Implementation of an Educational Program about Rapid Response Teams for Intensive Care Unit Nurses

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Abstract

Patients who exhibit critical changes in condition should be identified promptly and receive care that will stabilize their condition. The significance of Rapid Response Teams (RRT's) in the hospital setting is multifaceted and includes improved patient safety and outcomes by early identification and prompt treatment for patients' experiencing an acute change in condition (Chan et al., 2010; Winters et al., 2013).

The formal educational training program implementation for RRT nurses is a quality improvement initiative. The educational implementation consisted of a didactic lecture portion and simulation session. A single group, pre-posttest design was used to evaluate the effectiveness of the lecture. Data were also collected on the overall simulation experience as rated by the participant. The Student Satisfaction and Self-Confidence in Learning (2005) tool developed by the National League of Nursing (National League of Nursing, 2005).

A total 14 nurses attended one of the two educational training program sessions for Intensive Care Unit (ICU) Nurses to the RRT. There was a statistically significant increase between the pretest (M=7.93, SD=1.07) and posttest (M=9.07, SD=0.73), z (11)=-2.93, $p<0.05$). Survey results from the simulation using the Student Satisfaction and Self-Confidence in Learning questionnaire were analyzed for each participant who successfully completed the simulation scenarios (n=6). The 13 question survey utilized a Likert scale response with 1 as strongly disagree to 5 as strongly agree with the statement. Results had mean score of 4.80 (Min=4.08, Max=5.00).

The utilization of the Rapid Response Team in the inpatient hospital setting is essential to patient safety and contributes to positive patient outcomes. The standardized educational training

program allowed for a structured process to train nurses who participate within the Rapid Response Team.

Overview

In-hospital cardiopulmonary arrests are associated with low survival and accompanying morbidity and mortality (Chan, Jain, Brahmakee, Nallmothu, Berg & Sasson, 2010). Patients frequently display signs or symptoms of deterioration for several hours or days prior to cardiopulmonary arrest associated with mortality up to 80 percent (Winters, Weaver, Pfoh, Yan, Pham & Dy, 2013). Patients who exhibit critical changes in condition should be identified promptly and receive care that will stabilize their condition. The lack of care escalation is considered a failure to rescue and can be considered a serious adverse event (Jones, DeVita & Bellomo, 2011). Rapid response systems were created in hospital settings in order to improve the recognition and response to critically ill patients outside of the intensive care units (ICU) to decrease morbidity, mortality, and code blue events (Winters et al., 2013). Rapid response teams, a component of rapid response systems, have been associated with significant reduction of cardiopulmonary arrest rates in adults that occur outside the ICU (Chan, 2010).

The significance of rapid response teams (RRT's) in the hospital setting is multifaceted and includes improved patient safety and outcomes by early identification and prompt treatment for patients experiencing an acute change in condition (Chan et al., 2010; Winters et al., 2013). Historically, RRT's were created in reaction to a report by the Institute of Medicine, *To Err is Human: Building a Safer Health System,* which reported that approximately 44, 000 to 98, 000 hospitalized patients experienced preventable medical errors with many errors resulting in death (Kohn, Corrigan & Donalsdon, 2000). The Joint Commission (2009) also addressed the improvement of patient safety and outcomes with Goal 16, which specifically addresses RRT's

through the improvement of the identification and response to clinical deterioration in patients outside of the intensive care area. Genardi et al. (2008) reported that 61% of United States hospitals operate RRT's for the purpose of providing expert clinicians at the bedside.

The use of skilled nurses outside of the ICU is essential to deliver expertise at the bedside for patients who experience emergencies. RRT's provide a team of multi-disciplinary expert clinicians at the bedside in an efficient manner (Chan et al., 2010). The composition of the RRT varies among institutions and can include an attending physician, resident physician, critical care physician, critical care nurse, administrator, clergy, and/or respiratory therapist (Chan et al., 2010; Jones, DeVita, & Bellomo, 2011). Critical care nurses are a vital component of the RRT and often the leaders in emergency situations (Gerardi et al., 2008). Early activation of the RRT decreases unplanned ICU admissions and reduces cardiopulmonary arrest resulting in death and disability (Genardi, Cronin & Thomas, 2008; Sittner, Schmaderer, Zimmerman, Hertzog & George, 2009; Winter et al., 2013). The need for trained expert clinicians to assess and triage patients quickly is an important component of the rapid response system (Winters et al., 2013).

Appropriate training and education are necessary to provide evidence-based rapid response system aimed at decreasing morbidity, mortality, and cardiopulmonary arrest outside of the intensive care unit (Winters et al., 2013). The purpose of this quality improvement project is to implement a formal training program for nurses on a RRT. The significance of the educational training program will be directed at prompt stabilization of patient condition and reducing cardiopulmonary arrest outside of the ICU.

Theoretical Framework

A model of Nursing as a Complex Adaptive System (CAS) was used as an organizing framework for this project. CAS's are "densely linked, intersecting, and interacting connection

of agents, each making their own contribution and acting both independently in making that contribution and interdependently in linking that contribution to the independent but related contributions of other agents" (O'Grady & Malloch, 2013, p. 562). The hospital setting is a dynamic and complex environment that is often unpredictable. Patients' conditions can change rapidly and require swift intervention by a RRT in order to achieve a stable condition. The CAS theory is not a single theory, but is a result of the collection of overlapping theories from various sciences that attempts to explain complex, non-linear systems (Chaffee & McNeill, 2007). The model of Nursing as CAS theory was selected because of its ability to depict the emergency situation as a unique, unfolding event with patterns of relationships (McDaniel, Lanham & Anderson, 2009). The CAS theory has been used effectively in medicine and nursing to describe complex, non-linear environments such as a rapid response call (Chafee & McNeill, 2007).

