Simulation has been demonstrated in the literature as an effective measure to improve skill, knowledge, self-confidence, and outcomes in patients experiencing OB emergencies (Cobbett & Snellgrove-Clark, 2016; Fransen, et al., 2017; Veltri, et al., 2017).

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Appendix A

Caldwell
MEDICAL CENTER

Letter of Support for Off-Campus Research

March 11, 2020

Institutional Review Board:

As an authorized representative of Caldwell Medical Center, I grant approval for Tracy Littlehale, Doctor of Nursing Practice (DNP) student at Eastern Kentucky University), to conduct research involving human subjects at my organization. I understand that the purpose of this research is to implement an educational session followed by simulation to examine whether these measures increase the self-confidence of Emergency Department (ED) nurses and Emergency Medical Services (EMS) personnel in the care of a patient with obstetrical (OB) emergencies as measured by the Self-Confidence in Learning Instrument (SCLI) and to examine whether ED nurses and EMS personnel demonstrate competence in caring for a patient with an OB emergency during the simulation as measured by the Creighton Competency Evaluation Instrument (C-CEI).

I Grant permission for this project to involve individuals who staff the Emergency Department at Caldwell Medical Center and Emergency Medical Personnel who work with Caldwell County Emergency Medical Services and I have determined these individuals to be appropriate subjects for this research. I understand that they will be asked to participate in an educational session on caring for a high-risk obstetrical patient and participate in a simulation, as well as anonymously complete a few forms related to the project.

To support this research, I agree to allow staff to participate in this project at our facility.

Sincerely,

Dan Odegaard, FACHE
CHIEF EXECUTIVE OFFICER
Phone: 270.365.0321
Fax: 270.365.4150
caldwellmedical.com

Caldwell
MEDICAL CENTER

Appendix B

Completion Date 08-Feb-2019
Expiration Date 07-Feb-2022
Record ID 30481449

This is to certify that:

Tracy Littlehale

Has completed the following CITI Program course:

Social & Behavioral Research - Basic/Refresher (Curriculum Group)
Social & Behavioral Research - Basic/Refresher (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Eastern Kentucky University

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w94e67b2b-1a01-4894-9ecb-5f4fdb056534-30481449

Completion Date 02-Apr-2020
Expiration Date 02-Apr-2023
Record ID 36145753

This is to certify that:

Angela Clark

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

Biomedical Research - Basic/Refresher (Curriculum Group)
IRB Required Course: Biomedical Research (Course Learner Group)
1 - Basic Course (Stage)

Under requirements set by:

Baptist Health – Kentucky & Southern Indiana

Collaborative Institutional Training Initiative

Verify at www.citiprogram.org/verify/?w195d58ff-47e2-4699-9a21-ec8499d58a51-36145753

Appendix C

Cover Letter

Simulation to Increase Self-Confidence and Performance of the Emergency Department (ED) Team and EMS Professionals in Caring for Patients with Obstetrical (OB) Emergencies in the ED

Tracy Littlehale, MSN, RN
Doctor of Nursing Practice Student
Eastern Kentucky University
Department of Baccalaureate & Graduate Nursing

Hello,

I am Tracy Littlehale, a Doctor of Nursing Practice student at Eastern Kentucky University's Department of Baccalaureate and Graduate Nursing. I am completing my doctoral project and am asking for your participation. As a participant in the project, you will view a 60 min educational video on OB emergencies and, on a separate day, participate in an OB Mock Emergency/simulation in the Caldwell Medical Center ED. Before the video, you will be asked to complete a brief demographic survey that includes your age, job title, years of experience and a Self-Confidence in Learning Instrument (SCLI). After the OB Mock Emergency/Simulation you will complete another copy of the SCLI. The surveys will take approximately 15 minutes to complete. During the OB Mock Emergency/Simulation sessions. I will evaluate teams on assessment, communication, clinical judgment and patient safety using the Creighton Competency Evaluation Instrument (CCEI). Your responses on the surveys as well as your performance in the OB Mock Emergency/Simulation will be anonymous and study results will be reported only as aggregate (group) data with no identifying information. The aggregate results from the project will be shared in written and oral presentation about the project.

Your participation in this project is voluntary. You are under no obligation to participate and you may withdraw from the project at any time. Your participation, completion of the surveys is not a requirement or a condition employment, benefits or services from Baptist Health Madisonville. The project involves no foreseeable risks or harm to you or your position within the organization.

If you have any questions about this project, please contact me at tracy_littlehale@eku.edu or my faculty advisor, Dr. Gina Purdue at gina.purdue@eku.edu. Questions or concerns about your rights as a study participant may be directed to the office of Sponsored Programs, Jones 414/Coats CPO 20, Eastern Kentucky University, Richmond, KY. I look forward to working on this project and appreciate your consideration as a future participant.

