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Patient Deterioration Simulation Education and New Graduate Nurses' Self-Confidence and Competence

Submitted in partial fulfillment of the requirements for the degree of Doctor of Nursing Practice at Eastern Kentucky University

By

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Richmond, KY

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Abstract

Inconsistent identification and intervention for patient deteriorations has been identified as a global healthcare issue that has a profound effect on patient outcomes. Failure to rescue (FTR) rates are influenced by the quality of care a hospital provides in the event of patient deterioration. Rapid Response Teams (RRTs) are summoned to the bedside in the event of a patient deterioration to assess the patient and intervene quickly. Efficient use of RRTs prevents cardiopulmonary arrests and decreases hospital mortality, thirty-day morality, and length of stay. Patient deterioration simulation education can improve the use of RRTs and positively influence patient outcomes. New graduate nurses and their preceptors report that new graduate nurses need additional patient deterioration education. A rural community hospital provided patient deterioration simulation education for new graduate nurses in an attempt to improve the utilization of an existing Rapid Response Team and patient outcomes by improving new graduate nurses' self-confidence and competence. The pre- and post-intervention self-reported self-confidence scores were compared. The scores increased post-intervention, with a large effect size and a clinically significant eta squared value (.48). This pilot project supports further studies exploring new graduate nurses' self-confidence levels with patient deterioration simulation education.

Keywords: failure to rescue, Rapid Response Teams, simulation education

Patient Deterioration Simulation Education and New Graduate Nurses' Self-Confidence and Competence

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Failure to rescue (FTR) is the percentage of patients who die with a complication in the hospital (U.S. Department of Health and Human Services (USDHHS), 2015). The USDHHS (2015) states that FTR rates reflect hospital quality, as the survival of a patient who suffers a complication is dependent upon the care delivered by the hospital. Therefore, hospital mortality could be improved if complications are identified early and appropriate care is readily available.

Problem Description

In 2009, there were 36 million Americans over the age of 65. This population is expected to more than double, reaching over 72 million in 2030 (USDHHS, 2016). An aging population brings about an increase in patient acuity due to the associated increase in comorbidities that complicate care (American Nurses Association, (ANA) 2015). An aging population, an increase in patient co-morbidities, higher patient acuity, more complicated care, and inadequate nurse staffing can contribute to "the perfect storm" for higher rates of failure to rescue (ANA, 2015). Measuring the scope of FTR has proven to be a challenge, as variations in definition have been identified in the literature and contribute to a 40% omission rate in reporting (Silber et al., 2007). Due to inconsistencies in data reporting, the USDHHS (2015) has recently identified FTR as a quality measure and provided a clear definition in an attempt to accurately collect data. Hospitals need to provide the appropriate training and resources to ensure patient deteriorations are identified early and multidisciplinary care teams are available for immediate bedside evaluation and treatment.

The Institute for Healthcare Improvement introduced Rapid Response Teams (RRTs) in 2005 as part its "100,000 Lives Campaign" in order to provide immediate critical bedside care in

the event of patient decline (USDHHS, 2016). Additionally, the 2008 National Patient Safety Goals by The Joint Commission included the implementation of systems to summon additional assistance in the event of patient deterioration (USDHHS, 2016). The aim of RRTs is to prevent cardiac arrest by providing care to inpatients with unexpected clinical deterioration by assessing and stabilizing the patient, and facilitating transfer to a higher level of care if needed (Alshehri, Ljungberg, & Ruter, 2015; Jones, DeVita, & Rinaldo, 2011).

Beitler, Link, Bails, Hurdle, and Chong (2011) found that the implementation of a RRT did reduce hospital-wide mortality. However, simply having an RRT in place does not resolve FTR events. Jones, Belloma, and DeVita (2009) found that low usage of RRTs is associated with poor patient outcomes. Further, delays of greater than one hour between the onset of abnormal vital signs to RRT activation are common in clinical practice and are associated with increased hospital length of stay, increased hospital mortality, and increased thirty-day mortality (Barwise et al., 2015).

Numerous studies have demonstrated that as RRT activations increase, cardiopulmonary arrests and Code Blue Team activations decrease, which reflects the association between earlier recognition and intervention with deterioration and improving patient outcomes (Avis, Grant, Reilly, & Foy, 2017; Braaten, deGunst, & Bilys, 2015; Solomon, Corwin, Barclay, Quddusi, & Danenberg, 2016). In an attempt to improve efficiency of RRTs to further improve patient outcomes, barriers to prompt activation have been identified. Barriers that have been shown to impair or slow the activation of the RRT by nurses include: lack of confidence and knowledge, insufficient monitoring of vital signs, ineffective communication, imbalance of shared ownership and individual responsibility, over reliance on notifying physicians first, and lack of appropriate

training and education (Braaten, deGunst, & Bilys, 2015; National Patient Safety Agency, 2007; Wakeam, Hyder, Ashley, & Weissman, 2014).

Nurses are commonly in the position to be the first healthcare professional to assess early signs of deterioration. Nurses with varying levels of experience have voiced fear of criticism for activating the RRT (Roberts et al., 2014). Additionally, new graduate nurses report a level of discomfort with skills essential to patient rescue: assessment skills, communicating with physicians, prioritization, and time management (Goode, Lynn, McElroy, Bednash, & Murray, 2013). Regardless of experience, self-efficacy influences the nurse's decision as to whether or not to activate the RRT (Roberts et al., 2014). In particular, new graduate nurses frequently question their ability to recognize patient deterioration, and will defer to more experienced nurses to make the decision for them (Purling & King, 2012; Roberts et al., 2014). Conversely, nurses who had a previous positive experience with RRTs were more likely to activate the RRT again (Roberts et al., 2014).

Kantar (2012) found preceptors report 95% of new graduate nurses have difficulties interpreting changes in patients' condition. New graduate nurses frequently question their ability to recognize patient deterioration and these feelings of being underprepared create a stressful transition to practice (Missen et al., 2016; Purling & King, 2012; Roberts et al., 2014). How difficult this transition to practice experience is for the new graduate nurse, will determine the likelihood of the new graduate nurse staying in that position (Al-Dossary, Kitsantas, & Maddox, 2014; NCSBN, 2012). Providing support to assist with development of skills, clinical decision-making, and leadership have been found to improve confidence, satisfaction, and retention (Al-Dossary et al., 2014).