The model of Nursing as CAS theory was used to explain patterns of adaptability and relationships in the ever-changing, chaotic environment during a rapid response call. The educational intervention was designed and implemented using the CAS theory framework, which helps view components and relationships within the system that allows for new methods for the development of nursing practice (Chaffee & McNeill, 2007). The model of Nursing as a CAS theory also allows for the examination of the relationships of the interprofessional healthcare team and the nurses' roles within the complex hospital environment. Nurses involved in RRT must be aware of inherent uncertainty in the healthcare organizations that account for the unpredictability in the RRT situation (McDaniel et al, 2009).

The underpinnings of the model of Nursing as a CAS allowed for the examination of emergency situations and the nurse's specific role during the crisis event. Specific detail was given to the nurse's adaptability during a chaotic situation and how to minimize the competing

external environment. The RRT nurse must be able to control all aspects of the situation to safely stabilize the patient's condition. The use of the model of Nursing as a CAS also highlighted the importance of team functioning, effective collaboration, clear communication, and swift intervention.

Literature Review

The literature review examines the effect of rapid response teams on the inpatient hospital setting, the need for formalized education for rapid response nurses, and current educational practices in the literature. The use of skilled nurses outside of the ICU is essential to deliver expertise at the bedside for patients who experience emergencies. McNeill et al. (2013) in a systematic review discussed that RRT's improve patient outcomes specifically morbidity, mortality, decreases in cardiopulmonary arrest, and unplanned ICU admission. Detection of acute changes in a patient's condition is crucial in a successful rapid response team (Winters et al., 2013). Winters et al. (2013) completed a meta-analysis of seven systematic reviews and concluded that the implementation of a rapid response team was associated with a statistically significant reduction in non-ICU cardiopulmonary arrests. McNeill et al. (2013) and Chan et al. (2009) also reported the decrease of non-ICU cardiopulmonary arrests through the implementation of a rapid response team. McNeill et al. (2013), Chan et al. (2010) and Thomas et al. (2007) found that the deployment of rapid response teams decreased unplanned ICU admissions with prompt assessment and treatment at the bedside.

In addition to improvement of patient safety and outcomes, rapid response teams have a positive impact on staff and the hospital organization. Benin et al. (2012) and Thomas et al. (2007) identified that rapid response teams positively expedite care for critically-ill patients, increase employee engagement and morale, as well as efficiencies in organizational throughput.

Benin et al. (2012), Jones et al. (2011) and Shapiro et al. (2010) found that RRT's also support staff in a crisis situation as well as increasing job satisfaction among nursing staff. Benin et al. (2012) identified that nurses feel more confident, educated, and empowered in their practice with swift treatment of acutely ill patients when collaborating with the RRT. The original intent of RRT's was directed at improvement of patient safety and outcomes but extends beyond measurable results that are invaluable for nursing staff.

Training of rapid response team members is essential to emergently provide competent and evidence-based care to patients who are clinically unstable. Implementation of an educational training program is necessary to ensure skilled staff on the RRT (AHRQ, 2012; Chan et al., 2009; Winters et al., 2013). Jones et al. (2011) explained that sustained education of the RRT and medical-surgical unit staff is necessary to the success of the program, as well as updating staff on evidence-based practice standards. Thomas et al. (2007) stated an essential component of the implementation of a RRT included ongoing education and communication, which promotes staff engagement. Education of the RRT staff is imperative to the overall success of program and provides opportunities for learning, communication with leadership, and a forum for improvement (Chan et al., 2009; Thomas et al. 2007; Winters et al., 2013).

Simulation has been utilized as an effective method for evaluation of psychomotor skills and individual clinical decision making ability (Lindsey & Jenkins, 2013). Simulation also offers a safe, realistic environment for nurses to practice for emergency situations. Lindsey and Jenkins (2013) completed an educational intervention that evaluated clinical judgment through a simulation scenario relating to rapid response situations. The randomized sample utilized senior level nursing students with 79 participants. The findings from the pre-posttest design demonstrated that clinical simulation is effective in improving the students' knowledge and

clinical judgment during a rapid response situation (Lindsey & Jenkins, 2013). Specifically, training for RRT members should include assessment/triage, communication, documentation, leadership skills, and institution policies/procedures (AHRQ, 2012; Jones et. al, 2011).

Mc Neill et al. (2013) in a systematic review of 43 studies evaluated the effectiveness of whether rapid response systems improve hospital survival. McNeil et al. found that rapid response teams improve hospital survival, reduce unplanned ICU admissions, and reduce cardiac arrest rates outside of the ICU. Winters et al. (2013) in a systematic review of 26 articles also found that rapid response teams are associated with reduced cardiac arrest rates outside of the ICU with reduced mortality, but failed to address the effect on ICU admission rates. Chan et al. (2009) and McNeill stated that RRT's decreased unplanned ICU admission through prompt assessment and intervention (Chan et al., 2009). Benin et al. (2012), Jones et al. (2011) and Shapiro et al. (2010) noted that in addition to having positive impacts beyond morbidity and mortality that RRT's also supported nursing staff.