Sincerely,

Tracy Littlehale MSN, RN
Eastern Kentucky University DNP Student

Cover Letter

Preparing for Obstetrical (OB) Emergencies in the Emergency Department (ED)

Tracy Littlehale, MSN, RN
Doctor of Nursing Practice Student
Eastern Kentucky University
Department of Baccalaureate & Graduate Nursing

Hello,

You are invited to participate in an evidence-based project that will help a doctoral student complete her degree and hopefully help you feel more self-confident and competent with OB emergencies. I am Tracy Littlehale, a Doctor of Nursing Practice (DNP) student at Eastern Kentucky University's Department of Baccalaureate and Graduate Nursing. As a participant in the project, you will watch an online educational presentation on OB emergencies and, participate in an online OB Mock Emergency/Simulation. Before the educational presentation, you will be asked to complete a brief form, the Self-Confidence in Learning Instrument (SCLI). After the OB Mock Emergency/Simulation, you will participate in a scheduled online "live" debriefing session to discuss your experience. After the debriefing, you will complete another copy of the SCLI and a short program evaluation. The surveys will take approximately 10 minutes total to complete. Your responses on the surveys as well as your performance in the online OB Mock Emergency/Simulation will be anonymous and study results will be reported only as aggregate (group) data with no identifying information. The aggregate results from the project will be shared in written and oral presentations about the project. **The simulation and educational session are required as clinical for your course but participating in the project by completing the questionnaires is optional. So, the only thing you have to do to help me with my project is anonymously complete the questionnaires.**

My original project was approved for implementation with Emergency Department Nurses, but due to the Covid-19 pandemic, they had to cancel, and I have the opportunity to implement the project in your course.

***Your participation in this project is voluntary. You are under no obligation to participate and you may withdraw from the project at any time. Your participation in the project involves no foreseeable risks or harm to you or your position within your course.*

If you have any questions about this project, please contact me at tracy_littlehale@eku.edu or my faculty advisor, Dr. Gina Purdue at gina.purdue@eku.edu. Questions or concerns about your rights as a study participant may be directed to the office of Sponsored Programs, Jones 414/Coats CPO 20, Eastern Kentucky University, Richmond, KY. I hope you will favorably consider participation in this project. I look forward to working with you.

Sincerely,

Tracy Littlehale MSN, RN
Eastern Kentucky University DNP Student

Appendix D

Participate in a Study: Preparing for OB Emergencies in the ED

You are invited to participate in an educational program & simulation on OB Emergencies in the ED
You will be asked to fill out a few short surveys for an EKU Students' doctoral project.
Participation is Voluntary.

Dates: MAY 5 & 7
Location: CMC ED

Contact Tracy Littlehale for more information:
tracy.littlehale@mymail.eku.edu or 270.836.6464

Appendix E

Creighton Competency Evaluation Instrument (CCEI)

Student Name: _____
Staff Nurse Instructor Name: _____

0= Does not demonstrate competency
1= Demonstrates competency
NA= Not applicable

Date: _____/_____/_____
MM / DD / YYYY

	Circle Appropriate Score for all Applicable Criteria - If not applicable, circle NA			COMMENTS:
ASSESSMENT				
1. Obtains Pertinent Data	0	1	NA	
2. Performs Follow-Up Assessments as Needed	0	1	NA	
3. Assesses the Environment in an Orderly Manner	0	1	NA	
COMMUNICATION				
4. Communicates Effectively with Intra/Interprofessional Team (TeamSTEPPS, SBAR, Written Read Back Order)	0	1	NA	
5. Communicates Effectively with Patient and Significant Other (verbal, nonverbal, teaching)	0	1	NA	
6. Documents Clearly, Concisely, & Accurately	0	1	NA	
7. Responds to Abnormal Findings Appropriately	0	1	NA	
8. Promotes Professionalism	0	1	NA	
CLINICAL JUDGMENT				
9. Interprets Vital Signs (T, P, R, BP, Pain)	0	1	NA	
10. Interprets Lab Results	0	1	NA	
11. Interprets Subjective/Objective Data (recognizes relevant from irrelevant data)	0	1	NA	
12. Prioritizes Appropriately	0	1	NA	
13. Performs Evidence Based Interventions	0	1	NA	
14. Provides Evidence Based Rationale for Interventions	0	1	NA	
15. Evaluates Evidence Based Interventions and Outcomes	0	1	NA	
16. Reflects on Clinical Experience	0	1	NA	
17. Delegates Appropriately	0	1	NA	
PATIENT SAFETY				
18. Uses Patient Identifiers	0	1	NA	
19. Utilizes Standardized Practices and Precautions Including Hand Washing	0	1	NA	
20. Administers Medications Safely	0	1	NA	
21. Manages Technology and Equipment	0	1	NA	
22. Performs Procedures Correctly	0	1	NA	
23. Reflects on Potential Hazards and Errors	0	1	NA	

COMMENTS

Total: _____
Total Applicable Items: _____
Earned Score _____

Revised for DEU use 8/20/2013

Appendix F

Debriefing Questionnaire
Tracy Littlehale
Preparing for Obstetrical (OB) Emergencies in the Emergency Department

How do you feel about the simulation ?
How did you think the simulation went?
Can you tell me what happened?