Precepted orientation for new graduate nurses provides limited experiences in a chaotic clinical environment, as the preceptor is expected to manage a full patient load and patient care is appropriately prioritized over the educational experience of the new nurse. Therefore, the quality of learning during orientation can be negatively affected by the demands of patient care (Siggins, 2012). Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries (2014) completed a longitudinal, randomized, controlled trial and found that simulation is an effective educational methodology to replace up to 50% of clinical hours in undergraduate nursing programs. Clinical simulations provide nurses with experiences that may not present in a predictable timeline in the clinical setting, thus creating a structured learning experience to develop skills, critical thinking, and clinical decision making and influence future patient care (Hayden et al., 2014). Parker (2014) found that nurses who used analytical thinking – the process of gathering assessment data, forming a hypothesis about what may be happening, and continuing to assess and analyze until the most likely decision has been supported – were twice as likely to activate the RRT appropriately than nurses who used intuitive or mixed model decision making. Additional Parker (2014) findings include that analytical clinical decision making should be taught using a combination of didactic and high-fidelity patient simulation in an effort to increase RRT activations and decrease FTR rates. Therefore, clinical simulation is an ideal teaching methodology for early identification and management of patient deterioration in a controlled, safe environment with an opportunity for reflective learning and debriefing.

Patient deterioration simulation education outcomes have been studied with nursing students and multidisciplinary hospital teams (Hart et al., 2014; Wehbe-Janek, Pliego, Sheather, & Vilamaria, 2014). Hart et al. (2014) found that patient deterioration simulation education increased knowledge, self-confidence, and teamwork for nursing students. Wehbe-Janek et al.

(2014) found that patient deterioration simulation education for multidisciplinary teams not only decreased anxiety and increased communication for participants, but increased RRT activations and decreased Code Blue Team activations, and decreased hospital mortality. Roberts et al. (2014) found that nurses who had a previous positive experience with RRTs were more likely to activate the RRT again, and simulation provides a safe learning environment for positive experiences to occur.

Staff education to improve FTR rates should focus on standardized communication, roles and responsibilities, early indicators of deterioration, appropriate activation of the RRT, and a formal escalation policy (Wakeam, Hyder, Ashley, & Weissman, 2014). Additionally, educational programs that include simulation have been shown to improve an individual's ability to recognize deterioration early, communicate, work as a team, and provide role clarity. Therefore, self-efficacy improves, fear of criticism is relieved, and the participants have a positive experience when interacting with the RRT (Salvatierra, Bindler, & Daratha, 2016; Wehbe-Janek, Pliego, Sheather, & Vilamaria, 2014).

Specific Aim

The purpose of this project is to improve the self-confidence and competence of new graduate nurses dealing with patient deterioration, with an educational program. The literature supports implementation of educational programs to minimize barriers to RRT activation, emphasizing simulation education as a teaching methodology (Bell-Gordon, Gigliotti, & Mitchell, 2014; Purling & King, 2012; Wehbe-Janek, Pliego, Sheather, & Vilamaria, 2014).

Available Knowledge

A comprehensive review of the literature included searches of CINAHL and MEDLINE databases with the key terms "patient deterioration", "failure to rescue", "patient rescue", "rapid

response team", "education", "simulation education", and "new graduate nurses". The literature is rich with studies identifying the early signs and symptoms of patient deterioration and studies demonstrating that the implementation and efficient use of RRTs improves patient outcomes. Additionally, studies were found that identified barriers to activating the RRT in the event of patient deterioration. Finally, studies were identified that demonstrate patient deterioration education that includes simulation reduces barriers to activating the RRT when a patient exhibits the early signs and symptoms of deterioration.

Barwise et al. (2015) completed a retrospective observational cohort quasi-experimental study to determine if delays in activating RRTs contributed to worse patient outcomes, including morbidity and mortality. Barwise et al. reviewed all RRT activations in 2012 and the vital signs for those patients up to 24 hours prior to the activation. They then compared outcomes of patients who had a delayed RRT activation to those patients who did not have a delayed RRT activation. A delayed RRT activation is defined as more than a one-hour lapse between abnormal vital signs that met the RRT activation criteria and the notification of the RRT. The team reviewed a total of 1,725 RRT activations, 43% of the patients had timely RRT activations and 57% of the patients had delayed RRT activations. Delayed activations were more common between midnight and 8:00 a.m., and the patients with delayed activations were more likely to require transfer to the intensive care unit. Additionally, the group with delayed RRT activations had higher hospital mortality (8% no delay, 15% delay; adjusted odds ratio, 1.6; $p = 0.005$), higher 30-day mortality (13% no delay, 20% delay; adjusted odds ratio, 1.4; $p = 0.02$), and longer length of average hospital stay (no delay 6 days, delay 7 days; relative prolongation, 1.10; $p = 0.02$). Further, as the delay to activate RRT increases, the association for these poor

outcomes becomes stronger. Barwise et al. concluded that education to activate RRTs early is warranted.

Angel et al. (2016) completed a retrospective correlational study to determine the effects of a RRT on the incidence of cardiac arrests outside the critical care area within a 636-bed academic hospital. The sample included 273 patients over the age of 18 over a four-year period who experienced cardiac arrest outside of the critical care areas. A RRT was implemented after two years and a comparison was made between the first and second two-year cohorts. Improved outcomes post-RRT implementation include: a reduction in the incidence of cardiopulmonary arrests in non-critical care areas (273 total in four-year period, of which, 62% occurred during first two years) and a decrease in length of stay for those patients transferred to the critical care areas (3.5 days versus 1.5 days; $p = 0.007$).

