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Postpartum Hemorrhage (PPH) Simulation Project

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Executive Summary

Postpartum Hemorrhage (PPH) Simulation Project

Problem

Maternal deaths from complications of pregnancy or immediately after delivery represent a problem of global significance; postpartum hemorrhage (PPH) is a leading cause of maternal mortality and accounts for 25 percent of maternal deaths, many occurring without identifiable risk factors. Due to the relative infrequency of PPH, student nurses may miss opportunities to practice critical skills and gain knowledge in a supervised learning environment. Simulation allows students to practice low-frequency, high-stakes events such as PPH within an environment of safety. The question addressed by the PPH project was: Will participation by senior Obstetric (OB) nursing students, detailing the care of a patient experiencing PPH, increase knowledge, confidence and clinical judgment?

Purpose

This was an evidence-based investigation of the effect of simulation on student knowledge, confidence and clinical judgment. Current simulation frameworks and methodologies were used to assist obstetrics students to recognize signs of clinical deterioration during PPH, vital skills transferrable to other clinical practice areas.

Goals

Project goals included enhancing knowledge, confidence and clinical judgment of nursing students, demonstrated by the ability to prioritize care during a simulated PPH; secondly, to promote nursing program learning outcomes of therapeutic intervention, intellectual inquiry and analysis, communication and collaborative caring. Finally, to provide a higher fidelity simulation experience, utilizing currently owned simulation manikins, with minimal financial impact.

Objectives

The project evaluated participant knowledge, confidence and clinical judgment about PPH through pre and posttests, satisfaction and confidence surveys and evaluation of reflective comments. Budgetary impact of improvements in fidelity was evaluated.

Plan

Thirty-three 3rd semester traditionally enrolled prelicensure baccalaureate students underwent a one-group, pretest-posttest design to assess the impact of simulation on knowledge and confidence and completed clinical judgment surveys. Observation of selected participants by DNP student rater for correlation with self-reports was accomplished. Data was analyzed using IBM SPSS version 23.

Outcomes and Results

Knowledge scores improved six and eighteen percent; one score was unchanged and one worsened. Satisfaction with simulation teaching methods, materials, instruction improved ($p < .0$ to .003 at .05), although confidence in skills and responsibility for learning did not. Student self reports correlated well with DNP student rater. Several themes of importance were identified, such as the importance of prioritization, communication and improving medication knowledge.

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Finally, I would like to give thanks and praise to God, who put this desire in my heart and wouldn't let it wither. Even during the tough and stormy times, I could rely on His counsel to "be still and know that I am God"

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Postpartum Hemorrhage (PPH) Simulation Project

Simulation is an accepted teaching strategy in nursing education which helps students develop skills and attain competencies necessary to deliver safe patient care (Strickland & March, 2015). High Fidelity Simulation (HFS) allows students to focus on medically complex situations by providing nursing interventions to human patient simulators (HPS) with no risk to patients (Gates, Parr, & Hughen, 2012). This becomes increasingly important as nursing programs compete for clinical placements and hospitals experience staffing changes, limiting quality preceptors and experiences for students.

The 2014 landmark study by the National Council of State Boards of Nursing (NCSBN) suggested that up to 50% of clinical hours may be replaced with high quality simulation without any loss of academic or clinical integrity (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014), but there is continued discussion regarding measuring student outcomes in simulation. Further, improving fidelity of simulations currently in use and evaluating student outcomes will become increasingly important as clinical placement challenges escalate (Gates et al., 2012). This paper will discuss the Postpartum Hemorrhage (PPH) Simulation Project as an evidence-based project to examine the effect of HFS on student knowledge, confidence, and clinical judgment.

Problem Recognition and Definition

The World Health Organization (WHO) estimated there were 287,000 maternal deaths worldwide in 2012, primarily from complications occurring during pregnancy or immediately after delivery (WHO, 2013). Sheldon et al. (2013) reported an incidence of postpartum hemorrhage of five to ten percent, primarily in healthy women without significant risk factors. Due to the relative infrequency of such occurrences, students may spend an entire obstetrical

(OB) rotation without caring for women experiencing postpartum hemorrhage. It is in low-frequency, high-stakes events such as PPH that simulation is especially valuable.

Simulation has been described by Jeffries (2005) as "activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision-making, and critical thinking through techniques such as role playing and the use of interactive mannequins" (p. 97). Students provide care to medically complex patients in environments where no harm will result from missteps.

Simulation as a teaching strategy has been successfully utilized for centuries. Jeffries, Bambini, Hensel, Moorman, and Washburn (2009) describe 16th and 17th century birthing simulators formed of woven wicker, leather, and fabrics taken into communities by master teachers to educate midwives on techniques for handling birthing complications (p. 616). Over time, HPS have become increasingly sophisticated and complex in their capabilities, shifting focus to simulation design elements that promote learner outcomes, which include scenario complexity, cues, objectives, and debriefing.

Simulation has been a useful tool bridging the gap between student knowledge and understanding (Lasater & Nielsen, 2009); however, simulation also clearly reveals gaps in understanding. As a simulation facilitator, it was apparent when students were simply following prescribed physician standing orders or an algorithm without understanding the underlying pathophysiology of the scenario. This was a primary driver in the development of the PPH Simulation Project.

Another significant motivation for the development of the project was to provide a more robust PPH simulation than the current simulation which had been in use since before 2011. This current simulation employed a static manikin and laptop computer with PowerPoint slides

set to display two sets of vital signs and written patient responses. If students requested additional vital signs or more information, the simulation facilitator created it in the moment and verbalized it as the voice of the manikin. This created variance between scenarios, making learner outcomes somewhat inconsistent. Additionally, the present simulation did not utilize the high fidelity HPS already available which could improve scenario realism, standardization and promote consistency of student experience (Gates et al., 2012).

Three additional drivers existed for the development of the PPH Project. Considerable competition existed for prelicensure clinical placements in Northern Colorado and Wyoming; nursing education programs examined equitable ways to utilize acute care placements. Additionally, placements were impacted by hospital staffing challenges: high staff turnover, inter-departmental cross training, changes in staffing matrices, and new staff orientation often limited the precepting abilities of hospital staff, negatively affecting student learning experiences.

Another consideration for project development resulted from of the NCSBN National Simulation Study which was completed in 2014 (Hayden et al.). This longitudinal, randomized controlled study examined replacing traditional clinical hours with simulation hours in pre-licensure nursing programs. The study evaluated data from over 600 students from 10 nursing programs for knowledge, clinical competency, NCLEX pass rates, and manager evaluation of readiness to enter clinical practice. Results of this study suggested that high quality simulations were effective when replacing up to 50% of traditional clinical hours with no loss of academic or clinical integrity.

Finally, the PPH Simulation Project was developed in congruence with the American Association of Colleges of Nursing (AACN) Essentials of Doctoral Education for Advanced

Practice Nurses (AACN, 2006). The Doctor of Nursing Practice (DNP) Essentials encourage doctoral students to seek "preparation in the science of pedagogy to augment their ability to transmit the science of the profession they are practicing and teach" (p. 7), which was foundational to this project. According to Terry (2015), tools such as simulation must be used, and opportunities for processes such as skills rehearsals embedded within scenarios help prepare students to care for present and future patients as well; this is especially important as the population ages and becomes more medically complex. In her interpretation of the DNP Essentials, Chism (2013) urges DNP students and practitioners to act as mentors to others in nursing and to participate in patient education; to do so one must first educate student nurses. Finally, in the Zaccagnini & White (2014) discussion of the Boyer Model of Scholarship, education of students is a critical application of DNP scholarship and a pivotal reason for the development of the project.

Project Purpose

The PPH Simulation Project was an evidence-based project, systematically investigating simulation practice issues which may promote practice change. Nurse educators are tasked to educate future generations of nurses, improve patient safety, and apply current research. This project examined a portion of what is known about simulation and how may it be utilized to improve specific student outcomes (Crawford & Lopez, 2014). The PPH project was not meant to generate new knowledge, nor be generalized outside the project agency. Congruent with Zaccagnini and White (2014), the project was within this student's "field of expertise" (p. 419), addressed a problem of significance for a population, and was designed to improve a practice outcome (AACN, 2006). The project was developed to provide a more robust PPH simulation

than the one currently used in the School of Nursing (SON) at the University, and fully utilize High fidelity patient (HFP) simulators owned by the SON.

PICO Question

The development of the PPH project utilized a framework discussed in Zaccagnini & White (2014), which described a process for development of the research question and project. The acronym *PICO* allowed the DNP student researcher to evaluate evidence collected regarding the population, intervention, comparison, and outcome(s) of interest.

The PICO for the PPH project was as follows:

Population: Senior baccalaureate OB nursing students

Intervention: Simulation detailing care of patient with PPH

Comparison: Pretest measure of knowledge, confidence

Outcome: Increase in knowledge and confidence following simulation, measured by posttest; Increase in clinical judgment following simulation measured by survey and observation

The research question of the PPH project was as follows: Will participation by senior Obstetric (OB) nursing students, detailing care of a patient experiencing PPH, increase knowledge, confidence and clinical judgment?

Nursing Theoretical Framework

Jeffries Simulation Model

The Jeffries Simulation Model was selected as a theoretical underpinning for this project because the model supports the project well. Developed in 2005, the model was meant as a suggested template for simulation design as well as proposed outcomes of interest for educator evaluation (Jeffries, 2005). The model acknowledges interactions between the

student/participant and teacher/instructor and the impact of the type of educational practices utilized as well. Examination of design characteristics of simulation including level of fidelity, complexity of the simulation scenario and cues provided to the learner, and structured debriefing, where learning is reinforced or takes place upon reflection are additional critical components (Groom, Henderson, & Sittner, 2014). Further, the Jeffries Simulation Model examines learner outcomes of knowledge, skills or competency, critical thinking or clinical judgment and self-confidence, which are of interest in this project. See Appendix A for a visual depiction of the model.

Tanner's Clinical Judgment Model

The Clinical Judgment Model by Tanner (2006) is the second theory upon which the PPH project was designed, based on her seminal work describing the process of contextualizing the patient experience, identifying patterns, cue recognition and reflections on actions as ways to improve clinical judgment. Tanner defines clinical judgment "to mean an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (p. 204).

Tanner's model is particularly appropriate when caring for patients showing signs of clinical deterioration, such as those experiencing PPH; it is grouped into four main concepts: noticing, interpreting, responding, and reflecting, which are stages in the development of clinical judgment. Participants are able to respond to patient cues and prioritize care as they move through simulation, "reflecting-*in*-action to note patient response and subsequently reflecting-*on*-action during debriefing to reinforce learning, correct missteps, and bring context to future patient care or simulation experiences. See Appendix B for a visual depiction of the model.

Systematic Review of the Literature

During coursework at Regis University, the literature review has uncovered many articles pertinent to the project. Search engines utilized have included CINAHL, Google Scholar, Ovid, and EBSCO Host. Search terms have included simulation, high-fidelity, knowledge, self-confidence, confidence, self-efficacy, clinical judgment, critical thinking, nursing students, clinical deterioration, retention, skills, clinical decision-making, cues, and competence. For this project, this writer has used approximately 47 articles, levels II-VII, based on the leveling system from Melnyk & Fineout-Overholt (2012). See Appendix C for a literature review table and Appendix D for the systemic review of the literature table. The literature review revealed several thematic elements of importance; these will be discussed in the following sections.

Simulation

There was agreement among authors that simulation provides participants with opportunities to practice skills in environments where no harm will come to actual patients (Gates et al., 2012; Lasater, 2007; Strickland & March, 2015). Simulation was particularly helpful in high stakes procedures which involve more risk to patients, or events which occur less frequently but with potentially devastating patient outcomes (Jeffries et al., 2009). Simulation fidelity or level of realism exerts significant impact on participant performance as well. When coupled with levels of environmental fidelity which mimic an actual patient care setting, HFP simulators capable of near human responses assist participants to suspend belief, necessary for successful simulation. Several subthemes of importance were identified.

Authors suggested debriefing was a critical component of simulation, particularly for participants with less experience. A study by Buckley and Gordon (2011) indicated nurses reported improved responses to clinical emergencies after participation in simulation,

acknowledging debriefing as a significant factor. Debriefing allowed for reflection and correction, and allowed students opportunity to deepen understanding of material and procedures (Jeffries et al., 2009). Participants developed an understanding of what they did not know and clarified what was misunderstood; often debriefing was a springboard to reflection-on-action, resulting in better critical thinking abilities (Jeffries et al., 2009; Tanner, 2006).

Many authors suggested higher fidelity simulations improved participant performance. A study by Gore, Leighton, Sanderson, and Wang (2014) suggested participants in simulation utilizing HFP simulators reported better achievement of learning needs than those using low fidelity patient (LFP) simulators, where static manikins afforded less ability for participants to directly communicate and interact with them.

Enhanced communication was a common subtheme in simulation literature; generally, authors described student report of increased ability to communicate with patients, family members and other nurses within the simulation, or this ability was observed by faculty raters. Participants in the study by Bambini et al. (2009) described increased awareness of verbal and non-verbal communication (i.e., body language) with patients and family, and their potential effects on care. Communication clarity and assertiveness was evident especially when participants had fewer years of experience (Buckley & Gordon, 2011) or during low-frequency, high-stakes event rehearsals (Jeffries et al., 2009).

Finally, most authors agreed that simulation offered opportunity for repeated rehearsals which optimized participant learning outcomes and knowledge and skills acquired. A study by Hart et al. (2009) suggested notable improvements in knowledge, skills and clinical reasoning dealing with a deteriorating patient simulation when utilizing repeated dosing. Harvey, Echols,

Clark, and Lee (2014) also found that knowledge and competency was maintained by using repeated dosing through refresher courses.

Knowledge

Knowledge acquisition as a simulation learning outcome depended on whether simulation was where a skill was first taught or where skill proficiency was evaluated. Some authors found no significant improvements in knowledge among participants, but noted small sample sizes (Harvey et al., 2014) or limited time on task (Akhu-Zaheya et al., 2013) as possible reasons for this. Repeated exposure to simulations may have a positive impact on a student's ability to understand, apply and retain knowledge acquired during simulation (Akhu-Zaheya et al., 2013).

Some authors acknowledged improvement, sometimes significantly, in participant knowledge. Many participants reported increased knowledge immediately following simulation and prolonged retention afterwards (Birch et al., 2007; Botma, 2014). Additionally, reflection and contextual awareness practiced during simulation helped participants identify and understand cues which helped to form linkages with underlying pathophysiology (Endacott et al., 2010).

Confidence

There was considerably more author agreement on the theme of confidence as an outcome of simulation; further, the nursing literature had many examples indicating participant confidence was affected by previous experience (Arnold et al., 2009; Brown & Chronister, 2009; Buckley & Gordon, 2011). Less experienced nurses and students with limited prior exposure to either traditional clinical experiences or simulation had higher confidence scores after immersive simulation (Akhu-Zaheya et al., 2013; Andrighetti Knestrick, Marowitz, Martin, & Engstrom, 2011; Bambini et al., 2009; Birch et al., 2007; Botma, 2014; Buckley & Gordon, 2011; Jeffries et al., 2009).

Clinical Judgment

Tanner (2009) defined clinical judgment as the process by which nurses "assess a patients' condition, establish a plan of care and make subsequent modifications based on the observed response" (p. 204). Additionally, the 1990 American Philosophical Association Delphi Report described critical thinking as evidence-based contextual judgment which guides actions (Facione, 2015). Many authors use the terms interchangeably, but the PPH project will utilize the term clinical judgment. Failure to employ clinical judgment may result in missing cues of patient deterioration, failure to act and significant patient morbidity or death (Facione, 2015; Hoffman, Aiken, & Duffield, 2009).

Studies by some authors did not support a significant improvement in clinical judgment. For example, a study by Fero (2009) suggested participants with more active or kinesthetic learning styles benefitted from simulation or videotaped vignettes for development of clinical judgment. Further, participant self-report of improved ability to apply learned theory to simulation was not subsequently observed by instructor raters (Bambini et al., 2009).

However, many pertinent studies suggested participants made important improvements in the development of clinical judgment. Participants were generally found better able to prioritize care, be attentive to patient cues, and understand pertinent pathophysiology. Studies suggested students had improved application of nursing knowledge and skills and reported simulation afforded opportunities to think critically and apply knowledge in different ways (Botma, 2014; Hart et al., 2014; Jeffries, 2009). Further, Dillard et al., (2009) suggested simulation increased attentiveness to patient indicators and subtle signs of deterioration, which aided students' understanding of possible underlying physiologic causes.

Project Scope and Significance

The PPH Simulation Project utilized a small convenience sample of senior students during their OB rotation. It was developed to provide a more robust PPH simulation than what was in current use and more fully utilize HFP simulators already owned by the School of Nursing (SON). Increased fidelity will improve participant ability to suspend belief, leading to improved outcomes. The project evaluated participant knowledge, confidence, and clinical judgment related to simulation participation. This project was supported by findings of the NCSBN National Simulation Study (Hayden et al., 2014) which indicated high quality simulation was a suitable replacement for a portion of traditional clinical hours no loss of academic or clinical integrity.

Market Analysis

SWOT Analysis

The PPH project underwent a thorough strategic assessment during the planning stages. A *SWOT* analysis was performed, during which the project strengths, weaknesses, opportunities, and potential threats were evaluated. A SWOT analysis is a tool utilized in business to "move the institution closer to its stated vision" (Waxman, 2013, p. 152), remaining congruent with the organizational values of the organization. It is further described in Zaccagnini & White (2014) as a tool which helps DNP projects remain on a steady trajectory through identification of barriers early in the process so they may be dealt with and course corrections made.

According to Waxman (2013), assessments of internal influences involve project strengths and weaknesses, whereas external influences are revealed as opportunities and threats. A strategic analysis of strengths of the PPH project identified several key strengths.

The PPH Project was congruent with the mission, philosophy, conceptual framework, and curriculum model of the University and supported the SON undergraduate student outcomes. The academic staff and faculty were identified as supportive of the project; additionally, the OB course facilitator and clinical faculty agreed a more robust PPH simulation would enhance the OB simulation experience. Further, the PPH Project had minimal budgetary impact, which will be discussed later. Finally, the PPH project was an evidence-based project developed to positively improve student outcomes; project development strived to connect to the rapidly expanding field of simulation research and simulation best practices.

The PPH Project was examined for design weaknesses, particularly those capable of impacting the outcome measures of interest of the project. Melnyk & Fineout-Overholt (2012) reported "the most desirable indicators of care delivery outcome are reliable, valid, measureable, suitable to the population of interest, and not overly costly to collect, and sensitive to changes within and across individuals" (p. 302). Outcome measures of the PPH Project may be limited by small sample size, with a sample frame of thirty-three. Further, it was anticipated project participants would require additional time on Simulation Day to complete pretests, posttests, and demographic survey, which may delay progression to the next simulation station. To remedy this, all students completed the pretest after receiving general instructions for the day from the OB course coordinator and returned to complete the posttest at the close of their final simulation. Finally, the proposed PPH Project required a faculty to operate the manikin and another to facilitate the simulation, instead of a single facilitator for the currently utilized simulation.

Project opportunities included finding ways to encourage student participation in the project and to reward faculty support for the project. Obtaining clinical faculty feedback was

also a useful informal measure of the project and encouraged future participation. Finally, the project supported faculty desire to utilize higher fidelity in the PPH simulation.

Few threats were identified to the PPH Project; most significantly, the proposed project required an operator for the HFP simulator in addition to the scenario facilitator. The University had several full-time faculty trained on the HFP simulators; however, no adjunct faculty were trained. Due to other teaching responsibilities, faculty who usually participated in simulation were unavailable; however, the OB course coordinator was able to arrange for a simulator operator. Additionally, technical or mechanical problems with the manikin, scenario or videotaping could impact on the simulation outcome; however, such problems were minimal and were managed without impacting simulations. Finally, shuffling of rooms normally used for certain scenarios in order to accommodate the PPH Project could have resulted in some faculty confusion, but this did not occur. See Appendix E for SWOT Analysis.

Driving and Restraining Forces

The planned change proposed in the PPH Project required careful planning and identification of "stakeholders, goals, plans for implementation and processes for evaluation" (Ellis & Hartley, 2012, p. 486). According to Lewin's change theory, unless a system has adequate incentives to change, restraining forces will maintain equilibrium and prevent change from occurring (Ellis & Hartley, 2012). Driving forces incentivize the system to make the change; the PPH project had many driving forces. The OB course coordinator, who additionally acted as the DNP Clinical Mentor for this project, displayed tremendous support for the project. This helped garner support from other University faculty as well as the interim chair of the SON. There was general agreement among OB faculty that the current PPH simulation could be improved and HFP simulators could be more fully utilized. Finally, the DNP student

investigator, acting as change agent, represented a positive force for change and maintained project momentum.

Restraining forces which could have impeded the PPH Project included potential staffing conflicts or shortages as the project utilized a HFP simulator which needs an operator, which only some full-time faculty are trained to do. Also, due to other faculty commitments in the fall semester, which is the planned time for project implementation, it was initially unclear whether the project would take place on two half-day sessions or a single full-day session, which could alter available faculty, increase faculty fatigue and impact outcomes and effect sample frame. Finally, using the SimMan™ HFP simulator for the project required shifting of another scenario to a larger, less strategically equipped room which may have detracted from that simulation, since run by a less experienced faculty, which might have resulted in faculty resistance. Creativity was required to maintain academic integrity of both simulations as the change occurred. See Appendix F for Market Analysis.

Stakeholders

According to Terry (2015), stakeholders understand systems processes and may prevent common pitfalls and provide strategic insights. As interim chair of the SON, Dr. Faye Hummel was instrumental in providing support and assistance wherever necessary. Dr. Melissa Henry, clinical placement coordinator and chair of the Undergraduate Leadership Team (ULT), promoted the PPH Project for ULT approval, a precursor to Institutional Review Board (IRB) submission. Other critical stakeholders included Deborah Rojas, SON Simulation Coordinator, for her simulation expertise, OB clinical faculty, other faculty, clinical agencies where students enjoy traditional clinical experiences, the SON Learning Resource Committee (LRC). Aims Community College stakeholders included Erika Greenberg, interim chair of the SON, and

Laurie Casey, Simulation Coordinator, for generously sharing simulation materials for project use. Finally, this project was created because of the students; without them, there would be no need to develop this project.

Project Team

The PPH Project Team was comprised of two significant individuals. Dr. Barbara Berg, Capstone Chair, has provided tremendous time, effort, and energy towards project development, improvement, and refinement, and has been a continued source of support. Sheila Postiglione, RN, MSN, has acted as DNP Clinical Mentor for the project. Her knowledge, expertise, and input have led to continual project improvements. These individuals possess advanced experience and knowledge required for mentorship (Chism, 2013) and have provided ongoing guidance for this DNP student researcher.

Cost-Benefit Analysis

According to Waxman (2013), the Cost-Benefit Analysis (CBA) is a strategic tool which guides project or program implementation, based on determination of priorities and opportunity costs. As stated previously, implementation of the PPH Simulation Project had a small budgetary impact. The additional costs for the project over the current simulation were estimated at $665.00 annually; of that, $640.00 covered an adjunct faculty salary to facilitate the simulation, and $25.00 were spent on additional paper supplies for information sheets, pre and posttests and demographic survey. An operator was necessary for scenarios using HFP simulators; UNC utilized only full-time faculty in this capacity during this project. Evaluating additional simulation costs using an average class size of 36 students per semester would result in an increase of approximately $9.00 per student; however, students would not actually be assessed this amount, as costs would be applied to existing lab or program cost centers.

The anticipated benefits of the PPH Project included improved student outcomes of knowledge, confidence and clinical judgment, through use of a more robust simulation. Another benefit would be higher levels of satisfaction among clinical faculty resulting from improved student performance. Finally, this project would improve utilization of HFP simulation manikins currently owned. See Appendix G for Cost-Benefit Analysis.

Project Objectives

Vision and Mission

The vision of the PPH Project was to partner with nursing students, faculty, and clinical agencies to improve PPH simulation quality and student outcomes. The project mission was to promote simulation as an evidence-based learning strategy to improve OB nursing student knowledge, confidence, and clinical judgment. The project utilized current simulation frameworks and methodologies for the enhancement of student learning. Finally, the project assisted students to recognize signs of clinical deterioration during PPH, skills which are directly transferrable to other areas of clinical practice.