Tell me more about… (a specific action of the team during the simulation that the PI wishes to explore further).

What went well?
What can you improve upon?
How will this experience impact your practice?

Appendix G

Demographic Questionnaire
Principal Investigator: Tracy Littlehale
Project: Preparing for Obstetrical Emergencies in the Emergency Department

STUDY ID:
___ ___ ___ ___
Write the first two letters of your mother's first name, then write the first two letters of your father's first name (or any 4 letters you choose). Write the same letters on every form for data analysis purposes!

Directions: Place a check by the answer that applies to you. Fill in short answer (s) as applicable.

I am an:
___RN
___LPN
___ Emergency Medical Systems
(EMS Personnel)
___MD/DO
___APRN/PA
___Other

How long have you been in the above position?
___0-2 years
___3-5 years
___6-10 years
___11-14 years
___15-19 years
___20+ years

Have you participated in caring for a patient having a complication with a vaginal delivery in the past year?

___Yes
___No

If yes, what complication(s) (if any) did the mother/and or infant experience?

___Shoulder dystocia
___Precipitious delivery
___Cord Prolapse
___Pre-Eclampsia/Eclampsia
___Other (please explain)

How did you receive pre-simulation education?
___Classroom Session
___Recorded Session
___I did not participate in a pre-simulation education session.

Appendix H

___ ____ first two letters of mother's first name
___ ____ first two letters of father's first name
The above information must be the same on every form so that your answers may be compared while keeping you anonymous.

Program Evaluation
Tracy Littlehale
Preparing for Obstetrical (OB) Emergencies in the Emergency Department

Please circle the number that best reflects your response to the following questions.
1 is strongly disagree and 5 is strongly agree.

The educational session was beneficial.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Strongly Agree	Agree
1	2	3	4	5

2. The simulation was beneficial.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Strongly Agree	Agree
1	2	3	4	5

3. The information presented in the didactic session will help me better care for patients with obstetrical emergencies.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Strongly Agree	Agree
1	2	3	4	5

4. The simulation will help me better care for patients with obstetrical emergencies.

Strongly Disagree	Disagree	Neither Agree nor Disagree	Strongly Agree	Agree
1	2	3	4	5

Are there any other thoughts, comments or perspectives you would like to share?

Appendix I

Student Satisfaction and Self-Confidence in Learning

Instructions: This questionnaire is a series of statements about your personal attitudes about the instruction you receive during your simulation activity. Each item represents a statement about your attitude toward your satisfaction with learning and self-confidence in obtaining the instruction you need. There are no right or wrong answers. You will probably agree with some of the statements and disagree with others. Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs. Please be truthful and describe your attitude as it really is, not what you would like for it to be. This is anonymous with the results being compiled as a group, not individually.

Mark:
1 = STRONGLY DISAGREE with the statement
2 = DISAGREE with the statement
3 = UNDECIDED - you neither agree or disagree with the statement
4 = AGREE with the statement
5 = STRONGLY AGREE with the statement

Satisfaction with Current Learning	**SD**	**D**	**UN**	**A**	**SA**
1. The teaching methods used in this simulation were helpful and effective.	○ 1	○ 2	○ 3	○ 4	○ 5
2. The simulation provided me with a variety of learning materials and activities to promote my learning the medical surgical curriculum.	○ 1	○ 2	○ 3	○ 4	○ 5
3. I enjoyed how my instructor taught the simulation.	○ 1	○ 2	○ 3	○ 4	○ 5
4. The teaching materials used in this simulation were motivating and helped me to learn.	○ 1	○ 2	○ 3	○ 4	○ 5
5. The way my instructor(s) taught the simulation was suitable to the way I learn.	○ 1	○ 2	○ 3	○ 4	○ 5
Self-confidence in Learning	**SD**	**D**	**UN**	**A**	**SA**
6. I am confident that I am mastering the content of the simulation activity that my instructors presented to me.	○ 1	○ 2	○ 3	○ 4	○ 5
7. I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum.	○ 1	○ 2	○ 3	○ 4	○ 5
8. I am confident that I am developing the skills and obtaining the required knowledge from this simulation to perform necessary tasks in a clinical setting	○ 1	○ 2	○ 3	○ 4	○ 5
9. My instructors used helpful resources to teach the simulation.	○ 1	○ 2	○ 3	○ 4	○ 5
10. It is my responsibility as the student to learn what I need to know from this simulation activity.	○ 1	○ 2	○ 3	○ 4	○ 5
11. I know how to get help when I do not understand the concepts covered in the simulation.	○ 1	○ 2	○ 3	○ 4	○ 5
12. I know how to use simulation activities to learn critical aspects of these skills.	○ 1	○ 2	○ 3	○ 4	○ 5
13. It is the instructor's responsibility to tell me what I need to learn of the simulation activity content during class time..	○ 1	○ 2	○ 3	○ 4	○ 5