Solomon, Corwin, Barclay, Quddusi, and Dannenberg (2016) completed a systematic review and meta-analysis to assess the effectiveness of RRTs on reducing hospital mortality and non-intensive care unit cardiopulmonary arrest rates. Thirty studies that included before-after studies, cohort studies, and cluster randomized trials that reported hospital mortality and/or non-intensive care unit cardiopulmonary arrests, were analyzed by two independent reviewers. A pooled analysis showed that mortality significantly decreased (relative risk [RR] = 0.88, 95% confidence interval: 0.83-0.93, $I^2 = 86\%$, 3,478,952 admissions) and non-intensive care unit cardiopulmonary arrests significantly decreased (RR = 0.62, 95% CI: 0.55-0.69, $I^2 = 71\%$, 3,045,273 admissions) after implementation of an RRT.

Yuan, Williams, and Fang (2012) completed a systematic review to describe available evidence regarding the effects of high-fidelity simulation on nursing students' confidence and competence. They assessed the methodological quality of 24 quasi-experimental descriptive or

qualitative studies, 18 were English and 6 were Chinese studies. Sample sizes ranged from 10 to 308. Findings included that there was no established definition for competency and various instruments were used to measure competence and confidence with no attention to validation of measurements. They concluded that there is not robust evidence to support that high-fidelity simulation improves confidence and competence ($c^2 = 5.82$, $p = 0.05$; $c^2 = 171.09$, $p = <0.00001$, respectively). They recommend the development of a formal measurement instrument for evaluating high-fidelity simulation and further studies with larger sample sizes.

Since Yuan, Williams, and Fang published their systematic review in 2012, there have been several noteworthy studies, evidence-based practice projects, and integrative reviews published supporting simulation education as an effective teaching methodology. Jansson et al. (2014) completed a randomized controlled trial using an educational simulation intervention on caring for a patient requiring mechanical ventilation. They used an 86-item Ventilator Bundle Observation Schedule (VBOS), whose overall content validity has ranged from 0.99-1.0, and overall intraclass correlation coefficient has ranged from 0.93-1.0. The intervention group scores for the VBOS went from a pre-intervention score of 46.8% to a post-intervention score of 60.0%. Findings supported transfer of learned skills to clinical practice following simulation education.

Additionally, Boling, Hardin-Pierce, Jensen, and Hassan (2017) implemented a pilot program using simulation education for new cardiothoracic intensive care unit nurses. They used the Simulation Evaluation Tool (SET), a validated 13-item, zero to two Likert Scale questionnaire, to measure effectiveness of the simulation education. A high degree of effectiveness was perceived by participants, as post-intervention scores ranged from 1.46 to 2.0 with a mean of 1.64. Therefore, the simulation education was determined to be a highly effective training methodology.

Bell-Gordon, Giliotti, and Mitchell (2014) completed an evidence-based practice project using simulation education to improve the recognition of patient deterioration among 15 medical-surgical nurses. They used the RAPIDS-Tool (Rescuing a Patient in Deteriorating Situations Tool) to score participants' performance during two simulation activities. The RAPIDS-Tool has a reported inter-rater reliability of 0.99 and a high correlation between the global rating and checklist score ($r = 0.94$, $p<.001$). The mean total baseline performance score was 29.60 with a SD of 5.84, which increased to 34.60 with a SD of 6.51 post-intervention. Findings support simulation as an effective teaching methodology to improve assessment and management of patient deterioration.

Foronda, Liu, and Bauman (2013) completed an integrative review of 101 studies to evaluate simulation education in undergraduate nursing education. Inclusion criteria included research studies with undergraduate nursing students and mannequin simulations. Identified themes include: confidence and self-efficacy, satisfaction, skills and knowledge, interdisciplinary experiences, and anxiety. Although the simulation experience was reported to induce anxiety, the students reported an understanding of the importance of the experience. Study findings support simulation is an effective and satisfying way to increase knowledge and confidence in undergraduate nursing students.

Bias, Agostinho, Coutinho, and Barbosa (2016) completed an integrative review of six primary studies, qualitative and quantitative designs, exploring how simulation education assisted with emergency nursing education outcomes. The reviewed studies explored the effect simulation had on the participants' clinical skills, critical thinking, self-confidence, and teamwork. Simulation is considered to be a safe way for nursing students to practice identifying deterioration and practicing emergency skills with opportunities for feedback and reflection.

They found simulation to be a satisfactory method for teaching that had positive effect on nursing students' responses to emergencies and self-confidence.

Hart et al. (2014) studied the outcomes associated with a structured curriculum that focused on identifying and responding to patient deterioration, which included simulation. The convenience sample (N=48) included undergraduate Baccalaureate Nursing students who were either juniors or seniors. The curriculum included didactic content, skills lab, medium and high fidelity simulation, and guided reflection sessions over a period of one semester. The Likert response Self-confidence scale (Cronbach's alpha 0.93-0.96), the 37-item multiple choice Knowledge questionnaire (developed by the researchers and assessed by a panel of experts), and the Team Emergency Assessment Measure (Cronbach's alpha 0.89) were used to obtain data at baseline, at week 6, and at the end of the course. Findings included significant effects in knowledge ($F(2.92) = 236.99$, $p < .001$), self-confidence ($F(2.92) = 292.99$, $p < .001$), and perception of teamwork ($F(1.46, 65.85) = 122.27$, $p < .001$) related to patient deterioration. Knowledge scores steadily increased from baseline to midpoint and to post-intervention ($M = 67.00$, $SD = 6.66$; $M = 80.62$, $SD = 7.34$, $p < .001$; $M = 88.70$, $SD = 6.48$, $p < .001$, respectively). Self-confidence scores also improved from baseline to midpoint and again at post-intervention ($M = 2.59$, $SD = 0.52$; $M = 3.96$, $SD = 0.56$, $p < .001$; $M = 4.25$, $SD = 0.41$, $p < .001$, respectively). Additionally, perception of teamwork scores increased from baseline to midpoint and again at post-intervention ($M = 1.87$, $SD = 0.89$; $M = 3.20$, $SD = 0.56$, $p < .001$; $M = 3.76$, $SD = 0.30$, $p < .001$).

Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries (2014) completed a longitudinal, randomized, controlled study to determine if simulation was an acceptable teaching methodology to replace clinical hours in a pre-licensure nursing program. The sample consisted

of 666 nursing students from 10 undergraduate programs randomly divided into a control group (n=268), a group with simulation education replacing 25% clinical time (n=293), and a group with simulation education replacing 50% clinical time (n=286). No statistically significant difference was found among the measurements taken at 6 weeks, 3 months, and 6 months for clinical competency assessed by clinical preceptors and instructors ($p = 0.688$), comprehensive knowledge ($p = 0.478$), and NCLEX pass rates ($p = 0.737$). Therefore, supporting simulation education as an effective teaching methodology to replace up to 50% of clinical hours.

Wehbe-Janek, Pliego, Sheather, and Villamaria (2014) conducted a longitudinal quasi-experimental pre-post study implementing an interprofessional simulation-based educational program with the goal to increase RRT usage. The curriculum included clinical emergencies that would warrant activating the RRT or the Code Blue Team and emphasized early recognition of patient decline and effective communication amongst team members. The sample was made up of 359 staff members: 278 unit nurses, 34 medical residents, 12 intensive care unit nurses, 22 respiratory therapists, 9 pharmacists, and four supervisors. The education was offered over a three-week period and outcomes were measured up to three months post-implementation.

Participant self-perceived anxiety and self-confidence, hospital RRT and Code Blue Team activation frequencies, and hospital mortality were measured pre- and post-study and compared. There was a statistically significant decrease in reported anxiety with responsibilities before the team arrived (-34.2 ± 27.2, $p < .001$), with emergency medication administration (-37.8 ± 26.3, $p < .001$), with use of the code cart and equipment (-36.1 ± 26.1, $p < .05$), with communication (-14.0 ± 16.7, $p < .05$) and the ability to lead (-16.1 ± 19.1, $p < .001$). Overall hospital RRT activations increased, while Code Blue Team activations decreased. Hospital mortality rates demonstrated a steady decrease. Further, 65% of participants reported that

simulation education was the most effective educational method that led to understanding appropriate RRT use.

Synthesis of Research Findings

Review of the literature reveals several key points worthy of consideration regarding FTR, RRTs, and how to improve patient outcomes. The following points regarding RRTs and patient outcomes are found in the literature: effective use of RRTs improves patient outcomes, such as fewer cardiopulmonary arrests, lower hospital mortality, lower thirty day mortality, and shorter length of stay (Angel et al., 2016; Barwise et al., 2015; Solomon et al., 2016); and delays in RRT activation beyond one hour from onset of abnormal vital signs is associated with higher hospital mortality, higher thirty day mortality, and longer hospital stay (Barwise et al., 2015).

Although Yuan, Williams, and Fang (2012) completed a systematic review concluding there was no robust evidence to support competence and confidence increases with simulation education, studies completed since that time demonstrate that simulation education is an effective teaching methodology (Bell-Gordon, Giliotti, & Mitchell, 2014; Bias, Agostinho, Coutnho, & Barbosa, 2016; Bolin, Hardin-Pierce, Jensen, & Hassan, 2017; Foronda, Liu, & Bauman, 2013; Jansson et al., 2014). Additionally, Hayden et al. (2014) completed a longitudinal, randomized, controlled trial and found that simulation is an effective educational methodology to replace up to 50% of clinical hours in undergraduate nursing programs. This is significant in that clinical simulations provide nurses with experiences that may not present in a predictable timeline in the clinical setting, thus creating a structured learning experience to develop skills, critical thinking, and clinical decision making and influence future patient care. Simulation education also provides a controlled, safe environment, with the opportunity for reflective learning and debriefing (Hayden et al., 2014).

Studies have implemented patient deterioration simulation education with nursing students and multidisciplinary hospital teams and demonstrated positive outcomes (Hart et al., 2014; Wehbe-Janek et al., 2014). Hart et al. (2014) found that patient deterioration simulation education increased knowledge, self-confidence, and teamwork for nursing students. Wehbe-Janek et al. (2014) found that patient deterioration simulation education for multidisciplinary teams not only decreased anxiety and increased communication for participants, but increased RRT activations and decreased Code Blue Team activations, and decreased hospital mortality.

Application to Evidence-based Nursing Practice

There is a wealth of literature that demonstrates patient deterioration simulation education improves the use of RRTs for better patient outcomes that include mortality rates and length of stay (Angel et al., 2016; Barwise et al., 2015; Solomon et al., 2016), and the evidence supports simulation education as an effective teaching methodology for an evidence-based practice intervention (Bell-Gordon, Giliotti, & Mitchell, 2014; Bias, Agostinho, Coutnho, & Barbosa, 2016; Bolin, Hardin-Pierce, Jensen, & Hassan, 2017; Foronda, Liu, & Bauman, 2013; Hayden et al., 2014; Jansson et al., 2014) . Patient deterioration simulation education reduces barriers that prevent or slow activation of the RRT by providing knowledge and experience to improve skills, critical thinking, clinical decisions making, communication, and teamwork (Hart et al., 2014; Wehbe-Janek et al., 2014). Therefore, implementing a patient deterioration simulation education program for new graduate nurses, should improve competence and confidence for nurses (Foronda, Liu, & Bauman, 2013).

Rationale

Patricia Benner's nursing theory moves the professional nurse through a hierarchy of five levels of growth and acquired skills: novice, advanced beginner, competent, proficient, and

expert (Tomey & Alligood, 1998). Novice nurses have no past experience that can be applied to their current situation and they function by following the rules they know. Advanced beginners have some experiences that can relate to current practice but continue to struggle with transferring lessons from past experiences to new situations. Competent nurses provide care within a vision of the big picture that includes intentional plans, evident priorities, and long-term goals. Proficient nurses are guided by a keen sense of perception and are able to view a scenario in its entirety. Expert nurses have the most experience and function on intuition by identifying the essence of a problem and predicting possible outcomes. Expert nurses are highly flexible, efficient, and effective (Benner, 1984). Benner describes critical incidents, which are meaningful clinical learning experiences that provide a deeper level of understanding of nursing practice. A critical incident may be a patient care experience when an intervention influenced a patient outcome positively or negatively. The nurse applies lessons from critical incidents to future patient care episodes; therefore, experience expands the nurse's pool of knowledge and skills to produce a more proficient nurse (Benner, 1984).