Project Goals

The PPH Project was developed for implementation within the University with a goal to benefit the simulation experience of senior OB nursing students enrolled there. As such, elements of the SON conceptual framework were integral to the project, as were the stated outcome concepts of therapeutic interventions, intellectual inquiry and analysis, communication and collaboration, respect and caring, and leader/manager/professional roles (University of Northern Colorado, 2015).

Enhancing the confidence, skill and ability of students to make rapid decisions under pressure in a safe environment are important outcomes of simulation (Foronda et al., 2013).

Further**,** simulation was found to be a safe strategy for students to adopt the role of nurse and begin to practice professional behaviors (Berragan, 2014). Project goals were further driven by the desire for a more robust simulation that better utilized available simulators, was sustainable, and had a small financial impact. Perhaps most importantly, the PPH Project would establish a simulation with more consistency in delivery and evaluate measureable outcomes of knowledge, confidence and clinical judgment.

Objectives help propel the project towards completion and are "...clear, realistic, specific, measurable, and time-limited statements of action" which enable measurement of change (Zaccagnini & White, 2014, p. 236). Objectives developed for this capstone project were as follows:

1) Increase participant knowledge regarding PPH as evidenced by improvement in knowledge posttest scores.

2) Increase participant satisfaction and confidence in learning as evidenced by improvement in NLN Student Satisfaction and Self-Confidence in Learning Survey.

3) Increase participant clinical judgment as evidenced by student reflective comments indicative of developing clinical judgment.

4) Develop student-identified subthemes of importance noted in student reflective comments which may indicate development of clinical judgment.

5) Demonstrate cost neutrality, sustainability and improved robustness (fidelity) of the proposed project as evidenced by budget data, and observation.

The Kellogg Foundation Logic Model (2004) was used as a visual representation of the development of the PPH Simulation Project, as it helps both in the planning and implementation

phases of a project. The utility of the model results from repeated examination, clarification and revision which occur during project evolution. The logic model was the model at the core of this study; project outcomes became clearer and potential impacts evident. The logic model for the PPH Simulation Project is found in Appendix H.

Methodology and Evaluation Plan

Research Design

The PPH project utilized a quasi-experimental, mixed-methods design with a convenience sample of students not randomly assigned to groups (Terry, 2015). The project utilized a one-group, pretest-posttest design to assess the impact of the simulation (intervention) on participant knowledge and confidence. Additionally, a one group survey regarding participant self-report of clinical judgment was administered following simulation. During simulation, a primary and secondary nurse were designated in the scenario; subsequently, project participants in these roles were observed via videotape by the DNP student rater.

All participants completed a pretest of knowledge, confidence, and satisfaction regarding preparation for simulation. The student investigator observed simulations in real time; subsequently, videotaped review of primary and secondary nurse participants was completed utilizing the Lasater clinical judgment rubric. Comparison of primary and secondary nurse comments and student investigator comments was performed. Additionally, participants completed knowledge, confidence, and satisfaction posttests as well as a Lasater clinical judgment self-evaluation survey.

Population and Sampling

The setting of the PPH Simulation Project was within UNC's SON. This was a coeducational, public institution of higher learning in Greeley, Colorado, accredited by the

Commission on Collegiate Nursing Education (CCNE). The PPH project was open to all traditional third semester nursing students enrolled in NUR 420 (Clinical Practice of Childbearing Families) and NUR 425 (Childbearing Families Theory).

The OB Course Coordinator facilitated project participation and provided the DNP student investigator an opportunity to briefly address the class, providing a recruitment letter and information sheet for the PPH project to potential participants. Participation in the PPH project was voluntary and not compensated; however, all students were required to participate in the simulation as a part of their class activities whether project participants or not. Project participation or withdrawal did not affect class standing or grades. Typical nursing class sizes were 36 students; however there were only 33 traditional students enrolled in this class; all students were eligible for recruitment and volunteered for the project. According to Polit and Beck (2012), to achieve a medium effect size of 0.5 at a significance level of 0.05 (95%), 29 students were needed for project participation (p. 425).

Protection of Human Subjects

Level of review. The PPH Simulation Project was an educational intervention taking place within UNC; participants were volunteers who completed pretests, surveys, and posttests which were coded in order that collected data would not be associated with individual students. As such, the project attained exempt review status from the IRB of Regis University, under the category 45CFR46. 101. b (categories one and two), which was further accepted as evidence of appropriate review for protection of human subjects by the IRB of UNC (Terry, 2015). For exempt review, this author completed the Collaborative Intuitional Training Initiative (CITI) Basic Training Modules. See Appendices N, O, and P for documentation.

Confidentiality. Students voluntarily participated in the project and were able to withdraw at any time. All project participants were asked to complete a pretest, posttests, and demographic survey; however, records were not identified by student name or student number. Participants coded all records by their mothers' birth day and birth year, utilizing the dd/mm format. Completed tests and surveys were kept by the DNP student investigator until results were collated and recorded. After that time, records were maintained in a separate, locked area following applicable agency policies. Videotaped recordings of the simulation sessions were managed by UNC in accordance with established simulation policies and procedures.

Vulnerable populations. No vulnerable populations participated in the PPH Project. All students were college-aged juniors to seniors, anticipated to be over 18 years old. Participants clearly understood the voluntary nature of their participation and were able to withdraw at any time; it was reinforced that grades and class standing were unaffected by participation or withdrawal. Further, data from the project was not analyzed until after grades had been posted at the close of the semester.

Protection of human subjects was a concern of this project. Participants were offered equal opportunity to participate in the PPH project or decline without penalty; however, all students were required to participate in the simulation. Lunch was provided for all simulation participants whether project participants or not. Full disclosure of the project purpose, data collection, and confidentiality of data was made to participants. Inclusion criteria included students currently enrolled in the NUR 420 course, 18 years of age or older, enrolled in the traditional baccalaureate degree program in the SON. Exclusion criteria included students younger than 18 or enrolled in the second degree accelerated program of study.

Information Sheet

The PPH Simulation Project was granted exempt status as an educational intervention and adherence to principles of ethical conduct of research was followed (Melnyk & Fineout-Overholt, 2005). As such, no consent was required, but an information sheet was provided to potential recruits containing appropriate contact information, statement of project purpose, and project objectives (Terry, 2015). Procedures for collection of project data were disclosed and maintenance of confidentiality assured. See Appendix I for Information Sheet.

Simulation Development

The PPH Simulation Project was developed to create a more robust simulation than currently in use at UNC and more fully utilize the HFP simulators available for simulation. However, it was important to incorporate the characters of Jennifer and Dan introduced to students during case studies regarding prenatal care and subsequently incorporated throughout the childbearing cycle. As such, details regarding Jennifer and Dan's birth were incorporated into the PPH project to maintain continuity and congruence with student experience. Labs, physician's orders, and medication algorithms were embedded within the scenario.

Additional scenario complexity and fidelity was incorporated by utilizing selected aspects of the NLN/Laerdal Moderate PPH OB Scenario used with permission of Aims Community College, a purchaser of this simulation and related materials (See Appendix K). This material provided additional manikin settings for vital signs, responses, supplies, and simulation parameters which were incorporated into the updated simulation for improvement.

Environmental fidelity in the simulation room was provided by an IV bottle, tubing with labeling on a pump which was not running, artificial blood on cotton balls (to simulate clots) and soaked onto chux beneath the manikin to simulate hemorrhage, a palpable but boggy fundus, and

other equipment such as a working bed, oxygen mask or cannula attached to a working flow regulator without delivered air, medication Pyxis, foley catheter kit, bedpan, scale, chart, and medication books.

Project Model

The PPH Simulation Project was an educational intervention in which all students, whether participating in the project or not, underwent the same intervention. All students attended 12 hours of traditional clinical experience at their respective clinical agencies. All students were required to attend Simulation Day and participate in four OB simulations detailing high-risk OB content, having completed requisite preparation sheets and readings for them.

Project participants completed a knowledge and confidence pretests, which took approximately 10 minutes for completion. These will be discussed in more detail in a later section. Following simulation, participants completed posttests on knowledge, confidence, and clinical judgment, and a brief demographic survey, which took approximately 15 minutes to complete.

All simulations were observed in real-time by the DNP student investigator; at the close of the semester, videotaped review by the DNP student investigator and DNP clinical mentor of primary and secondary nurse participant's roles was accomplished. The instructor version of the clinical judgment tool was utilized to examine the primary and secondary nurses from each simulation group for development of clinical judgment. See Appendix J for Project Model.

Measurement Instruments and Tools

National League for Nursing (NLN) Survey. Permission was obtained from the NLN for use of their Student Satisfaction and Self-Confidence in Learning Survey (SSSL). This 13-item instrument contains five questions measuring satisfaction with simulation and eight

questions on self-confidence in learning, arranged on a five point Likert scale. The survey has been found to be both valid and reliable by the NLN over numerous uses with established reliability using Cronbach's alpha for satisfaction = 0.94; for self-confidence = 0.87 (NLN, 2015). See Appendix K. The survey was utilized in the manner described by Andrighetti et al., (2011), where it was used in a modified form as both a pretest and posttest confidence measure. See Appendix L for the instrument.

Lasater Clinical Judgment Rubric. The Lasater Clinical Judgment Rubric (LCJR) was developed to clearly communicate expectations for development of clinical judgment, as described in the Tanner Model (Lasater, 2007). Permission was obtained to utilize the LCJR from Aims Community College, Department of Nursing and from the rubric developer. All project participants completed the 11-item student self-evaluation as a posttest measure; additionally, the DNP student investigator performed the evaluation on student participants who were in primary and secondary nurse roles for the simulation. This resulted in 11 DNP student investigator evaluations, which were then compared to student self evaluative comments. The LCJR has been found to be both valid and reliable, with a Cronbach's alpha for internal consistency = 0.97 (Lasater & Kardong-Edgren, 2012) and overall internal consistency for construct validity, or the ability of the tool to actually measure clinical judgment = 0.95 (Victor-Chmil & Larew, 2013). See Appendix M for the instrument.

NCLEX-style test bank questions. Knowledge as an outcome was discussed by Jeffries (2005) as an increase in awareness, proficiency and understanding resulting from participation in an educational endeavor. Participants in the PPH project prepared for simulation by completing a preparation sheet for PPH as they did for each mandatory simulation in which they participated. Project participants completed a five-item pretest of NCLEX-style questions

selected from available test bank sources, such as the primary textbook, ATI™ practice questions and Saunder's NCLEX 6th Edition Review Book. The ATI™ is a "nationally normed standardized, proprietary exam" (O'Donnell, Decker, Howard, Levett-Jones, & Miller, 2014, p. 376) which has acceptable psychometric data.

Test questions were selected from the course text or NCLEX review book and underwent content validity assessment utilizing the Content Validity Index for each item (I-CVI), using a four point scale of one meaning not relevant and four meaning highly relevant. The item index was then averaged to give a Scale Index, (S-CVI); the authors recommended using an expert pool of at least three experts "and suggest a value of .90 as the standard for establishing excellent content validity" (Polit & Beck, 2012, p. 337). The project utilized at least three OB content experts to assess for content validity and the process will be described later in this paper.

Data Analysis

Data analysis involved the use of descriptive statistics; summary aggregate demographic data was collected from participants to include age, gender, and previous healthcare experience. Analysis of data related to self-report survey and observations of selected participants relative to the development of clinical judgment was accomplished. Finally, pre and posttest differences between groups were evaluated by t-test.

According to Polit and Beck (2012), the "one-group, pretest-posttest design … [may be appropriate for] ... brief teaching interventions, with baseline knowledge data obtained immediately before the intervention and posttest knowledge data collected immediately after it" (p. 219). The authors posit the intervention may reasonably explain an increase in scores. They further suggest this design is especially vulnerable to threats to internal validity, such as history and maturation.

The PPH project minimized these threats by requesting students not discuss simulation content with those who had not yet participated in simulation. Additionally, student fatigue and cognitive overload was avoided by scheduling brief breaks during Simulation Day, and by groups completing their complete simulations experience in half-day blocks.

UNC Approvals and Timeline

A Letter of Intent was filed with UNCs Undergraduate Leadership Team (ULT), who subsequently granted approval to conduct the PPH Simulation Project at UNC. Following IRB approvals, the PPH Simulation Project was implemented in the fall semester, 2015. During this time, subjects were enrolled, outcomes assessed and data collected. Data interpretation and synthesis occurred after the close of the fall semester, following posting of the final grades. See the Project Timeline in Appendix R.

PPH Simulation Project Budget

The PPH simulation used currently has fixed costs for one faculty to facilitate the simulation. Both simulations included the estimated cost of simulation equipment maintenance contract with manikin vendor annually. Simulation-related supplies (gloves, pads, chux, etc.), were estimated at $50 per semester for both simulations.

Additional costs for the proposed PPH Simulation Project included the addition of a faculty facilitator for the simulation. Costs were approximated at $40/hour for two four-hour sessions per semester, or approximately $320/semester ($640/yr) and $25 for paper and printing supplies related to testing. The DNP student supplied these costs during the project, so there were no costs incurred by the school or students. See the Project Budget Appendix Q.

Findings and Results

OB Simulation days were scheduled for two half-day sessions in the fall of 2015. A total of 33 students took part in four separate simulations of approximately one hour each on those two days in groups of five to six each. Students volunteered to assume the role of primary and secondary nurses, the spouse, recorder(s), or family member. The scenario consisted of a five minute orientation to the setting, manikin, and objectives followed by a bedside report on their normal postpartum patient; the primary and secondary nurses were then given about 10 minutes to review the chart, standing orders, policies, and procedures and to develop a plan of assessment/care for their patient.

Upon reentry, the scenario began and ran for about 20 minutes, during which the patient began hemorrhaging. Students were instructed to pause the scenario in order to directly question the facilitator as needed. The facilitator portrayed the off-going nurse as well as the medical provider who was available by phone and to whom the students gave report. At the close of the scenario, 15 minutes was allotted for debriefing, which included discussion on documentation and Situation, Background, Assessment and Recommendation (SBAR) communication used during the scenario.

Demographics

Thirty-three students participated in the PPH Simulation Project. Eighty-one percent (27) supplied demographic information. Ninety-six percent (26) of respondents were female; ages ranged from 21 to 44 years with a median age of 22 and a mean age of 24.5. Eighty-nine percent (24) listed previous healthcare experience as a certified nursing assistant (CNA) and one self-identified home health experience. Another student noted experience in the Emergency

Department in an unidentified role, while another wrote of a summer internship of some sort. Finally, a CNA listed additional summer internship experience.

Objective One: Increase Participant Knowledge

The goal of objective one was to increase participant knowledge regarding PPH as evidenced by improvement in knowledge posttest results. Nursing student knowledge regarding identification and synthesis of knowledge about PPH is vital to providing safe care for postpartum women. During data analysis, a *t*-test was performed utilizing IBM SPSS 26 software to evaluate pre-test and posttest differences between groups. A paired-samples t-test was conducted on the aggregate data to compare student knowledge about PPH completing the usual pre-simulation preparation worksheets with student knowledge after participation in a simulation detailing the care of a patient with PPH. While there was an increase in mean scores between the pretest (M=73.33, SD=16.33) and posttest (M=78.79, SD=14.94) conditions; t (32) = 1.79, p = .083.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	KPREAGG	73.33	33	16.330	2.843
	KPOSTAGG	78.79	33	14.949	2.602

Figure 1-A. Paired Samples Statistics

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	KPREAGG & KPOSTAGG	33	.375	.031

Figure 1-B. Paired Samples Correlation

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	KPREAGG - KPOSTAGG	-5.455	17.516	3.049	-11.666	.756	-1.789	32	.083

Figure 1-C. Paired Samples Test

Individual questions on the knowledge pre and posttest were evaluated for percent change. The five-question knowledge test was created by the DNP student investigator utilizing the procedure referred to in Polit and Beck (2012) for establishing content validity of the test questions. The Content Validity Index for each item (I-CVI) was assessed; using a four point scale of one meaning not relevant and four meaning highly relevant, an item index was then averaged to give a Scale Index (S-CVI). Expert OB clinician input was sought; twelve letters with ten sample questions were distributed by email with ten replies received. The authors "suggest a value of .90 as the standard for establishing excellent content validity" (Polit & Beck, 2012, p. 337); the five questions with the highest rankings were selected. These questions met or exceeded .90 for content validity.

Individual test questions were then evaluated for score changes. Responses on three questions improved from six to eighteen percent. These questions related to nursing assessments, interventions, and understanding etiology. One question showed a decline in scores, which was further evaluated. Primary nursing responsibilities were incorrectly identified as establishing venous access (2) and catheterizing patient (1) compared to one pretest incorrect answer of establishing venous access. One question showed no change in scores and was correct 100% in both pre and posttest (Table 2).

Test Questions	Pretest Results Aggregate	Posttest Result Aggregate	Percent Change After Simulation
The most important nursing intervention when a nurse observes profuse postpartum bleeding is to:	Correct=18 Incorrect=15 55% correct	Correct=21 Incorrect=12 64% correct	9% improvement
Which drug is administered after delivery to reduce the risk of postpartum hemorrhage after the placenta has been delivered?	Correct=33 Incorrect=0 100 % correct	Correct=33 Incorrect=0 100 % correct	No change
The perinatal nurse is caring for a woman in the immediate post-birth period. Assessment reveals that the woman is experiencing profuse bleeding. The most likely etiology for the bleeding is:	Correct=26 Incorrect=7 79 % correct	Correct=32 Incorrect =1 97 % correct	18 % improvement
A primary nursing responsibility when caring for a woman experiencing an obstetric hemorrhage associated with uterine atony is to:	Correct=32 Incorrect=1 97% correct	Correct=30 Incorrect =3 91 % correct	6 % decline
What woman is at greatest risk for early postpartum hemorrhage?	Correct=12 Incorrect=21 36 % correct	Correct=14 Incorrect =19 42 % correct	6 % improvement

Table 4. Comparison of Pre and Posttest Scores

Objective Two: Increased Participant Satisfaction and Self-Confidence

Objective two focused on if there was increased participant satisfaction and confidence in learning following simulation participation, as evidenced by improvement in NLN Student Satisfaction and Self-Confidence in Learning Survey.

A paired samples *t* test was performed to evaluate whether statistically significant differences existed between the mean satisfaction and self-confidence scores before and after participation in the PPH Project. The results of this test suggested significant increases in all measure of student satisfaction after simulation participation.

Similarly, student self-confidence scores increased in five of eight measures. Self-confidence scores not showing significant improvement related to learner responsibility for learning, application of learning and how to get help in understanding covered concepts. The results of the paired samples *t* -test suggest that while there were increases in all mean satisfaction and self-confidence scores, not all self-confidence scores showed a significant increase.

Satisfaction	***p*-value**
The teaching methods used in this content/simulation were helpful and effective.	.000
The content/simulation provided me with a variety of learning materials and activities to promote my learning the postpartum hemorrhage content.	.002
I enjoyed how my instructor taught the content/simulation.	.018
The teaching materials used in this content/simulation were motivating and helped me to learn.	.000
The way my instructor(s) taught the content/simulation was suitable to the way I learn.	.008
Self-confidence	***p*-value**
I am confident that I am mastering the content of postpartum hemorrhage/simulation activity that my instructors presented to me.	.000
I am confident that this material/simulation covered critical content necessary for the mastery of postpartum hemorrhage.	.002
I am confident that I am developing the skills and obtaining the required knowledge from this content/simulation to perform necessary tasks in a clinical	.090 (n.s.)
My instructors used helpful resources to teach the content/simulation.	.000
It is my responsibility as the student to learn what I need to know from this content/simulation.	.625 (n.s.)
I know how to get help when I do not understand the concepts covered in the content/simulation.	.447 (n.s.)
I know how to use content activities/simulation activities to learn critical aspects of these skills.	.037
It is the instructor's responsibility to tell me what I need to learn of the postpartum hemorrhage/simulation activity content during class time.	.014

Figure 5. Student Satisfaction and Self-Confidence Scores (©NLN, 2005, used with permission, adapted by Andrighetti et al., 2012)

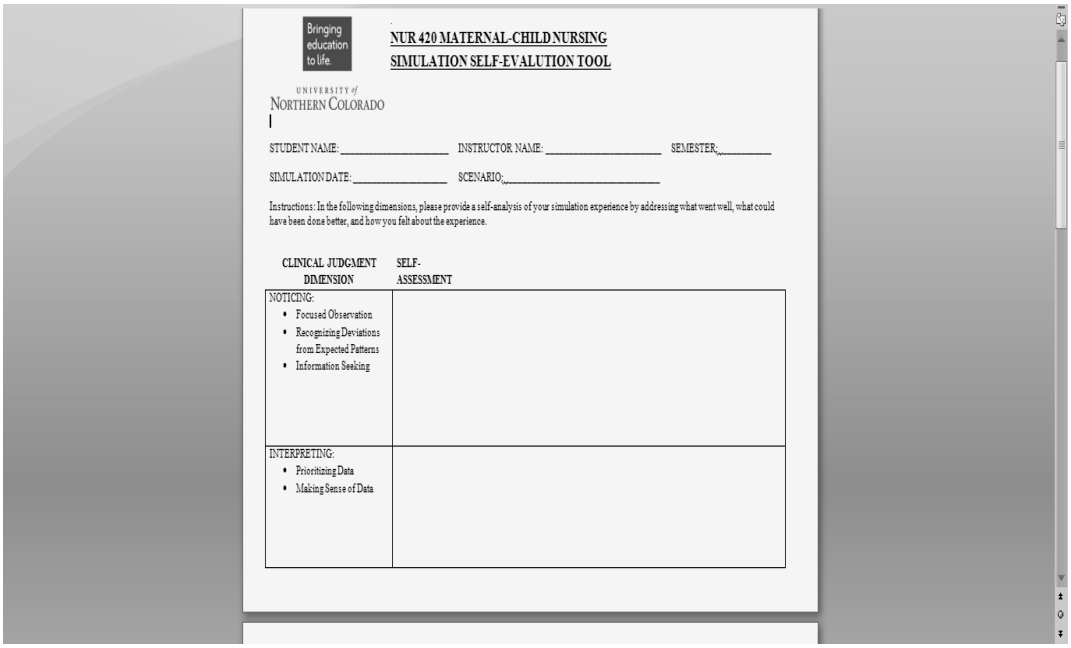
Objective Three: Increased Participant Clinical Judgement

Objective three was to provide evidence of increased participant clinical judgment through review of student reflective comments indicative of developing clinical judgment. The Lasater Clinical Judgment Rubric (LCLR) was designed to help students share thoughts on their development of new skills and abilities to respond to patient care situations. Consisting of

structured self-assessment, the LCJR aimed at enhancing student learning and demonstrating evidence of critical thinking through the use of structured reflection (Cato et al., 2009).

During recruitment, a handout was provided to potential participants describing the four areas of Tanner's Clinical Judgment Model (2006) which included: Noticing, Interpreting, Responding, and Reflecting. As part of the PPH project posttest, participants completed the self-reflection tool where they could respond to items within each of the four areas. Student self-evaluation comments were noted and the DNP student investigator (SI) assigned a skill level of *Beginning, Developing, Accomplished,* or *Exemplary* based on student comments. The DNP SI observed each simulation in real-time, commented, and assigned a skill level score on each primary and secondary nurse dyad using the LCJR.

After the close of the semester, the SI and DNP clinical mentor viewed the videotaped recordings of the simulations, again using a blank student self-evaluation form to make comments and then assigning a skill level based on comments. The scores assigned by the DNP SI at this viewing were the ones used; however, comparisons of the real-time scores were made. Although there were noted to be a few different comments, the scores were unchanged. Therefore, despite being a highly subjective scoring system, a level of internal scoring consistency was achieved. See Figure 6 and Figure 7.



