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Simulation in Assisting Nurses to Better Recognize Early Signs of Clinical Deterioration of Patients

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By

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Abstract

The need to enhance the knowledge and skills of nurses caring for patients who exhibit signs of clinical deterioration has been validated in the literature. The literature has further supported the registered nurse as the key individual expected to recognize signs of clinical deterioration in the patient. The use of simulation as an effective teaching strategy has been well documented in the literature. The purpose of the project was to use simulation as an educational intervention to increase nurse knowledge, self-confidence, and competency when caring for patients exhibiting signs of clinical deterioration. The findings of this project are supported by the literature. A significant improvement in nurse knowledge and self-confidence was demonstrated after a simulation based educational intervention. Competency evaluation during the simulation based intervention provided information to help nurses when caring for deteriorating patients.

Acknowledgements

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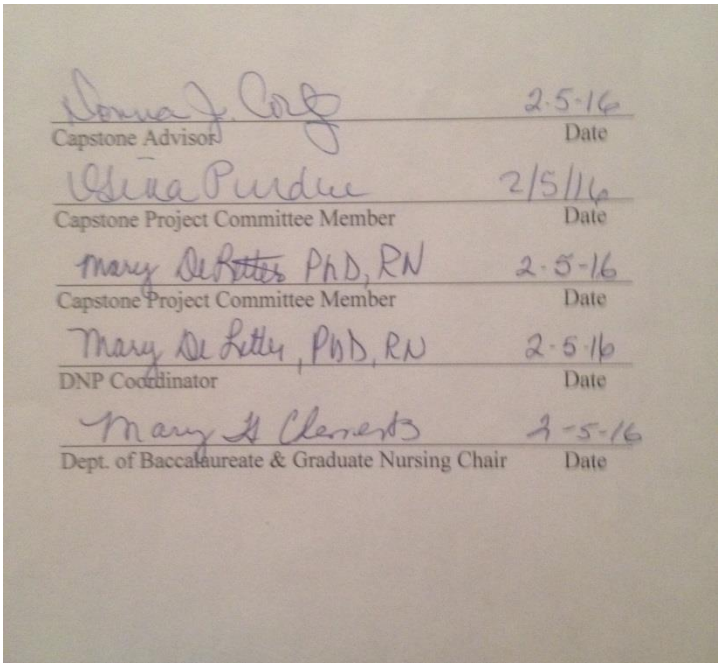

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Simulation in Assisting Nurses to Better Recognize Early Signs of Clinical Deterioration of Patients

Background and Significance

The Institute for Healthcare Improvement (2004) reported 35-40% of hospital deaths occur on medical surgical units. The National Patient Safety Agency (2007) reported 1,804 incidents resulting in patient deaths in 2005. Although Hall, Levant, & DeFrances (2013) reported inpatient hospital death rates have decreased from 776,000 to 715,000 between the years 2000 to 2010, hospital deaths for septicemia increased by 17%. Additionally, 576 of those deaths were potentially avoidable and related to patient safety including 64 that were associated with the patient's condition deteriorating without nurse recognition and intervention.

The need for nurses to identify and intervene sooner during patient deterioration has become an important focus of the education and training of nurses (Endacott et al., 2010). Early recognition of changes in complex patient conditions is a priority for safe, quality nursing care. Mok, Lang, & Liaw (2015) found respiratory rate was a vital sign not documented by many nurses, yet was clearly important in recognizing clinical deterioration of patients. The consequences of this lack of ability to recognize early signs of clinical deterioration can lead to failure to rescue events within organizations resulting in negative health outcomes and patient deaths.

Hospital-based nurse educators are challenged to find effective ways to prepare nurses to care for patients with more complex health care conditions (Bultas, Hassler, Ercole, & Rea, 2014). The use of simulation as an educational strategy has been validated as effective in training nurses in the care of patients in many studies. Butlas et al. (2014) found high-fidelity simulation effective for training pediatric nurses to recognize patient clinical deterioration.

Disher et al. (2014) found simulation an effective teaching strategy for bedside nurses in the early recognition and treatment of acute care patients whose condition has started to deteriorate. The use of simulation as an educational strategy has shown to decrease failure to rescue rates for organizations (Askew et al., 2012). The use of simulation has also shown increased nurse self-confidence and competency in recognizing early signs of clinical deterioration, thus leading to improved patient outcomes (Cooper et al., 2013). Research findings support the use of simulation to increase nurse knowledge level and clinical judgment skills (Kinsman et al. 2012; Lindsey & Jenkins, 2013; & Liaw et al. 2012). The purpose of this project was to implement an evidence-based intervention utilizing simulation to increase nurse knowledge, confidence, and competency level when a patient's clinical condition begins to deteriorate.

Theoretical Framework

Patricia Benner utilized the Dreyfus Model of Skill Acquisition and applied it to nursing in her Novice to Expert Model (Benner, 1984). Components of the Novice to Expert Model can be applied as a way of determining skill level in nursing practice. Benner (1984) implied that with the Novice to Expert Model, experience and mastery of skills occurs resulting in performance improvement. Benner used the model to describe characteristics of the nurse at each level of development (novice, beginner, advanced beginner, competent, proficient, and expert).