 Revised December 22, 2004

Appendix J

Program Outline
Tracy Littlehale
Preparing for Obstetrical (OB) Emergencies in the Emergency Department (ED)

PROGRAM OBJECTIVES

By the end of the activity, the student will be able to:

- Apply concepts learned regarding labor, delivery, postpartum and newborn nursing care to the nursing management of an obstetrical patient and a newborn patient.
- Integrate concepts learned about obstetrical emergencies to the care of a patient experiencing an obstetrical emergency.
- Demonstrate competent SBAR communication with members of the interdisciplinary team.
-

PROGRAM OUTLINE

- In the days preceding the OB Mock Emergency/Simulation (simulation), participants will attend one of several didactic sessions on high risk obstetrics, created by the Principal Investigator (PI), Tracy Littlehale.
    - Didactic session will last approximately 30 min, with 5-10 additional minutes for included for participants to complete the Demographic Questionnaire and Pre-Program SCLI (Student Satisfaction and Self-Confidence in Learning Instrument)
        - Topic outline for didactic session:
            - Review incidence and prevalence of OB emergencies in the ED
            - Discuss the phases and stages of labor
            - Demonstrate how to properly palpate contractions and listen to fetal heart tones.
            - Engage in review of common OB emergencies with interventions:
                - Prolapsed Umbilical Cord
                - Shoulder Dystocia
                - Postpartum Hemorrhage
            - Brief Recap
        - Program Continues on Simulation Days. Participants will participate in one simulation of a vaginal birth with complications in small groups:
            - Admission of maternal laboring patient to the ED (10 min)
            - Assessment of maternal patient (5 min)
            - Delivery of patient complicated by shoulder dystocia (10 min)
            - Immediate postpartum period complicated by excessive bleeding (5 min)
            - Patient stabilized and EMS leaves CMC with patient to take mother and newborn to a hospital which has maternity care. (10 min)
            - Debriefing (20 min)
                - Principal Investigator will lead the group in a debriefing session, using the questions on the debriefing questionnaire.

Appendix K

Summary Evaluation Tables

Citation (Full APA)	Study Purpose	Concep-tual Frame-work	Design/ Method	Sample/ Setting	Major Variables Studied and their Definitions	Measurement of Major Variables	Data Analysis	Findings	Appraisal: Worth to Practice
Cobbett, S & Snellgrove-Clark, E. (2016, October). Virtual versus face-to-face clinical simulation in relation to student knowledge, anxiety, and self-confidence in maternal-newborn nursing: A randomized control trial. *Nurse Education Today, 45*, 179-184. doi:10.1016/j.nedt.2016.08.004	To compare the effective-ness of two maternal newborn clinical simulation scenarios; virtual clinical simulation (VS) and face-to-face high-fidelity manikin (HFS—called F2F by authors) clinical simulation.	The Nursing Educa-tion Simula-iton Framewo rk (Jeffries, 2005)	Randomized experimental pretest-posttest design. Participants randomly assigned to HFS (called F2F in article)or VCS groups, then in dyads to complete two sims:-care of the pregnant pt. with GBS -care of the pregnant pt. with pre-eclampsia.	56 third year BSN students at a public research univ in Canada Setting: the Univ Clinical learning & sim lab	IV: VCS & HFS On providing care to the pregnant woman experiencing (previously validated by authors) VCS-computer multimedia sim in a virtual world allowing for interaction HFS: Simulation with a high-fidelity manikin. (previously validated by the authors DV:	Administered before & after simulation interventions: <u>Knowledge Test (GBS & pre-eclampsia):</u> Validity established by maternity faculty at the univ & experienced item writer. 10 item multiple choice <u>Nursing Anxiety & Self-Confidence with Clinical Decision Making Scale (NASC-CDM)</u> (White, 2011).: validity	Independent samples t-test compared HFS & VCS. No significant difference in post-test scores between 2 groups for either sim topic: <u>Pre-eclampsia</u> HFS:(M = 4.80, SD = 1.19) /VCS:(M = 4.12, SD = 1.54); t (48) = 1.75, p = 0.09, (two-tailed). <u>GBS</u>:HFS:M = 6.82, SD = 1.25/VCS M = 6.40, SD = 1.73) t (51) = 1.02, p = 0.31, (two-tailed). <u>Anxiety:</u>⇑VCS:(M = 73.26) HFS (M = 57.75); t=-3.2; p=0.002 <u>Self-confidence</u> No diff. in groups: HFS M=115.25	⇑ Knowledge and self-confidence were obtained by both groups (VCS & HFS) for both GBS & pre-eclampsia <u>Effect size for increased knowledge for pre-eclampsia= .049, moderate effect</u>. <u>Effect size for increased knowledge</u>	<u>Limitations:</u> Convenience sample, but randomly assigned. Somewhat small sample size. Knowledge tool was devised by educators, but not previously tested. Small sample size reduces generalization. Fear of being tested on material could have been motivating factor in learning for students. <u>Strengths:</u> NASC-CDM valid & reliable