Multiple authors identified differences among composition among responding RRT members as well as training methods (Chan et al., 2009; Thomas et al., 2007; Winters et al., 2013). Chan et al. (2009) and Winters et al. (2013) noted that activation criteria varied widely and could contribute in failing to rescue patients. The review of the literature showed significant similarities and differences associated with the implementation and outcomes of rapid response teams in the adult hospital population that positively affect patient outcomes. Lindsey and Jenkins (2013) successfully implemented and showed the effectiveness of a novel training program. The training program included simulation, which effective in improving the nurse's knowledge and clinical judgment. A diverse and comprehensive approach is necessary to prepare the rapid response nurse for all types of emergencies.

Methods

Design, Subjects and Setting

The formal educational training program implementation for rapid response nurses is a quality improvement initiative. The educational implementation for nurse members to the RRT consisted of a didactic lecture portion and simulation session. A single group, pre-posttest design was used to evaluate the effectiveness of the lecture. Convenience sampling was conducted using specific inclusion criteria. The inclusion criteria are critical care experience of at least two years, Basic Life Support (BLS) and Advanced Cardiac Life Support (ACLS) certification, unit employee of at least one year, performance evaluation of greater than 3.3/5, and charge nurse experience greater than one year. The nurse manger of the two intensive care units using the specific inclusion criteria selected the participants. The expected sample size was about 10 participants, with 14 participating in the lecture portion and six in the simulation portion. The setting for implementation is a moderate size, community teaching hospital located in the Mid-Atlantic area. There was adequate space for the lecture portion, and a high-fidelity simulation lab was used. See Appendix B for project timeline.

Procedures

The educational intervention for a formal educational training program for nurses on a RRT included lecture and simulation portions. The three-hour didactic lecture session included the following content: RRT history, RRT policy review, assessment, prioritization, and communication using SBAR, documentation, chain of command, leadership skills, and special situations relating to the RRT (DeVita, 2008). See Appendix C for Educational Outline. A pre-posttest design was utilized to assess effectiveness of the lecture. The pre-posttest is a 10 question multiple-choice test with each question worth one point. Two expert PhD research

nurses, specializing in curriculum development and hospital based education, reviewed the pre-posttest for content and validity of the test. The pretest was given prior to the start of the lecture portion. The posttest evaluation was administered immediately after the lecture portion. Each test was coded at the top of the form with an individual identifier to be able to match the pretest to the posttest. The participants were asked to write the first two letters of their mother's maiden name and the month of their birth. For example if their mother's maiden name is "Smith" and their month of birth is May then the code would be “SM05”. No other personal identifying information was collected from the participants. See Appendix D for pretest/posttest.

The simulation portion included three scenarios for the most common events for RRT activation: respiratory distress, a neurological event, and dysrhythmia/fluctuation in vital signs (shock). All simulation sessions had a 10-minute pre-briefing session. Each individual scenario took 15 minutes, followed by a 45 minute guided reflection and de-briefing session. The structured debriefing was completed using National League for Nursing (NLN) Simulation debriefing techniques. A fully functional simulation laboratory using an integrated simulator or human patient simulator capable of responding to interventions and responses was utilized. See Appendix E-G for scenarios.

Data Collection and Analysis

Demographic data were collected including: age range, range of years of nursing experience, range of years of critical care experience, educational attainment, and range of years in current position. See Appendix H for example of demographic data collection tool.

A pre-posttest was used to assess the effectiveness of the lecture portion. The pretest and posttest scores were compared and evaluated for effectiveness of the intervention using the Wilcoxon Signed Rank Test. This test is intended for use of repeated measures, including when

participants are measured on two occasions (Pallant, 2010). The assumptions for the Wilcoxon signed rank test have been met including the use of independent observations.

Data were also collected on the overall simulation experience as rated by the participant. The Student Satisfaction and Self-Confidence in Learning (2005) tool developed by the NLN was used. The tool is a 13-item instrument intended to measure student satisfaction with the simulation activity and self-confidence in learning using a five-point scale (NLN research grants, 2013). Reliability of the scale was tested using Cronbach's alpha (satisfaction = 0.94; self-confidence, 0.87) respectively (Jeffries & Rizzolo, 2006). The participants completed the tool after the simulation during the debriefing session. The data were be analyzed using SPSS and presented using a table format with descriptive statistics.

Human Subject Protection and IRB Process

All participants were asked to take part in the intervention. The participants were given rights to questions about their participation. The volunteers participated in education and evaluation in conjunction with the hospital's Department of Education and Research. The anonymity of the participants was respected including de-identification of personal information. The benefits of participating in the intervention include training to the RRT to provide safe care to patients experiencing emergencies. Submission to the University of Maryland, Baltimore Institutional Review Board (IRB) as well as the individual facility's IRB was completed. Both IRB's deemed the project quality improvement and non-exempt for review (non-human subjects).

Results

A total of 14 nurses attended one of the two educational training program sessions for Intensive Care Unit Nurses to the Rapid Response Team. Of the 14 participants, all completed

the pre-posttest for the lecture portion of the education. Of the 14 participants, six completed the simulation portion of the education. Educational preparation was divided evenly with seven participants at the associate degree level and seven at the bachelor's degree level. The majority of the nurses were 18 to 30 years old with one to five years of experience in critical care nursing and current position.

Scores from the pretest and posttest were analyzed for each participant completing all 10 questions on both tests (n=14). The results from the pretest and posttest met the assumptions for non-parametric testing using the Wilcoxon signed rank test. The additional assumptions for the Wilcoxon signed rank test have been met including the use of independent observations on two occasions. There was a statistically significant increase between the pretest (M=7.93, SD=1.07) and posttest (M=9.07, SD=0.73), $z(11)=-2.93$, $p<0.05$). The mean increase between the pretest to posttest score was 1.14 with a 95 percent confidence interval.