The model incorporates and describes the five major concepts of the learner (Benner, 1984). The novice nurse has no experience in situations and must be given opportunities to gain this experience. The advanced beginner nurse can perform marginally as there have been enough real situations for the nurse to remember actions necessary to function. The competent nurse has experienced 2-3 years of similar situations. This stage is a key stage for utilizing

simulation to further assist nurses in decision-making. The proficient nurse has 3-5 years of experience and greater decision-making ability and learning is enhanced by adding complexity to situations. This stage is where nurses can best recognize signs of deterioration in patients. Benner's model lists expert nurses that make complex decisions involving patient care and often serve as resources for other nurses.

Simulation is a current teaching strategy which allows practice in a safe environment without risking patient harm (McClure & Gigliotti, 2012). Benner's Novice to Expert Model can be applied in the simulation environment assisting nurses to better recognize signs of clinical deterioration in a safe setting. The model provides educators the ability to identify the nurse's level of development and allows for the identification of learning needs of the nurse in a specific situation (Benner, 1984).

Review of Literature

The use of simulation as a teaching strategy to improve registered nurse performance in caring for patients is well documented in the literature. Recognition of early clinical deterioration in patients and appropriate actions is an important responsibility of nurses in the care of patients. Studies from academic and practice settings were reviewed to evaluate the effectiveness of utilizing simulation to increase nurse knowledge, confidence level, and performance when a patient's clinical condition begins to deteriorate.

Cooper et al. (2010) used a mixed methods design to examine the ability of senior nursing students to assess, identify and respond to patients whose clinical condition was deteriorating in a simulated environment. Quantitative measures included demographics, knowledge, skill performance, and situation awareness. The sample included 51 Bachelor of Nursing and Bachelor of Rural Health nursing students. The majority of the participants were

female (94%) with a mean age of 29 years (range: 20-54 years). The participants completed an eleven item Multiple Choice Questionnaire (MCQ), viewed two video-recorded simulated scenarios, and completed two simulation exercises. Participants showed significant improvements between the two simulation scenarios ($p < 0.001$). The average score was 59.5% (range 29.7—78.3), SD 12.1, with a 95% confidence interval ranging from 56.5-62.5. The study is limited by its small sample size and a primarily Caucasian population.

Lindsey & Jenkins (2013) utilized a pretest-posttest, two group, randomized experimental design to study the impact of a clinical simulation educational intervention on student nurse clinical judgment in managing the care of patients experiencing accelerated clinical deterioration. The sample population ($n = 79$) for the study was primarily 20-22 year old Caucasian female from northern Illinois. The participants were randomly assigned into simulation ($n=40$) and traditional classroom ($n=39$) code blue and rapid response education sessions. All students ($N = 79$) were pretested. The control group ($n = 39$) was posttested after participation in a traditional code blue and rapid response education intervention. The intervention group ($n = 40$) was posttested after receiving a ten minute lecture by the primary investigator regarding the history of rapid response teams, criteria for activating the system, role of the nurse during the rapid response call, clinical outcomes of rapid response teams, etc. Students then participated in a rapid response clinical scenario. The investigators developed an eleven item, multiple-choice survey to assess students' pretest and posttest understanding of rapid response systems. Nursing students who received the rapid response education intervention had significantly higher posttest scores ($M = 90.91$, $SD = 8.73$) than did the nursing students who had not receive the intervention ($M = 64.80$, $SD = 19.69$), $t(77) = 7.65$, $p < .001$). The results of this study support the use of

simulation as an educational intervention to increase the knowledge level regarding rapid response systems.

Liaw et al. (2012) studied how nursing students felt simulation programs helped to prepare them to transfer clinical practice as they encountered patients with deteriorating conditions. A qualitative approach using critical incident techniques (CIT) was used in this study to gather information by helping participants reflect and describe their thoughts and actions during an event. The sample included 15 third year nursing students who participated in a six-hour simulation program and had worked with deteriorating patients. All participants were female and their ages ranged from 22 to 26 years. Results indicated the knowledge acquired from simulation training was applied to recognize cues of deterioration. Participants were able to compare a patient's situation with ones from simulation experiences and were able to identify possible problems. Nurses further reported that familiarity between actual clinical experience and prior simulation experiences prompted the participants to perform effective nursing actions. Findings support the use of simulation as an educational strategy to increase nurse confidence and performance when caring for patients whose clinical condition is deteriorating. Limitations of the study include self-reported data and prior knowledge of the researcher could have created bias during the analysis of the study as participants may have wanted to please the interviewer who was also the simulation facilitator.

Askew et al. (2012) utilized a pre- and post-intervention study to improve registered nurse recognition and response to failure to rescue situations on a surgical oncology unit. The study included 45 registered nurses, 40% of whom had five or less years of nursing experience. Nurse participants worked in teams of two or three during the training intervention. Each team of nurses went through two simulation experiences with feedback and discussion prior to the

second simulation experience. The unit had experienced three to four failure to rescue events per month prior to the simulation education intervention. No failure to rescue events were experienced one year after the simulation intervention. Monthly outcome data showed cardiac and respiratory events were decreased by 300% and appropriate notification of rapid response team events increased by 60%. The study supports simulation as an education intervention to increase knowledge, skills, confidence, and communication when working with patients whose clinical condition is deteriorating.