					Effect on: Knowledge (r/t GBS and pre-eclampsia Anxiety Self-confidence	(α=0.96/anxiety) (α=0.97/self-confidence) Self-report, 6 choice Likert-scale, 27 items in two subscales of self-confidence and anxiety	VCS M=104.89 (t = 1.93; p = 0.059) <u>Preference</u> ↑for HFS (>90%)	<u>for GBS=0.28, Small effect</u> ⇑ Anxiety in virtual simulation vs. HFS HFS preferred over VCS	No statistical difference between demographics of 2 groups. Feasible for practice and low risk. Important to my project because increased knowledge & confidence in OB complications were demonstrated via simulation. Small to moderate effect size

HFS=high fidelity simulation

Citation (Full APA)	Study Purpose	Con-ceptual Frame-work	Design/ Method	Sam-ple/ Setting	Major Variables Studied and their Definitions	Measure-ment of Major Variables	Data Analysis	Findings	Appraisal: Worth to Practice
Fransen, A., Ven, J. Shuit, E., Tetering, A., Mol, B., Oei, S…Oei, S.G. (2017). Simulation-based team training for multi-professional obstetric care teams to improve patient outcome: a multicentre, cluster randomized controlled trial. *BJOG: An International Journal of Obstetrics & Gyneacology, 124*(4), 641-650. Doi:10.1111/1471-0528.14369	To investigate whether simulation-based obstetric team training in a simulation center improves patient outcomes.	None	Multicenter, open, cluster, parallel randomized controlled trial. Random assignment of obstetric units (cluster =1 OB unit) to either a 1-day, multi-professional, simulation-based team training with focus on crew resource management (CRM) in a simulation centre or to no such team training. No training= Control Group	Obstet ric units in the Nether -lands and a simula tion center in the Nether -lands.	IV: 1-day (8hr) HFS based, multi-professional team training focused crew resource management (CRM) in a simulation center vs. no such training. 80 % of time spent on CRM, 20% on skills. Staff from each cluster were randomly divided into teams comprised of an OB/GYN, a midwife &/or resident, and nurses. Participation was mandatory.	Intention-to-treat analyses performed at cluster level, including a measuremen t 1 year before sim to explore outcomes on all women on the units with a singleton pregnancy beyond 24 weeks.	Each group included 12 OB units. Median unit size =1224 women, combined total= 28, 657 women. 471 medical professionals took the training course. Composite outcomes for OB outcomes during the first year after the simulation were explored. Complications considered included: low Apgar, severe PPH, trauma d/t shoulder dystocia, eclampsia, hypoxic-ischemic encephalopathy, maternal and perinatal mortality. Composite outcomes for OB complications were not reduced, but injury from shoulder dystocia	Reduction in injury from shoulder dystocia and 4-fold increase with treatment with packed RBC for PPH were identified in the study, although overall reduction in composite OB complications was not reduced.	This study is valuable to my project, because it demonstrates the effectiveness of simulation (focused on CRM) in the reduction of injury from shoulder dystocia and timely, effective treatment of PPH. Strengths: the study design and randomizatio n. Sample size was also a strength and high level of participation (95%).

			Intervention Group= Sim Group The authors for the simulation had previously established validity.		DV: OB outcomes on women with a singleton pregnancy beyond 24 weeks of gestation in the year after the simulation, based on intention-to-treat analyses performed at the cluster level (1 cluster = 1 OB unit). Measurement 1 year before the simulation was also performed.		was reduced & 4 fold increased treatment with packed RBC for PPH was identified. Composite outcome for OB complications was not different between groups: [odds ratio (OR) 1.0, 95% confidence interval (CI) 0.80–1.3]. Team training reduced trauma due to shoulder dystocia (OR 0.50, 95% CI 0.25–0.99) & ↑ invasive treatment for severe postpartum hemorrhage (OR 2.2, 95% CI 1.2–3.9) compared with no intervention. No difference in other outcomes between groups.		Limitations: non-validated collection tool & continued education during the post-study were major limitations Feasibility for practice: would take a concerted, committed effort over time to implement. Ethical considera-tions pose issues re: withholding training in control group when it has been demonstrated to produce results for PPH and shoulder dystocia. .