Clinical simulations provide nurses with experiences that may not present in a predictable timeline in the clinical setting, thus creating a structured learning experience to develop skills, critical thinking, and clinical decision making and influence future patient care (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). Therefore, clinical simulation is an ideal teaching methodology for early identification and management of patient deterioration in a controlled, safe environment with an opportunity for reflective learning and debriefing. Parker (2014) found that nurses who used analytical thinking – the process of gathering assessment data, forming a hypothesis about what may be happening, and continuing to assess and analyze until the most likely decision has been supported – were twice as likely to activate the RRT

appropriately than nurses who used intuitive or mixed model decision making. Additional Parker (2014) findings include that analytical clinical decision making should be taught using a combination of didactic and high-fidelity patient simulation in an effort to increase RRT activations and decrease FTR rates. Benner's (1984) nursing theory guides the development of skills through increased meaningful clinical experiences, to move the nurse from novice to advanced beginner and beyond. Larew, Lessans, Spunt, Foster, and Covington (2006) applied Benner's concepts to clinical simulations based on performance characteristics and learning needs of nurses at varying levels of clinical competency to assist in further skill development and knowledge.

In addition to the five levels of proficiency, Benner (1984) identifies seven roles of nursing practice: the helper, the teacher-coach, the diagnostician, the patient monitor, the manager of quickly changing situations, the implementer of therapeutic interventions, and the ensurer of quality practice and competency. Patient deterioration simulation education would assist in the development of the helper, diagnostician, monitor, manager of rapidly changing situations, implementer of therapeutic interventions, and the ensurer of quality practice and competency roles by providing meaningful learning experiences with reflection and debriefing.

Methods

Context

A 105-bed rural community hospital serving multiple counties, wished to implement patient deterioration education in order to improve patient outcomes with more efficient use of the existing RRT. The target population includes new graduate staff nurses who work in medical-surgical and telemetry areas. The staff nurses working in these areas are the nurses who identify a patient deterioration in practice and decide when to activate the RRT. The staff nurses

working in the critical care and emergency department areas are the nurses who serve on the RRT and will be responding to patient deteriorations. Therefore, both groups of nurses participated in the education and the simulation. The project parallels the facility's mission, goals and strategic plan of improving the health of the community by potentially improving patient outcomes. The facility's The stakeholders for this project include the Chief Nursing Officer and Director of Education, both were committed to the implementation of the education plan. Additional stakeholders include staff nurses, patients, Directors, and leadership within the facility, as they may all benefit from the project.

Intervention

The Institutional Review Board (IRB) Proposal was submitted and approved through Baptist Health Lexington's IRB as an expedited review. An IRB deferment was obtained from Eastern Kentucky University's IRB. A cover letter explained implied consent. Employees were informed that participation was voluntary, that they could withdraw at any time, that participation or declination to participate in no way influenced employment, that all information was anonymous, that data will be secured in a locked filing cabinet in the PI's locked office with limited access, and data will only be reported in aggregate form. The risk of participating is a potential loss of confidentiality, and that the study team would make every effort to ensure this does not happen. It was explained that although no benefit is guaranteed by participating, some participants may learn how to identify and manage patient deterioration. Since the education was mandatory, the employing facility paid employees for attendance.

Resources needed for successful implementation and evaluation included personnel, technology, and funds. Necessary personnel included: a physician from the facility, who presented didactic content; two faculty members, who implemented simulation and collected

data; two educators from the facility, who discussed case studies and policies; and a DNP program faculty member, who served as co-investigator. The study team members were paid by their employer. Eastern Kentucky University provided the facilities, handouts, and needed technology for the education and simulation. The education attendees and potential study participants were scheduled to attend by their manager and received pay from the facility for attending, whether or not they chose to participate in the study. The high-fidelity simulation equipment expenses were covered by a collaborative agreement between Eastern Kentucky University and the participating hospital. The project leader donated time and obtained an SPSS license at no charge for statistical analysis.

The project was an experimental quantitative design, consisting of a cohort observational data collection and a before and after intervention data collection. The participants were observed for competency during a simulation and completed a self-confidence scale before and after the education intervention.

New graduate nurses from the participating agency were selected by nurse leaders to attend a five-hour paid mandatory patient deterioration education offering on Eastern Kentucky University's campus. The new graduate nurses had less than 18 months of experience. New graduate nurses were the targeted population, as they tend to lack the education, experience, and skills to identify patient deterioration (Purling & King, 2012). Critical care and emergency department nurses attended as RRT members. Five new graduate nurses, one critical care nurse, and one emergency department nurse attended the education offering. Although the education was mandatory, participation in the study was voluntary. Nurses who attended the required education had the option to participate in the study by completing the Clinical Decision-Making Self-Confidence Scale before and after the education. Implied consent was explained and

involved agreeing to permitting project team members to observe the simulation for data collection and completing a survey on two separate occasions for a pre-test post-test design. Data analysis included comparison of the pre-test and post-test self-confidence results. Performance of competencies was evaluated so the relationship between competence scores and self-confidence scores could be examined.

The evidence-based intervention was patient deterioration education. The education plan consisted of didactic content, discussion of case studies, review of related facility policies, and a patient deterioration simulation. The group of attendees received didactic content that reviewed statistics demonstrating that early identification and intervention with patient deterioration increases the likelihood of patient survival. Additionally, the five most common pathways of deterioration were discussed, including what is typically found on assessment and the needed evidence-based interventions.

Next, the group was divided into two smaller groups. Each group included one experienced RRT nurse from the critical care or emergency department areas and two or three new graduate nurses. One group discussed case studies while the other group participated in the simulation, the groups then switched experiences so that each group participated in the case study discussion and the simulation. The case study discussion consisted of ten patient deterioration scenarios pulled from the five most common pathways of patient deterioration. Each scenario started with a brief patient assessment. Attendees were asked to identify what additional information they would gather, what they believe could be happening to the patient, what may happen if no action were taken, what interventions should be implemented, and what resources were available to them in the facility should a similar situation occur in practice.