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UNIVERSITY of NORTHERN COLORADO

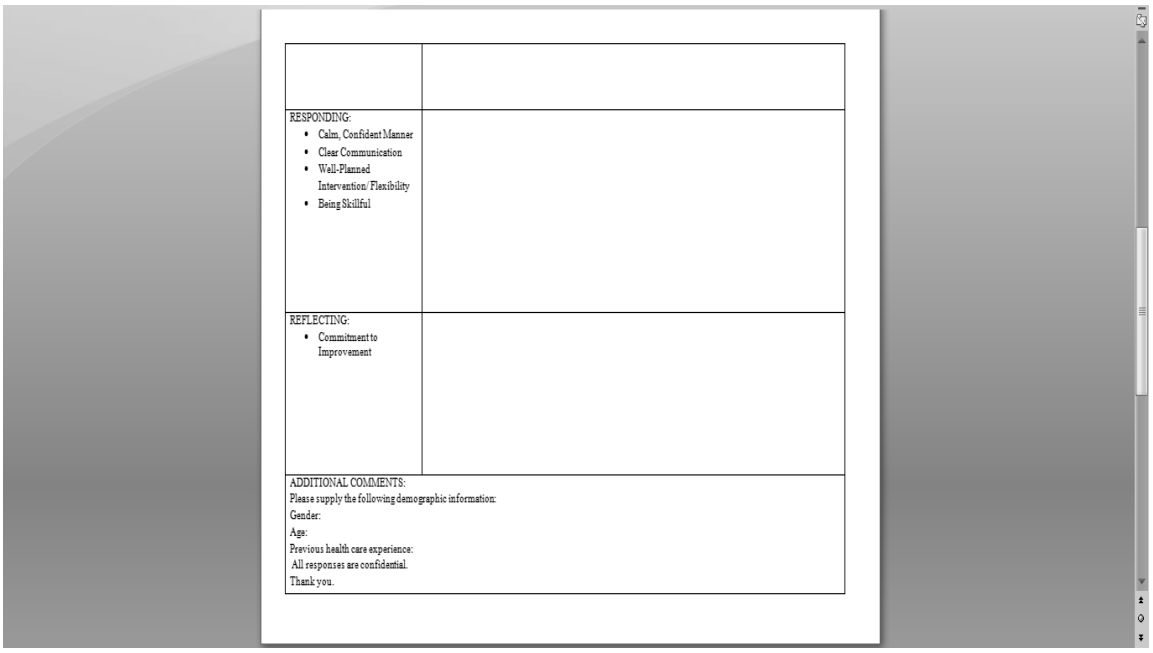
NUR 420 MATERNAL-CHILD NURSING
SIMULATION SELF-EVALUTION TOOL

STUDENT NAME:_____ INSTRUCTOR NAME: _____ SEMESTER:_____

SIMULATION DATE:_____ SCENARIO:_____

Instructions: In the following dimensions, please provide a self-analysis of your simulation experience by addressing what went well, what could have been done better, and how you felt about the experience.

CLINICAL JUDGMENT DIMENSION	SELF-ASSESSMENT
NOTICING: • Focused Observation • Recognizing Deviations from Expected Patterns • Information Seeking	
INTERPRETING: • Prioritizing Data • Making Sense of Data	



RESPONDING: • Calm, Confident Manner • Clear Communication • Well-Planned Intervention/ Flexibility • Being Skillful	
REFLECTING: • Commitment to Improvement	
ADDITIONAL COMMENTS: Please supply the following demographic information: Gender: Age: Previous health care experience: All responses are confidential. Thank you.	

Figure 6. Lasater Clinical Judgement Rubric Self-Evaluation Forms (Used with permission of Aims Community College)

Student	Scored Similar	Scored Differently
A17	Interpreting, Responding, Reflecting	Noticing
A4	Noticing, Interpreting, Reflecting	Responding
A6	Noticing, Interpreting, Responding, Reflecting	
A12	Noticing, Interpreting Responding, Reflecting	
A14	Noticing Responding, Reflecting	Interpreting
A21	Noticing, Interpreting Responding, Reflecting	
A28	Noticing, Interpreting, Responding, Reflecting	
A19	Responding, Reflecting	Noticing, Interpreting
A29	Interpreting, Responding, Reflecting	Noticing
A23	Noticing, Interpreting, Responding, Reflecting	
A25	Noticing, Interpreting, Reflecting, Responding	

Figure 7. Lasater Clinical Judgment Rubric Scoring Comparisons

A total of 44 items were scored for 11 respondents; a 12th respondent could not be properly identified by role designation and was omitted. Identical ratings were noted for 38 parameters; however, some interesting differences were noted. Four of the six times when rankings differed, student rankings were one to two levels above SI rankings; however, the other two times, student ranked themselves lower than those assigned by the SI.

Objective Four: Importance of Simulation through Reflection

Simulation helps students develop necessary skills and knowledge to care for patients and successfully transition to the RN role (Cordeau, 2012). The PPH simulation project engaged students in a "high-intensity, low-frequency event … [to] … improve patient safety outcomes

and communication skills" (Jeffries et al., 2009, p. 618). Objective four was to develop student-identified subthemes of importance noted in student reflective comments which may indicate development of clinical judgment. The simulation self-evaluation tools invited the students to reflect on three major themes for self-analysis: What Could Have Gone Better, How I Felt, and What Went Well. From these major themes, student-identified subthemes were developed and will be reviewed here.

What Could Have Gone Better

Subtheme: Communication. Some students were pleased with their communication abilities, noting *"The nurses were very calm and did a great job reassuring the patient and her husband. They maybe could have communicated with each other a little more in regards to what they were doing, but overall it went well"* and *"I thought our responses were pretty appropriate. My one thing that I would have done differently would be to communicate better/more effectively with family and the patient about what is going on and what we were going to do to fix what was going wrong."*

Others were less complimentary, stating *"They did not respond to the amount of blood and pt [patient] complaints. They did basic interventions"* and even felt "*the nurses got flustered when they recognized a problem & the family started asking questions."* Interdisciplinary communication, as shown by nurse to physician telephone reports, was another important communication element identified by students. Although one student felt she "*should have called [the] Dr. sooner when interventions weren't effective"*, others recognized the importance of having complete assessment data before calling.

The SBAR communication tool is a format used to improve patient safety, especially in situations involving multiple stressors, frequent interruptions and emergent variables competing

for attention in an emotionally charged high-stakes event, such as PPH (Lancaster, 2015; Ozekcin, Tuite, Willner, & Hravnak, 2015). Use of this structured tool in simulation may help student organize and prioritize interventions, as revealed in self-reflection. One student felt she could have had a "*better SBAR with the doctor and having all my information"* before phoning; another remarked "*practicing SBAR communication-being prepared with necessary information before calling physician...*" as well as "*improvement in SBAR → and knowing how much blood this patient had already lost would have been helpful...*" to providing care. Students summed it up by recommending in order to "*...SBAR more effectively"* it is important to "*have all assessment data before SBAR.*"

Subtheme: Confidence. Simulation activities are designed to increase student clinical skills and abilities, resulting in reduced anxiety and promoting achievement of more self-confidence (Jeffries et al., 2009); however, students often report simulation provokes anxiety which may increase throughout their simulation experiences as the simulation scenarios increase in complexity (Cordeau, 2012). Anxiety was evident in some student comments; one noted *"I would say they planned well before starting simulation; however, the tension and being nervous made them not follow what is supposed to be done."* Another student observed "*they were a bit nervous & not sure what they were supposed to use in the simulation room.*"

Having a divided focus compounded the problem of anxiety as one student explained *"...the nurses got flustered when they recognized a problem & the family started asking questions"* and stated *"I know I have the right skills. I would like to better employ them."* Reflecting on communication issues, one student remarked "*in the future, I think I would like to communicate more/effectively with family, and had I known more about the medications, I could*

have answered my patient's questions and been more confident", linking confidence with knowledge.

Subtheme: Assessments and Interventions. Authors agree that intentional practice of essential skills combined with feedback provided during debriefing and subsequently linked with reflection on action yields positive learner response (Jeffries, 2016; Liaw, Chan, Scherpbier, Rethans & Pua, 2014). In the PPH project, students recognized multiple opportunities to improve aspects of care, such as checking vital signs (VS), as an indicator of maternal well-being. One student noted *"...the nurses did not pay attention to the altered vital signs and did not add up the total blood loss*" while another remarked *"They did not respond to the amount of blood and pt complaints. They did basic interventions."* But some missed assessments like they *"...forgot to read the monitor ...* [for VS] *… but focused on the physical findings on the patient";* therefore they *"didn't notice low BP or high heart rate."* They concluded by saying the nurses *"could have prioritized vital signs better."*

One student expressed difficulty *"...prioritizing the data and what was crucial"* while others recognized the need to *"...perform longer fundal massage"* or *"... a harder fundal check*" as well as to assess *"...if she needed to void because that can affect uterine atony."* Recognizing the need for teamwork, one student concluded *"...but should've done continuous massage, gave both meds at the same time, called the MD sooner. [We] should've cathed her."* Others concluded *"I need to review orders a little better"* and *"...any problems faced in sim would probably have been alleviated by reading/memorizing standing orders."*

Theme: How I Felt

Subtheme: Bridging the Gap. Despite role differences within the simulation scenario, students identified opportunities for learning. The recorder role afforded one nurse a greater

degree of objectivity as she observed *"...I noticed that my group did some things very well, but also missed some things. They did well communicating and double checking with one another, asking questions, but forgot some vital info like wash hands and check identifiers."* Another recorder related this ability to being in a less stressful role where she was *"...able to identify the deviations from the things I expected the nurses to do. We as observers are not the ones responsible for the stressful situation so it is much easier to identify what went poorly and also to know the way the situation should go."*

The ability of simulation to help students form linkages between theoretical concepts and applications to practice were also elements evident in student reflections. "*I thought the PPH simulation went really well. We had a basis of understanding of interventions we learned before sim in lecture, but sim really helped with the application of those skills. It helped me learn there are many different interventions you can use to improve PPH."* Another remarked *"it was so helpful to understand how much and how vigorous the fundal massage was as well as why we give certain meds."* As one nurse concluded *"simulation helps me see the big picture when putting together VS with other data..."*

Subtheme: Outward Calm-Inward Panic. Simulation-related anxiety may be due, in part, to not knowing what to expect within the unfolding scenario, despite completing topical preparation sheets; however, orientation to the simulation environment, equipment, and objectives can be helpful to increase student focus and effectiveness (Cordeau, 2012; Jeffries, 2016). *"The instructors spent time showing where the equipment was located. That was nice! Also, I feel that sometimes the equipment doesn't work (example=bed rail did not go down). It makes the simulation difficult."* Despite this, some remained anxious which impacted performance; as one student stated, she became *"nervous and unorganized. Had planned out*

before simulation but became nervous once simulation started and lost thought processes." Another reflected "*although I observed a few modifications I would have made in the scenario as recorder, when I acted as the nurse in the next scenario I felt like I made the same mistakes because I was anxious and didn't feel confident."*

Remaining calm was a trait valued by nurses who described "*in my head I was panicking but we stayed calm and collected...*" Another recognized a calm demeanor as a goal to strive for, saying "*...I want to work on remaining calm and internalizing any reactions..."* in an effort to remain calm for family, being *"...mindful that keeping them calm in turn keeps the patient calm."* A husband echoed this reflection saying *"the nurses were wonderful and calm and confident. This allowed me to stay calm as well despite being worried about my wife. The nurses worked well together and I felt as though I was not inadequate and leaving my wife to suffer alone."* Finally, *"...sim can be very nerve-racking, but I feel it is good to be put in a realistic scenario that pushes your nerves before going into clinicals."*

However, some experiences detracted from the simulation. Some experienced frustration at not understanding the rules of simulation, or if it was appropriate to ask for help, both possible barriers to learning. One student was comfortable with her assessments but less sure of the nursing interventions, describing her *"...struggle[s] at implementing order of interventions while in sim and could use coaching on having it be ok to seek information from charts/outside resources during sim."* Additionally, after implementing interventions some felt *"...waiting in simulation for something 'to happen' after interventions is sometimes frustrating."*

Subtheme: Take-home Points. Over the course of the PPH project, the Jeffries Simulation Framework (2005) underwent evaluation and review by researchers and noted simulation experts and is now classified as a middle-range theory rather than conceptual

framework (Jeffries, 2016). While its major tenets remain the same, albeit refined and expanded, outcomes underwent modification to acknowledge the far-reaching impact simulation may have. Outcomes no longer refer simply to identified learner outcomes such as knowledge, skills, and improvements in confidence or satisfaction; additionally, outcomes refer to learning which may directly and measurably affect patient care, and subsequently affect population or system health (Jeffries, 2016; McGaghie, Draycott, Dunn, Lopez & Stefanidis, 2011).

Students in the PPH project gained valuable insights through simulation; upon reflection, they identified opportunities to apply their learning to future practice. "*As the observer I noticed quite a few things that the nurses did that I would have either forgotten, done differently or hoped that I would have done as well. I made realizations to do things intentionally in clinical and as a nurse that I probably wouldn't have done before. Observation-observed actions s/he may have forgotten in real life."* Some had very specific examples, stating she *"learned a lot from PPH sim. Pay more attention to orders and meds ordered-amount, route...basically I need to remember the 7 rights of meds."* Another stated "*In the future I will focus on bigger complications and keep in mind the available interventions to use in order to correct a postpartum hemorrhage.*" Despite the anxiety that sometime accompanies simulation, some "*...would like the opportunity to do this simulation again and provide a greater comfort level with the medications and their side effects*" because they believe "*sim helps organize future thoughts when stressful situations arise. I think we are well prepared with a sense of data."* The importance of *"following doctor's order and knowing the facility protocol so that I know what & how & when to do things when hemorrhaging happens*" indicates a desire to look at available resources and care options for patient treatments. Finally, one remarked "*I will take what I've*

learned and apply it to future simulations as well as in my clinical practice", indicative of a commitment to improving future practice.

Theme: What Went Well

Subtheme: Prepped Well. In order to maximize successful student learning, students must be actively engaged in becoming self-directed, self-motivated learners (Jeffries, 2016); however, it remains a faculty responsibility to construct learning opportunities which strategically guide pre-simulation study activities. Students completed a preparation sheet for PPH, as they did for each simulation participated in, as is the standard. One student remarked *"...Our clinical prep work was very useful for our gathering and compilation of preparatory info."* Others felt that *"...utilizing info obtained prior to simulation"* helped their experience; another stated *"I feel like we prepped very well for prioritizing our interventions based on clinical presentations."*

Each nurse dyad received a patient report and was then give a brief time before starting the simulation to privately consult with each other regarding plan of care and division of labor. Many students found this helpful, stating "*...I also felt like it really helped to take a minute with my other nurse before starting sim to collect our thoughts & decide our interventions*." Another remarked "*...we were still able to think clearly and follow the steps we had set in place*." Simulation preparation as a self-directed activity may promote learning and improve overall performance (Liaw et al., 2011).

Subtheme: Recognized Deviations. Students prepared for the PPH simulation by completing a prep sheet prior to simulation which aimed at providing content for PPH and promoting active learning. The simulation scenarios provided a context for learning, enabling students to apply new knowledge. Embedded cues within the scenario further assisted students

to understand context and meaning of the information, while developing a better awareness of signs of deterioration (Bogossian et al., 2013; Liaw et al., 2011).

Most students felt positive about their ability to recognize signs of clinical deterioration. One observer noted "*The nurses were very aware of deviations from normal and responded appropriately.*" Another felt they *"...did a good job of assessing the patients overall status & recognizing that the amount of blood was too much.*" This observation by another who reported "*The nurses switched gears quickly and successfully once they noticed that something was off. When the patient was stating that she was dizzy and bleeding a lot, the nurses shifted into a focus on her bleeding. They asked appropriate questions to gather more information.*" Linkages to specific cues were made; for example, a student described having "*correctly identified her low BP, high HR & abnormality of bleeding"* and then modified their actions and *"stopped [complete] assessment when noticed blood amount. [They] focused on hemorrhage at that point. BP, HR, blood mL, all pointed to hemorrhage."*

The intensity of the moment may have colored the perceptions of one nurse who remarked "*I thought we did pretty well with the focused observation and assessment. We didn't miss anything major. We both recognized that [both] the amount of blood/clots on the pad were abnormal, as well as the BP being too low. We were also attentive to patient expressions/cues."* Others were more effusive in their praise, saying "*The nurses did a great job of recognizing the situation & the signs & symptoms that led them to the conclusion of hemorrhage*" and complimented them because they *"...were able to see the changes and what needed to be addressed."* One student summed up her experience by saying *"...providing focused assessments/observations and recognizing deviations in expected patterns. I was able to seek further information as necessary."*

Subtheme: Prioritized Actions. After successfully identified deviations from normal in their patients, prioritization of actions became an important indicator of developing clinical judgment (Bambini et al., 2009). Understanding which interventions to perform and deciding on the order of implementation was highly valued by PPH project participants.

Students noted success when nurses "*responded quickly to her complaint of bleeding*", reporting "*instead of completing less important assessments they focused on controlling the bleeding with fundal massage and medications which was good.*" One nurse stated *"I was able to prioritize and assess the data presented"* while another noted *"...we were still able to think clearly and follow the steps we had set in place. We knew the order of the interventions we should provide."* Specific priorities were identified; for example, one nurse felt *"they prioritized the data, feeling that the BP was of great importance as was the 300 grams lost in bleeding"*, which mirrored a response by a nurse who felt "*we prioritized the hemorrhage situation with weighing the loss/cleaning/administered meds, but knew that continuous fundal massage was needed based on the data of blood loss."*

Linking patient cues with nursing interventions was evident in student comments. For example, once they *"observed the bleeding and clots were very significant also because mom was lightheaded and dizzy. Her uterus was boggy so that was definitely a deviation from normal. [We] checked our orders*" and subsequently instituted *"skills used in class were [to] ↓er [lower] HOB [head of bed], get O_2 on patient, get BP, get other VS, do fundal massage."* Additionally, *"the nurses in simulation recognized how important it was to check bleeding, check BP and vigorously massage fundus as well as administer meds*" and they "*did well at watching vital signs and doing orders first."*

Teamwork was evident as one nurse said *"I thought that we did a great job prioritizing what needed to be done, starting with the least invasive/harmful intervention and continuing up the chain until the patient was found to be okay"* by focusing on *"...controlling the bleeding with fundal massage and medications." "We prioritized her bleeding & uterine atony over her lung/heart sounds, understood why that was important*" and "*...they kept in mind to continuously re-evaluate and see if the interventions had been helpful and continued to act upon that as indicated which was impressive."*

Understanding of the clinical scenario was evident when one student commented *"we knew that her vital signs were consistent with compensatory mechanisms related to hypovolemia/hemorrhage. Our priority was to get the blood pressure back within normal limits and to get the uterus firm."* Another remarked *"we did well at assessing the effectiveness of our interventions and that guided our decisions in terms of what to do next*", while another said *"...every time there was a deviation I knew what to do next"* which helped *"prioritized when to give meds."* One nurse summed it up by saying they *"responded to variations from normal, remained calm, weighed blood loss, administered medications with the 6 rights of administration, performed fundal massage, assessed and reassessed vital signs, notified physician",* leading another to conclude their *"responses were clear, calm and confident. Interventions were well-planned and skill/flexibility were evident."*

Subtheme: Calm Communication. Maintaining the outward appearance of calm for the sake of the family was important to students, perhaps as a precursor of the inward calm sought by all nurses in intense clinical situations. Outward calm may result from increased self-confidence and development of clinical judgment, assisted by ability to recognize patterns of clinical deterioration in patients. Simulation is uniquely suited to facilitate such learning.

Most family members and simulation observers were complimentary of the nurses calm communication styles; one wrote *"as a family member, it was an easy job to communicate [with the] w/nurses"* and although they *"seemed a little apprehensive when waiting for symptoms to subside, but communicated effectively w/one another about steps to be taken."* Perhaps this led another to remark they "*stayed relatively calm & reassured pt. [patient] & spouse. [They] communicated well with the other nurses, doctor & family."* One observer noted "*the nurses in this simulation remained very calm in the situation and communicated to the 'husband' in the scenario what was happening."*

One student was a bit self-deprecating, saying *"I might have explained to the patient more about what was happening/why interventions were being performed"*, while a 'spouse stated *"I pushed to get information from the nurses. I supported Jennifer"* Most, however, felt the nurses *"explained interventions well*" and *"they communicated very well with each other, always bouncing ideas back and forth. They were reassuring to the patient and Dan."* Additionally, they *".... explained what they were doing, meds they were giving. They knew the interventions well, knew exactly how to act & what to do. They kept calm & reassured pt. in a scary situation."*

Several nurses described the importance of remaining outwardly calm despite inner panic. One noted *"I thought we did a great job of maintaining a calm state (at least on the outside) and not panicking.*" Another astutely noted *"I am working on 'calm nurse face' and not reacting too negatively or positively to an observation or patient question. This was difficult today with what we observed, but I was able to curb it by talking to a family member in a calm manner."* Identifying that remaining calm for family helped promote inward self calm was very empowering for students and a major take-away of this simulation.

Objective Five: Cost Neutrality and Sustainability

The current low fidelity PPH simulation utilized had fixed costs for one faculty to facilitate the simulation. Both simulations included an estimated cost of simulation equipment maintenance contract with manikin vendor annually. Simulation-related supplies (gloves, pads, chux, etc.) were estimated at $50 per semester for both simulations.

Additional costs for the proposed PPH Simulation Project included a faculty facilitator for the simulation. Costs were approximated at $40/hour for two four-hour sessions per semester, or approximately $320/semester ($640/yr) and $25 for paper and printing supplies related to testing. The DNP student supplied the paper/office items during the project so no costs were incurred by the school for these supplies. UNC provided the additional faculty facilitator for the two simulation days. A full-time faculty served as manikin operator for the simulation.

Replication of the PPH simulation project is both cost-neutral and sustainable given the current faculty and simulation capabilities of the University. The PPH Simulation Project Budget is found in Appendix P.

Improved Fidelity

Many authors suggested that higher fidelity simulations improved participant performance, especially when environmental and psychological fidelity were high. This related to the student's ability to suspend belief and fully embrace the simulation scenario. The previous PPH simulation utilized a mid-fidelity HPS, along with a laptop computer at the bedside which displayed components of the scenario, quoted patient responses, and listed pre-planned responses to treatments. These were maintained on the laptop and changed by the facilitator as appropriate, with other responses verbalized by the facilitator.

The PPH project utilized high fidelity HPS manikins owned by the university and enhanced student experience without incurring more cost. Students spoke directly with patient, who responded to questions; new vital signs were displayed each time students checked them for a treatment response. Student ability to suspend belief was enhanced and was evident to simulation observers.

Limitations, Recommendations, Implications for Change

The problem of PPH is one of regional, national, and global significance. The PPH Simulation Project was an evidence-based project to examine the effect of an OB simulation on student knowledge, confidence, and clinical judgment in third semester senior students enrolled in a traditional baccalaureate nursing program. It aimed to promote simulation as a learning strategy through the use of relevant theoretical frameworks to enhance student ability to recognize signs of deterioration and provide care to the patient experiencing postpartum hemorrhage.

Simulation is an effective teaching strategy suitable for different types of learners. It has been found to be an acceptable substitute for up to 50% of clinical hours in prelicensure nursing programs; however, there is discussion regarding what constitutes high quality simulation and as well as meaningful measurement of clinical outcomes. The PPH Simulation Project utilized existing resources at UNC more fully and had minimal budgetary impact. Further, the PPH project directly measured outcomes of interest, namely student knowledge, confidence, and clinical judgment after simulation participation. The outcome measures of this project reinforced simulation as a vital teaching pedagogy for future generations of nurses.

Knowledge

Results of the project suggested between six to eighteen percent increase in knowledge scores on three questions following simulation; one question remained unchanged while another demonstrated a 6% decline. Evaluation of possible explanations leads the student investigator to two confounding variables. First, the question with an unchanged response rate was correct 100 percent correct each time; this may be due to sufficient coverage of content in pre-simulation preparation worksheets. Secondly, the 6% decline in score may have related to confusion over content reviewed during simulation preparation or information obtained during debriefing or during the simulation itself (Gates et al., 2012). These results suggested that participation in simulation did improve knowledge scores but not significantly as measured by this test.

Confidence

The NLN Nursing Student Satisfaction and Self-Confidence in Learning instrument was used in this project, as modified by Andrighetti et al. (2011). The results of the paired samples *t*-test suggest that while there were increases in all mean satisfaction and self-confidence scores, not all self-confidence scores showed a significant increase.