Kinsman et al. (2012) utilized an interrupted time series analysis design to study how the Feedback Incorporating Review and Simulation to Act on Clinical Trends ($FIRST^2ACT$) simulation program impacted nurse observations and ability to practice with deteriorating patients in an Australian hospital. The data were grouped into two week periods and were assessed five times before and after intervention to ensure changes were attributed to the intervention. Registered Nurses working on acute medical and surgical units at a small, rural hospital were recruited by invitation to participate. The sample included 34 registered nurses with a mean age of 41 years (range 22-60), and 43% (n = 15) of the nurses held postgraduate certificates. Each nurse participant spent one and a half hours in a First Act simulation program, completing two scenarios of patient deterioration, self-review, and individual feedback with a clinical expert. Findings showed a reduction in less than satisfactory frequency of observations ($\beta = -0.112$, $t = -3.57$, d.f. = 7, $P = 0.009$) and pain score charting ($\beta = -0.179$, $t = -4.585$, d.f. = 7, $P = 0.003$) after a simulated event.

McKay et al. (2013) utilized a prospective, controlled before-and-after intervention trial to study the impact of a newly designed observation scale, Pediatric Early Warning Scores (PEWS) and an accompanying education package on the frequency of documentation of vital

signs and communication between health professionals and associated medical review in deteriorating pediatric patients. The intervention was an education package which consisted of an e-learning package and a 3 hour face-to-face low fidelity simulation package. A pre-intervention and a post-intervention staff survey was used to determine what vital signs nurses felt reflected patient deterioration and how confident the nurses were in assessing a child deteriorating. There was significant improvement in vital sign documentation during the intervention period including level of consciousness ($p < 0.001$), respiratory effort ($p < 0.001$), capillary refill ($p < 0.001$), and blood pressure ($P = 0.007$). There was a significant improvement in the number of documented communication events from nurses to the patient's medical team following patient deterioration during the intervention period ($P < 0.001$). The study demonstrates early warning scoring systems provide a framework to help nurses in assessment of patients who are deteriorating related to vital sign documentation and communication to the healthcare provider. This article supports simulation as an effective educational intervention.

Synthesis of the Literature

Synthesis of the literature resulted in many commonalities. The literature review consisted of three studies utilizing nursing students as participants and three studies using registered nurses. Five investigators (Cooper et al. 2010; Askew et al. 2012; Kinsman et al. 2012; Lindsey & Jenkins, 2013; & Liaw et al. 2012) found the use of simulation as an intervention helped nurses in skill performance when caring for patients whose clinical condition was deteriorating. Three investigators (Kinsman et al. 2012; Lindsey & Jenkins, 2013; & Liaw et al. 2012) found the use of simulation helped to increase nurse knowledge level and clinical judgment skills. Self-confidence was found to be increased in two studies (Kinsman et al. 2012

& Liaw et al. 2012) after a simulation event. Askew et al. (2012) found an improvement in failure to rescue rates after a simulation intervention. McKay et al. (2013) supported the use of early warning scoring system accompanied by low-fidelity simulation to assist nurses in vital sign documentation and communication in caring for patients whose condition has begun to deteriorate.

Agency Description

Baptist Health is the largest not-for-profit healthcare system in the state of Kentucky. The healthcare system includes nine hospitals which employ more than 17,000 employees. The first Baptist Health Hospital opened in 1924 in Louisville, Kentucky. In 2012, Trover Health System elected to become the seventh hospital for the Baptist Health Chain. The healthcare system has a mission that is Christ-centered and incorporates the values of integrity, respect, stewardship, excellence, and collaboration.

Baptist Health Madisonville is a 410 bed, not-for-profit, acute and skilled care hospital serving a six county region. The hospital offers a variety of services including: a 20-bed critical care unit, an observation unit, a women's health center, an advanced cancer care center, a heart and vascular center, a wound care center, an ambulatory surgery center, eight satellite locations, a family practice residency program, an educational affiliation with the University of Louisville School of Medicine, and houses an anesthesia school of medicine. The healthcare facility saw 8,746 inpatients in fiscal year 2014.

The mission of the facility is excellent care, every time. Quality is a top priority for the facility. The hospital maintains national accreditation through The Joint Commission. The mission and commitment to quality by Baptist Health Madisonville is congruent with the change project as the project aimed to enhance quality care for patients. The project aimed for excellent

care, every time by ensuring patients with signs of deterioration is cared for promptly and appropriately.

Madisonville Community College in partnership with Baptist Health Madisonville was the recipient of a grant for the establishment of an inter-professional simulation hospital that was constructed within the hospital. This grant initiative sought to provide additional educational opportunities including inter-professional activities to help ensure better staff retention within the facility. The simulation hospital began operation in October 2015. The simulation project was in alignment with the overall goals of the simulation hospital.

The target population was staff nurses working on a medical-surgical unit and caring for medical-surgical patients. Discussions with the Vice-President of Nursing, unit directors, assistant directors, and clinical leaders verified the need for education of nurses on the medical-surgical units, especially the night shift as many new nurse graduates are placed on the medical-surgical units on the night shift. The medical-surgical unit where the project was implemented had the majority of full-time, registered nurses with less than 1 year experience on the night shift.