The simulation group was given a brief orientation to the simulation room and equipment. The RRT nurse started outside the simulation room and responded when the attendees chose to activate the RRT during the simulation. The new graduate nurses were given a patient chart with current orders and participated in the simulation from beginning to end. The simulation was a post-operative patient experiencing difficulty breathing due to fluid overload. It was expected that the simulation participants would identify the patient is experiencing fluid overload and take appropriate action. The desired competencies included notifying personnel resources (physician and/or RRT) for orders to decrease or discontinue the intravenous fluids and administer a diuretic.

Study of the Intervention

During the simulation, two study team members observed and completed the Creighton Competency Evaluation Instrument based on the participants' performance of competencies (Hayden, Keegan, Kardong-Edgren, & Smiley, 2014). Additional data collection included the completion of the Clinical Decision-Making Self-Confidence Scale, by those who consented to participate in the study (Hart, Spiva, & Mareno, 2014). The CDMCS was completed prior to education implementation and again at the end of education implementation. In summary, the educational offering was mandatory, however, participation in the study was voluntary and included completion of the CDMSCS survey on two occasions and consenting to be observed during the simulation for completion of competencies on the CCEI.

Measures

Due to the small number of participants, in order to protect confidentiality, minimal demographic data were collected. This included the number of months of practice experience

and if the participant had experienced a simulation before the implementation date. All demographic data is reported as aggregate data.

CCEI. The Creighton Competency Evaluation Instrument (CCEI) is a 23-item Likert-type scale to evaluate performance of participants in patient care simulations. The project leader determined which of the 23 items applied to the simulation and only those items were included for data collection. For example, the items "Provides evidence-based rationale for interventions" and "Assesses the environment in an orderly manner" were determined not essential to this simulation. Two observers determined if the participant either demonstrated competency or did not demonstrate competency. The four categories in the instrument include assessment (two competencies), communication (four competencies), clinical judgment (six competencies), and patient safety (five competencies). The total possible score for the simulation was 17. For inter-rater reliability, 31 faculty raters were individually compared with an expert rater and the overall agreement was 79.4 %. For content validity, 35 faculty members rated content validity using a Likert-type scale ranking items from strongly agree to strongly disagree (1-4). Faculty raters agreed that each behavior should be included in the instrument ($M = 3.89$, $SD = 0.19$) and reflected the assigned category ($M = 3.86$, $SD = 0.22$; Hayden, Keegan, Kardong-Edgren, & Smiley, 2014). Permission to use the CCEI was granted via an online terms of agreement and use form. There is no charge for its use and there is an online training module that was completed prior to use.

CDMSCS. The Clinical Decision-Making Self-Confidence Scale (CDMSCS) is a 12-item, 5-point Likert scale instrument rating an individual's self-confidence in recognizing, assessing, intervening, and evaluating effectiveness of interventions during clinical deterioration situations (Hart, Spiva, & Mareno, 2014). Responses range from not at all confident to very

confident (1-5 respectively) and a mean score is obtained by averaging all responses. The total possible raw score could be 12-60, with total possible mean scores of 1-5. Higher mean scores reflect a higher level of self-confidence (Hart, Spiva, &Mareno, 2014). Because it is a Likert-type scale, it is considered ordinal level of measurement. Cronbach's alpha is reported to be .93 and .96, respectively for a pretest posttest study with nursing students (NCSBN, 2009) and .98 with nursing students and registered nurses (Hart, Spiva, &Mareno, 2014). A construct validity item analysis was completed and "inter-item correlations ranged from .36 to .86". Hart, Spiva, and Mareno (2014) corrected the Item-total correlations, from .69 to .85 (p. 316). Permission has been obtained to use the CDMSCS by Dr. Hicks and there is no cost and no required training.

Analysis

Data were entered into SPSS (V. 24) for analysis. Demographic data were analyzed using frequencies, means, medians, and modes. Each variable on the CDMSCS was given an abbreviated name and each scale item was given a numerical code. Individual responses to each CDMSCS question were coded 1-4 (strongly disagree to strongly agree) and entered in SPSS. A paired t-test analyzed the difference between the mean scores on the CDMSCS pre- and post-intervention. This illustrated whether self-confidence scores remained the same, improved, or declined following the patient deterioration simulation education. The effect size was calculated to determine the clinical significance.

Ethical Considerations

New graduate nurses participating in a study that is part of an academic practice partnership with their employer may perceive the willingness or declination to participate as a factor that influences employment. Therefore, the new graduate nurses were reassured during the consent process that their responses to the surveys were confidential, results would be

reported as aggregate data, and their participation or lack of participation in the study would have no impact on employment. Additional precautions were taken to ensure that the members of the study team collecting data were employees of the university and not the hospital.

Results

A total of five new graduate nurses (NGNs) participated in the project. Three NGNs had less than 6 months of practice experience, one NGN had between 6 and 12 months of experience, and one NGN had between 12 and 18 months of experience. Regarding simulation experience, 3 of the NGNs had no simulation experience, one NGN had participated in simulation on one occasion and one NGN had participated in simulation on more than one occasion (see Table 1).

Table 1

Sample Demographics

New Graduate Nurses with:	Raw Number	Percentage
<6 months of experience	3	60%
6-12 months of experience	1	20%
12-18 months of experience	1	20%
No simulation experience	3	60%
1 simulation experience	1	20%
>1 simulation experience	1	20%

The CCEI data were reviewed to determine if participants demonstrated the essential competencies during patient deterioration simulation. The essential competencies fell under the categories of assessment, communication, clinical judgment, and patient safety. Both groups successfully demonstrated all of the essential competencies during the simulation.

A paired samples t-test was conducted to analyze differences in the mean pre- and post-test scores on the Clinical Decision-Making Self-Confidence Scale (CDMSCS). The increase in scores from baseline to post-intervention was not found to be statistically significant (baseline M = 39.6, SD = 10.14; post-intervention M = 47.8, SD = 7.46), t (4) = 1.95, p = .123 (two-tailed). The mean increase in CDMSCS scores was 8.2 with a 95% confidence interval ranging from -3.49 to 19.89. The eta squared statistic (.48) indicated a large effect size (see Table 2).

Discussion

Upon completion of the didactic patient deterioration education, participants successfully demonstrated patient rescue competencies during a simulation exercise. Self-confidence scores were obtained pre- and post-intervention and compared. Due to the small sample size, the increase in self-confidence scores was not found to be statistically significant; however, the increase in self-confidence scores was found to be clinically significant.