Clinical Judgment

The LCJR self-evaluation tool was utilized in this project to invite self-reflection on simulation learning. 44 rankings were assigned by the student investigator; 86 % (38) were consistent with scores generated from student surveys. Of the six comments which differed from the student investigator, 66 % (4) had student comments indicating higher levels of clinical judgment than the student investigator and 33 % (2), suggested comments indicative of lesser clinical judgment levels than those assigned by the student investigator, a finding similar to other investigators (Cato et al., 2009). The self-reflection comments provided suggested the simulation

had significant impact on the students. Many subthemes of importance were identified included the significance of communication, assessments and interventions, the benefit of preparation, effects of prioritization and the critical importance of remaining calm.

Limitations and Recommendations

There were several important limitations of this project. The sample population consisted of a small, predominantly female, homogeneous sample from one western baccalaureate-degree nursing program; although the sample frame was large enough to achieve a moderate effect size, the results had limited generalizability to other populations. Consideration of replicating the project over several semesters within the university and comparing results or conducting the project at different sites having less homogeneous populations may expand its value.

Additionally, the project focused on one content area of the nursing curriculum not accounting for previous simulation experiences of participants. Further, the project implemented a change from using a static manikin and PowerPoint slides to provide the basis for the scenario to utilization of a HFPS; however, no outcomes measures were available to determine actual improvement using the HFPS over the previous simulation, limiting generalizability.

Secondly, although efforts were made by the SI to minimize subjectivity, assignment of student proficiency by the SI on the LCJR was inherently highly subjective. Ideally, the LCJR scoring sheet is used to numerically rank student performance parameters, eliminating much student and faculty subjectivity. However, utilizing the LCJR solely as a forum for student self-reflection yielded valuable insights into student growth and educational gains, and this SI would hesitate to incorporate the numeric scoring component over concern of losing the rich self-reflections. Authors have further suggested it is costly and time-intensive to adequately train faculty on using the Lasater (Schlairet & Fenster, 2011). However, incorporating a different

numeric scoring tool such as the Creighton Clinical Evaluation Instrument may bring greater objectivity leaving the self-reflection untouched.

Finally, despite improved scripting with the use of a HFPS, simulations varied somewhat depending on student assessment questions during the course of simulation. Similarly, although all facilitators have undergone Debriefing Assessment for Simulation in Healthcare (DASH) training, debriefing is affected by facilitator experience and therefore subject to variation. Additionally, debriefing was student-led based on simulation events and student concerns. Perhaps to reduce variation faculty can develop suggested responses to questions commonly asked by students and develop a few debriefing questions to cover if not part of the student-led responses.

Implications for Practice

The research question posed by the PPH project evaluated if participation by senior OB nursing students in a simulation detailing the care of a patient experiencing PPH would result in increased knowledge, confidence, and clinical judgment. The project aimed to enhance student ability to perceive, understand, and act on cues indicative of clinical deterioration in the PPH patient; however, it remained unclear whether students were successful achieving higher learning and developing linkages to underlying pathophysiology or had simply implemented standing orders based on designated vital signs parameters or algorithms (Bambini et al., 2009).

Findings of the PPH project suggested significant increases in satisfaction after simulation, evident in student self-reflections and survey scores. Similarly, most confidence scores improved significantly, a finding congruent with Bogossian et al. (2013), who further suggested increasing simulation fidelity may not correlate with increased knowledge. Mean knowledge scores among project participants increased, but not significantly, which was an

unexpected project finding. Although content validity of the pre and posttest was achieved, perhaps the five question format was too brief to adequately determine substantive changes in knowledge following simulation. Therefore, use of a test comprised of additional validated questions may yield more meaningful results.

This project evaluated development of clinical judgment following simulation participation, understanding that low frequency, high stakes events such as PPH offer opportunities for students to employ active learning in an environment of safety with appropriate degrees of complexity. Additionally, simulation provides students with immediate post-experience feedback which may enhance student understanding and improve outcomes (Jeffries, 2016). While this investigator used the LCJR in a modified fashion not suggested by the developer, student comments revealed deep and robust reflections about their simulation experience, evaluating their performance, patient responses, family interactions, and interpersonal and interprofessional communication capabilities in the context of commitment to future learning and application to practice (Cato et al., 2009). Future projects fully utilizing the LCJR would enhance quantitative data regarding development of clinical judgment.

Fidelity was an important consideration of the PPH project which requires further study. The project used HFP simulation manikin in a university setting to more fully utilize university-owned resources, adding psychological and environmental fidelity to the student experience. While this project was found to be cost neutral and sustainable within the university, it is necessary to consider the balance of costs associated with higher fidelity simulations with benefits students derive. Students may experience high levels of satisfaction and confidence, but may not demonstrate improved knowledge acquisition (Bogossian et al., 2011). Careful evaluation of costs versus utility must be employed to justify individual institutions budgeting

for costly HFPS purchases rather than partnering with other institutions to maximize purchasing power. Additionally, exploration of the use of high fidelity, low technology simulators, such as *PartoPants™* by PRONTO, International, or *mamaNatalie©* by Laerdal (2015), should be explored. These simulators combine the advantages of a simulated patient for realism, achieving high psychological and environmental fidelity and student buy-in while presenting a cost effective, low maintenance alternative to HFPS manikins for institutions with smaller OB simulation budgets or resource-limited environments, offering global opportunities for low cost OB simulations (Andrighetti et al., 2011; Cohen, Cragin, Rizk, Hanberg, & Walker, 2011; Walker et al., 2012).

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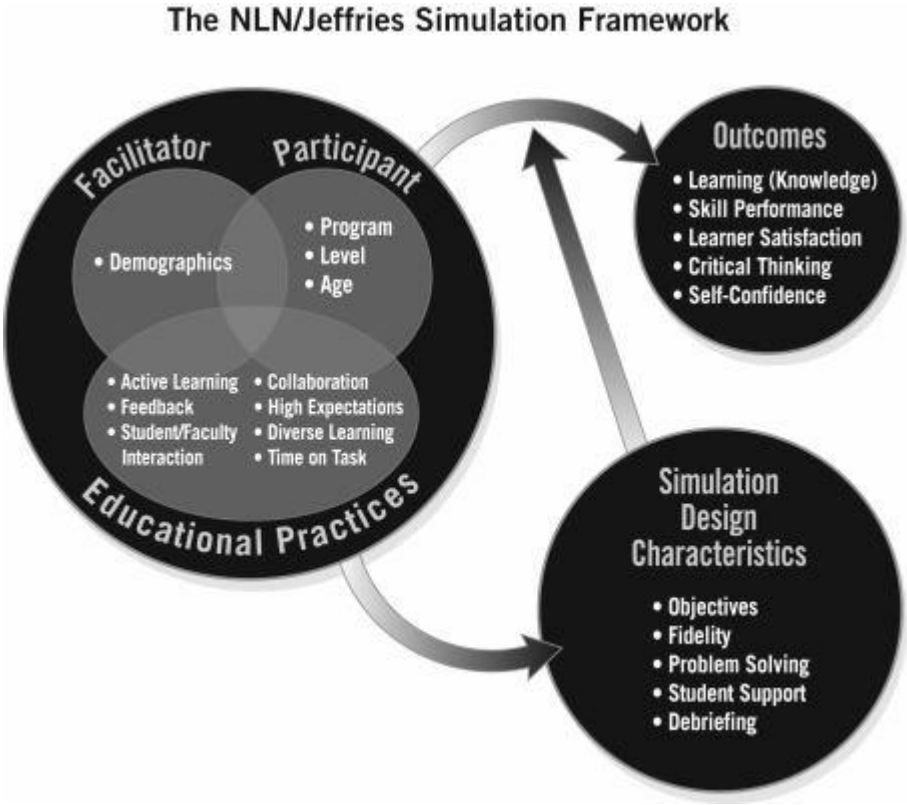
Appendix A

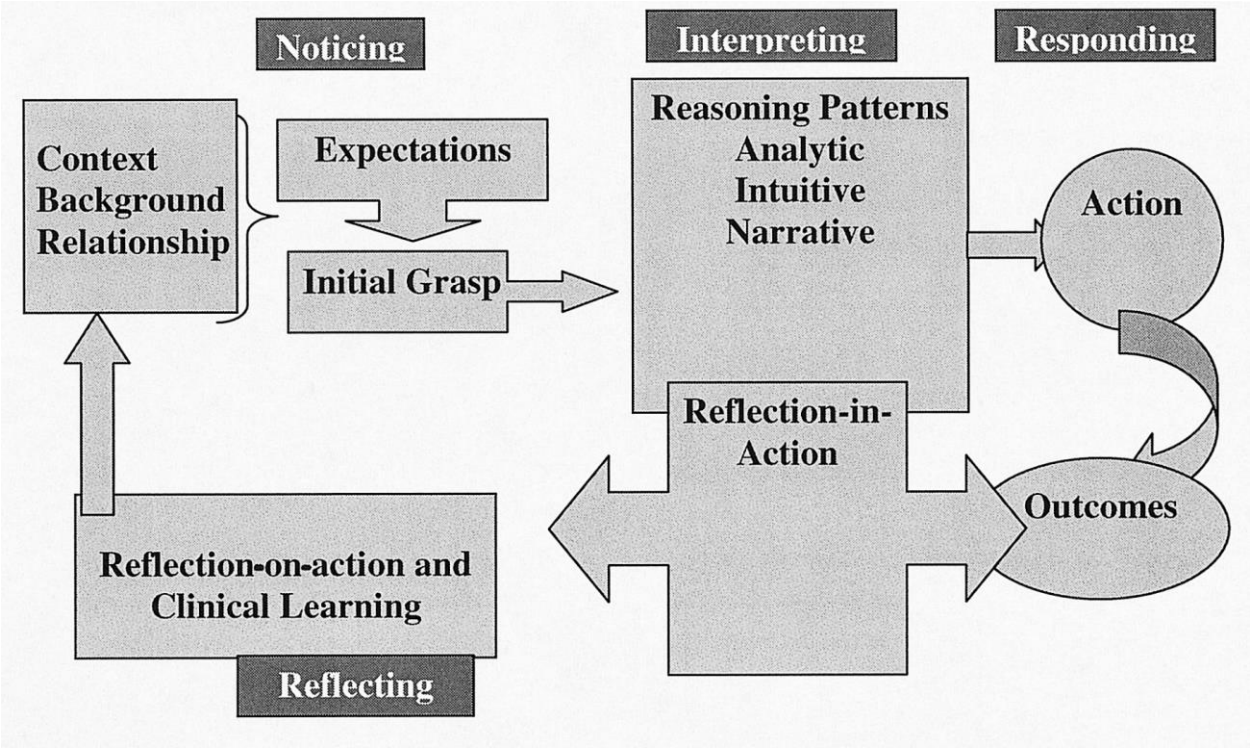
Jeffries Simulation Framework



Used with permission from Jeffries, P. R. (Ed.). (2012). *Simulation in nursing education: From conceptualization to evaluation.* New York, NY: National League for Nursing.

Appendix B

Tanner's Clinical Judgment Model



Tanner, C.A. (2006)

Appendix C

Literature Review Table

Number Articles Reviewed	236 (6 systematic reviews of the literature)
Search Engines Used	CINAHL, Google Scholar, Ovid, EBSCO Host
Search Terms	Simulation, high-fidelity, knowledge, self-confidence, confidence, self-efficacy, clinical judgment, critical thinking, nursing students, clinical deterioration, retention, skills, clinical decision-making, cues, competence
Inclusion Criteria	English, research articles, editorials, expert committee opinions and reports
Exclusion Criteria	Non-English research articles, earlier than 2005 (except for seminal works by authors).
Number Articles Included in Project	47
Levels of Evidence (Melnyk & Fineout-Overholt, 2005)	I=0 IV=4 VII=1 II=5 V=4 III=13 VI=20

Appendix D

Systematic Review Evidence Table

[Format adapted with permission from Thompson, C. (2011). Evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.]

Article/Journal	Using simulation to improve the use of evidence-based practice guidelines. *Western Journal of Nursing Research, 33*,296-305.	Effectiveness of simulation on knowledge acquisition, knowledge retention, and self-efficacy of nursing students in Jordan. *Clinical Simulation in Nursing, 9*(9), e335-e342.	Shoulder dystocia and postpartum hemorrhage simulations: Student confidence in managing these complications. *Journal of Midwifery and Women's Health,*	Evaluation tools in simulation learning: Performance and self-efficacy in emergency response. *Clinical Simulation in Nursing, 5, e35-e43*	Outcomes of clinical simulation for novice nursing students: communication, confidence, clinical judgment. Nursing Education Perspectives, 30 (2): 79-82.
Author/Year	Aebersold, M. (2011)	Akhu-Zaheya, L., Gharaibeh, M., Alostaz, Z. (2013).	Andrighetti, T. P., Knestrick, J. M., Marowitz, A., Martin, C. (2011)	Arnold, J. J., Johnson, L. M., Tucker, S. J., Malec, J. F., Hendrickson, S.A., Dunn, W. F. (2009).	Bambini D., Washburn J., Perkins R., (Mar-Apr, 2009)
Database/Keywords	Evidence-based practice, simulation, diffusion of innovation, conceptual models	High-fidelity simulation, Jordan, knowledge acquisition, knowledge retention, self-efficacy	midwifery education, postpartum hemorrhage, shoulder dystocia, simulation	Simulation, emergency response, performance measurement, confidence	Decision Making, Clinical Education, Clinical Education, Nursing Postnatal Care -- Education Self-Efficacy Simulations Students, Nursing, Baccalaureate
Research Design	Qualitative	Quasi-experimental	Quasi-experimental	Quasi-experimental	Quasi-experimental, repeated measures design.
Level of Evidence	VI*	III*	III*	III*	III*
Study Aim/Purpose	Discusses why EBP important; examines Translational Research Model as applied to EBP utilizing simulation	Looked at knowledge acquisition, self-efficacy and knowledge retention after participation in a traditional (PowerPoint and mannequin) vs. sim-based BLS course.	Examined pre and posttest measures of confidence between groups after participation in either a low or high fidelity simulation with shoulder dystocia or PPH	Looked at validity and interrater reliability of a performance assessment tool featuring an emergency scenario to measure nurses response; also evaluated the reliability and internal consistency of a self-efficacy or	This study looks at the relationships between simulation and non-sim. It examines student self-confidence and clinical competence, using a framework of Tanner's clinical judgment model

				confidence tool.	and the Lasater clinical judgment rubric.
Population/Sample size Criteria/Power	n=78 nurses completed sepsis scenario	N=52 (traditional training + sim/experimental group) N=58 (traditional training only	n=10 control (standard teaching and low fidelity sim (LFS); n-18 intervention (HFS) CNM students	n=41 med surg & critical care nurses divided into 3 groups: >10 yrs experience, BLS, ACLS; <13 months critical care experience, BLS, ACLS, 12 wk critical care internship; No critical care experience, 2-8 yrs med-surg, BLS, no critical care internship or orientation. Tor the study n=16 randomly selected from the initial pool of 41, 4 excluded 2/2 technical reasons or anxiety. Final n=12.	N=53
Methods/Study Appraisal Synthesis Methods	sim scenario developed to evaluate how well nurses could identify S&S urosepsis and subsequently initiate treatment or goal-directed therapy (GDT). "Pt." was programmed to improve if nurses followed the EBP of GDT.	Pre and posttest (1 wk)[Acquisition] and delayed (1 month) [retention] design of 2nd year nursing students in a Jordanian program	pre and posttest measures of confidence using and adaptation of the NLN Student Satisfaction and Self-Confidence in Learning Instrument	Emergency Response Performance Tool (ERPT) Knowledge tool: 11-item ACLS-based exam taken prior to the sim and 1st and 2nd confidence tests.	
Study tool/instrument validity/reliability	Sim ran for 20 min with 15-20 min debriefing. After debriefing, questions about the GDT for urosepsis were asked; nurses unfamiliar with them were able to review them.	Standard BLS AHA knowledge exam and emergency response tool developed by Arnold et al. (2009) to assess participant's confidence in responding to an emergency situation. Revised Cronbach's alpha=.83.	Previous content validity established in numerous studies at .Cronbach's alpha .87. Content validity for this study Cronbach's alpha .80	Emergency Response Performance Tool (ERPT); Fischer's exact test for categorical variables [p=.03]; Kruskal-Wallis test for continuous variables [p=.02]. ERPT [construct validity via Spearman correlation coefficient for test-retest	Pretest-posttest and follow-up survey Self-efficacy pre-post Cronbach's alpha .817, .858.

				reliability [rs=.87] and Cronbach's alpha .92 internal consistency confidence items. Knowledge tool	
Primary Outcome Measures/Results	Of the 78 nurses completing the sim, 62 were able to ID sepsis based on critical markers of GDT. Only 35 used the EBP guidelines to treat their patients. Once familiar with the GDT, nurses reflected they would bring the info back to their units.	No significant differences between groups in acquisition or retention; higher self-efficacy in the sim [experimental] group	Increase in confidence noted in posttest groups: moderate effect size for shoulder dystocia and large effect size for PPH.	Confidence and knowledge scores were highest for group 1 [most experienced] and lowest for group 3, consistent with Bandura's self-efficacy theory.	No statistically significant differences b/t sim and self confidence Between the simulation group vs. the regularly trained group.
Conclusions/Implications	Sim is a helpful strategy to diffuse knowledge into practice, as described in Tiller's model of Translating Research into Practice (2007).	Nurses trained with traditional and sim techniques combined had better results for self-efficacy but not for skill acquisition or retention	High-fidelity simulation promotes improved learner confidence after sim participation.	ERPT demonstrates reliability and validity for performance as well as reliability and internal consistency for confidence	Author felt that traditional lab training worked well for entry level courses and suggested simulation may be reserved for later courses. Also felt the "hook" of technology with simulation may justify its use.
Strengths/Limitations	Did not really look at sim as a way to promote the use of EBP; it did illustrate how sim may be an effective experiential learning strategy. Also, making this opportunity available for more participants and not just for others to view the results might be more helpful.	Jordanian study may not have applicability to cultures more adept with use of sim in teaching. Needed a larger sample size [128 vs. 110]. Oral and not recorded debrief so students couldn't see their mistakes.	Small sample size, one midwifery program. Recommend future research on knowledge, skills and confidence acquired during sim equate to improved patient outcomes.	ACLS guidelines changed during this study and participants were certified under both guidelines. Old guidelines were utilized but may be a confounding variable. New confidence tool had no criterion validity, had 2 items that were not an exact match. Was modified for future use. Confidence tool and ERPT have a basic level of validity, reliability and usability. Med admin could not be evaluated since least experienced	Limitations: Social-response bias (data self-reported). Combated by anonymity. Selection threat: no control over who participated. Variability in student experience due to differences in student communications during sim. Faculty challenges 2/2 newness.

				didn't have ACLS, and the ERPT reflected these protocols. Small sample size-need larger sample for validation.	
Funding Source	None declared.	Unknown	Medela and National Institute of Nursing Research (One author's funding source)	Unknown	Not determined
Comments	Looks at Roger's theory of diffusion. Discusses sim as a method to teach crisis mgt skills.			ERPT may serve as a template for the development of an OB sim-related tool	Future study to focus on prioritization and provision of safe care. Evaluate different levels of students (BSN, AD, LPN-to-RN)
Article/Journal	Learning nursing through simulation: A case study approach towards an expansive model of learning. *Nurse Education Today, 34,* 1143-1148.	Obstetric skills drills: Evaluation of teaching Methods. *Nurse Education Today,(27), 915-922 doi:10.1016/j.nedt.2007.01.006*	High-fidelity nursing simulation: impact on student self-confidence and clinical competence. *International Journal of Nursing Education Scholarship,* 7 (1).	Undergraduate nursing students' performance in recognizing and responding to sudden patient deterioration in high psychological fidelity simulated environments: An Australian multi-center study. *Nurse Education Today, 34,* 691-696.	Nursing students' perceptions on how immersive simulation promotes theory-practice integration. *International Journal of Africa Nursing Sciences, 1,* 1-5.
Author/Year	Berragan, L., (2014).	Birch, L., Jones, N., Doyle, P. M., Green, P., McLaughlin, A., Champney, C., Williams, D., Gibbon, K., Taylor, K. (2007)	Blum C.A., Borglund S., Parcells, D. (2010).	Bogossian, F., Cooper, S., Cant, R., Beauchamp, A., Porter, J., Bucknall, T., Phillips, N., The First2Act™ Research Team. (2014).	Botma, Y., (2014).
Database/Keywords	Simulation, learning, nursing students, professional practice learning, expansive learning	Postpartum hemorrhage; Skills drills; Emergency training; Teaching methods; Teamwork; Simulation based training	Clinical Competence, Confidence, Outcomes of Education, Patient Simulation, Students, Nursing, Baccalaureate Teaching Methods	Education, Nursing, Patient deterioration, Simulation, Clinical performance, clinical decision making, situational awareness, teamwork	Transfer of learning, theory-practice integration, simulation, deliberate practice
Research Design	Small-scale narrative case study	Random assignment to one of three groups: lecture only, lecture and sim or sim only	Quasi-experimental, quantitative study Not randomized	A mixed multicenter study of senior yr. nsg students in Australia,	Qualitative descriptive study using focus group interviews of

			due to student lab schedules	utilizing descriptive research.	senior nsg students (3rd & 4th yr) which were recorded and transcribed same day.
Level of Evidence	IV*	III*	III*	V*	VI*
Study Aim/Purpose	Looked at how simulation affected learning of undergraduate nursing students. Objectives: explore the sim experience from small group view, look at sim-based learning from the vantage points of students, nurse-mentors and nurse-educators. Looks at sim as learning not teaching strategy.	To determine the best way to teach OB emergency skills to residents, midwives and nurses.	This study looks at the relationships between simulation and non-sim. It examines student self-confidence and clinical competence, using a framework of Tanner's clinical judgment model and the Lasater clinical judgment rubric.	FIRST2ACT™ (Feedback Incorporating Review and Simulation Techniques to Act on Clinical Trends)[Buykx, et al, 2011]is a learning program which focuses on understanding clinical performance and decision making. Dual study aims: ID characteristics that may effect and predict performance, teamwork and situational awareness when caring for a deteriorating pt. Secondly, look at ways to improve pt safety by examining factors which might be modified.	Looked at how does sim enable students to apply what they learn in class to practice. Looked at transfer of knowledge, critical thinking and clinical reasoning. Confidence and competence also examined.
Population/Sample size Criteria/Power	Full-time, 1st year undergrad nsg students (n=9) Nurse Educators (n=3)who facilitated education sessions RN mentors (n=4) who supported students in practice	6 teams of 6 people each. Teams and not individuals scored. Authors felt to achieve significance it would take 25 teams.	N=53 BSN student nurses in junior year	University A: n=97 (28%) University B: n-32 (9%) University C: n=31 (31%) Trustworthiness of results was enhanced through triangulation of the data.	Nsg students 4th yr: n=33 Each student underwent at least 3 immersive sims. Trustworthiness of results was enhanced through triangulation of the data.
Methods/Study Appraisal Synthesis Methods	Sim session (2 hr on eight sessions). Ability to have drop-in sessions for informal support. OSCE assessment at the end of yr. 1 before clinical placements. Semi-structured interviews by the	Questionnaire pretest, immed posttest and 3-month posttest. Semi-structured interviews or debriefing.	Control group=traditional ed methods and task trainers as well as student volunteers. Intervention group=skill competency demonstrated on Laerdal sim man manikin.	Pre-intervention briefing (11-iter multiple choice knowledge test), simulation intervention (8 minutes each: 4 min subtle deterioration, 4 more obvious), and video aided debriefing followed by written eval.	Audiotaped interviews and question added to the sim eval form: "Please tell me [facilitator] how sim helps you apply in practice what you have learned in class." A co-coder also coded interview data