A review of data (May 2014-May 2015) from the hospital regarding rapid response team calls and code blue calls on medical surgical units showed at least fifty percent of the rapid response team calls occurred on the night shift, more than sixty percent of the code blue calls occurred on the night shift, and the majority of the rapid response team calls that progressed to code blue calls occurred on the night shift. The combination of new nurses on the night shift as well as the rapid response team and code blue calls information made the project a good fit for the organization. Additionally, the hospital had 137 rapid response team calls and 104 code blue calls during this one year period.

The key stakeholders involved in the project change included the following corporate officers: President/Chief Executive Officer of the facility, the Vice-President of Nursing Services, and the Vice-President Education Division. The roles of the corporate officers were important to provide support for the change. The unit director, the nursing education department, and the simulation hospital staff played key roles in the change to facilitate the educational process for the staff nurses involved in the project. Support from information technology was important to assist with technology needs as the project unfolded. Most importantly, the bedside staff nurses were key individuals for implementation and success of the project.

Important factors recognized during the initial assessments that were relevant to the implementation of the project related to better patient outcomes. Baptist Health Madisonville is known for innovation, quality and safety driven measures. The facility has received multiple awards such as one of the top 100 Cardiovascular Hospitals in 2007, the Kentucky Hospital Association Quality Award in 2010 for Hospitals and 2012 for Women's Care, and the Thomson Reuters 100 Top Hospitals: National Benchmarks award in 2009. The facility supports decisions being made by nurses serving at the bedside by representation of nurses on multiple councils including: unit based councils, nursing practice council, nursing quality council, and professional development council. The facility incorporates best practices such as: safety hubs, time-out procedures, use of PER (Professional Exchange Report) reporting, utilization of rapid response teams, and electronic bar coding and medication scanning practices. These practices are only a few examples of supporting evidence that ensures Baptist Health Madisonville clearly serves as an institution which promotes change and best practices which ultimately lead to better patient outcomes.

Project Design

The project utilized a pretest and posttest design. The project leader obtained permission from Eastern Kentucky University Institutional Review Board (IRB), as well as permission from Baptist Health IRB and the Nursing Practice Council prior to project implementation. After project planning, pre-testing occurred, followed by project implementation and post-testing in October 2015. Analysis of data collected occurred in November 2015. The data were entered and analyzed by the project leader.

Project Methods

The project leader attended the 3 East unit meetings in August. The recruitment flyer (Appendix A) was distributed and reviewed with the potential participants. The project leader reviewed mandatory participation in the simulation intervention as a requirement of all RNs and RNAs employment and reinforced that participation in the capstone project (completion of the data collection instruments) was voluntary and would not affect employment. The unit director scheduled participants for a designated time to complete the simulation intervention in the simulation lab. Institutional Board Review (IRB) approval (Appendix B) was obtained through Eastern Kentucky University and Baptist Health Madisonville (Appendix C) prior to implementation. A Statement of Mutual Agreement was also signed by the healthcare facility (Appendix D).

The project leader greeted each participant at the simulation hospital and guided them to the scheduled simulation lab. Participants were given a packet including: a cover letter (Appendix E), a demographic survey (Appendix F), pre and post knowledge test, pre and post self-confidence test, and the Creighton Competency Evaluation Instrument. Each packet was number coded for data entry. Pre and Post data forms were color coded to distinguish pre and

post data. No identifying information was included on the forms and no information connecting the participant with the code was collected. Paper and pencil data forms were completed by participants in the simulation lab to assure confidentiality. The facility did not require participants to achieve competency, but rather to learn from the experience.

The project leader reviewed the cover letter with each participant and reinforced that participation in the simulation project (completion of the data collection instruments) was voluntary and did not affect employment status or evaluation. Each participant completed the pre knowledge and self-confidence assessment and a demographic survey prior to the project. Each participant received didactic education (a voice over PowerPoint presentation) and then participated in a high-fidelity simulation activity. Orientation to the simulation environment was provided prior to the simulation intervention. The scenario involved a sepsis patient whose clinical condition began to deteriorate. A paper chart was used during the scenario instead of having the participants use an electronic record. Additionally, hospital forms for sepsis protocol and professional exchange report were available at the nurse's station for nurse access. Each participant listened to a recorded report prior to participation in the scenario. The scenario was run by a simulation assistant volunteer from the college with vital signs and condition changes predetermined. A script was used when the nurse contacted the provider for additional orders. The project leader completed the Creighton Competency Evaluation Instrument during the simulation scenario. The project leader completed on-line training as required in order to use the instrument for participant evaluation. Worksheets for the tool were also utilized to detail what participants should perform in order to meet each competency.

A debriefing exercise was conducted post simulation intervention with each participant. Each participant then completed a post knowledge and self-confidence assessment. Total time

for the educational intervention was approximately 60 minutes. All RNs and RNAs participating in the simulation received one contact hour of continuing education credit regardless of participation in the project. An anonymous evaluation of the education project was completed as required by the agency representative responsible for continuing education offerings, but was not a part of the project data.