Table 2

Clinical Decision-Making Self-Confidence Scale Statistical Analysis

Mean	SD	Difference	t value	p value
Pre: 39.6	10.14	8.2	1.95	.123
Post: 47.8	7.46			

Eta square = .48 (large effect size)

Interpretation

The clinically significant increase in self-confidence scores post-intervention warrants further studies on patient deterioration simulation education exploring self-confidence and competence with new graduate nurses.

Limitations

The sample for this project was made up of homogenous group of NGNs from a rural community hospital. The sample size was small (n=5), but included all eligible NGNs from the facility. One challenge with education offerings for staff nurses, is pulling groups of nurses out of the workforce while maintaining adequate staff for patient care. This is particularly challenging with small numbers of nursing staff in a rural community hospital. Therefore, it is important to be judicious when deciding the amount of time nurses are away from direct patient care. This further justifies exploring outcomes with smaller sample groups prior to implementation with larger groups.

Conclusions

Patient deterioration simulation education assisted in successful demonstration of patient rescue competencies and an overall clinically significant increase in self-confidence scores. These findings parallel the results from studies found in the literature, which used different populations. Bell-Gordon, Giliotti, and Mitchell (2014) found simulation to be an effective teaching methodology to improve experienced medical-surgical nurses' management of patient deteriorations. Jansson et al. (2014) and Boling et al. (2017) found simulation to be an effective teaching methodology for experienced nurses. Foronda, Liu, and Bauman (2013) completed an integrative review and found simulation is an effective and satisfying way to increase knowledge and confidence in undergraduate nursing students. Hart et al. (2014) found patient deterioration curriculum with simulation experiences increased self-confidence scores for nursing students. Bias, Agostinho, Coutinho, and Barbosa (2016) completed an integrative review and found simulation to be have a positive effect on emergency response and self-confidence with nursing

students. This project parallels these findings, but with the specific population of new graduate nurses, and supports further studies with this population.

Funding

The project leader is the recipient of the 2017 Kentucky Nurses Association Doctoral Nursing Student Scholarship. A portion of those funds was used to provide lunch for all attendees of the educational intervention, whether or not they participated in the study.

Feasibility for Sustainability

Due to the unique academic practice partnership between the rural community hospital and regional university, sustainability of this project is feasible. Leaders from both facilities have expressed interest in continuing patient deterioration simulation education. Data analysis justifies the expense as an investment in improved patient outcomes. A plan can be developed to offer the education to future incoming newly hired nurses. Future data analysis can investigate if retention of new graduate nurses improves as a result of the educational program assisting them with the transition to professional practice.

Summary

A patient deterioration simulation education offering was conducted for a 105-bed rural community hospital's nursing staff with the intention of improving the new graduate nurses' competence and self-confidence in order to better identify patient deterioration and appropriately intervene in the clinical setting. Data analysis illustrated a clinically significant improvement in self-confidence for new graduate nurses when identifying and managing patient deterioration.

References

Al-Dossary, R., Kitsantis, P., & Maddox, P.J. (2014). The impact of residency programs on new nurse graduates' clinical decision-making and leadership skills: A systematic review, Nurse Education Today, 34, 1024-1028.

Alshehri, B., Ljungberg, A.K., & Ruter, A. (2015). Medical-surgical nurses' experiences of calling a rapid response team in a hospital setting: A literature review. *Middle East Journal of Nursing*, 9(3), 3-23.

American Nurses Association (2015). Optimal nurse staffing to improve quality of care and patient outcomes. Retrieved from http://www.nursing world.org/Avalere-WhitePaper-on-NurseStaffing

Angel, M., Ghneim, M., Song, J., Brocker, J., Tipton, P.H., & Davis, M. (2016). The effects of a Rapid Response Team on decreasing cardiac arrest rates and improving outcomes for cardiac arrests outside critical care areas. *Medsurg Nursing: Official Journal of Medical-Surgical Nurses,* 25(3), 153-158.

Associates in Process Improvement (API). (2017). Model for Improvement. Retrieved from http://www.apiweb.org

Avis, E., Grant, L., Reilly, E., & Foy, M. (2016). Rapid Response Teams decreasing intubation and code blue rates outside the intensive care unit. *Critical Care Nurse*, 36(1), 86-90.

Barwise, A., Thongprayoon, C., Gajic, O., Jensen, J., Herasevich, V., & Pickering, B.W. (2015). Delayed Rapid Response Team activation is associated with increased hospital mortality, morbidity, and length of stay in a tertiary care institution. *Critical Care Medicine*, 44(1), 54-63.

Beitler, J.R., Link, N., Bails, D.B., Hurdle, K., & Chong, D.H. (2011). Reduction in hospital-wide mortality after implementation of a rapid response team: A long-term cohort study. *Critical Care*, 15(6), R269. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3388666/

Bell-Gordon, C., Gigliotti, E., & Mitchell, K. (2014). An evidence-based practice project for recognition of clinical deterioration: Utilization of simulation-based education. *Journal of Nursing Education and Practice*, 4(6), 69-76.

Benner, P. (1984). *From novice to expert.* Menlo Park, CA: Addison-Wesley Publishing.

Bias, C.G., Agostinho, L.S., Coutinho, R.P., & Barbosa, G.S. (2016). Simulation in emergency nursing education: An integrative review. *Journal of Nursing Education and Practice,* 6(12), 12-17.

Boling, B., Hardin-Pierce, M., Jensen, L., & Hassan, Z.U. (2017). Implementing simulation training for new cardiothoracic intensive care unit nurses. *Clinical Simulation in Nursing,* 13(1), 33-38. doi: 10.1016/j.ecns.2016.09.001

Braaten, J.S., deGunst, G., & Bilys, K. (2015). Rapidly increasing Rapid Response Team activation rates. *The Joint Commission Journal on Quality and Patient Safety*, 41(9), 421-427.

Foronda, C., Liu, S., & Bauman, E.B. (2013). Evaluation of simulation in undergraduate nurse education: An integrative review. *Clinical Simulation in Nursing,* 9(10), e409-416. doi: 10.1016/j.ecns.2012.11.003.