	researcher after the OSCE by phone and email			Scenarios included cardiac, shock and respiratory.	independently to identify themes.
Study tool/instrument validity/reliability	Looked at themes and patterns which emerged. Mentors looked at sim as a way to recognize strong students with good potential for becoming good nurses and developing safe skills. Mentors felt sim helped them build confidence. Weaker students would benefit from sim safety and extra practice. May also help their decision-making R/T staying in program or leaving.	Participant teams were scored by videotape and assessed by questionnaire pretest, immed posttest and 3-month posttest. Semi-structured interviews or debriefing sessions also occurred.	Lasater Clinical Judgment Rubric student and faculty evaluations at midterm and final evaluations for confidence and clinical judgment.	Clinical Knowledge: 11 item Multiple Choice Questionnaire (MCQ); Clinical Performance: OSCE (Objective Structured Clinical Exam). Non-technical skills (leadership, teamwork, task mgt): TEAM Measure [Team Emergency Assessment Measure]. Situational Awareness: SAGAT [Situational Global Assessment Tech]. All instruments previously validated.	Used audio recorded interviews and triangulated data for trustworthiness of results.
Primary Outcome Measures/Results	Sim aided student development of a nsg identity, as the complexities of nsg were seen, rather than tasks. This led to more confidence, change in conduct and development of the nsg personality not just task orientation. Educators emphasized contextual care, AKA practical reasoning, which encourage students to put the pieces together without worrying about pt safety or timeliness. Gives time for deliberation and reflection. Allows practice for performance competence.	Sim and lecture had better scores for sustained knowledge and confidence. No score was really statistically significant.	No statistically significant differences b/t sim and traditional training in development of self-confidence. Both groups had improved scores, for confidence and clinical competence.	Cronbach's alpha of .912 for the TEAM Scale. Clinical Performance: modified Angoff Technique for passing marks. Overall the study indicated senior nsg students didn't have the knowledge, skills, teamwork or clinical awareness to safely care for a deteriorating patient as a leader or team member.	Responses had 5 basic themes: theory-practice integration, confidence, deliberate practice, motivation and teamwork. Interviews were accomplished and "trustworthiness" determined by triangulation of the data, credibility of the facilitator, corroboration of the independent coder and description of the results.
Conclusions/Implications	Sim as a	Sim was great at decreasing	Author felt that	Even though	Sim is a

	learning strategy allows students to practice skills, acquire critical reasoning, determine context of care, interpret nsg info and develop nsg identities. If successful they were able to become nurses. If not, they often left the program. Expansive learning and professional practice learning are "WAYS OF KNOWING NSG" (Berragan, 1998)	anxiety in dealing with new and difficult situations.	traditional lab training worked well for entry level courses and suggested simulation may be reserved for later courses. Also felt the "hook" of technology with simulation may justify its use.	students know they were to care for a deteriorating pt, they often still did poorly. Higher MCQ scores were assoc with higher OSCE scores. Skills should be repetitively practiced until an appropriate level of expertise is attained. Teamwork is an important skill to cultivate.	valuable tool for bridging the theory-practice gap. Motivation to learn and apply has been id'd by the author as a critical element in the transfer of learning.
Strengths/Limitations	Small sample size is limitation. Validation of data analysis was said to be achieved through a three-stage analysis technique: making sense of the data, reducing data to issues, themes or areas of further study and then explanation. This is possible for a small study but not feasible for a larger one.	Limitations: small sample size, limiting teaching topic to one for a whole day may not be practical. Strengths: demonstrated that enjoyable learning environment helped ease anxiety and sustain learning. May replace clinical hours? Team communication and interpersonal skills must be fostered.	Small sub-groups of lab participants, pretty homogeneous groups overall. Author recommended larger sample, more diverse population and additional groups such as AD and BSN cohorts.	Large study. Roving research team. OSCE and TEAM assessments scored by 2 observers, and discussed after each assessment. Instruments were validated and reliable.	Standardized tools to measure critical thinking and clinical reasoning were not used. There was no way to control for the use of sim vs. standardized patients before the immersive sim. Teamwork could not be measured. Retention of skills not addressed.
Funding Source	Unknown	Unknown	Not determined	Australian Government Office for Learning and Teaching.	Unknown
Comments	Emphasis on contextualization and critical reasoning development in sim is critical to my capstone. Expansive learning may be another search term.			Situational awareness is a critical factor in determining what comes next in PreE and eclampsia evolution. Students must be able to recognize early indicators of PreE and impending doom if we are to prevent progression or worsening of the disease.	Uses some of the same conceptual framework as I am thinking of. Potentially good resources. Similar topics of critical thinking and clinical judgment.
Article/Journal	The effect of simulation learning on critical thinking	The effectiveness of high fidelity simulation on medical-surgical registered nurses ability to recognize and	Preferred thinking style, symptom recognition, and	Implementation of active learning pedagogy	Teaching experiences of second degree accelerated

	and self-confidence when incorporated into an electrocardiogram nursing course. *Clinical Simulation in Nursing, 5,* e45-e52.	respond to clinical emergencies. *Nursing Education Today, 31,* 7, 716-721.	response by nursing students during simulation. *Western Journal of Nursing Research,* 1-18. Retrieved from sagepub.com/journalsPermissions.nav DOI: 10.1177/0193945914539739	comparing low-fidelity simulation versus high-fidelity simulation in pediatric nursing education. *Clinical Simulation in Nursing, 5, e*129-e136.	baccalaureate nursing faculty. *International Journal of Nursing Education Scholarship, 10*(1), 275-281
Author/Year	Brown, D., Chronister, C., (2009).	Buckley, T., Gordon, C. (2011).	Burbach, B., Barnason, S., Hertzog, M. (2014)	Butler, K.B., Brady, D. (2009).	Cangelosi, P. (2013)
Database/Keywords	Simulation, critical thinking, self-confidence, human patient simulation, nursing students.	Simulation, high fidelity, assertiveness, graduate education, emergency response, clinical deterioration.	Nursing education, nurses as subjects, clinical reasoning, simulation	Active learning, pediatric simulation, pediatric nursing education, high-fidelity simulation, pediatric human patient simulation, pediatric nursing education.	Accelerated second degree nursing programs, faculty experiences, teaching strategies, faculty retention
Research Design	Comparative correlational research design	Survey design Qualitative study?	Descriptive, one-way exploratory design	Randomized, two-group experimental design	van Manen's (1997) hermeneutic phenomenological approach to human science research applied via interview
Level of Evidence	II*	VI*	VI*	II*	VII*
Study Aim/Purpose	Hypothesis 1: sim students will score higher on critical thinking and clinical judgment skills that those in non-sim group. Hypothesis 2: Students who have both sim and didactic teaching will have higher self-confidence than didactic only students.	To determine if sim training improved patient outcomes, immersive, high fidelity sim techniques were used to train nurses and their ability to detect signs of deteriorating conditions in multiple scenarios.	Looked at three main research questions: How does a student's preferred thinking style relate to their ability to identify symptoms and employ a therapeutic response? Then, how does their ability to identify a signs and symptoms relate to the type of therapeutic response they provide?	To determine if there was a difference in student perception of active learning (as defined in the Nursing Education Simulation Framework of Jeffries) using high vs. low fidelity sim.	To address differences in teaching between traditional and 2nd degree nursing students.
Population/Sample size Criteria/Power	Convenience sample of 140 senior nursing students in a critical care course taking an EKG class. Previous attendees	n=38 nurses 164 clinical pt emergencies: 46% cardiac, 32% resp, 10% neuro, 7% cardiac arrest, 5% electrolyte disturbances	n=29 Larger sample desired for increased power of the statistical analysis but unavailable due to time constraints.	n=31 associate degree students Convenience sample of students who have completed their Peds rotation (2nd of 4 semesters).	14 faculty from 8 eastern universities

	excluded.		Final semester nsg students, Traditional, no accelerated		
Methods/Study Appraisal Synthesis Methods	70 minutes lecture and 30 minutes sim activity weekly, with debriefing. Elsevier-Evolve's EKG Sim test, a 30 question multiple choice exam.	Follow up survey done 3 months after completion of the training.	"Think Aloud" procedures for student verbalizations regarding pt symptoms	Randomized two group experimental design	Phone (2) or personal interviews with FT or PT faculty regarding teaching in an accelerated 2nd degree program
Study tool/instrument validity/reliability	Researcher-developed self-confidence tool, with +content validity but not construct validity.	Questionnaire sent by mail three months after completion of the sim. Questions R/T clinical emergencies the participants had seen since sim and if sim had changed their ability to: a)recognize, prioritize and recruit help; b)perform pt assessments and rapidly intervene; c)ability to team lead; d)communicate with the team. Responses were on a 4-point Likert scale. Descriptive stats used to examine sample and frequencies for each question. Spearman's rank-order correlation between the years of experience and most useful aspects of sim.	Rational Experiential Inventory-40 (REI-40) was found to have validity. Video-recorded sim performed on single subjects and review by 2 reviewers. Interrater reliability established.	Sim design instruments developed by NLN/Laerdal 3-yr multisite study had validity and reliability confirmed.	Faculty felt the need to be prepared all the time and that these students demand more, more pressed for time.
Primary Outcome Measures/Results	Cronbach's alpha for confidence tool on pre and post test results. Pearson's correlations for confidence questions vs. EKG test scores.	Outcomes measured were the number of times skills were used in practice and the usefulness of the sim for preparing for the real thing.	Graphical & descriptive analysis completed for normalcy, linearity and outliers. Frequency stats calculated for nominal data and descriptive analysis on all continuous variables. Spearman's Rho for continuous variables. Mann-Whitney U for relationships between continuous and categorical variables.	Comparison of the two groups regarding learning outcomes, satisfaction, confidence and student performance. Cronbach's alpha for instrument reliability, Sim Design Scale features and their importance, educational practices, student satisfaction and confidence. Levine's test for equality of variances; results determined t-tests to be run as unequal variances.	2nd degree students were more challenging, may be more reticent clinically and more open to Socratic questioning techniques.
Conclusions/Implication	The study did not support hypothesis 1, R/T increased knowledge and critical thinking.	Immersive sim and didactic teaching improves nurse's perceived ability to respond to certain emergencies and cues of impending doom. Debriefing is nearly as	No significant differences between the REI-40 type and symptom of deterioration	Sim was helpful in bridging the theory-practice gap and could be structured to reinforce	2nd degree students were more challenging, may be more reticent clinically and

	Variables which affected this were job-related tele experience and whether 1st or 2nd semester seniors. Confidence scores did positively affect critical thinking scores but no distinct correlation found. In general, more confident students did better on the critical thinking components.	important. Practicing assertiveness, team leading and handoff reports are important tasks for newer nurses.	missed. Experiential scores were not linked to missing symptoms. Thinking style was not linked with number of therapeutic responses. Rational ability and rational engagement were associated with recognition of critical symptoms. But many students relied on their first assessments without getting more assessments for info.	learning needs and standardize the curriculum. Confidence and satisfaction were increased, especially in high-fidelity sim. Non-threatening sim environment could enhance student learning without increasing patient risk.	more open to Socratic questioning techniques.
Strengths/Limitations	Clinical, personal or work experiences in students can't be controlled for and may alter results. Time on task in sim may be too brief to effect real change. 30 min for sim and debriefing was used here. Small sample size. Disparities in didactic b/t sim and control group (70 vs. 100 min). All students did not complete the confidence tool or demographic form, which limited the power of the study. Reusing the confidence tool would give construct validity.	Small sample size. Questionnaire does not appear to have any content or construct validity. Looked at experienced nurses and their perceived abilities vs. an objective measure. It was also difficult to identify which intervention assisted learning: immersive sim, combined platform or didactic alone.	Student anxiety around sim, small sample size, lack of experience in the team-leader role, hardcopy medical record not EHR,	Small sample size; power analysis using a large effect size increased chance of type II error (accept null when null was wrong). Interrater reliability was not established.	Small group, not ethnically or regionally diverse.
Funding Source	Clinical Teaching and Scholarship Award $1909.00	Unknown.	Partial funding from Gamma Pi of Sigma Theta Tau		
Comments	Uses Benner's novice-to-expert. SROL looked at sim outcomes such as knowledge, skill performance, learner satisfaction, critical thinking and self-efficacy. Generally found	May be helpful as it looks at deteriorating patient and confidence. Does not address skill acquisition or critical thinking except indirectly in the "experienced nurse" scores.	First time I heard about the "think aloud" which measures student identification of deteriorating or changing symptoms or need for actions. May be a way to look at critical thinking and		

	that sim was not well defined in improving critical thinking.		clinical reasoning as several cited authors did.		
Article/Journal	Nursing students' self-assessment of their simulation experiences. *Nursing Education Perspectives, 30,* 2, 105-108.	Simulation Enhances Self-Efficacy in the Management of Preeclampsia and Eclampsia in Obstetrical Staff Nurses. *Clinical Simulation in Nursing, 9 (9), e369-e377.* http://dx.doi.org/10.1016/j.ecns .2012.05.006	'Changes of concern' for detecting potential early clinical deterioration: A validation study. *Australian College of Critical Care Nurses, 23,* 188-106.	'Patients of concern' to nurses in acute care settings: A descriptive study. *Australian College of Critical Care Nurses, 22,* 178-186.	A collaborative project to apply and evaluate the clinical judgment model through simulation. *Nursing Education Research, 30,* 2, 99-104.
Author/Year	Cato, M.L., Lasater, K., Peeples, A.I. (2009).	Christian, A., & Krumwiede, N. (2013, September)	Cioffi, J., Conway, R., Everist, L., Scott, J., Senior, J. (2010).	Cioffi, J., Conway, R., Everist, L., Scott, J., Senior, J. (2009).	Dillard, N., Sideras, S., Ryan, M., Carlton, K.H., Lasater, K., Siktberg, L. (2009).
Database/Keyword	Self-assessment, simulation, clinical judgment rubric, clinical learning.	preeclampsia; high-fidelity human; simulation; human patient simulator; nursing education; obstetrics; preeclampsia; self-confidence; Bandura; self-efficacy; NLN/Jeffries Simulation Framework	Emergency response teams, content validation, patient of concern, criteria.	Clinical deterioration, adult patient, acute settings, emergency response team calling criteria, early recognition.	Faculty development, clinical judgment, student evaluation, clinical learning, high-fidelity learning.
Research Design	Descriptive study of the application of Lasater Clinical Judgment Rubric as a student self-assessment of progression of clinical thinking.	Prospective cohort study	Descriptive study	Exploratory descriptive study	Descriptive study using Lasater's Clinical Judgment Rubric and Tanner's Clinical Judgment Model (Noticing, Interpreting, Responding, Reflecting)
Level of Evidence	VI*	IV*	VI*	VI*	*VI
Study Aim/Purpose	To give students effective feedback about their progression through clinical sim.	Looked at high-fidelity simulation as a method to educate OB nurses in preeclampsia and eclampsia. Also looked at satisfaction with sim training.	To establish content validity for the use of "changes of concern" used by nurses to denote pt deterioration and rationale for calling the emergency response team.	To identify cues of early clinical deterioration in pts who don't meet criteria for activating emergency response team call.	Evaluate the effectiveness of a workshop for faculty on how to evaluate clinical thinking of students during sim; evaluate student learning after one sim; evaluate faculty and student perceptions of the sim experience.
Population/Sample size Criteria/Power	n=48 students, two times per term	N=49 mandatory attendance in sim, 48 consented for study, 47 completed immediate posttest, 33 delayed posttest	n=10 nurses with 5 or > yrs. emergency experience served as content area experts for questionnaires.	n=17 nurses in four area health services with 5 or > years of experience, acute care ward in facility where emergency response team	Two schools of nsg joined for the faculty workshop, simulation and post sim eval of participant perceptions n=68 Juniors in adult health nsg

				in place >2 yrs. Purposeful and snowball sampling for recruitment.	course and their faculty
Methods/Study Appraisal Synthesis Methods	Lasater's Clinical Judgment Rubric; Tanner's Clinical Judgment Model	Pretest, immediate posttest, and 8-wk posttest, single group design, studying a group of OB nurses	"Pt of Concern" questionnaire based on Bausell's content validity criteria of necessity and sufficiency. 80% was considered adequate score.	Interviews with a purposive sample of nurses recalling phone calls to the rapid response team regarding "changes in patient" or signs of clinical deterioration.	Evaluated quantitative and qualitative data from faculty and student evaluations and reflections after faculty workshop and sim. Lasater's Clinical Judgment Rubric; Tanner's Clinical Judgment Model
Study tool/instrument validity/reliability	Used the Lasater Clinical Judgment Rubric of clinical behaviors (Beginning, Developing, Accomplished and Exemplary) as applied to the Tanner Four Phases of Clinical Judgment (Noticing, Interpreting, Responding and Reflecting). Descriptions of each level were given to students to aid selection.	Used "Ravert's Self Efficacy for Obstetric Critical Episodes Eval" tool (rev. 2004)	Evaluated the reasons for phone calls to the emergency team: four main criteria: airway, breathing, circulation, neuro and "other" which included multiple reasons for the call. May involve non-quantifiable pt cues or subtle signs of deterioration.	Audiotaped interviews of 1 hr each with transcriptions. Interrater reliability of coding of cues achieved on 10% randomly selected transcripts.	Used Lasater's Clinical Judgment Rubric with Tanner's four phases of clinical judgment.
Primary Outcome Measures/Results	The feedback process after sim was found to be helpful and satisfying to all involved but was time consuming and reduced from 2x's per term to 1x/term at faculty request.	Looked at self-efficacy at two points after high-fidelity sim participation. Used "Ravert's Self Efficacy for Obstetric Critical Episodes Eval" tool (rev. 2004)	Looked at content validity of "changes of concern": noisy breathing, inability to talk in sentences, increased need for O2 to maintain sats, agitation, impaired mentation, increased cap refill time, not following expected trajectory, new or escalating pain/ symptom/observ ation.	Identified 10 pt cues and two mediating factors which influenced the decision to call the emergency response team. Mediating factors included cultural/linguist ic issues R/T diversity and cognitive impairment. Cues were noisy breathing, inability to speak in sentences, increased need for O2 to maintain sats, agitation, mental impairment, decreased or impaired	Sim contributes to the development of clinical judgment. Debriefing alone does not reveal depth of knowledge but reflections help. Integration of the verbiage from the Lasater Clinical Judgment Rubric into the syllabus, assignments and evals would ease use of this framework.

				cutaneous perfusion, not expected trajectory, new or escalating pain/symptom/ observation. All except "not following expected trajectory, new or escalating pain, new symptom and new observation" were on the previous "concerned about pt calling criteria".	
Conclusions/Implication	Self-reflection offered a richer insight and depth of experience than simple debriefing. Clinical judgment model provides a framework for students to organize patient care activities and management of clinical scenarios.	Participation in HF Sim promoted both immediate and sustained self-efficacy.	Ongoing assessment is necessary to identify changes in pt condition which may indicate deterioration and provide linkages to symptoms and anticipated clinical course. There is agreement on the importance of the 10 factors associated with a pt of concern, less agreement about symptom evaluation.	Some nurses laced confidence to bundle vague symptoms together into a convincing scenario or did not possess understanding of underlying physiologic changes signaling impending doom.	Focusing on tasks limits the ability of students to "think like a nurse". Written reflections may help identify those who are focusing on tasks not concepts. Results may help tailor targeted clinical assignments if some students are having problems with easier concepts.
Strengths/Limitations	Descriptive study, so questionable quantifiable value. It does support reflection and the use of the tool. Did not discuss validity of the tool but I am sure that is elsewhere.	Limitations: homogeneous study group, no f/u beyond 8 wks, researcher formerly leader there (hawthorn effect), no emphasis on family	Only nurses who volunteered and had a lot of emergency experience were studied. Interdisciplinary and floor nurse studies may have more applicability. Small study size.	Identified possible precursors to impending crisis and need for more nurse education in underlying physiology. Also promoted mentoring approach with newer nurses and mixed skill sets on shifts. No interprofessiona l data base. No data on inexperienced nurses. Retrospective study: suggested concurrent study to minimize recall issues.	Fairly small descriptive study so limited evidence quality.

Funding Source	Unknown	Unknown	Unknown.	University of Western Sydney.	Unknown
Comments				Expert care relates to comprehensive body of knowledge, memory indexed by experiences and ability to match current pt patterns with previous experiences. These are typical program outcomes for senior nsg students.	Effective use of Sim for students involves helping students recognize patterns practiced in sim, and then reinforcing in the clinical area. These include looking at recognizing signs of clinical deterioration.
Article/Journal	Track, trigger and teamwork: Communication of deterioration in acute medical and surgical wards. *Intensive and Critical Care Nursing, 26*, 10-17.	NYU3T: Teaching, technology, teamwork: A model for interprofessional education scalability and sustainability. *Nursing Clinics of North America, 47*, 333-346.	Final year nursing students' ability to assess, detect and act on clinical cues of deterioration in a simulated environment. *Journal of Advanced Nursing, 66, 2722-2731.*	Improving nurses vasopressin titration skills and self-efficacy via simulation-based learning. *Clinical Simulation in Nursing, 10*, e291-e299.	Comparison of simulation-based performance with metrics of critical thinking skills in nursing students: A pilot study. Doctoral dissertation, University of Pittsburg School of Nursing.
Author/Year	Donohue, L., Endacott, R. (2010).	Djukic, M., Fulmer, T., Adams, J.G., Lee, S., Triola, M.M. (2012).	Endacott, R., Scholes, J., Buykx, P., Cooper, S., Kinsman, L., McConnell-Henry, T. (2010).	Fadale, K.L., Tucker, D., Dungan, J., Sabol, V. (2014).	Fero, L.J. (2009)
Database/Keyword	Early warning scoring, teamwork, acutely ill patients, medical and surgical wards.	Interprofessional education, simulation, virtual patients, E-learning, medical students, nursing students.	Clinical judgment, deterioration, nurse education, nursing students, patient safety, simulation.	Simulation, vasopressor, performance, self-efficacy, nurse, advanced nursing skills.	Dissertation.
Research Design	Qualitative design	Descriptive	Descriptive	Quasi-experimental pre and posttest design. One-sided hypothesis testing of the ability of sim to increase both general and situational self-efficacy and skill performance.	Quasi-experimental two group crossover design
Level of Evidence	*V	*VI	*VI	*III	*III
Study Aim/Purpose	Looked at staff nurse processes to ID deterioration; and critical care outreach perceptions of pt	Measure teamwork and collaboration knowledge, skills and attitudes (QSEN KSAs) of a mixed med student and nsg student cohort	Evaluate final year nsg student ability to recognize cues of clinical deterioration in sim pts.	To evaluate sim as a learning strategy and determine of it increased self-efficacy and performance	To evaluate the relationship the metrics of critical thinking skills and performance in simulated

	mgt. Also, multidisciplinary team actions around deterioration.			across three measurement points.	scenarios and identify predictors of sim-based performance
Population/Sample size Criteria/Power	n=11 floor nurses who managed a pt referred to critical care outreach team. n=3 outreach team members involved	2nd semester 1st yr Med students and 2nd degree baccalaureate nsg students in 1st semester. n=164 each group	n=51 Sims were R/T hypovolemic shock and septic shock	n=16 (convenience sample) n=14 female Sim R/T vasopressor titration. 75%=BSN 81.3% critical care or ED	Convenience sample of students in final term of school: n=14 diploma n=12 associate n=10 baccalaureate "within-subject" method gave greater study power and decreased error variance (p.42).
Methods/Study Appraisal Synthesis Methods	Critical incident reviews with audio recorded and transcribed interviews 2-3 wks after incident for best recall. Focus on description of incident, actions and outcome. Outreach team interviews were about overall mgt of care of deterioration on floors, not specific incidents.	Used (GITT) Geriatric Interdisciplinary Team Training and TeamSTEPPS. Had didactic portion on ID collaboration, team building exercises. Remained with same group for entire year. Mandatory module completion; possible time shadowing a colleague from the other discipline. Virtual Patient experiences or unfolding case scenario in groups of 4 completed throughout semester. High fidelity sim (Jeffries Sim Framework) is voluntary.	11-question multiple choice Knowledge questionnaires completed. Videotaped sims; reflective interviews. Thematic analysis of video and interviews identified process differences. Four themes emerged in cue recognition: initial response, differential recognition, accumulation of signs, diversionary activity.	10-question GSES looked at self-beliefs of ability to cope with difficult situations as they arose. 12-question MSES looked at self eval of skill at vasopressor titration and emotional stability during crisis. Three different scenarios with three different patients requiring the same actions—development of an algorithm to be followed. Used videotaped vignettes (VTV) and human patient simulation (HPS) scenarios.	Looked at critical thinking skills and simulation-based performance. Six categories: recognizing problem, reporting of essential data, initiating appropriate nsg interventions, anticipates medical orders, provides rational and prioritizes situation. Overall expectations were "met or not met".
Study tool/instrument validity/reliability	Track and trigger device was MEWS (Modified Early Warning System). Half the nurses had completed ALERT (acute life-threatening events recognition and treatment).	Appears to be questionnaire or comments solicited from pilot study participants; responses were incorporated into current study.	102 video recorded sims and 51 reflective interviews. Observational and reflective interview data analyzed via dimensional analysis and educationalist perspective. Face and content validity was assured for questionnaire and interview.	General Self-Efficacy Scale; Modified Self-Efficacy Scale (GSES or MSES). Cronbach's alpha (in high .80's) for GSES. Face validity of MSES by content experts. 100% interrater reliability was achieved.	California Critical Thinking Disposition Inventory (CCTDI) and Calif. Critical Thinking Skills Test (CCTST). Categorized as "strong, average or weak" critical thinking skills.
Primary Outcome Measures/Results	Nurses look at pt trends over time	Interprofessional education (IPE) was felt to enhance	Reflective reconstruction or	Statistically significant	Statistically different (better)