Instruments

Knowledge Test

The Detecting Patient Deterioration Education Test is a knowledge test developed by Baptist Health. The test is a ten item, multiple choice test used for staff development evaluation throughout the Baptist Health system. Participants could score a maximum of ten points on the knowledge test with one point being given for each correct multiple choice question. The knowledge test was administered pre-intervention and post-intervention. Permission for use of the tool was granted to the project leader by the agency.

Creighton Competency Evaluation Instrument (C-CEI)

The Creighton Competency Evaluation Instrument (C-CEI) was used to assess competency level during the simulation intervention. The C-CEI specifically evaluates four categories: assessment, communication, clinical judgment, and patient safety. The instrument has a reported Interrater Reliability of .952 and an internal consistency Cronbach's alpha of .979 (Adamson & Kardong-Edgren, 2012). Participants were scored during the simulation using the C-CEI. Each item on the C-CEI allows one point if the participant demonstrates competency, zero points if the participant does not demonstrate competency, and a not applicable option for competencies not used during the scenario. The instrument has a total of 23 items that can be scored as (1) demonstrates competency or (0) does not demonstrate competency. This project's

Cronbach's alpha was acceptable at .776. Permission to use the instrument is granted by the creators after online training is completed.

Clinical Decision-Making Self-Confidence Scale

The Clinical Decision-Making Self-Confidence Scale developed by Frank Hicks was completed pre and post intervention. Hart, Spiva, & Mareno (2014) found the internal consistency reliability of the instrument to be adequate to high. The Self Confidence Scale is a 12 item survey with Likert scale responses from 1 (not at all confident) to 5 (Very confident) with higher scores indicating greater self-confidence. The scale reflects four dimensions of self-confidence including: Recognition of change in condition in critical care issues; performing basic physical assessment in critical care issues; identifying interventions for conditions in critical care issues and evaluating effectiveness of interventions. Cronbach's alphas for internal consistency ranged from 0.93 -0.96. Permission to use the scale was granted by the author (Appendix G). This project's Cronbach's alpha was .969.

Results

Data were analyzed using the Statistical Package for Social Sciences (SPSS) Version 23. The 40 participants ranged in age from 21years to 55 years, with the mean age of the nurses at 32.9 years. The participants had less than 1 year of experience to 31 years of experience as a Registered Nurse. The majority of the nurses (52.5%) had 2 years or less experience. The mean years of experience were 4.5 years. The educational level of nurses was found to be Associate Degree Nurses (82.5%) and Bachelor of Science Degree Nurses (17.5%). Advanced Cardiac Life Support was held by 48% of the nurses.

Knowledge Test

A paired-samples t-test (two-tailed, Table 1) was conducted to evaluate the impact of the educational intervention on nurse knowledge level. The pre-intervention scores ranged from 2 to 8 points; post-intervention scores ranged from 5 to 10 points. There was a statistically significant increase in knowledge scores from pre-intervention (M = 5.70, SD =1.34) to post-intervention (M = 7.65, SD = 1.17), t (39) = 10.49, $p < .000$ (two-tailed). The mean increase in knowledge scores was 1.95 with a 95% confidence interval ranging from -2.32 to -1.57. The eta squared statistic (.74) indicated a large effect size.

Self-Confidence

A paired-samples t-test (two-tailed, Table 2) was conducted to evaluate the impact of the educational intervention on nurse self-confidence level. The pre-intervention scores ranged from 29 to 58 points; post-intervention scores ranged from 36 to 60 points. There was a statistically significant increase in self-confidence scores from pre-intervention (M = 45.11, SD = 6.99) to post-intervention (M = 50.08, SD = 7.31), t (37) = 6.17, $p < 000$ (two-tailed). The mean increase in self-confidence scores was 4.97 with a 95% confidence interval ranging from -6.61 to -3.34. The eta squared statistic (.51) indicated a large effect size.

Competency

The percentage of nurses meeting the criteria within each component of the C-CEI was calculated (Figure 1). In the assessment component, 97.5% (N=40) of the nurses scored the maximum of three points. In the communication component, 80% of the nurses scored the maximum of five points. In the clinical judgment component, 85% of the nurses scored the maximum of eight points. Although there are nine criteria on the C-CEI in clinical judgment, only eight were included in the simulation. In the patient safety component, 27.5% of the nurses

Table 1

Paired T-test Comparison of Knowledge Scores pre-intervention and post-intervention

Score	Mean ± SD	*t*	*df*	*p*
Pre-intervention	5.70 ± 1.34	10.49	39	< .0001
Post-intervention	7.65 ± 1.17			

The eta squared statistic .74 indicated a large effect.