Survey results from the simulation using the Student Satisfaction and Self-Confidence in Learning questionnaire were analyzed for each participant who successfully completed the simulation scenarios (n=6). The 13 question survey utilized a Likert scale response with 1 as strongly disagree to 5 as strongly agree with the statement. Results had mean score of 4.80 (Min=4.08, Max=5.00).

Discussion

Utilization of the Rapid Response Team in the inpatient hospital setting is essential to patient safety and contributes to positive patient outcomes. Patients can deteriorate quickly outside of the intensive care unit, resulting in death and disability. The standardized educational training program allowed for a structured process to train critical care nurses who participate within the RRT. The quality improvement project evaluated the impact of an educational training

program for critical nurses on the RRT at a local community teaching hospital. Participation was greater than anticipated with a projected attendance of 10 nurses with actual participation of 14 nurses. Nurses had a positive attitude towards learning with meaningful participation and knowledge sharing.

The pretest and posttest scores confirmed the nurses' gain in knowledge from the educational training program. The pretest scores demonstrated that the learners had some foundational knowledge regarding Rapid Response Teams including institutional policies and procedures. The posttest scores show an increase in knowledge of Rapid Response Teams including roles, responsibilities, and evidence-based practice in the hospital setting. This increase in knowledge through lecture and simulation will allow for translation of knowledge into practice.

The total number of participants for the lecture portion was 14 nurses, whereas the simulation only included six nurses. The six nurses selected to participate in the simulation portion were new nurses to the Rapid Response Team. The institution chose for the experienced RRT nurses to not participate fully in the simulation portion, rather to focus on the lecture component of the education. The institution defined an experienced nurse as one who is already actively participating as a RRT nurse. The novice nurse was defined as a nurse with critical care experience but new to the RRT. The emphasis on the lecture portion allowed for a concise review of new policies, roles, and responsibly that were significant changes to the current role. Additional time was also allowed for information sharing and feedback about the current state of the RRT program. With the differences in the program structure, an additional class offering was necessary to accommodate the two sets of learners in the training program.

Dissemination and Translation into Practice

At the institutional level, the long-term success of the educational program is contingent upon a successful sustainability plan. For continued offerings of the educational training, a train the trainer program was implemented for sustainability. All educational materials including the pre-posttest, simulations, and survey were provided to the critical care educator. A learning packet was created, assembled, and bound for the participants for easy reference. Continued collaboration with the educator was helpful to the creation of this program and will ensure its success in the future.

In addition to the standardized educational training there were also significant role changes for the RRT nurse. These role changes and responsibilities were changed based on best practices found in the literature and identified needs of the institution. The RRT nurse rounds twice a day on all units to provide assistance and consultation for any patient who may be deteriorating. This team-oriented rounding process allows for the RRT nurse and Medical-Surgical charge nurses to communicate openly regarding potential emergencies and/or issues on the unit. The RRT nurse also is meeting with the charge nurses regarding emergency equipment checks and educational needs on the unit that can be addressed. This increased collaboration with the units has allowed for a more positive and meaningful working relationship between the Medical-Surgical nurses and RRT nurses.

To disseminate findings to leadership, a presentation to the Emergency Response Committee was completed to report results of training program. Due to the positive feedback from participants, a request was made from the Emergency Response Committee to have an interdisciplinary Rapid Response simulation day. This simulation day will include all disciplines of the RRT including: nursing, resident physicians, respiratory therapy, pastoral care, and

nursing supervision. Currently, the RRT education day is in the planning stages and will include collaboration with all disciplines. In addition, the project will be submitted to a peer reviewed journal for publication.

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Appendix A

Evidence RATING Table

Source (Authors, year)	**Objective**/ Study intervention or exposures compared	**Design**	**Sample** (how selected & description)	**Outcomes** studied (how measured)	**Results**	***Level & Quality Rating**
1) Benin, Borgstrom, Jenq, Roumanis, & Horwitz, 2012	To qualitatively describe the impact of a RRT at a large university affiliated hospital.	Qualitative open-ended interviews with multi-disciplinary team during November 2008 to January 2009.	Purposeful sampling with interviewing until no new concepts were identified. Multidisciplinary team included nursing, senior residents, respiratory therapy, house staff, administrators, and RRT team members. n=49 total interviews	Interviews began with a question regarding recent or memorable experience with the RRT. Standard open-ended question techniques were employed for broad discussion of RRT. Interviews were described verbatim by an independent transcriptionist and coded using qualitative coding techniques.	Themes from interviews were categorized into domains: morale/teamwork, education, workload, patient care, hospital administration. Within each domain positive and negative implications emerged. Areas for improvement for each domain were clearly explained and detailed by the interviewee. Positive impact beyond patient mortality included expedited care for critically ill patient, increased employee engagement and morale, and positively influenced hospital throughput.	6B
2) Chan, Jain, Brahmajee, Berg & Sasson, 2010	To examine the effect of RRT's on reducing cardiopulmonary arrest and hospital mortality rates.	Review of RCT's and prospective studies of RRT's that reported data on changes in the primary outcomes of hospital mortality or the secondary outcome of cardiopulmonary arrest cases.	Review of 18 studies from 17 publications were identified and yielded information on the value of the RRT. 18 studies yielded nearly 1.3 million hospital admissions.	Evaluated 18 studies to assess the effectiveness on RRT's on reducing cardiopulmonary arrest and hospital mortality rates using a systematic review of studies published using PubMed, EMBASE, Web of Knowledge, CINAHL, and all Evidence Based Medicine Reviews.	Implementation of RRT in adults was associated with 33.8% reduction in rates of cardiopulmonary arrest outside the ICU (RR, 0.66; CI 0.54-0.80) but was not associated with lower hospital mortality rates.	1A
3) Gerardi, Cronin, Thomas, 2008	To explore the revitalization of a rapid response team.	Retrospective chart review with pre and post intervention data analyzed.	One hospital reported efforts of rejuvenating rapid response team to improve functionality and efficiency within team.	Measured average number of rapid response calls, decrease in code blues, and decrease in code blue outside the ICU.	Average number of RRT calls tripled post intervention as well as a 22% decrease in code blue events. There was a 33% decrease of code blue events outside of the ICU. Also in-	4C