	and see signs of clinical deterioration in pts but in this study did not rely on the standardized MEWS form for assessment. Regular rehearsal of assessment skills and reinforcement of ongoing assessments aided early detection and reporting of deterioration. Better "hand off" reports to succinctly report critical info are needed.	communication; appreciation of and understanding of the workload of other group was also enhanced.	narrating the findings to make sense of them will help bridge the theory practice-gap and may help refocus students for learning	increases in both general and pressor-related self-efficacy between the three measured times were achieved and maintained even after 6 wks post training. Slight decrease was non-significant.	rate of initiating appropriate nsg interventions with HPS than VTV. 75%/88.9% students failed meet performance expectations in either VTV or HPS. Most unable to provide essential report data, sound rationale or anticipate orders. Good prioritization of care and initiation of interventions. No overall performance differences.
Conclusions/Implication	Nurses look for trends when assessing pts but often fail to use objective measures (MEWS) for track and trigger or to talk effectively with outreach teams. Rehearsal of skills R/T assessments was emphasized in interviews. Track and trigger systems are adjunct helps in triggering a response.	IPE was helpful to participants. Simulation assisted learning process if the complexity of the medical scenario did not overshadow the purpose of the sim or exceed level of participants.	Curricular changes should be considered to enhance student ability to perform ongoing not static assessments and provide linkages between assessment findings and pathophysiology and assessment of trends.	Self-efficacy and performance may be enhanced through sim, especially in the learning of difficult skill. Self-Efficacy: General self-efficacy and pressor-related self-efficacy are related and improved during sim. Performance: Sim decreased response time to initiating pressor change and speed, even at 3rd post measure. 37% of participants failed to make the required titration. Time may be a factor.	Critical thinking is a major priority of focus for nursing education. A 2008 Nsg Executive Center analysis suggested focus on competencies of recognizing changes in pt status, anticipating risk, interpreting assessment data, facilitating decision making and recognizing when to call for help.
Strengths/Limitations	Cannot link outcomes with processes. Routine assessment was not evaluated. Skill mix and workload of floor at the time of critical incident wasn't id'd. Small sample size. Dealt with specific CI data	Small pilot study; article describes work being done currently on a larger scale.	Single site study using only one cohort of students; 54% of them participated but no knowledge scores known on other 46%.	Since convenience sample of 16 used, more chance of Type II error, though one-sided hypothesis testing limited that. Recruitment challenges led to expansion of criteria to nurses <3yrs	Vignettes may be different than what's seen in clinical and may have affected scores. Sim scenarios were done alone possibly increasing anxiety and decreasing performance. Small study size may limit

	for staff nurses and general gestalt for outreach teams. Degree of recall and extent of reflection varied.			experience, so potential recent exposure to sim and performance bias. Camera problems; potential for social desirability bias.	generalizability.
Funding Source	Unknown.	Supported by the Josiah Macy Foundation	Nurses Board of Victoria	Unknown.	Unknown.
Comments	Slow insidious deterioration is difficult to spot. Repetition makes deterioration easier to spot. SBAR communication may be one way to help ID relevant info and present succinctly without hesitation.	Brought out good points about stakeholder buy in, curricular support, scheduling conflicts and time to set up and run successful simulations. Concept of scalability discussed-large scale application of a program via development of a tool kit.	How to balance the flow of sim with the value of interruption as a way to refocus. Thinking out loud or narrative reflection is important in the learning process. Situational awareness is a process. Assessments are ongoing and not one-time events.	25% med error rate where nurses gave wrong pressor or didn't follow protocol. May indicate need for improved or strengthened curricula regarding following protocols and refresher med courses.	Talked about CCTDI, CCTST and Watson-Glaser Critical Thinking Appraisal (WGCTA). Watson-Glaser defines critical thinking as "an amalgamation of an individual's attitudes, knowledge and skills". Sounds like QSEN!
Article/Journal	Evaluation of simulation in undergraduate nurse education: an integrative review. Clinical simulation in nursing: 9, 406-416. doi:10.1016/j.ecns.2012.11.003.	Psychometric testing on the NLN student satisfaction and self-confidence in learning, simulation design and educational practices questionnaire using a sample of pre-licensure novice nurses. *Nurse Education Today, 34*, 1298-1304.	Multidisciplinary obstetric simulated emergency scenarios (MOSES): Promoting patient safety in obstetrics with teamwork-focused interprofessional simulations. Journal of Continuing Education in the Health Professions, 29 (2): 98-104.	Urinary catheterization skills: One simulated checkoff is not enough. *Clinical Simulation in Nursing, 10*, 455-460.	Fidelity's effect on student perceived preparedness for patient care. *Clinical Simulation in Nursing, 10*, e309-e315.
Author/Year	Foronda, C., Liu, S., Bauman, E.B., (2013).	Franklin, A., Burns, P., Lee, C. (2014).	Freeth, D., Ayida, G., Berridge, E. J., Mackintosh, N., Norris, B., Sadler. C., Strachan, A., (2009). DOI: 10.1002/chp	Gonzalez, L., Sole, M.L. (2014).	Gore, T., Leighton, K., Sanderson, B., Wang, C. (2014).
Database/Keyword	nursing; simulation; evaluation; undergraduate; literature review; students; integrative review	Simulation, evaluation self-confidence, education, nursing, psychometrics.	continuing education, interprofessional learning, patient safety, teamwork, simulation, transfer to practice, obstetrics	Sterile technique, urinary catheterization, nursing education, simulation, perishable skill, skills training, aseptic technique, competency validation,	Fidelity, simulated clinical experience, traditional clinical experience, student perceived learning effectiveness, simulation objectives.

				skills mastery, mastery learning.	
Research Design	Review of the literature (CINAHL and PUBMED only). Originally 447 articles were identified but subsequently excluded. Only 101 articles within 5 yrs of 2012 were reviewed	Statistical review of surveys to determine reliability and validity.	Uses the Kirkpatrick Evaluation framework to synthesize common IP education outcomes, such as reaction, modification of perceptions and attitudes, acquisition of knowledge and skills, behavioral change, change in practice and benefits to pts.	Quantitative descriptive study using video-recorded observations.	Quasi-experimental design, comparison groups were students randomized in high vs. low fidelity sim experiences.
Level of Evidence	V*	IV*	III*	*V	II*
Study Aim/Purpose	Evaluate current research on simulation and formulate possible research trajectories for future.	To determine the psychometric (science of measuring mental capabilities and processes) properties of the Self-Confidence in Learning Scale (SCLS), Simulation Design Scale (SDS) and Educational Practices Questionnaire (EPQ).	To evaluate participants' perceptions of MOSES courses, their learning and the transfer of its principles to clinical practice.	To assess student competence in urinary catheter insertion, identify most common breaches in aseptic technique in those who'd previously been checked off on the skill.	Assess student perception of effectiveness of meeting learning needs in two settings: comparing HFS vs. LFS within simulated and traditional clinical environments; compare clinical environments (sim vs. traditional) based on high or low fidelity groups.
Population/Sample size Criteria/Power	101 articles dealing with mannequin-based simulations for undergrad nursing students	n=2200 surveys by novice nurses in a pre-licensure baccalaureate nsg program in the US. Traditional or accelerated students who participated in sim, >18 y.o.	13 MOSES courses ran consisting of OB nurses, midwives and anesthesia. (93 course participants: 57 midwives; 21 OBs, and 15 anesthetists). Interviews after course completion looked at + IP learning environment, participants learning and transferability.	n=13 (1 excluded due to kit issues). Upper division undergrad nsg students in baccalaureate program.	n=70 1st semester nsg students enrolled in fundamentals clinicals with didactic. Enrollment mandatory for sim but study participation was not. 66 students actually consented to have their data used.
Methods/Study Appraisal Synthesis Methods	Literature review	Looked at reliability (item analysis, discrimination and Cronbach's alpha), validity testing (confirmatory [CFA] and exploratory factor analysis [EFA] as well as concordant and discordant validity).	Interview following participation in MOSES workshop	Immediately before sim did a demographic questionnaire and one-item confidence question about cath skill. Performed the cath alone within 15 min	Using factor analysis this study identified 3 subscales: teaching-learning dyad, holism and nursing process. Traditional clinical environment vs. simulated

				or excluded. Debrief with principal investigator using standardized checkoff sheet. Sheet was used as a debrief guide. Video-recorded sessions were evaluated by both investigators	clinical environment Cronbach's alphas .87, .80, .83 vs. .89, .85, .84.
Study tool/instrument validity/reliability	Looked at five "themes": confidence/self-efficacy, satisfaction, anxiety/stress, skills/knowledge, and interdisciplinary experiences	The three tools were sent anonymously to 2200 student nurses after participation in a sim event. Previous validity and reliability had been by learner-reported measures.	Structured Interview following participation in MOSES workshop	Student cath sim was video recorded followed by debrief with principle investigator. Videography software used by both investigators to review tapes and identify breaches.	Sim experience occurred after 8 wks of assessment and skills labs and a week before the start of 6 wk traditional clinical experiences. After everything was completed, students completed the Leighton Clinical Learning Environment Comparison Survey (L-CLECS), a 27 item self-reported survey of student perceptions of how well their learning needs were met in sim and traditional. Looks at self-efficacy, teaching-learning, holism, communication, nursing process and critical thinking.
Primary Outcome Measures/Results	Confidence: insufficient evidence; satisfaction: + scores but lowest among seniors; anxiety: useful anxiety around + learning; skills: no difference in clinical skill but improved ID communications	13 item student satisfaction and self-confidence in learning scale (SCLS), 20 item sim design scale (SDS) and 16 item educational practices questionnaire (EPQ). Cronbach's alpha for overall reliability of SCLS 0.92; SDS 0.96; EPQ 0.95.	All participants valued the MOSES experience and felt it positively influenced IP relations. Insight was gained but there were two learning outcomes, as id'd by Jarvis: learner reinforced but unchanged; learner changed & more experienced.	Identification of breaches into 3 categories: maintain asepsis while opening kit, while donning sterile gloves, while cleansing the meatus. Only 54% maintained asepsis while opening and assembling kit, 62% while donning gloves and 38% while cleaning	No statistical difference b/t HFS & LFS in perception of learning needs met in the traditional clinical environment for any subscales or sum scores. HFS group perceived learning needs better met than LFS group in SCE, and better on 2 subscales (not holism). HFS students

				meatus.	had no differences b/t sim & traditional clinical. LFS group felt learning needs better met in traditional clinical compared to SCE.
Conclusions/Implication	Some studies may list skills differently or be counted twice. Used only 2 databases. Strengths:	This study suggests SCLS, SDS and EPQ are both reliable and valid. Construct validity in the SCLS and SDS could be improved.	Determining what helps facilitate transfer to practice will help increase effectiveness of sim.	Students may have a lack of self-awareness about how well they can accomplish technical skills. They also may have difficulty if they try to apply memorized steps rather than understood principles. Faculty should demo competence to ensure standardization. Must remain current.	HFS better met learning needs within the sim environment. But all students had their learning needs met by the SCE or Traditional clinical experience. Interaction with mannequin improves sim experience.
Strengths/Limitations	Unknown	Convenience sample from one site could limit demographic diversity. Results may not be generalizable. Lg. sample size allowed random selection of separate confirmatory and exploratory subsamples.	This study dealt with Midwives, OBs, anesthetists but not nurses. May not be as applicable to student populations. Debriefing was limited by the "starting points" of the participants, so may be less informative if someone was stuck.	Small sample size (pilot study), potential for selection threat (students may have perceived deficit so came for more practice or perceived confidence and came to show off). Difficulty with realism of female task trainer; unsurety if male trainer would have any less breaches.	Important to remember that there must be linkages b/t sim learning experience and learning objectives in order to allow students to have clear expectations, utilize the nsg process to develop a plan of care, practice therapeutic communications and utilize concepts of pt safety, and apply concepts learned in their evidence-based didactic experience as well. Small, homogeneous sample, cannot generalize. Self-reported perceptions. Variable times of assessment. Reflective journals not discussed in

					terms of meeting learning objectives.
Funding Source	UNK	UNK	Nation public safety agency in UK NPSA: www.npsa.nhs.uk	Unknown.	Unknown.
Comments				Sim is felt to be best when there is repetition and deliberate practice in an interactive environment. Contextual learning improves performance and knowledge transfer. "Dose effect" or how many times one must practice a skill to become competent at it is not known.	Nice diagram of study. Looked at mannequin fidelity & environmental fidelity, or how the sim environment mimicked the actual clinical environment. "Medium env. fidelity": pumps present, rates written, not running. Rec. to develop an instrument to measure translation of knowledge.
Article/Journal	Learning nursing procedures: The effect of simulator fidelity and student gender on teaching effectiveness. *Journal of Nursing Education*, *47*(9), 403-408.	NLN/Jeffries Simulation Framework state of the science project: Simulation design characteristics. *Clinical Simulation in Nursing*, *10*, 337-344.	Using online exercises and patient simulation to improve student's clinical decision making. *Nursing Education Perspectives*, *31*, 6, 387-389.	Improving BSN students' performance in recognizing and responding to clinical deterioration. *Clinical Simulation in Nursing*, *10*, e25-e32.	Effectiveness of a structured curriculum focused on recognition and response to acute patient deterioration in an undergraduate BSN program. *Nurse Education in Practice*, *14*, 30-36.
Author/Year	Grady, J. L., Kehrer, R.G., Trusty, C.E., Entin, E. B., Entin, E.E., Brunye, T. T., (2008).	Groom, J. A., Henderson, D., Sittner, B.J.(2014)	Guhde, J. (2010).	Hart, P., Maguire, M.B., Brannan, J.D., Long, J.L., Robley, L.R., Brooks, B.K. (2014).	Hart, P.L., Brannan, J.D., Long, J.L., Maguire, M.B., Brooks, B.K., Robley, L.R. (2014).
Database/Keyword	Not listed: simulation, fidelity, teaching effectiveness, nursing students, skill acquisition	NLN/Jeffries Simulation Framework; simulation design characteristics; problem Solving; fidelity; debriefing	Case study, clinical decision making, clinical judgment, high-fidelity simulation, debriefing.	Clinical deterioration, education, nursing, simulation, students.	Acute deterioration, curriculum, simulation, clinical skills.
Research Design	NG and ua cath insertion in low and high fidelity sim mannequins	Review of the literature around simulation design characteristics.	Descriptive survey based on case study.	Quasi-experimental, one group repeated measure design. Random assignment to their group.	Mixed methods design with quasi-experimental, repeated measures (quantitative portion) and a descriptive, qualitative approach.

Level of Evidence	III*	V*	VI*	III*	*III
Study Aim/Purpose	Evaluate differences in skill acquisition with improved fidelity in human patient simulators. To evaluate gender differences.		To evaluate an assignment combining lecture, lab, online discussion and simulation as a way to improve critical thinking and clinical decisions.	To eval the effectiveness of a structured sim curriculum in improving BSN student ability to recognize and respond to Acute Patient Deterioration events (APD).	Evaluate effectiveness of a structured curriculum incorporating sim training in students' ability to recognize and respond to acute pt deterioration.
Population/Sample size Criteria/Power	52 1st yr nsg students initially; ended up with 39, 27 female and 12 male		n=80 of 83 returned evals 3rd year baccalaureate nsg students in a hybrid course. Weekly course has 4 hrs lecture, online discussion, 2 hr lab and 12 hrs hosp clinical rotation. Each group of 10 clinical students divided into 2 discussion groups. Online discussions read and graded by clinical faculty but initially no feedback given [expectation failure]	n=50 in course 48 actual participants; 39 juniors, 9 seniors, Elective course in patient deterioration after med-surg rotation completion.	n=48 Junior or senior students in a single university
Methods/Study Appraisal Synthesis Methods	NG and ua cath insertion in low and high fidelity sim mannequins		Case study wk 5 discussed what unfolding scenario meant in their group on line. Before sim, had online discussion of pt problems & nsg assessments/interventions appropriate. In sim, had roles for primary & secondary nurses, aide, family and respiratory & observers [specific role ?s for each] 10 min to complete sim then standard debrief. Debrief in 2 parts: reflective critical thinking component had all students done at one time.	Used Tanner's clinical judgment model (noticing, interpreting, responding, and reflecting) as a base for sim. APD course: 45 hrs lectures, medium-fidelity skills labs, 3 HFS at beginning middle and end of course, and facilitator-led debriefs. ABCDE [….disability, exposure] framework. BLS framework CAB. Focused on repeated/ongoing pt assessments, skill practice and asking for help.	45 hr elective course in Acute Pt Deterioration (APD) offered to junior or senior BSN students. Composed of lectures, skills labs, medium-fidelity sim and 3 HFS, with post-sim facilitator-led guided reflection sessions (GRS). Used ABCDE (…..Disability, Exposure) and BLS (CAB-2010 changes). Emphasis was on early identification of S&S, initiating interventions, ongoing assessments and getting help. Videotaped sim sessions and audiotaped GRS.
Study tool/instrument	Objective skills	The simulation design	Evaluation of the	Emergency	Self-confidence

validity/reliability	check lists	characteristics construct serves as a fundamental guiding foundation for creation, execution, and evaluation of sim scenarios.	assignment was done as a course eval at the close of the semester. Students felt the assignment utilized critical thinking skills, enhanced awareness of pt assessment and was a good experience that should remain in the course [4.7, 4.81, 4.72] and in fact, asked for more of these assignments.	Response Performance Tool (Arnold, 2009)[adapted for this study] and Patient Outcome Tool (DeVita, 2008). Video-recorded sim sessions reviewed by researchers. Pt outcome tool Part 1 of ERPT was 12 yes-no questions; part 2 was continuous variables measuring time to initiate task. 10 min sim and 45 min debrief with guided reflection.	scale (Cronbach's alpha .93-.93), knowledge questionnaire (researcher-developed; face and content validity assessed), Team Emergency Assessment Measure (TEAM) (All validities established; Cronbach's alpha0.88-0.93). GRS by research team using scripted questions.
Primary Outcome Measures/Results	Generally, higher fidelity, more realistic simulation experiences enhanced skill acquisition.	Simulation Design Characteristics are widely discussed in the simulation community, but there is a lack of supporting evidence.	Students did not like the ambiguity of online discussion without instructors providing the "right answer". Online disagreements without instructor input often allowed incorrect judgments but "expectation failure" might have forced students to discover the correct answer for themselves.	Using multiple teaching strategies, sim-based education enabled students to provide early detection of critical events of deterioration and improve pt outcomes.	One-way repeated ANOVA to test the effect of the intervention. Bonferroni adjustment?
Conclusions/Implication	Evaluate which skills students would benefit from having a higher fidelity simulation experience.	We must standardize sim terms and develop better descriptions of constructs and methodologies reported in the simulation literature, as well as expand and improve research designs.	In this hybrid class, even thou initially students did not appreciate lack of faculty input into discussion boards they eventually appreciated the overall course. There must be discussion in the lab area to dispel incorrect notions and untruths about clinical assessments.	Students enrolled in this course were able to improve their assessment skills, response time, efficiency and effectiveness in detecting APD events. More research is needed to eval knowledge and skill retention after repeated rehearsals and look at use of differing clinical outcomes.	APD course allowed practicing skills learned or talked about in lecture. Multiple sims allowed practice and refinement of skills newly learned. Knowledge gained through observation, participation or coursework. 1st phase: students recognized they thought they knew what to do in an APD event, but really didn't, and where to go for help. Tried to

					synthesize previous knowledge, referred to assessment rules following steps, reference points, etc to make sense of situation. 2nd phase: GRS, instructor input, taking responsibility, gaining personal knowledge aided transition to practice, promoted self-efficacy and confidence and assisted bridging the knowledge-practice gap. Group functioning increased when the roles of other players were clear and order was present. Clinical reasoning skills enhanced, confidence improved and knowledge gained through the course. Perceived teamwork and communication skills improved.
Strengths/Limitations	Small study, limited population and generalizability. Look at whether certain skills would benefit from more realism than other skills.	Improving use and referencing of the NLN/JSF in the design, implementation, and reporting of simulation instruction and research should bring more standardization and reproducibility to the process.	Students had trouble reflecting on their process of critical thinking, but it may be an end of semester time constraint. Author recommended grading the assignment. Also, may help ID what they do not know and how to get the knowledge they need via changed attitude.	Single study site may lack broad applicability. Had mostly junior but a few senior nsg students so may have affected outcomes. Study crossed 2 semesters so student cross talk may have occurred. Always ended with cardiac arrest so students knew what was coming.	One site study, small sample. Conducted over two semesters which might have allowed talk among students. Homogeneous sample.
Funding Source	Office of Naval Research Award N00014-04-1-0825, administered by the Henry M. Jackson	Unknown	Unknown.	NLN research grant.	Unknown.