Goode, C.J., Lynn, M.R., McElroy, D., Bednash, G.D., & Murray, B.,M. (2013). Lessons learned from 10 years of research on a post-baccalaureate nurse residency program. *The Journal of Nursing Administration*, 43(2), 73-79.

Hart, P.L., Brannan, J.D., Long, J.M., Maguire, M.B., Brooks, B.K., & Robley, L.R. (2014). 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.

Hayden, J., Keegan, M., Kardong-Edgren, S. & Smiley, R.A. (2014). Reliability and validity testing of the Creighton Competency Evaluation Instrument for use in the NCSBN National Simulation Study. *Nursing Education Perspectives*, 35(4), 244-52.

Hayden, J., Smiley, R.A., Alexander, M., Kardong-Edgren, S., & Jeffries, P.R. (2014). NSCBN National Simulation Study: A longitudinal, randomized, controlled study replacing clinical hours with simulation in prelicensure nursing education. *Journal of Nursing Regulation*, 5(2), S1-S64.

Institute for Health Improvement (IHI). (2011). Science of Improvement: Testing changes. Retrieved from http://www.ihi.org/knowledge/Pages/HowtoImprove/default.aspx.

Jansson, M.M., Ala-Kokko, T.I., Ohtonen, P.P., Merilainen, M.J., Syrjala, H.P., & Kyngas, H.A. (2014). Human patient simulation education in the nursing management of patients requiring mechanical ventilation: A randomized, controlled trial. *American Journal of Infection Control,* 42, 271-276. doi: 10.1016/j.ajic.2013.11.023

Jones, D., Bellomo, R., & DeVita, M.A. (2009). Effectiveness of the Medical Emergency Team: The importance of dose. *Critical Care*, 13(5), 313-324.

Jones, D.A., DeVita, M.A., & Rinaldo, B. (2011). Rapid Response Teams. *New England Journal of Medicine*, 365(2), 139-146.

Kantar, U.D. (2012). Clinical practice of new graduate nurses in Lebanon: Challenges and perspectives through the eyes of preceptors, Journal of Continuing Education for Nurses, 43, 518-528.

Larew, C., Lessans, S., Spunt, D., Foster, D., & Covington, B.G. (2006). Innovations in clinical simulation: Application of Benner's Theory in an interactive patient care simulation. *Nursing Education Perspectives* (National League for Nursing), 27(1), 16-21.

Missen, K., McKenna, L., & Beauchamp, A. (2016). Registered nurses' perceptions of new nursing graduates' clinical competence: A systematic integrative review, Nursing and Health Science, 18, 143-153.

National Council of State Boards of Nursing (NCSBN, 2012). Transition to practice has taken off with our innovative new study. Retrieved from: https://www.ncsbn.org/363.htm

National Patient Safety Agency, 2007. Recognizing and responding appropriately to early signs of deterioration in hospitalized patients. National Patient Safety Agency.

Parker, C.G. (2014). Decision-making models used by medical-surgical nurses to activate rapid response teams, *MedSurg Nursing*, 23(3), 159-164.

Purling, A. & King, L. (2012). A literature review: graduate nurses' preparedness for recognizing and responding to the deteriorating patient. *Journal of Clinical Nursing*, 21, 3451-3465. doi: 10.111/j.1365-2702.2012.04348.x.

Roberts, K.E., Bonafide, C.P., Paine, C.W., Paciotti, B., Tibbetts, K.M., Keren, R., Barg, F.K., & Holmes, J.H. (2014). Barriers to calling for urgent assistance despite a comprehensive pediatric Rapid Response System. *American Journal of Critical Care*, 23(3), 223-229.

Salvatierra, G.G., Bindler, R.C., & Daratha, K.B. (2016). Rapid Response Teams: Is it time to reframe the questions of Rapid Response Team measurement? *Journal of Nursing Scholarship*, 48(6), 616-623.

Siggins Miller Consultants. (2012). Promoting quality in clinical placements: literature review and national stakeholder consultation, Health Workforce Australia: Adelaide.

Silber, J.H., Romano, P.S., Rosen, A.K., Wang, Y., Even-Shoshan, O., & Volpp, K.G. (2007). Failure-to-rescue: Comparing definitions to measure quality of care. *Medical Care*, 45(10), 918-925. dio: 10.1097/MLR.0b013e31812e01cc

Solomon, R.S., Corwin, G.S., Barclay, D.C., Quddusi, S.F., & Dannenberg, M.D. (2016). Effectiveness of rapid response teams on rates of in-hospital cardiopulmonary arrest and mortality: A systematic review and meta-analysis. *Journal of Hospital Medicine*, 11(6), 438-445. doi: 10.1002jhm.2554.

Tomey & Alligood (1998). *Nursing theorists and their work.* St. Louis, MO: Mosby-Year Book, Inc.

U.S. Department for Health and Human Services, Administration for Community Living, Administration on Aging. (2016). Aging Statistics. Retrieved from http://www.aoa.gov/Aging_Statistics/

U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality, National Quality Measures Clearinghouse. (2016). Rapid response systems. Retrieved from http//www.psnet.arhq.gov/primers/primer/4.

U.S. Department of Health and Human Services, Agency for Healthcare Research and Quality, National Quality Measures Clearinghouse. (2015). Failure to rescue: percentage of patients who died with a complication in the hospital. Retrieved from http://www.qualitymeasures.arhq.gov/summaries/summary/50111.

Wakeam, E., Hyder, J.A., Ashley, S.W., & Weissman, J.S. (2014). Barriers and strategies for effective patient rescue: A qualitative study of outliers. *The Joint Commission Journal on Quality and Patient Safety*, 40(11), 503-513.

Wehbe-Janek, H., Pliego, J., Sheather, S., & Villamaria, F. (2014). System-Based interprofessional simulation-based training program increases awareness and use of Rapid Response Teams. *The Joint Commission Journal on Quality and Patient Safety*, 40(6), 279-287.

Yuan, H.B, Williams, B.A., & Fang (2012). The contributions of high-fidelity simulation to nursing students' confidence and competence: a systematic review. International Nursing Review, 59(1), 26-33.