Table 2

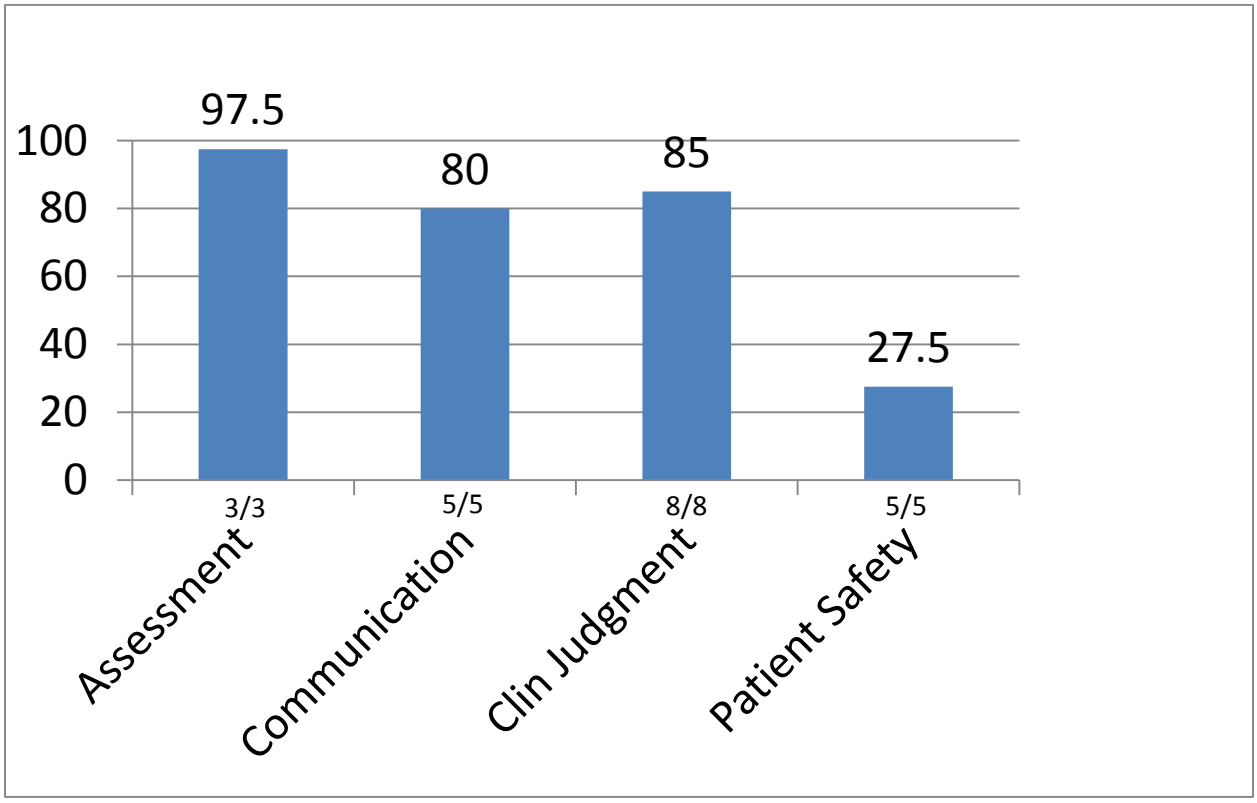
Paired T-test Comparison of Self-Confidence Scores pre-intervention and post-intervention

Score	Mean ± SD	*t*	*df*	*p*
Pre-intervention	45.11 ± 6.99	6.172	37	< .0001
Post-intervention	50.08 ± 7.31			

The eta squared statistic .51 indicated a large effect size.

Figure 1

Percent of nurses meeting criteria within each C-CEI component



scored five out of a maximum of five points. Although there are six criteria on the C-CEI in patient safety, only five were included in the simulation. The competency demonstrated least by the nurses was using patient identifiers. The other four patient safety competencies were met by 92% of the nurses.

Discussion

This evidence-based project supports findings in the literature indicating simulation could improve nurse knowledge and self-confidence level. Similar to Lindsey & Jenkins (2013), this project supports the use of simulation as an educational intervention to help increase nurse knowledge level. One primary difference is that Lindsey and Jenkins used student nurses as participants, where this project utilized staff nurses. Like Askew et al. (2012), this project utilized a pre- and post-intervention approach resulting in an increase in knowledge and confidence level. Askew et al. (2012) utilized groups of 2-3 participants during the simulation events, where this project utilized one nurse during the simulation event. Participants discussed knowing to call for help was important during patient deterioration events and that future simulations would be enhanced using small groups of nurses. Similar to the Askew et al. study, participants discussed during debriefing the need to have additional simulation interventions such as mock code blue events. Additionally, nurses reflected on how the ability to use the standardized sepsis protocol during the simulation helped remind them of criteria to be assessed and important implementation measures.

Debriefing was an essential component of this project. The participants were able to revalidate prior knowledge from the didactic audio presentation, practice working with a deteriorating patient in the simulation lab including the use of standardized sepsis protocol order sets, and then spend time talking about the simulation event during debriefing. The ability for

the nurses to practice care of a patient in a safe environment promoted a positive experience for nurses to learn.

One limitation of the educational intervention was the small sample size. Additionally, some of the participants had never been exposed to simulation which may have resulted in participant unsureness of how to perform. While nurses were not as familiar with the simulation environment, using simulation to reinforce basic safety competencies such as using patient identifiers is important in the care of patients. Additionally, working with another nurse would have enhanced teamwork and perhaps even higher self-confidence scores.

Sustainability

The results of this project support simulation as an educational intervention for nurses caring for deteriorating patients. Data received from unit director feedback, debriefing, and the continuing education evaluations indicated the desire of the nurses for more simulation experiences, especially for high stakes events such as mock codes. Plans are being developed to expand the project to the other two medical-surgical units of the hospital. Future simulations will be planned with more than one nurse participating to enhance teamwork and response. Discussions have been initiated to include inter-professionals working together to care for deteriorating patients, adapting the project to fit other patient types such as stroke or heart attack victims, and to have more simulation events for high stake events such as mock codes. The C-CEI was found to be an effective tool for evaluating simulation activities in the simulation hospital and has been adapted to be used in the inter-professional simulation hospital.