Citation (Full APA)	Study Purpose	Con-cep-tual Frame-work	Design/ Method	Sample/ Setting	Major Variables Studied and their Definitio ns	Measuremen t of Major Variables	Data Analysis	Findings	Appraisal: Worth to Practice
Jacobs, P. (2017). Using high-fidelity simulation and video-assisted debriefing to enhance obstetrical hemorrhage mock code training. *Journal for Nurses in Professional Development*, *33*(5), 234-239. doi:10.1097/NND.0000000000000387	To explore the nursing staff's perception of the benefits of using HFS during mandated OB hemorrhage mock code training. Use of video-assisted debriefing was used to enhance the nursing staff's evaluation of their communica-tion and teamwork processes during a simulated OB crisis To improve team performance in handling a hemorrhage/	Erics-son's (2004) Theory of Delib-erate Prac-tice	nonexperi mental descrip-tive one group poststudy was used 16 simulation s over 5 weeks in sessions of 90 minutes each: 20 minutes for prebrief, 25 minutes for the simulation s, and 45 minutes for debriefing .	Setting: a 220-bed Midwestern medical center with a well-developed simulation program. Sample: N=84 nurses, nurse aids and unit secretaries Staff on the unit were required to participate to meet state requirements. 5 or 6 OB staff members participated in each session	Feelings, team-work, commun-ication, and clinical practice	Teamwork scored with Mayo Clinic High-Performance Teamwork Scale (MHPTS), but decided not to use this data. Variables were also assessed with 8 open ended questions and a 4-item questionnair e, 4 point Likert-type scale	Videotaping made them nervous at first, but they learned from viewing their performance. Teamwork identified as good communication, the identification of a team leader, working together to help each other take care of the patient. Good communication defined as: thinking out loud, being respectful, repeating and clarifying information, asking questions, and using SBAR when reporting to an authority figure or leader Participants consistently indicated key assessments for patient scenario included postpartum assessment (fundus and flow), administration of oxygen, the starting a second intravenous line, inserting an indwelling urinary catheter, and estimating blood loss and weighing of peri-pads. Every group identified at least one intervention that they ‘‘should have done	Immediate feedback on performance is crucial to learning. Individuals over-rated their communica-tion and teamwork. Peers and researcher helped individual participants see gaps. Improving communica-tion and teamwork can improve patient outcomes.	Participants in Mock Code in PPH reported increased communicati on and teamwork. They learned from watching their experience and the debriefing of their peers.

	hypovolemic crisis in post - partum women						sooner'' in the scenario. Post-simulation survey (87.1%Y93%) indicated a ranking of 5 = totally agree or 4 = agree in all four questions. The mode for each question was 5, and the means ranged from 4.3 to 4.5. Participants gave high ratings to all three of the learning tools measured, but they gave the highest scores not to the high-fidelity manikin (52.4% ranked it 5) but to the debriefing (63.1%) and especially the videotaping (70.2%). Watching replay of teamwork provided the most benefit for evaluating communication and teamwork skills		

DIC=disseminated intravascular coagulation; LFS=Low fidelity simulation; tx=treatment; MCQ=multiple-choice questionnaire

Citation (Full APA)	Study Purpose	Concep-tual Frame-work	Design/ Method	Sample/ Setting	Major Variables Studied and their Definitions	Measureme nt of Major Variables	Data Analysis	Findings	Appraisal: Worth to Practice
Kato, C., & Kataoka, Y. (2017). Simulation training program for midwives to manage postpartum hemorrhage: A randomized controlled trial. *Nurse Education Today, 51,* 88-95. doi: 10.1016/j.nedt.2017.01.005	To explore the effectiveness of a simulation training program for midwives in performance and knowledge for the management of postpartum hemorrhage (PPH).	none	RCT With pre-test posttest comparison of 2 groups: Simulation group	81 midwives, working at one ob ward in an urban area of Japan, who: 1) had 2-3 yrs. clinical experience, 2) worked in an obstetrics ward, and 3) had experience with birth assistance. Prior experience of simulation training for PPH excluded a participant.	IV: LFS combined with patient actors preceded by an independent e-learning experience the day prior to simulation. DV: Change in Performance & knowledge r/t PPH in midwives as assessed on month post-simulation <u>e-learning experience</u> (online, prior to sim): 1) physiology of PPH, 2) assessment of hemorrhagic shock, 3) managing PPH (hemostatic approach,	<u>Perfor-mance Change</u> evaluated with PPH scenario performance test 1 mo. post-sim. Participants performed 15 min sim assessed by trained assessor. Performance in a PPH scenario was measured with a 17-item checklist, each question worth 0-2 pts, 34 total. ↑ score= ↑Perfor-mance. High inter-	Sim Group: n=40 Control Group: n=41 <u>Performance</u> ↑ significantly in Sim Group Sim group: M= 23.85(SD 2.71) Control Group: M= 18.00(SD 3.01) (MD 5.85 95% CI 4.85–7.12, t = 9.17, p < 0.001). <u>Knowledge</u> ↑ significantly in Sim Group Sim Group: M=3.65(SD 3.40); Control Group M= –0.02 (SD 3.02) (MD 3.67 95% CI 2.25–5.10, t = 5.14, p <0.001).	Performance & knowledge r/t management of PPH were significantly improved after simulation training. 1 hour prep/e-learning was completed prior to the sim. <u>Effect size of simulation on increasing performance= 2.04 = Large Effect</u> <u>Effect size of simulation on increased Knowledge of PPH management = 1.08= Large Effect</u>	Performance & knowledge r/t management of PPH were significantly improved after LFS with actors, simulation training & e-learning pre-sim. Limitation: assessment over a longer period than 1 mo. is needed. Knowledge & performance were assessed, but ultimate goal is improved patient outcome. Strength: Adequate sample size; e-learning validated prior to use (Kato, et al, 2015. Validated & piloted tools. Feasible for practice and low risk.