	Foundation for the Advancement of Military Medicine.				
Comments			Discusses 6 stages of critical thinking development (Elder & Paul, 2010). Expectation failure: student way of thinking leads to faulty expectations [trust but verify] which creates a profound learning experience.	Mentions inconsistency in # of clinical, didactic and sim hrs. Article [Hayden, Smiley, Sim in Nsg Ed Current Regs.] mentions %age of sim hrs that may substitute for clinical hrs by state. "Chain of Survival" actions (Bhanji, 2010) applicable to PreE?	Discussed Benner (2010) as indicating that a theory practice gap will impede successful transition to role as novice nurses. Recommended teaching strategies which bridge the gap, such as skills labs, sim and repetitive rehearsals.
Article/Journal	Comparison of two TeamSTEPPS training methods on nurse failure-to-rescue performance. *Clinical Simulation in Nursing, 10,* e57-e64.	The NCSBN national simulation study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation, 5, (2), supplement,* s1-s64.	Reliability and validity testing of the Creighton competency evaluation instrument for use in the NCSBN national simulation study. *Nursing Education Perspectives, 35,* 4,245-252.	Simulation in nursing education: Current regulations and practices. *Journal of Nursing Regulation, 5,* 2, 25-30.	A comparison of novice and expert nurses' cue collection during clinical decision-making: Verbal protocol analysis, *International Journal of Nursing Studies, 46,* 1335-1344.
Author/Year	Harvey, E.M., Echols, R.S., Clark, R., Lee, E. (2014).	Hayden, J.K., Smiley, R.A., Alexander, M., Kardong-Edgren, S., Jeffries, P.R. (2014).	Hayden, J., Keegan, M., Kardong-Edgren, S., Smiley, R.A. (2014).	Hayden, J.K., Smiley, R.A., Gross, L. (2014).	Hoffman, K.A., Aiken, L.M., Duffield, C. (2009).
Database/Keyword	Simulation, failure-to-rescue, nursing, team, performance, TeamSTEPPS, in situ simulation, in situ training, case study review, registered nurse, comparison, quasi-experimental study.	Not an article per se, but a supplement to a journal. As such, typical keywords apply.	Creighton Competency Evaluation Instrument (C-CEI), Creighton Simulation Evaluation Instrument (C-SEI), Evaluation, clinical nursing education, reliability, validity, simulation study.	None listed by author.	Cue usage, decision-making, expert, novice, verbal protocol analysis.
Research Design	Quasi-experimental, two-group comparison, pre/post intervention study	Comparison, multisite, longitudinal, randomized, controlled trial of nursing programs across the US.	Descriptive study?	Descriptive study	Empirical descriptive study
Level of Evidence	*III	*II	*VI	*VI	*VI
Study Aim/Purpose	Compare sim-based training (SBT) with case study review (CSR), both	Eval if sim was an effective substitute for traditional clinical experience. Determine if ed outcomes were achieved by integrating sim throughout	A competency eval instrument was modified to be used in the Nat'l Council of	Describe regulations and current practices R/T using SBT in	When evaluating novice and expert nurses: are there differences in

	using TeamSTEPPS (Team Strategies and Tools to Enhance Performance and Pt Safety) training on knowledge, confidence, teamwork and skills.	the entire nsg program. Eval impact of sim fidelity on new grad practice. Pt 1 is RCT. Pt 2 is employer survey.	State Boards of Nursing Nat'l Sim Study (NCSBN NSS). This article was to test the content validity of the new C-CEI (Creighton Competency Eval Instrument) modified from previous Creighton Sim Eval Instrument (C-SEI).	lieu of traditional clinical hours for nsg students.	cue usage, clustering and approach to decision tasks between the two groups?
Population/Sample size Criteria/Power	n=39 RNs; Convenience sample of 2 med-surg PCUs in an academic med center Level-1 trauma center. Drew names out of hat for selection to group.	n=23 initial applicants (Schools of Nursing) 10 (SONs) selected: 5 ADN, 5 BSN, geographically diverse, community colleges and large universities as well. Effect size d=0.35 selected. Because 3 groups used, sample of 200 students per group was needed. 847 students consented to participate in study. 666 completed the study.	Standard validation questionnaire distributed to five schools of nursing. Faculty rated the modified C-CEI on its ability to accurately measure performance and competency. Videos scripted at 3 levels of performance tested validity. Tested on 3 BSN and 2 ADN programs. Faculty viewed (n=35) orientation video for the tool and its use and received list of behaviors for levels of competence.	Executive officers of Nat'l Council of State Boards of Nsg (NCSCBN) member BONs and 16 executive officers of associate members. Questions asked if regs stipulated use of sim, max amt of sim; if no regs, what was generally acceptable to replace traditional clinical hours. Info on: 69/76 (RN, PN/VN, APRN); 59 member BONs and 10 assoc members.	n=4 novice nurses (8-12 mos.ICU experience). All degreed. n=4 expert nurses (10-25 yr ICU experience). 3 degreed, 1 hosp-based certificate.
Methods/Study Appraisal Synthesis Methods	Participants attended 2.5 hr didactic ed program "ACT NOW" (Alert-Communicate-Treat-Nurses-Observing for-Warnings) which included a TeamSTEPPS module and 10 steps of vitality presentation (Sebat, 2009), followed by either a 1 hr SBT or CSR course.	Control group: Traditional clinical experience (TCE) with no more than 10% sim. 25% Group: TCE replaced by sim at this rate. 50% Group: TCE replaced at this rate.	Modified C-SEI to C-CEI. Assessment, communication, clinical judgment, pt safety were domains modified for generalizability for SBT and traditional ed environments, based on AACN Essentials and QSEN concepts.	Electronic survey sent to Boards of nsg regarding use of sim in RN, PN/VN and APRN programs	TA or Think aloud verbal protocols, concurrent verbal (Short term memory) audiotapes of nurses as they performed care. Also retrospective interviews (long term memory) (45-60 min) after the audiotaped transcriptions had been examined by the researcher.
Study tool/instrument validity/reliability	Videotaped SBT sessions of 2 consecutive scenarios of deterioration. Each 10 min.	Knowledge: assessed by ATI RN Comprehensive Predictor 2010 series. Clinical Competence: Creighton Comprehensive Evaluation Instrument (CCEI)	Clinical Competence: observe/gather info, recognize deviations from normal, prioritize	Descriptive survey only. Sent out by email. Non-incentivized, voluntary	Two phases of data collection (concurrent and retrospective think aloud [TA]) enhanced

	Debrief (20 min) via Sim Module for Assessment of Resident Target Event Responses (SMARTER). CSR sessions: 1 hr (30 min each case) facilitated by faculty, using same scenarios as SBT. TeamSTEPPS Team Performance Observation Tool and scenario event-based performance tool used for both, modified as indicated. Knowledge tool for pre/post test measurement with unclear psychometrics. Confidence survey Cronbach's alpha 0.94 and 0.91 at pre and post intervention. TeamSTEPPS Team Performance Observation Tool developed via Delphi technique.	[Cronbach's alpha 0.974-0.979], New Graduate Nurse Performance Survey (NGNPS) [Cronbach's alpha 0.972], Global Assessment of Clinical Competency and Readiness for Practice [interrater reliability of 0.80 on a similar question but reliability not established]. NCLEX; Critical Thinking Diagnostic [Cronbach's alpha 0.976 for reliability], Clinical Learning Environment Comparison Survey (CLECS)[TCE: Cronbach's alpha 0.741-0.877; Sim: 0.826-0.913]	action, maintain professional demeanor, communicate clearly, intervene effectively, perform skills correctly, eval results, reflect for safety and performance improvement. Because of pt and student variation it is difficult to provide a standardized approach to measuring competency.	responders.	validity and reliability. Inter-rater reliability of data transcription on cue collection was established: a Kappa of 0.774, 95% confidence interval of 0.5215-0.887 for data coding.
Primary Outcome Measures/Results	Only 5 subjects completed all pre/post test measures. There was an increase in confidence, teamwork and skills performance in the SBT group, but there was not a statistically significant change from baseline between the two groups except for teamwork and communication.	No statistical differences in: Clinical skills assessed by clinical preceptors and instructors, comprehensive nsg knowledge assessments, NCLEX pass rates, manager ratings at 6 wk, 3 and 6 months into practice. 50% students rated themselves higher than peers on critical thinking (statistically significant). Each group showed a preference for their learning environment. 86.8% pass rate for NCLEX, sl. higher for traditional but not statistically significant. Readiness to practice: 266 surveys. Clinical knowledge and critical thinking similar across all groups, between nurses and managers.	C-CEI found to have content validity of 3.78-3.89 on a 4-point Likert scale. Cronbach's alpha>0.90 on 3 levels sim performance. Comparison between faculty and expert ratings of video recordings showed interrater reliability, validity, and usability of the tool.	RN Programs: 38 states don't specify amt of sim that may replace clinical hours. Other states have a max amount, usually up to 25%. Many APRN sites answered not applicable.	Experts noted more cues, more clusters of cues and related them to the patients overall condition. Also noticed more subtle clues. Novice nurses looked at fewer cues and worked linearly. If a cause was determined as likely, assessment and further cue collection stopped. Decisions of care seemed based on cues and previous knowledge in expert nurses and cue response only in novices. Categorized as proactive

					(anticipatory) or reactive (cue based).
Conclusions/Implication	Nurses must have knowledge of S&S of deterioration, understand underlying physiology and have confidence, communication and teamwork skill to reduce mortality and morbidity. Supports that traditional education can improve some aspects of teamwork, but sim enhances overall teamwork competency. Supports the need for sequential sim to maintain performance. Also id's possible overestimation of ability to recognize and treat signs of patient deterioration.	More nsg programs create competition for clinical sites. Acuity, census, shorter pt stays and safety initiatives affect student learning experience. Substituting high quality sim for up to half of clinical hours results in no differences in meeting program outcomes or readiness to practice. Consistent findings across two time periods (education and early employment) two settings (academic and practice) two evaluators (educators and employers) supports the study findings.	C-CEI is easy to use after training and appropriate for BSN and ADN students. In the sim environment, you would likely be able to see more of the evaluation points than in traditional clinical environment, so sim evals may have scored a little higher.	Many states will consider regulations supporting substituting sim hours depending on the outcome of NCSBN study regarding the efficacy of sim learning as compared to traditional clinical learning at the 25 and 50% levels.	Need to identify "common knowledge" data base for aspects of care of expert nurses. Differentiation between critical and pivotal clues to pt deterioration and how clue clusters provide linkages to complex pt events..
Strengths/Limitations	30% staff turnover on one of the units during the study period. Lack of paired skill measures. Lack of validity and reliability for knowledge tool and skill measures, retest effect for pre/post knowledge assessment, small sample size, all-female sample limit generalization.	Schools participating were not randomly selected and may have had a bias toward sim. Preceptors and clinical instructors were not blinded to study group, may affect eval. End of course surveys may not have been forwarded by weaker students or new grads. Good generalizability of results. Sim team taught theory-based sim and debriefing.	When properly trained on the tool, and could use it both in sim and traditional clinical experience, it gave instructors a way to effectively and objectively measure student performance.	Identified that 50% of the surveyed BONs would be prompted to develop regulations to manage sim hours based on trends in sim research.	Small # of participants and only ICU nurses; may not be generalizable. Was a good representation of decision making on that unit. Because it was real-world, had a lot of variability, not generalizable to sim. Didn't eval the quality of decisions or outcomes as that would require same scenario for all participants (i.e.-sim!).
Funding Source	In part through the Research Acceleration Program at Carilion Clinic ($15, 105).	No monetary contributions noted.	Unknown.	Unknown.	Not funded-PhD research.
Comments	Discussed Agency for Healthcare Research and Quality (AHRQ, 2010) def of	Fascinating review of the history of sim, with mention of the 1847 *Handbook for Hospital Sisters*, mentioning mechanical dummies, models of arms and legs for	Successful instruments must incorporate components of cognitive, psychomotor and	Interesting to see how little standardization there is, even among our compact states.	Expert nurses have more cue clusters with more linkages b/t cue, tied to specific

	failure to rescue as not recognizing signs of clinical deterioration in patients which may lead to preventable complications including death. Mentioned Cook (2011) SROL & meta-analysis showing SBT improved learner knowledge, attitude and skills than non-SBT alone.	bandaging!	affective domains. Educators must move away from checklists for eval psychomotor tasks only. Synthesis of concepts must be evident across domains.		knowledge of underlying physiology and other domain-specific info. This enables them to act on previous experience. Important to understand the linkages, not so much what kind of info they have.
Article/Journal	Rethinking theory and practice: Pre-registration student nurses experiences of simulation teaching and learning in the acquisition of clinical skills for preparation for nursing practice. *Nurse Education Today, 31,* 711-715.	The effects of scenario-based communication training on nurses' communication competence and self-efficacy and myocardial infarction knowledge. *Patient Education and Counseling, 95,* 356-364. The effects of scenario-based communication training on nurses' communication competence and self-efficacy and myocardial infarction knowledge. *Journal of Professional Nursing, 0,* 1-13, (article in press).	Introducing an obstetric emergency training strategy into a simulated environment. *British Journal of Midwifery, 22, 3, 201-207.*	Defining clinical deterioration. *Resuscitation, 84,* 1029-1029-1034.	Simulation in nursing education: An evaluation of students' outcomes at their first clinical practice combined with simulations *Nurse Education Today, 34* (2), 252-8.
Author/Year	Hope, A., Garside, J., Prescott, S. (2011).	Hsu, L., Huang, Y., Hsieh, S. (2014). Hsu, L., Chang, W., Hsieh, S. (2014)	Hughes, C., Anderson, G., Patterson, D., O'Prey, M. (2014).	Jones, D., Mitchell, I., Hillman, K., Story, D. (2013).	Khalaila, R., (Feb, 2014)
Database/Keyword	Simulation, clinical skills, pre-registration nursing.	Simulation, experimental design, nurse, communication competence, communication self-efficacy, communication performance, myocardial infarction knowledge, learning satisfaction, randomized controlled trial (RCT).	None listed in article.	Clinical deterioration, patient deterioration, rapid response team, adverse event, risk stratification, deteriorating pt.	Simulation; Anxiety; Nursing students; Caring ability; Caring efficacy; Self-confidence
Research Design	Two-phase, mixed methods approach. Phase 1: evaluative questionnaire; 2: semi-structured focus group interviews.	Randomized controlled trial with a pre-test and two post-tests.	Descriptive analysis Questionnaire and focus group interviews. Questionnaire based on a previously validated tool used on psych student evals. Incorporated Kirkpatrick's Levels of educational eval (participant reaction, learning, transfer and results). Independent researcher	Lit review and proposal of new models or frameworks to identify pt deterioration.	Descriptive quantitative study with a pre/post test, using a convenience sample of 2nd yr BSN students

			performed focus group interviews within 2 wks after sim training.		
Level of Evidence	*VI	*II	*VI	*I	III*
Study Aim/Purpose	Evaluate student perceptions of simulation. Determine what may drive sim policy.	Determine the effects of a sim based training course on nurses' communication competence, self-efficacy, communication performance, MI knowledge, as well as general satisfaction with their learning experience.	Explored impact of sim, specifically an OB emergency drill training known as PROMPT on midwifery students self-efficacy. (Practical Obstetrical Multi-Professional Training) uses low-fidelity sim and pt actors who were students, which increased engagement.	Current models to define pt deterioration are not adequate due to an outcomes based focus and not "how did we get there". Also need to look at preventable causes for deterioration and how to prevent further damage, loss or death.	Evaluated if as anxiety decreased, caring ability and student satisfaction increased.
Population/Sample size Criteria/Power	Phase 1: n-approx. 500 participants. Phase 2: Three focus group interviews with senior students (n=35)	n=122 participants. n=63 control, n=59 experimental at pretest and 1st post-test; n=61(n=30 control, n=31 experimental) in the 2nd post-test. A priori power analysis required 45 subjects for with-in subject effects, 112 subjects for between-subject effects.	PROMPT training prep with session and manual took place 6 wks before sim day. Involved 1st-3rd yr midwifery students in various roles. 65 final yr midwifery students were invited; n=14, 2 focus groups.	Many large studies were looked at. Trends in the literature ranged from a post-event reactionary stance to a predictive model as frameworks moved to a safety-oriented approach.	61 second-year nursing students at their first clinical practice.
Methods/Study Appraisal Synthesis Methods	Phase 1 Questionnaire: 16 item, Likert-type scale. Optically read and manually coded by themes. Purposeful sample of themes became guide for the phase 2 semi-structured interviews. Focus group interviews were audio recorded and transcribed verbatim. Before this study, students were required to have 2300 hrs each of theory and practice hrs, with sim being part of theory. After a pilot study, this HEI was 1 of 13 pilot sites to	Experimental group received sim-based communication training course. Control group had a case-based communication course. LPN or RN at clinical ladder NO (novice) to N2 (expert). Objective Structured Clinical Exams (OSCEs) conducted w/o knowledge of which group nurses were in.	Four recurrent themes found on analysis of descriptive data. Self-awareness and confidence: questionnaires and focus groups supported students feeling of better confidence, decision making and communication skills. They also felt more self-awareness of skill set and ability to participate in an actual emergency. Ability to prepare for the sim improved their confidence. Making sim a safe, non-	Early frameworks progressed through negligence (it must be someone's fault) to adverse event (something bad happened to the pt: MI, surgical complication). Adverse events often were not R/T reason for admission but no focus on reason for deterioration. Then came time of physiologic instability preceding an adverse event, where pt has a cue or cue cluster that triggers a rapid	

	include 300 optional hrs of sim, from the practice hrs. Initially sim focuses on simple psychomotor tasks; later critical thinking and complex decision making are integrated into the sim.		judgmental place calmed nerves. Reflection and Feedback: the immediacy of feedback, the safety of the environment and the positive feedback from peers and faculty enhanced confidence building. Meaningful learning takes place when the threat is low and the sim environment is secure. Teamwork: majority felt the experience enhanced their skills and awareness of team working possibilities. Teamwork improved as the training day progressed. Smaller teams work better. Reciprocal expertise affirmation enables team members to share info and seek advice better.	response team. Then a more integrated model or risk stratification which considers multiple pt cues, factors responses, systems issues, etc. Reviewed APACHE system (Acute Physiologic and Chronic Health Evaluation) for post ICU admissions (validated multi-variable model).	
Study tool/instrument validity/reliability	Questionnaire and audio recorded focus group interviews.	Data collected through self-assessment scales, MI knowledge tests, learning satisfaction survey and direct observation. Communication assessed through 8-minute OSCE at 2nd post-test. Communication Competence Scale (CCS), Communication Self-Efficacy Scale (CSES), MI Knowledge Test (MIKT), Learning Satisfaction Scale (LSS), Communication Performance Checklist (CPC) part of the OSCE.	Questionnaire modified from a previously validated instrument.		p-values for each of the 3 hypotheses were found to be statistically significant
Primary Outcome Measures/Results	Themes identified: Enjoyment and fun in the sim and desire for more time there. Felt very valuable. Learning Style: Active, hands-on learning supported by sim. Theory to	Both groups could improve communication through training. This led to better team building and positive pt outcomes. Sim-based training improved communication more than case-based scenario and enhance confidence and self-efficacy concerning communication skills. No statistically different scores were seen on the OSCE at one month post-test. MI knowledge		Themes evident in the literature were identified as the models above. Integrated Model was a new conceptual framework developed by the authors based on what was seen most	Simulations before & during nursing students' first clinical practice may help reduce anxiety as well as increase caring behaviors and satisfaction with sim.

	Practice: improved linkages, improved learning opportunities, time for discussion. Safe Environment: low risk environment to practice skills without causing harm. Confidence: small group environment encouraged more group interactions and peer support. Professionalism: when in uniform and facilitated professionally, all treat it as a believable working environment. Being Observed: Initially difficult or intimidating to be watched and feeling silly talking to a mannequin. Suspending disbelief essential to sim quality. Recruitment: positively affects nsg school recruitment when sim center tours included in prospective student tours.	improved in both groups but no significant differences.		recently in the literature. Change to identifying objective criteria indicative of deterioration to "predict" who will have an event. Also recognized not all deaths were unexpected, but when they were, there should be systems in place for event review to determine if there were systems issues, provider issues, etc.	
Conclusions/Implication	Students need sim in order to practice skill they may not see in the clinical area, may have limited clinical placements, or may have ethical issues with students safely performing skills. Sim allows for active, experiential learning and in this study, students explained how sim helped them bridge the theory-practice gap. May be cost	All those trained did have improvements in communication abilities. Those who underwent sim-based training had better satisfaction as well as other measures.	PROMPT training booklet preparation and associated sim enhanced confidence, self-efficacy, team work and communication in participants. Participants had an opportunity to practice for OB emergencies in a safe environment and model behaviors to junior students. This enabled them to improve self-=awareness of what they knew without	Single parameter rapid response team (RRT) or modified early warning scores (MEWS) for multiple derangements. Their new definition is "a pt who moves from one clinical state to a worse clinical state which increases their individual risk of morbidity, including organ dysfunction, protracted hospital stay,	Few other studies evaluate caring ability and caring efficacy. Small sample size and no control group.

	prohibitive.		knowing.	disability or death	
Strengths/Limitations	Simulation can provide experiences at least as good as traditional learning. It is not meant as a "stand alone" strategy but as an adjunct to support theory. It helped build confidence which impacts future learning, motivation and skill development. Wearing uniform and acting professional helped minimize feelings of pretense around sim. This study is limited to students' subjective perspective. Single institutional study, may not be generalizable.	A single intervention may not be enough to support a continued change. Repetitive rehearsals over time may help. Sim in this instance was a DVD recording and not a mannequin-based training. Single regional hospital may limit generalizability. Reliability and discrimination of MI knowledge test could be improved. Single examiner performed all the OSCE evals, possible halo effect.	No pretest to see initial confidence levels before intervention. Because PROMPT training focused on emergencies, students could be sensitized to anticipate and respond sooner than they might in real life. No real multiprofessional or interdisciplinary teamwork existed in the sim.	Pts often are admitted with co-morbidities which affects their outcome. Global scoring systems may be less helpful but newer condition-specific assessment systems are being developed. RRT & MEWS as well as other objective scoring systems don't account for other factors R/T pt, disease or environment that can affect morbidity and mortality. Area of study identified is availability of staff with high level of awareness to intervene sooner before deterioration worsens.	UNK
Funding Source	Unknown	Grant from National Science Council of Taiwan.	Unknown.	UNK.	
Comments	Defines sim as understanding through doing, using *behaviorist theories* (student forms an assoc. b/t a stimulus and a response) and experiential learning (learning by doing or being there).	Sim puts the learner needs central to the process and creates a best practices teaching arena for students.	Sim provides effective learning opportunities for students to safely practice skills they may not see or use in the clinical setting due to staffing or acuity issues, and get immediate feedback on their practice. Sim can bridge the theory-practice gap, increase confidence and enhance learning through reflection and debrief, not as readily available in traditional clinical setting.	Current models to define pt deterioration are not adequate due to an outcomes based focus and not "how did we get there". Also need to look at preventable causes for deterioration and how to prevent further damage, loss or death.	Simulation in nursing education: An evaluation of students' outcomes at their first clinical practice combined with simulations *Nurse Education Today, 34* (2), 252-8.
Article/Journal	A cost-utility analysis of medium vs. high-fidelity human patient simulation manikins in	A systematic review of medical skills laboratory training: where to from here? *Medical Education, 41*,879–887. doi: 10.1111/j.1365-	Students' perceptions of their learning experiences using high-fidelity	Assessing faculty integration of adult learning needs in second degree nursing-	The contribution of high-fidelity simulation to nursing students' confidence and competence: a

	nursing education. *Journal of Clinical Nursing, 20* (23/24):3543-3552.	2923.2007.02821.x.	simulation to teach concepts relative to obstetrics. *Nursing Education Perspectives, 32* (3): 186-188.	education. *Nursing Education Perspectives, 32*, 1, 14-17.	systematic review. *International Nursing Review*, 59 (1): 26-33. (34 ref)
Author/Year	Lapkin, S., Levett-Jones, T. (2011)	Lynagh, M., Burton, R. and Sanson-Fisher, R. (2007).	Partin, J. L., Payne, T. A., Slemmons, M. F., (2011).	Robert, T. E., Pomarico, C. A., Nolan, M., (2011).	Yuan, H.B.; Williams, B.A.; Fang, J.B. (Mar, 2012)
Database/Keyword	Simulations, economics, models, anatomic, economics	Review, clinical competence, standards, education, teaching	Simulation, high-fidelity, nursing education, obstetrics education, student perceptions	Integrative learning, accelerated nursing students, 2nd degree nursing students, focus groups	Simulations, Education, Nursing, Confidence Clinical Competence
Research Design	Cost-utility analysis using a mutiattribute utility function [looked at cost and 3 student outcomes] from a quasi-experimental study	Review of the literature via multiple databases	Descriptive qualitative design using a traditional "phenomenological design". Students were recorded after participating in a sim event. Voluntary participation. Tapes were analyzed for shared themes, using "Colaizzi's" method.	Qualitative research design	Meta-analysis Author used: CINAHL, Proquest, MEDLINE, Science Direct, OVID and Chinese Academic Journal.
Level of Evidence	III*	V*	VI*	VI*	I*
Study Aim/Purpose	Compare high and medium fidelity sim costs with student satisfaction, knowledge acquisition and clinical reasoning	To evaluate simulation as it affected skill acquisition and retention over time. 11 studies actually looked at simulator-driven skill acquisition and found it to be superior. 2 looked at skill retention—skills labs are better.	To identify, positive or negative responses following an ob simulation for adn students.	To evaluate different types of teaching strategies which might be more or less effective for the adult learner. Focus group info from the beginning and end of study looked at student outcomes.	This article is reviews current literature, including both quantitative and qualitative studies, regarding any effects high fidelity simulation may have on student self-confidence and competence in their nursing ed programs.
Population/Sample size Criteria/Power	n=268 2nd yr n=84 3rd yr	44 RCT (~1600 participants overall).	60 2nd yr ob nsg students (adn) "purposive sample" Three measures of trustworthiness of qualitative research were used: credibility (used a WHCNP/ass't prof);	19 students	3 qualitative studies: n of 10, 69 and 20 students. 19 quantitative studies: ~2274 students total

			dependability (used same data collection regimen for all) & confirmability (utilized an audit trail).		
Methods/Study Appraisal Synthesis Methods	Mutiattribute utility theory analysis	Simulators may be computer, video, high or low fidelity sim	Recording ADN students in OB sim. regarding their sim experiences, either + or -,	Focus groups at beginning and end of study	Meta-analysis Author used: CINAHL, Proquest, MEDLINE, Science Direct, OVID and Chinese Academic Journal.
Study tool/instrument validity/reliability	No statistical differences b/t control (med fidelity) and intervention (HFS) in terms of clinical reasoning skills and satisfaction	Different outcomes measures for each study but primarily looked at skill acquisition	49/60 actually made recordings (82%). No negative responses unless group size exceeded 6 participants. 3 themes emerged: non-threatening environment, enhancement of learning and feeling prepared for practice.	Focus group work to determine learning needs and teaching preferences of nursing students embarking on a nursing program. Two-point focus groups to check in at mid-semester to obtain feedback on learning status, whether students felt "heard" and how the process of clinical education impacted classroom experience.	18 English and 6 Chinese studies looked at confidence and competence as outcomes of sim in this review. Results of meta-analysis indicated mixed contribution of HFS to confidence and competency. There was a lack of high-quality random control trials and few large sample sizes.
Primary Outcome Measures/Results	In this study, the additional costs of HFS did not seem to be justified by differences in enhanced learning by students	70% of the studies reported improved skill levels vs. standard or no training.	Supported use of sim for creating a positive learning environment	Adult learners felt like they brought much experience which was overlooked, hated busywork and able to multitask. Desired more NCLEX prep	Not enough evidence to support HFS led to better confidence and competency. This was due to few high quality RCT trials and small sample sizes.
Conclusions/Implication	Small sample size limits generalizability. May not be representative of long-term impact on clinical decision making. Costs only looked at differences b/t 2 interventions and didn't factor in overhead, operational or depreciation costs	Large review but excluded everything before 1998. Only included procedural skills. Didn't address cost-effectiveness.	Small sample size ADN students only Did not use pre-post test measures Up to 10 students were on one simulator which may impede learning	Small sample size	More quantitative studies using validated measures would improve connection between confidence and competency and sim participation. Also need more study looking at how well simulation experiences

					transfer into real life practice.
Strengths/Limitations	not determined	Received infrastructural support from the Hunter Medical Research Institute.	Unknown	Unk.	Unknown
Funding Source	Future study to focus on prioritization and provision of safe care. Evaluate different levels of students (BSN, ADN, RN-to-BSN]				
Comments	A cost-utility analysis of medium vs. high-fidelity human patient simulation manikins in nursing education. *Journal of Clinical Nursing, 20* (23/24):3543-3552.	A systematic review of medical skills laboratory training: where to from here? *Medical Education, 41*,879–887. doi: 10.1111/j.1365-2923.2007.02821.x.	Students' perceptions of their learning experiences using high-fidelity simulation to teach concepts relative to obstetrics. *Nursing Education Perspectives, 32* (3): 186-188.	Assessing faculty integration of adult learning needs in second degree nursing-education. *Nursing Education Perspectives, 32*, 1, 14-17.	The contribution of high-fidelity simulation to nursing students' confidence and competence: a systematic review. *International Nursing Review*, 59 (1): 26-33. (34 ref)

* Leveling Table p.10 from Melnyk, B. M., & Fineout-Overholt, E. (2005). *Evidence-based practice in nursing and healthcare.* Philadelphia, PA: Lippincott, Williams and Wilkins.