					patient mortality decreased from 2.9 to 2.7%.	
4) Jones, DeVita & Bellomo, 2011	To explore the prevalence and consequences of illness outside the ICU as well as review concepts of rapid response systems.	Review of rapid response systems in acute hospital settings and their effectiveness in improving patient outcomes.	Reviews of evidence from studies providing synthesis and opinion of current literature.	Provides evidence for response-triggering criteria, composition of team, interventions strategies for implementation, and outcome evaluation.	Evidence from effectiveness of RRT's from single-center, non-randomized with a short period of study time suggests further research. Implementation of RRT's may limit skills of floor staff as expert clinicians are always available. Further research is needed with a multi-center, randomized, control trial of rapid response systems to evaluate effectiveness of the system.	7B
5) McNeill & Bryden, 2013	To systematically review literature to assess whether early warning systems or emergency teams improve hospital survival.	Systematic review of RCT's related to early warning systems and emergency response teams examined to evaluate effectiveness.	Review of 43 studies met review criteria and included in systematic review. Studies were arranged in sections: early warning systems, single parameter systems, aggregate weighted scoring systems (AWSS), emergency response systems, medical emergency teams, and multidisciplinary outreach services. Each section was appraised using the SIGN warning system.	Evaluated 43 studies to assess effectiveness of whether early warning systems or emergency teams improve hospital survival (primary outcomes) and secondary measures of unplanned ICU admissions, ICU mortality, length of ICU stay, length of hospital stay, cardiac arrest rates.	Single parameter systems (n=2) examined and no evidence of implementation on single parameter triggering system alone improves hospital mortality. Evidence suggests that AWSS system (n=4) improves hospital survival and reduces both unplanned ICU admission and cardiac arrest rates. Medical emergency teams (n=20) improve hospital survival, reduce unplanned ICU admissions, and reduce cardiac arrest rates. Multidisciplinary outreach services (n=22) are effective in reducing readmission to the ICU and reduce hospital mortality.	1A
6) Shapiro, Donaldson & Scott, 2010	To evaluate the impact of a rapid response team through nurses who utilize	Mixed-method study with review focusing on qualitative portion	Convenience sample of 56 nurses from 9 hospitals that received	Semi-structured interview that was developed and validated by expert panel. Interviews were	Nurses described RRT's as quickly bring need resources to patients and facilitating transfers	6B

	the team.	in publication.	Robert Wood Johnson grants to start RRT's (n=56).	recorded and transcribed verbatim. Thematic analysis was used and coded data based on theme.	to ICU. Challenges to successful use of the RRT included mixed messages from leadership on how to activate and utilize the team.	
7) Sittner, Schmaderer,, Zimmerman, Hertzog, & George, 2009	To determine the impact of Simulated Training for Enhancing Patient Safety (STEPS) on nurses' RRT knowledge and judgment.	Quasi-experimental retrospective chart review. Pre-posttest-within subject design	Convenience sample of 11 Progressive Care Unit nurses. n=13 completion of STEPS intervention and immediate post-test n=11 completed entire study	Compared survey results from after initial intervention and 3 months post- intervention using 19 item pre-post multiple choice instrument developed by the research team to test participant knowledge and clinical judgment in crisis situations.	Implementation of Team STEPS training did not show statistical difference over time; however mean scores increased over time for the participants who completed entire study. Pre-test-M=14.0 Post-test-M=14.45 3-Month post-test-M=14.90	4C
8) Thomas, Force, Rasmussen, Dodd & Whildin, 2007	To describe implementation and effect of a RRT at 128 bed, non-teaching hospital.	Single descriptive, pre-post chart review over 16 month period.	Convenience sample of 267 patients was utilized after implementation of RRT.	Pre and post chart reviews were analyzed to evaluate if RRT was effective in reduction of code blue rate on medical surgical floors and unanticipated transfers to the ICU. Secondary outcomes explored utilization data of RRT including location, time of day, and who activated team.	Implementation of RRT reduced monthly medical surgical floor code blue events by 56% in post 16 month period. Unanticipated transfers to the ICU were decreased by 10%.	6B
9) Winters, Weaver, Pfoh, Yang, Pham, & Dy, 2013	To systematically review the literature to review the effectiveness and implementation of rapid response team in acute hospitals.	Systematic review of 26 articles was reviewed effectiveness of rapid response teams and 17 studies related to rapid response implementation using inclusion and exclusion criteria.	Two reviewers independently screened all abstracts for strength of evidence. Effectiveness n=26 Implementation n=17	Independently reviewed studies graded for strength of evidence. Specifically evaluating effectiveness and implementation of rapid response teams.	Rapid response systems are associated with reduced rates of cardiopulmonary arrest outside of the ICU and reduced mortality.	1A

Source (Authors, year)	Strengths	Weaknesses
1) Benin, Borgstrom, Jenq, Roumanis, & Horwitz, 2012	-Transcription validation completed to ensure for accuracy as well as independent transcriptionist to reduce bias.	-One hospital setting study limits generalizability. -No outside review or expert panel review threatens external validity.