				The exact location of the simulation was not specified	injection, blood transfusion), and 4) role play video on managing PPH. Based on national standards. e-learning program previously validated (Kato et al 2015). <u>Sim:</u> LFS combined with patient actors; Unfolded in 3 parts: 1) first response to PPH/exploring cause of bleeding, 2) tx of hemorrhagic shock, & 3) blood transfusion and (DIC). Validity of simulation training established. Based on national standards (Igarashi et al., 2015). e-learning program previously	rater reliability (Interclass Correlation Coefficient : ICC 0.954) (Kato et al, 2015). <u>Knowledge Change</u> evaluated by a 25-item (MCQ) given shortly before intervention & 1 mo. post-sim. MCQ developed & piloted by authors, (n=48 midwives)			Valuable to my topic because it demonstrates effectiveness of sim in ↑performance & knowledge in OB Sim coupled with 1 hr online prep (PPH).

					validated (Kato et al 2015): Comprised of 4 15 min modules: 1) PPH physiology 2) assessment of hemorrhagic shock, 3) managing PPH (hemostatic approach, injection, blood transfusion), and 4) role play video on managing PPH				

Study Purpose	Con-cep-tual Frame-work	Design/ Method	Sample/ Setting	Major Variables Studied and their Definitions	Measurement of Major Variables	Data Analysis	Findings	Appraisal: Worth to Practice
The purpose of this study was to compare knowledge and skill acquisition for a basic neurologic examination between OB nurses who participated in simulation and those who participated in an online self-study module. Short and long-term knowledge retention and skill transfer between groups were evaluated.	none	2-group single-blinded randomized controlled longitudinal design	Sample: 60 nurses, 30 in each group Setting: 4 community hospitals associated with a large nonprofit academic hospital in the Midwest United States	IV: Simulation with Standardized Patient (SP) or Online Self-Study Module (Power Point presentation with 41 slides) DV: Performance on neurological examination and knowledge of neurological examination r/t assessment of patient with pre-eclampsia	Nurses were randomized to either simulation or online self-study module and assessed by direct observation and completion of a standardized instrument by the observer at 3 time points: baseline (time 1), within 7 days of baseline in the clinical setting (time 2), and at 2 months (time 3) using a validated10-item Neurologic Knowledge Assessment and a 14-item performance skill checklist. Validity and reliability were established with both tools.	Mean SD P Of pre-intervention scores short-term and long -erm skill performance In both simulation and online self-study module Mean SD P Of Scores on Neurologic Knowledge Assessment, Short and long term	Simulation group had ↑levels in both short-term (time 2) [mean (SD), 67.6 (20.2) vs. 29.6 (19.0); P G 0.001] and long- term (time 3) [mean (SD), 46.1 (17.6) vs. 27.5 (15.9); P G 0.001] skill performance compared with nurses in the online self-study module. simulation & online self-study module groups had similar mean levels on Neurologic Knowledge Assessment/no significant difference scores at time 2 (P = 0.86)	Strengths: design; valid and reliable tools Limitations: no knowledge difference in online module and simulation group may be due to both groups (practicing RNs) already having high knowledge of neuro assessment skills. Importance to my project: This study is important because it demonstrates transference and maintenance of skill for 2

							and time 3 (P = 0.59)	months and relates to pre-eclampsia care.