Conclusion

The importance of early recognition and appropriate intervention by nurses when a patient's condition begins to deteriorate is validated in the literature. The utilization of

simulation as an effective teaching strategy is also validated in the literature. This evidence-based educational intervention utilized simulation to assist nurses in early recognition and intervention in the care of patients whose clinical condition is deteriorating. The intervention was effective in improving nurse knowledge and self-confidence level.

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Appendix A

October 2015

SIMULATION PROJECT
3 EAST STAFF NURSES

Registered Nurses and Registered Nurse Applicants

You are invited to participate in a capstone project which uses simulation as an educational intervention to assist nurses in recognizing early signs of clinical deterioration in patients.

- Your nursing director will assign you a date and time to attend.
- The project will take place at the Simulation Hospital located on 5 East.
- You will receive a CEU for your participation.

For more information contact: Loretta Elder, MSN RN CNE, Eastern Kentucky University DNP Student @ loretta_elder4@mymail.eku.edu.

Appendix B

EASTERN KENTUCKY UNIVERSITY
Serving Kentuckians Since 1906

Graduate Education and Research
Division of Sponsored Programs
Institutional Review Board

Jones 414, Coates CPO 20
521 Lancaster Avenue
Richmond, Kentucky 40475-3102
(859) 622-3636; Fax (859) 622-6610
http://www.sponsoredprograms.eku.edu

NOTICE OF IRB EXEMPTION STATUS
Protocol Number: 16-035
Institutional Review Board IRB00002836, DHHS FWA00003332

Principal Investigator: **Loretta Elder** Faculty Advisor: **Dr. Donna J. Corley**

Project Title: **Simulation in Assisting Nurses to Better Recognize Early Signs of Clinical Deterioration of Patients**

Exemption Date: **09/29/2015**

Approved by: **Dr. Jim Gleason, IRB Member**

This document confirms that the Institutional Review Board (IRB) has granted exempt status for the above referenced research project as outlined in the application submitted for IRB review with an immediate effective date. Exempt status means that your research is exempt from further review for a period of three years from the original notification date if no changes are made to the original protocol. If you plan to continue the project beyond three years, you are required to reapply for exemption.

Principal Investigator Responsibilities: It is the responsibility of the principal investigator to ensure that all investigators and staff associated with this study meet the training requirements for conducting research involving human subjects and follow the approved protocol.

Adverse Events: Any adverse or unexpected events that occur in conjunction with this study must be reported to the IRB within ten calendar days of the occurrence.

Changes to Approved Research Protocol: If changes to the approved research protocol become necessary, a description of those changes must be submitted for IRB review and approval prior to implementation. If the changes result in a change in your project's exempt status, you will be required to submit an application for expedited or full IRB review. Changes include, but are not limited to, those involving study personnel, subjects, and procedures.

Other Provisions of Approval, if applicable: None

Please contact Sponsored Programs at 859-622-3636 or send email to tiffany.hamblin@eku.edu or lisa.royalty@eku.edu with questions.

Appendix C

BAPTIST HEALTH
MADISONVILLE

PHONE: 270.825.5100 FAX: 270.825.5204
900 Hospital Drive Madisonville, KY 42431

March 16, 2015

Loretta Elder, DNP Student
1150 Baptist Hill Road
Providence, KY 42450

RE: Simulation in Assisting Nurses to Better Recognize Early Signs of Clinical Deterioration of Clients

Dear Ms. Elder:

On March 16, 2015 Baptist Health Madisonville Institutional Review Board reviewed the following item in reference to the listed study:

- Simulation in Assisting Nurses Protocol, dated June 27, 2014

The Board discussed this study which is designed to assist nurses in picking up the subtle signs of clinical patient decline for the purpose of earlier intervention. There is no actual patient contact.

This study is determined to be "Exempt" from IRB oversight by the Board Chairman based on criteria set forth by OHRP (45 CFR 46.101 b 4), Research involving the collection or study of existing data, documents, records, pathological specimens, or diagnostic specimens, if these sources are publicly available or if the information is recorded by the investigator in such a manner that subjects cannot be identified, directly or through identifiers linked to the subjects.

Waiver of consent is approved based on 45 CFR 46.116(d), the research involves no more than minimal risks to subjects. Any changes to this study would require re-evaluation by this IRB. As written, no further IRB oversight is required for this study.

Should you have any questions, please contact the IRB Coordinator at 270 824-3735.