Appendix E

SWOT Analysis

Strengths	**Weaknesses**
Supportive faculty and staff at project site	Small sample size
Low-cost intervention Congruent with SON mission, philosophy, conceptual framework and curriculum model	Students require time to complete pretest posttest and demographic survey before simulation
Evidenced-based project	Requires two faculty to run
Opportunities	**Threats**
Improving enrollment in project	Technical issues with manikin or scenario
Faculty desire a PPH simulation with improved fidelity	Shuffling of rooms, manikins
Elicit informal feedback from clinical faculty and reward project participation	Potential shortage of manikin drivers

Adapted from Zaccagnini & White, 2014

Appendix F

Market Analysis

Driving Forces	**Desired State: PPH Project**	**Restraining Forces**
Support of OB course coordinator, other OB faculty	Implement new scenario	Potential staffing conflicts or shortages
Support of Interim chair, other faculty	Utilize high fidelity simulator (HFS)	Potential simulation room and manikin conflicts
Utilization of available HFS equipment	Evaluate knowledge, confidence, and clinical judgment	Few drivers for simulation manikins trained
Minimal budgetary impact		
Evidence-based quality related to simulation		
DNP student advocate for change		

Adapted from Lee, 2006

Appendix G

Cost-Benefit Analysis

Salary	$640
Supplies	$25
Total	$665
Estimated cost/student: $9.24 (avg. 72 students/yr)	
Benefits of PPH Simulation Project Implementation	
Increased student knowledge, confidence and clinical judgment through use of more robust simulation	
Improved satisfaction of faculty, clinical instructors and clinical agencies	
Better utilization of simulation manikins owned	

Appendix H

Logic Model

Inputs	Activities	Outputs	Outcomes	Impacts
Staff: **Includes current lead OB faculty, participating adjuncts, TA staff or designee**	Ongoing meetings with lead OB faculty (*my DNP clinical mentor)* to coordinate activities. Meetings with other stakeholders to generate ideas, confirm buy-in for project	OB faculty facilitator to administer pretest to student cohorts at start of sim	Potential for revision of the presentation methods for unfolding case study, simulation or changes in delivery of simulation, such as repeated dosing of simulations throughout curriculum.	Increased faculty effectiveness
Students**: Third semester OB students in traditional track**	**Introduce** students to project early in course. **Identify** "reward" for participation (Thank You letter?) and secure participation. **Identify** pre and posttest tools for knowledge, clinical judgment and confidence	A pretest will be completed [by both cohorts] to establish baseline knowledge, clinical judgment and confidence. All students will complete PPH prep tool, then pretest before start of simulation, then simulation, then posttest. Selected students will have videotaped review of simulation for LCJR by DNP student PI.	Determine if outcome measures were met. For example, did students have a statistically significant difference in pretest and posttest scores?	Increased student knowledge, confidence, and clinical judgment. Increased student engagement.
Supplies: Sim-Man™ **high fidelity pt. (HFP) simulator or** Noelle™ **HFP simulator, based on availability. Routine simulation room supplies required. Other supplies include written testing materials, copier supplies**	**Identify** which simulator will be available and best for presenting scenario. **Practice** simulation with HFPS and available staff. **Revise** simulation based on input.	Change written simulation template or revise simulation as needed DNP student to provide testing materials, thank you letters, baked goods and food "goodies"	Provide a more effective simulation experience for students	Improved utilization of Sim-Man™ or Noelle™ HFPS
Support: **Interim chair of nursing department, undergraduate clinical placement director, staff simulation expert and overall staff support. Student support for project.**	**Inform** appropriate support personnel of progress. Invite to Capstone proposal presentation	Discuss outcomes with support personnel as they are available.	Discuss final outcomes with support personnel	Ongoing support from support personnel for future projects
Funding**: No additional funding required for project**	NA	NA	NA	NA

Adapted from W.K. Kellogg Foundation (2004).

Appendix I

Information Sheet

Information Sheet for Postpartum Hemorrhage (PPH) Simulation Project

You are being asked to participate in a capstone project and are requested to read the following information. If you have any questions or concerns, please feel free to contact any one of the following people. All questions or concerns will be held in strict confidence.

Contact Information

Please contact one of the following people if you have questions about this project or your part in it, questions, concerns or complaints about the research, or if you would like information about the results when they are prepared.

DNP Student Investigator: Carolyn Bottone-Post: cbottonepost@regis.edu
DNP Clinical Mentor: Sheila Postiglione: Sheila.Postiglione@unco.edu
DNP Capstone Chair: Barbara Berg: bberg@regis.edu
Regis Institutional Review Board: irb@regis.edu

Project Purpose and Objectives

The Postpartum Hemorrhage (PPH) Simulation Project is an evidence-based project, systematically investigating practice issues, which may promote practice change. This project examines how participation in a simulation detailing the care of a patient with PPH may affect participant knowledge, confidence and clinical judgment. The project also examines if simulation is an effective learning strategy.

Procedure

The PPH project is open to all third semester nursing students currently enrolled in NUR 425 (Childbearing Families Theory) and NUR 420 (Clinical Practice Childbearing Families). You have been provided with a recruitment letter from your OB Course Coordinator.

Students enrolled in NUR 420 and NUR 425 are required to participate in the PPH simulation, as well as all other scheduled simulations. However, participation in the PPH project is voluntary and will not affect class standing or grades in any way.

Prior to Simulation Day, all students will complete simulation preparation worksheets and readings to familiarize them with content. Information will be given by the course coordinator, contained in your course syllabus and worksheets found on Blackboard. At the start of simulation, participants will be asked to answer five questions about postpartum hemorrhage care, and brief demographic confidence surveys. This should take about 10 minutes to complete.

All students will complete in the PPH Project simulation and debriefing. Following debriefing, participants will be asked to answer five questions about postpartum hemorrhage care, a self-evaluation of clinical judgment (see attached rubric) and a brief satisfaction and confidence survey. This should take about 10 to 15 minutes to complete.

Risks and Discomforts

Participants may experience minimal discomforts which do not exceed those of all other non-participants in simulation. Some students may have increased anxiety related to any simulation participation; as such, enrolled students have access to UNC counseling services if needed.

Benefits and Compensation

Students who participate in the simulation may experience an increased level of knowledge, confidence, and clinical judgment following participation. Compensation will be provided in the form of an optional thank you letter distributed to participants indicating they supported a capstone project, which may be included in their portfolios.

Confidentiality and Record Keeping

All tests and surveys will be coded by participants using their mother's birthday (dd/mm format) in order to maintain confidentiality. Completed tests and surveys will be kept in a separate secure, password-protected and locked location by the DNP student until results are collated and recorded. At that time they will be kept in a separate locked area, following applicable UNC policies.

Voluntary Participation and Withdrawal

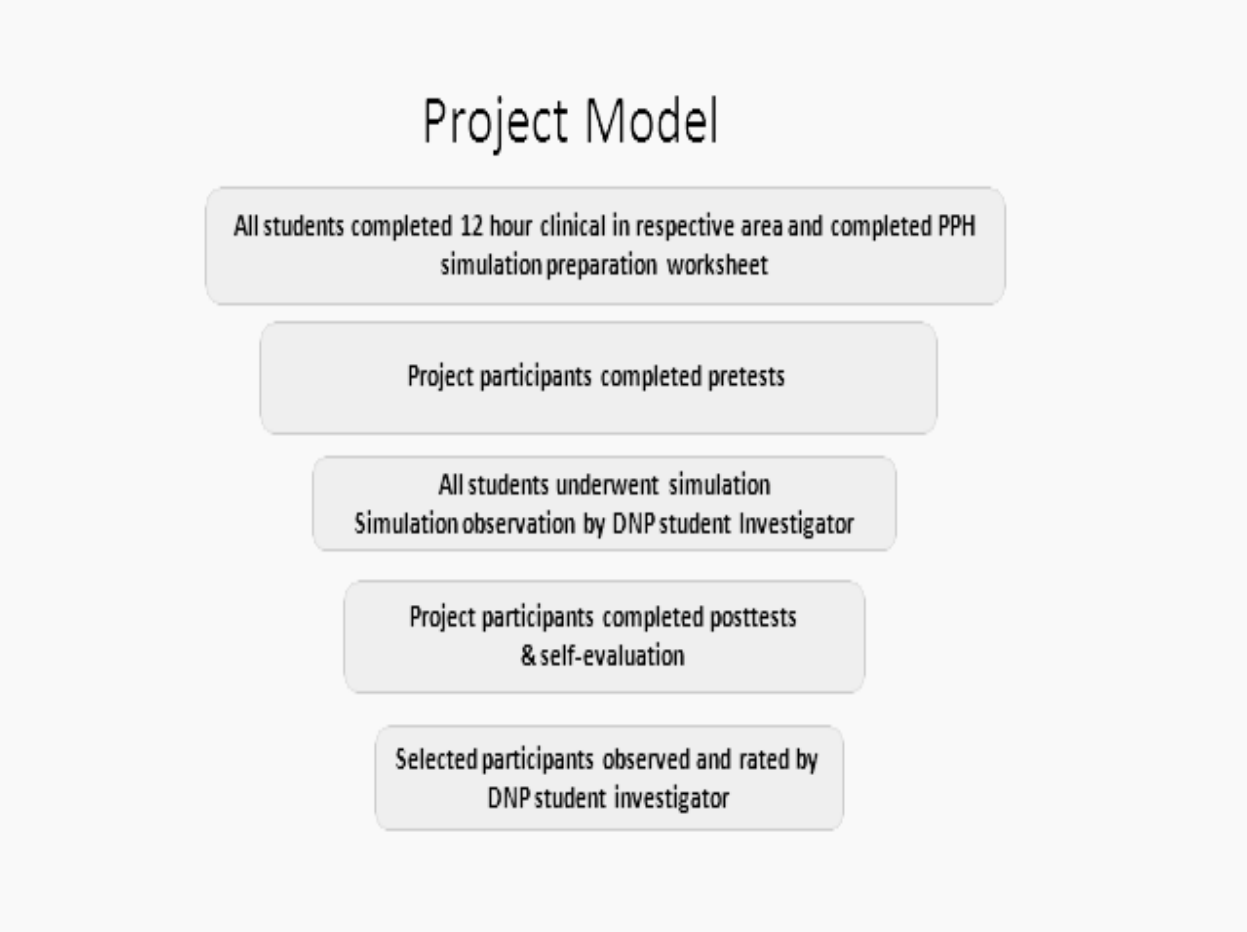
Participation in the project is strictly voluntary and you may leave the project at any time without penalty. Participation in this project or withdrawal will have no bearing on grades or class standing. Data from the project will not be analyzed until after grades have been posted at the close of the semester.

Copy to Participant

A copy of this information sheet has been provided as a reference. Please feel free to contact the DNP student, OB course Coordinator or others, as appropriate, with questions or concerns. Thank you for considering participation in this project.

Appendix J

Project Model



Appendix K

NLN/Laerdal Permission for Materials

Permission to use NLN/Laerdal Scenario Materials

July 5th, 2015

Hello Carolyn,

You have permission to use the attached tools for your project, but please reference that the Lasater Clinical Judgment Rubric is only used as reference for guiding student self-assessment and the faculty evaluation. It not been officially adopted as a tool that would result in an unsatisfactory grade for a student in simulation.

The hemorrhage simulation materials are owned by Aims, but it was developed by the National League of Nursing so although you have permission to use the information that Aims owns it is to be credited to NLN.

Thank you,

Erika

Erika Greenberg MSN, RN

Interim Director of Nursing Education Programs

Aims Community College

Allied Health and Sciences 203h

(970) 339-6647

Appendix L

NLN Student Satisfaction and Self-Confidence in Learning Survey

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 M

Lasater Clinical Judgment Rubric

LASATER CLINICAL JUDGMENT RUBRIC
Responding and Reflecting

Effective RESPONDING involves:	Exemplary	Accomplished	Developing	Beginning
Calm, Confident Manner	Assumes responsibility: delegates team assignments, assess the client and reassures them and their families	Generally displays leadership and confidence, and is able to control/calm most situations; may show stress in particularly difficult or complex situations	Is tentative in the leader's role; reassures clients/families in routine and relatively simple situations, but becomes stressed and disorganized easily	Except in simple and routine situations, is stressed and disorganized, lacks control, making clients and families anxious/less able to cooperate
Clear Communication	Communicates effectively; explains interventions; calms/reassures clients and families; directs and involves team members, explaining and giving directions; checks for understanding	Generally communicates well; explains carefully to clients, gives clear directions to team; could be more effective in establishing rapport	Shows some communication ability (e.g., giving directions); communication with clients/families/team members is only partly successful; displays caring but not competence	Has difficulty communicating; explanations are confusing, directions are unclear or contradictory, and clients/families are made confused/anxious, not reassured
Well-Planned Intervention/Flexibility	Interventions are tailored for the individual client; monitors client progress closely and is able to adjust treatment as indicated by the client response	Develops interventions based on relevant patient data; monitors progress regularly but does not expect to have to change treatments	Develops interventions based on the most obvious data; monitors progress, but is unable to make adjustments based on the patient response	Focuses on developing a single intervention addressing a likely solution, but it may be vague, confusing, and/or incomplete; some monitoring may occur
Being Skillful	Shows mastery of necessary nursing skills	Displays proficiency in the use of most nursing skills; could improve speed or accuracy	Is hesitant or ineffective in utilizing nursing skills	Is unable to select and/or perform the nursing skills
Effective REFLECTING involves:	**Exemplary**	**Accomplished**	**Developing**	**Beginning**
Evaluation/Self-Analysis	Independently evaluates/ analyzes personal clinical performance, noting decision points, elaborating alternatives and accurately evaluating choices against alternatives	Evaluates/analyzes personal clinical performance with minimal prompting, primarily major events/decisions; key decision points are identified and alternatives are considered	Even when prompted, briefly verbalizes the most obvious evaluations; has difficulty imagining alternative choices; is self-protective in evaluating personal choices	Even prompted evaluations are brief, cursory, and not used to improve performance; justifies personal decisions/choices without evaluating them
Commitment to Improvement	Demonstrates commitment to ongoing improvement: reflects on and critically evaluates nursing experiences; accurately identifies strengths/weaknesses and develops specific plans to eliminate weaknesses	Demonstrates a desire to improve nursing performance: reflects on and evaluates experiences; identifies strengths/weaknesses; could be more systematic in evaluating weaknesses	Demonstrates awareness of the need for ongoing improvement and makes some effort to learn from experience and improve performance but tends to state the obvious, and needs external evaluation	Appears uninterested in improving performance or unable to do so; rarely reflects; is uncritical of him/herself, or overly critical (given level of development); is unable to see flaws or need for improvement

LASATER CLINICAL JUDGMENT RUBRIC
Responding and Reflecting

Effective RESPONDING involves:	Exemplary	Accomplished	Developing	Beginning
Calm, Confident Manner	Assumes responsibility: delegates team assignments, assess the client and reassures them and their families	Generally displays leadership and confidence, and is able to control/calm most situations; may show stress in particularly difficult or complex situations	Is tentative in the leader's role; reassures clients/families in routine and relatively simple situations, but becomes stressed and disorganized easily	Except in simple and routine situations, is stressed and disorganized, lacks control, making clients and families anxious/less able to cooperate
Clear Communication	Communicates effectively; explains interventions; calms/reassures clients and families; directs and involves team members, explaining and giving directions; checks for understanding	Generally communicates well; explains carefully to clients, gives clear directions to team; could be more effective in establishing rapport	Shows some communication ability (e.g., giving directions); communication with clients/families/team members is only partly successful; displays caring but not competence	Has difficulty communicating; explanations are confusing, directions are unclear or contradictory, and clients/families are made confused/anxious, not reassured
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Being Skillful	Shows mastery of necessary nursing skills	Displays proficiency in the use of most nursing skills; could improve speed or accuracy	Is hesitant or ineffective in utilizing nursing skills	Is unable to select and/or perform the nursing skills
Effective REFLECTING involves:	**Exemplary**	**Accomplished**	**Developing**	**Beginning**
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Appendix N

CITI Documentation

- **COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI PROGRAM)**
- **COURSEWORK REQUIREMENTS REPORT***
- * NOTE: Scores on this Requirements Report reflect quiz completions at the time all requirements for the course were met. See list below for details.
- See separate Transcript Report for more recent quiz scores, including those on optional (supplemental) course elements.
- **· Name: Carolyn Bottone-Post (ID: 4659307)**
- **· Email: cbottonepost@regis.edu**
- **· Institution Affiliation: Regis University (ID: 745)**
- **· Institution Unit: Nursing**
- **· Curriculum Group: Human Research**
- **· Course Learner Group: Social Behavioral Research Investigators and Key Personnel**
- **· Stage: Stage 1 – Basic Course**
- **· Report ID: 15207472**
- **· Completion Date: 02/04/2015**
- **· Expiration Date: 02/03/2018**
- **· Minimum Passing: 80**
- **· Reported Score*: 96**
- **REQUIRED AND ELECTIVE MODULES ONLY DATE COMPLETED**
- Belmont Report and CITI Course Introduction 02/04/15
- History and Ethical Principles – SBE 02/04/15
- The Federal Regulations – SBE 02/04/15
- Assessing Risk – SBE 02/04/15
- Informed Consent – SBE 02/04/15
- Privacy and Confidentiality – SBE 02/04/15
- Regis University 02/04/15
- **For this Report to be valid, the learner identified above must have had a valid affiliation with the CITI Program subscribing institution**
- **identified above or have been a paid Independent Learner.**
- **CITI Program**
- Email: citisupport@miami.edu
- Phone: 305-243-7970
- Web: https://www.citiprogram.org

Appendix O

Regis IRB Approval Letter

REGIS UNIVERSITY

OFFICE OF ACADEMIC GRANTS

IRB – REGIS UNIVERSITY

September 1, 2015

Carolyn Bottone-Post
3954 Boxelder Drive
Loveland, CO 80538

RE: IRB # 15-233

Dear Ms. Bottone-Post:

Your application to the Regis IRB for your project, "Postpartum Hemorrhage Simulation Project", was approved as an exempt study on August 28, 2015. This study was approved per exempt study category of research 45CFR46.101.b(#1 and #2).

The designation of "exempt" means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,

Patsy McGuire Cullen, PhD, CPNP-PC
Chair, Institutional Review Board
Professor & Director
Doctor of Nursing Practice & Nurse Practitioner Programs
Loretto Heights School of Nursing
Regis University

cc: Dr. Barbara Berg

3333 Regis Boulevard, H-4, Denver, CO 80221-1099
REGIS.EDU | O 303-458-4206 | F 303-964-5528 | E oag@regis.edu

Appendix P

UNC Letter of Agreement

UNIVERSITY of
NORTHERN COLORADO

Letter of Agreement

July 20, 2015

To Regis University Institutional Review Board (IRB):

I am familiar with Carolyn Battone-Post's research project entitled *'Postpartum Hemorrhage Simulation Project'*. I understand The University of Northern Colorado's involvement to be allowing Carolyn to conduct her DNP capstone project with students in our 3rd semester OB simulation lab. The project entails a pre/posttest design to evaluate the impact of simulation on student learning and experience in simulation. The intervention (simulation) will be assessed with our students using a brief survey.

I understand that this research will be carried out following sound ethical principles and that participant involvement in this research project is strictly voluntary and provides confidentiality of research data, as described in the proposal.

Therefore, as a representative of the University of Northern Colorado I agree that Carolyn Battone-Post's research project may be conducted at our agency/institution.

Sincerely,

Melissa Henry, PhD, RN, FNP-C
Assistant Director of Undergraduate Programs
Melissa.henry@unco.edu
970.351.1735

Appendix Q

Project Budget

Personnel Expenses			
Salary @ 1.0 FTE	$60,000	$60,000	NA* supplied by UNC
Benefits @ 30% salary	$1,800	$1,800	NA* supplied by UNC
Additional hourly pay per semester*	NA	$320.00/semester	NA* Hours volunteered by DNP student
Non-personnel Expenses			
Student testing materials, other office supplies	$0	$25	$25
Equipment maintenance	Annual contract with vendor-$1420-$2670, extended warranty available (per Laerdal rep)	Annual contract with vendor-$1420-$2670, extended warranty available (per Laerdal rep)	NA*supplied by UNC
Simulation-related supplies	$50	$50	NA*supplied by UNC
Total expenses	$63,270-$64,520	$63,935-$65,185	$25

Appendix R

Project Timeline

Activity	Summer 2014	Fall, 2014	Spring, 2015	Summer, 2015	Fall, 2015	Spring, 2016
Theoretical Underpinnings	Summer, 2014	X	X	X		
Problem Recognition	Prelim.	Fall, 2014	X	X		
Needs Assessment			Spring, 2015	X		
Goals, Objectives, Mission Statement			Spring, 2015	X		
Work Planning				Summer, 2015	X	
Planning for Evaluation				Summer, 2015	X	
Implementation					Fall, 2015	
Giving Meaning to the Data						Spring, 2016