MN=maternal-newborn; NB=newborn; PP=postpartum

Citation (Full APA)	Study Purpose	Con-cep-tual Frame-work	Design/ Method	Sample/ Setting	Major Variables Studied and their Definitions	Measurement of Major Variables	Data Analysis	Findings	Appraisal: Worth to Practice
Veltri, L., Kaakinen, J.R., Shillam, C., Arwood, E, & Bell, K. (2016). Controlled post-partum-Newborn simulation with objective evaluation exchanged for clinical learning. Clinical Simulation in Nursing, 12(5), 177-186. doi:10.1016/j.ecns.2016.01.005	To investigate whether undergraduate nursing students' performance and learning in a simulated setting can be exchanged for experiencing a traditional clinical setting. Research Questions: Question 1: Is there a difference between students receiving a traditional pediatric clinical experience & MN simulations and students who received a traditional MN clinical experience plus these same MN simulations r/t psychomotor skills, ability to determine	Neuro-semant ic Lan-guage Learni ng Theory	Nonequi valent comparis on group, post-test only quasiex-perimen-tal design used to compare the two groups of students: those in a tradition-al pediatric rotation and those in a traditiona l MN rotation. Both groups had the same MN simulatio ns.	Convenie nce sample comprised of all the senior undergrad uate nursing students enrolled in a combined maternal-pediatric nursing course at a private univ. in the Pacific Northwest . (n=80)	Variables studied: nursing assessment, intervention & clinical reasoning in performing PP and NB assessments/ care. Is there a difference between high- and low-performing students psychomoto r skills, ability to determine appropriate intervention, and application of clinical reasoning in the maternal-newborn setting?	IV: MN simulations (PP and NB assessment/care) administered to students in a traditional pediatric rotation (students assigned to clinical on a hospital pediatric unit & students in a traditional MN rotation (students assigned to clinical on a hospital MN unit). DV: -psychomotor skills, ability to determine appropriate intervention, application of clinical reasoning in the maternal-newborn setting; -difference between high- and low-performing students' psychomotor skills, ability to determine	(n=80) Question 1: no significant difference between groups on assessment skills appropriate interventions and think critically, evaluated by PP & NB written scores, equivalent in both groups (t=0.838, p = .405 and t= 0.481, p = .632, respectively). No significant differences were noted in overall total scores (assessment plus written scores) for PP total score = 0.361, p =.719) or NB total score (t = 0.087, p = .931). A two-way ANOVA was performed to determine if a combined effect existed between students in either	Stats showed no significant differences in ability to demon-strate competent assess-ment skills, determine appropriat e interventi ons & think critically between 2 Groups: those in the pediatric rotation with MN sim performed as well as students in the MN rotation who had the same	Limitations : con-venience sample; sample size; lack of external inter-rater reliability testing of data collection instruments . Feasible for practice and low risk. This study is applicable to my project because it demonstrat es the effectiveness of simulation in teaching maternal

	appropriate intervention, & application of clinical reasoning in the MN setting? Question 2: Is there a difference between high- & low-performing students' psychomotor skills, ability to determine appropriate intervention, and application of clinical reasoning in the maternal-newborn setting? Question 3: Can simulation effectively evaluate the quality of students' simulation performance and clinical reasoning in the MN setting?					appropriate intervention, and application of clinical reasoning in the maternal-newborn setting: High-performing students: Students scoring ≥1 SD above mean. Low-performing students: Students scoring ≤1 SD below mean. -Effectiveness of using simulation to evaluate the quality of students' simulation performance and clinical reasoning in the maternal-newborn setting 4 Data Collection Tools developed by faculty& piloted before study form (ICC = 0.91): PP assessment checkoff form; NB assessment checkoff form; situation back-ground, assessment, recommendation report form; & a	group & their semester in the nursing program. No interaction noted between 3rd and 4th semester students and type of clinical experience on their psychomotor performance or critical thinking Question 2: Findings support differences between high- and low-performing student's simulation Performance r/t assessment ability, appropriate intervene, and critical thinking: low-performing students performed lower than high-performing students in each category. Significant correlation was found between PP psychomotor skills and clinical reasoning (r = 0.66; p= .001) & NB psychomotor skills & clinical	MN simulations, indicating that MN simulation could be substituted for students who had a pediatric rotation and no MN rotation. Small effect size: 0.02-0.05 for PP & NB total scores.	newborn skills, which would be needed for ER nurses caring for a patient with precipitous delivery. 2 participants left the study due to personal reasons, reducing n from 82 to 80.

						written reflection question form	reasoning (r = 0.63; p = 0.001) for both high- and low-performing students. No significant difference between psychomotor skills and critical thinking for high- and low-performing students, d (t= - 0.492, p=0.624) (high performers) & t=0.554, p = 0.581, low performers). Question 3: Findings indicate simulation can be used to effectively evaluate quality of NB & PP student performance & clinical by using and A-F grade school used by the university.		