	-Worked in groups to identify emerging categories of themes to strengthen internal validity. -Used purposeful sampling techniques as well as grounded theory as a framework. -Multi-disciplinary interviews strengthen rapid response team results from diverse perspective.	
2) Chan, Jain, Brahmajee, Berg & Sasson, 2010	-Meta-analysis of relevant randomized controlled trials -Well organized with operational definitions and evidence supporting - Databases were stated for basis of search -Potential additions suggested after review of the evidence and helps direct further research -High generalizability with use of RCT's and clinical practice guidelines -Clearly defined inclusion criteria for meta-analysis search -Scrutinized statistical analysis of data for reviewed studies	-Search terms were not clearly stated for the review -No financial disclosures were reported. -Reviewing panel credentials not discussed. -Did not account for patients who were considered DNR possibly skewing mortality scores for this type of event -Did not have patient level data and analyzed at study level -Variation in hospital make up of team (teaching vs. non-teaching) may skew results -Was unable to report on nursing satisfaction, DNR status, and prevention of complications due to study limitations.
3) Gerardi, Cronin & Thomas, 2008	-Clear background and purpose, and theoretical framework. -Appropriate needs assessment and steering committee developed. -Clinical triggers and overall intervention clearly defined. -Positive reinforcement actions to staff promote participation and cooperation. -Graphs clearly displayed results.	-Small sample size with no power analysis -No statistical analysis or discussion completed for comparison of variables. -Did not clearly define what primary and secondary outcomes were in study; just reported results. -Findings were not described well or include a table of results. -Convenience sampling without, blinding of subjects and Hawthorne effect could be present with staff since they are aware of surveillance. -Efforts of one hospital reduce generalizability of study.
4) Jones, DeVita & Bellomo, 2011	-Review of evidence from experts on Rapid Response Systems -Clear evidence sources were denoted with use appropriate citations -Clear operational definitions for rapid response system. -Used evidence from international studies.	-Opinion from paper may not be generalizable to all settings. -Australian physicians may limit generalizability. -No financial disclosures were reported. -Specific reviewing panel/authors credentials not reported.
5) McNeill & Bryden, 2013	- Systematic review of randomized controlled trials on rapid response systems published from 1996-Feb 2012. -Used EMBASE, CINAHL, and Cochrane Databases with consistent keyword search. --Well organized article with levels of evidence and recommendation for the reader based on best evidence from RCT's --Defined work group process of large group of diverse expert panelists for recommendations including external reviewers	-International systematic review and may limit generalizability to US population due to differences in overall health system. -Completed by two English physicians and can limit generalizability of protocols to other countries
6) Sittner, B., Schmaderer, M., Zimmerman, L., Hertzog,	-Conceptualization of study was well designed with pre/post chart reviews and Team STEPS implementation.	-Lack of randomization of subjects to groups; not true experimental design -Small sample size thus limiting generalizability

M., George, B., 2009	-RRT and Team STEPPS operational definitions and variables well-defined in background information. -Clear educational intervention program explained and completed systematically with staff. -Positive experience with nurses, such as offering continuing education, promotes participation in the study.	-No power analysis completed and no inclusion or exclusion criteria -Convenience sample used -Geographic limitations for study and may not be representative of general population -No blinding of subjects and Hawthorne effect could be present with staff since they are aware of study.
7) Shapiro, Donaldson & Scott, 2010.	-Sampled nurses from 9 different hospitals that received Robert Wood Johnson Foundation grants which increases generalizability. -Transcription validation completed to ensure for accuracy. -Worked in pairs to identify emerging categories of themes to strengthen internal validity. -External validity strengthened by including non-participating hospitals to assure for validity.	-Small sample size (n=56) -13 states represented in study, may limit generalizability to entire US population. -Sizes and types of hospitals not discussed. -Grant money received may alter rapid response systems in hospital due to increased resources, thus skewing results.
8) Thomas, Force, Rasmussen, Dodd & Whildin, 2007	-Longevity of study allowed researchers to see difference over time. -Clearly background, study description, and intervention. -Defined sample with inclusion and exclusion criteria.	- Single descriptive, pre-post chart review at one institution limits generalizability. -Small sample size with a convenience sample. -Lack of randomization of subjects to groups; not true experimental design -No power analysis reported
9) Winters, Weaver, Pfoh, Yang, Pham, & Dy, 2013	- Systematic review of randomized controlled trials on rapid response systems published from January 2000 through October 2012. -Used PubMed, PsycINFO, CINAHL, and Cochrane Central Registry of Controlled Trials. -Outside reviewer validated abstracted data with confirmation by second reviewer. -Disclaimer, financial support, and conflicts of interest stated.	-Reviewed only effectiveness studies that reported raw data for morbidity and mortality. -Selected reporting and bias could influence results that were reported. -International systematic review and may limit generalizability to US population due to differences in overall health system.