Sincerely,

William McCann

William McCann, M.Div., Chairman
Baptist Health Madisonville Institutional Review Board

Appendix D

Statement of Mutual Agreement for Capstone Project
Eastern Kentucky University
Department of Baccalaureate and Graduate Nursing
Doctor of Nursing Practice Program

I. General Information

Student Name: Loretta Elder MSN RN CNE

Project Title: Simulation in Assisting Nurses to Better Recognize Early Signs of Clinical Deterioration of Patients

Agency: Baptist Health Madisonville

Agency Contact: Tiffany Cabbibo, Vice President Nursing

II. Brief description of the project

The Doctor of Nursing Practice (DNP) student will plan an educational intervention utilizing simulation to assist medical surgical nursing staff in recognizing and intervening early when a patient's clinical condition begins to deteriorate. The expected project outcome will be increased nurse knowledge and confidence level when caring for patients whose clinical condition begins to deteriorate. The DNP student will attend unit meetings in August on 3 East to recruit and inform the nurses of the educational intervention. The DNP student will review that mandatory participation in the simulation intervention is a requirement of all RNs and RNAs employment and reinforce that participation in the capstone project (completion of the data collection instruments) is voluntary. The DNP student will work with the unit director for scheduling of the nurses to attend the educational intervention. Each participant will participate in a classroom learning environment followed by a simulation and debriefing exercise. Each participant will complete a pre and post knowledge and confidence test. The student will complete the Creighton Competency Evaluation Instrument during the simulation exercise. Each participant will be given a packet which will be number coded for data entry. Pre and Post data forms will be color coded to distinguish pre and post data. No identifying information will be included on the forms and no information connecting the participant with the code will be collected. Paper and pencil data forms will be completed by participants in the simulation lab to assure confidentiality.

III. Agreement of written and oral communication

The DNP student will be allowed to use the name of Baptist Health Madisonville and hospital specific data in the student's academic work. The student requests permission to present and/or publish the aggregate data for dissemination of evidence-based project results.

IV. Required Signatures:

Loretta Elder 8/6/15
Student Date

8/6/15
Capstone Advisor Date

Agency Representative Date

Appendix E

Loretta Elder
Doctor of Nursing Practice Student
Eastern Kentucky University
loretta_elder4@mymail.eku.edu
270-635-0431

Dear Registered Nurse and Registered Nurse Applicant:

I am a Doctor of Nursing Practice (DNP) Student at Eastern Kentucky University in Richmond, Kentucky. As part of my graduation requirements, I am completing an evidence-based project entitled "*Simulation in Assisting Nurses to Better Recognize Early Signs of Clinical Deterioration of Patients*".

The project is designed to increase registered nurses knowledge, confidence, and competency level in recognizing early signs of clinical deterioration when a patient's clinical condition begins to deteriorate. You will be scheduled to participate in the simulation as part of your employment as a nurse at Baptist Health Madisonville. If you volunteer to participate in the project you will be asked to:

- Complete a brief demographic questionnaire, which will ask for your age, nursing education level, number of years working as a registered nurse, and advanced certification status.
- Complete a pretest and a posttest, which will assess nurse knowledge and confidence level when caring for clients whose clinical condition has begun to deteriorate.
- Be scored during the simulation using a research instrument with established reliability and validity.

Completion of the questionnaire, pretest and posttest will take approximately 10 minutes. There are no foreseeable risks to you or your position within this institution.

Participation in the educational intervention is a requirement of all RNs and RNAs employment; however, participation in the capstone project (completion of the data collection instruments) is voluntary. No information will be collected that will identify you with the information you provide. Only group (aggregate) data with no personal identifiers will be used in written or oral presentations of the project results.

There is no penalty for not participating in the project and you will earn one continuing education credit for participating in the simulation regardless of your decision to participate in the project.

Any questions or concerns about the project may be directed to the Project Leader: Loretta Elder, Doctor of Nursing Practice Student, Eastern Kentucky University, at 270-635-0431. You may also contact my faculty advisor, Dr. Donna J. Corley by telephone (859-622-6316) or email (donna.corley@EKU.edu. Questions or concerns about your rights as a study participant may be directed to Sponsored Programs, Jones 414/Coats CPO Eastern Kentucky University.

Appendix F

Simulation Project Demographic Survey

What is your age in years?

- _____

Education: Circle the nursing education level you have completed?

- Associate degree in nursing
- Bachelor's degree in nursing
- Master's degree in nursing
- Doctorate degree in nursing

Experience: How many years have you worked as a Registered Nurse?

- _____

Advanced Certification:

Circle the certifications you have completed?

- ACLS
- BLS
- PALS
- OTHER: _____

Appendix G

Elder, Loretta J (Madisonville)

From: fhicks@carthage.edu
Sent: Friday, August 28, 2015 10:48 AM
To: Elder, Loretta J (Madisonville)
Subject: Re: Permission to use the 12 item self-confidence scale

Hello, Ms. Elder. Yes, you may use the tool. Good luck with your project!

Sent from my iPhone. Please forgive brevity, errors, and bizarre autocorrects.

On Aug 28, 2015, at 10:19, Elder, Loretta J (Madisonville) <LELDER0001@kctcs.edu> wrote:

> Hi Dr. Hicks,
>
> My name is Loretta Elder and I am enrolled in the DNP program at Eastern Kentucky University. I am currently working on my capstone project which utilizes simulation in assisting nurses to recognize early signs of clinical deterioration in a patient. I would like to ask permission to use your self-confidence scale in my project.
>
> If there is someone else I should contact, please let me know.
>
> I appreciate any help that you can give.
>
> Thank you so much,
>
> Loretta Elder MSN RN CNE
> Madisonville Community College
> Madisonville, Kentucky 42431
> 270-824-1814
> Lelder0001@kctcs.edu