Level of Evidence	**Number of Studies**	**Summary of Findings**	**Overall Quality** (you may expand further)
1	3	All three systematic reviews showed that the implementation of a rapid response team decreased code blue events outside of the ICU and unanticipated ICU transfers. Winters et al. (2013) & McNeill et al. reported that RRT's improve mortality, whereas Chan et al (2010) reported that RRT's failed to show improved mortality	A-All three systematic reviews used high levels of evidence with explicit inclusion and exclusion criteria. However, Winters et al. (2013) explained quality and strength of evidence rating procedures.
4	2	All studies explored other benefits of the rapid response team than just mortality. All three authors found that rapid response teams have positive effects on patient outcomes	C-Low levels of evidence with insufficient sample sizes included in studies. No randomization present.

		and staff satisfaction.. Gerardi, Cronin & Thomas (2008) explored the revitalization of a rapid response team, whereas Sittner, et al. (2009) explored simulation as a part of training for nurses on a rapid response tea. .	
6	3	Studies explored the implementation and effect of rapid response teams. Thomas et al. (2007) also identified key concepts for implementation. Shapiro, Donaldson & Scott, (2010) and Benin et al. (2012) used qualitative methods to explore the effects of implementation of rapid response teams on the interdisciplinary team.	B-Small sample sizes and lack of randomization limit generalizability. All three articles noted support from scientific evidence, but lacked comprehensive literature review.
7	1	Jones, DeVita & Bellomo (2010) explore the prevalence and consequences of illness outside the ICU as well as review concepts of rapid response systems.	B-Used moderate level evidence of with through literature review.

Quality Rating Scheme (Newhouse et al, 2007) *Rating quality of study (from Newhouse et al., 2007) Newhouse, R.P. (2006). Examining the support for evidence-based nursing practice. Journal of Nursing Administration, 36(7-8), 337-40*

Appendix B

Timeline of Scholarly Project

Implementation of Educational Training Program for Intensive Care Unit Nurses to the Rapid Response Team

Timeline for Scholarly Project									
Goal	2014								
	March	**April**	**May**	**June**	**July**	**August**	**Sept**	**October**	**Nov**
Finalize Project Proposal	**X**	-	-	-	-	-	-	-	-
Present Proposal and Secure Committee Approval	-	**X**	-	-	-	-	-	-	-
Submit to the IRB Committees	-	**X**	**X**	-	-	-	-	-	-
Conduct Project	-	-	-	**X**	-	-	-	-	-
Analyze, Synthesize and Evaluate Findings	-	-	-	-	**X**	**X**	**X**	-	-
Prepare Final Scholarly Project Manuscript	-	-	-	-	-	-	-	**X**	**X**

*Educational intervention is June 27th, 2014

Appendix C

Educational Outline: RRT/METS Nurse Training
June 27, 2014

1. History of RRT/METS
    a. RRT/ METS teams save lives and improve patient safety
        i. Prevent further deterioration in a decompensating patient
        ii. Treatment of unstable patient prior to cardiac arrest
            1. Reduces mortality
            2. Reduces hospital cardiopulmonary arrest rates
    b. Institute of Medicine Report
        i. Errors
        ii. Cost of Errors
        iii. Culture of patient safety and collaboration
    c. Addressing the need to prevent failure to rescue
        i. What is failure to rescue
        ii. Adverse event
    d. Purpose of METS team
        i. Bring critical care expertise to the bedside by providing early intervention and stabilization prior to any adverse health event or cardiac arrest
        ii. Critical care involves dealing with crises
            1. Patients outside of the critical care units may become rapidly ill
            2. Need critical resources and interventions to prevent death
    e. History of METS at facility
        i. Team formation
        ii. Longevity
    f. How METS team can make a difference
        i. Decrease cardiac arrest rates
        ii. Decrease ICU admissions
        iii. Support floor nursing staff
    g. Data from calls
        i. Average number of calls per month
        ii. Data tracked on each call
2. Review of METS Policy
    a. Where can METS policy be found
        i. Intranet
    b. Review of policy
        i. Goal: offset acute clinical deterioration and improve outcomes for the patient in a safe, effective, and efficient manner
        ii. Critical incident

1. An event that can directly cause an adverse patient outcome (Example: delivering the wrong dose of medication)

iii. Triggers for team activation
1. Staff concern
2. Acute change in heart rate
3. Respiratory distress with threatened airway
4. Acute change in level of consciousness
5. New, repeated, or prolonged seizures
6. Acute change in blood pressure
7. Dysrhythmia
8. Decreased urine output without a history of renal dysfunction
9. Failure to respond to treatment
10. Symptoms of Stroke
11. Change in mental status
12. Blood glucose changes

iv. Team composition
1. Critical Care Nurse
2. Senior Medical Resident
3. Respiratory Therapist

c. Responsibilities of the METS Nurse
i. Assessing patients along with senior resident
ii. Collaborates with senior resident on the treatment and plan of care for the patient
iii. Fulfills and implements ordered treatments
iv. Monitors the patient
v. Transports patient to a higher level of care if indicated
vi. Follow-up with patients 4-6 hours if not moved to a higher level of care

d. Questions

3. Assessment/Prioritization
a. Focused assessment on problem area
b. Must prioritize care based on patient's condition
c. Think in terms of A-B-C, H's & T's
d. Collaborate with team and discuss assessment findings to develop plan
e. AMPLE Technique to obtain key information
i. Allergies
ii. Medications
iii. Past Medical History
iv. Last Meal
v. Event

f. Discussion

4. Communication using SBAR
    a. Most common source of error during a crisis situation is miscommunication
        i. Ineffective communication is the leading cause of patient harm
        ii. 2500 Sentinel Events reported and reviewed by TJC
            1. 70% were result of communication failure
    b. Importance of clear communication
        i. Communication effectiveness is key to quality teamwork
        ii. Prevents errors
        iii. Shows cohesiveness of team during METS call
    c. Watch attitude and delivery of communication
        i. Avoid hazardous attitudes
            1. Anti-authority
            2. Impulsive
            3. Invulnerable
            4. Overly confident
            5. Resignation
    d. Video
    e. Discussion
        i. What worked and didn't work?
        ii. How can you improve your communication techniques?
5. Documentation
    a. Importance of accurate documentation
        i. Legal part of patient record
        ii. Be specific as possible
        iii. Make sure its legible
    b. Introduction of METS documentation form
        i. Found on the unit
        ii. Your responsibility to complete form
    c. Step-by-step process of how to document using sheet
        i. Reason for call
        ii. Vital Signs
        iii. Person who made the call
        iv. Notes
        v. Interventions
        vi. Documentation of individual members of the team
    d. Demonstration of documentation
        i. Sample to be filled out
    e. Sheets should be kept together for follow-up if not moved to a higher level of care
        i. After follow-up a copy in the chart, a copy to nurse manager of unit, and copy to director of critical care

    f. METS call that converts to Code Blue documentation
        i. Initiate code blue documentation when event occurs
6. Chain of Command
    a. Senior resident in collaboration with team makes decision on patient disposition
    b. METS RN notifies Nursing Supervisor of bed need
    c. Bed assignment occurs based on nursing supervisor's only
    d. If patient is deteriorating and needs a consult please advocate for patient
        i. Encourage senior resident for expert opinion
            1. Critical Care Consult
7. Leadership Skills
    a. METS RN's are leaders
    b. Work together collaboratively with METS team
    c. Must advocate for patient
        i. Appropriateness of interventions
        ii. Need for consults
8. Special Situations
    a. METS calls on the ground and first floor
        i. ED responds to support METS team
    b. METS calls for visitors
        i. Visitors are not considered patients
        ii. Cannot receive treatment unless in life threatening situation
        iii. Visitors should be taken straight to ED for treatment
    c. Family initiated METS Calls
        i. Families that are concerned about their loved one can call the METS Team
        ii. Ensure family that patient is being cared for and their concerns are addressed
        iii. Patient and family centered care are important
9. Handouts
    a. Power Point Presentation Notes will be provided to each participant the day of the educational intervention
        i. Not to be provided prior to implementation due to pretest completion
10. References
    a. Available upon request

Appendix D

Pretest/Posttest

Number: _____

1. The purpose of the Rapid Response Teams (RRT) or Medical Emergency Teams (METS) is to:
    a. assist the medical-surgical floor staff with additional care for a deteriorating patient
    b. provide expert care at a patient's bedside to provide early intervention and stabilization prior to any adverse event
    c. deal with difficult and combative patients
    d. take over the patient's care when an error has occurred

2. The METS Team Policy can be found:
    a. on the internet
    b. at the patient's bedside
    c. on the intranet
    d. in your manager's office

3. The METS Team is comprised of health care professionals who respond to a patient's bedside and include:
    a. Critical Care Nurse, Senior Resident, and Respiratory Therapist
    b. Primary Nurse, Respiratory Therapist, and Attending Physician
    c. Critical Care Nurse, Physical Therapy, and Nursing Supervisor
    d. Nurse Manager, Critical Care Nurse, and Primary Nurse

4. The most common source of error during a crisis response is:
    a. Miscommunication
    b. Equipment is not available or not working properly
    c. Nurse draws up the wrong medication
    d. Failure to intubate the patient fast enough

5. The single most important task each team member should complete to improve the coordination of the team is:
    a. The team leader should take charge
    b. Introduce him or herself and state the role that he/she will assume
    c. Manage the airway
    d. Attach defibrillator pads

6. A critical incident can be defined as a/an:
    a. abnormal situation or event that requires the attention of a physician or a nurse but it unlikely to harm the patient (Example: blood pressure cuff fails)
    b. event that can directly cause an adverse patient outcome (Example: delivering the wrong dose of medication)
    c. latent physiological precursors that predispose a person to commit an unsafe act that triggers a problem
    d. consequence of an event where harm or other undesirable results occur

7. AMPLE is a mnemonic used to help obtain key information and stands for:
    a. Assessment, medications, pulse, level of care, event
    b. Allergies, medications, past medical history, last meal, event
    c. Arrhythmia, monitor, pain, location, exacerbation
    d. Allergies, monitor, position, level of care, event

8. All of the following are triggers for activation of the METS team *except*:
    a. respiratory distress with threatened airway
    b. new, repeated, or prolonged seizures
    c. acute change in level of consciousness
    d. combative or agitated behavioral pattern

9. Documentation of the METS event should be on the:
    a. electronic medical record
    b. METS documentation form
    c. doctors event note only
    d. code blue event sheet

10. The responsibility of the METS nurse includes:
    a. assessing patients along with senior resident
    b. giving medications during the event
    c. deciding on the plan of care for the patient
    d. being the leader of the METS team

Appendix E

Stroke Simulation

Date: June 27. 2014 **File Name: Stroke**

Discipline: METS/RRT Training **Student Level: RRT Training**

Expected Simulation Run Time: 15 mins **Guided Reflection Time: 45 minutes**

Location: Simulation Lab

Admission Date: June 25th, 2014 **Today's Date: June 27, 2014** **Brief Description of Client** **Name: Maria Lopez** **Gender: Female** **Age: 27** **Race: Hispanic** **Weight: 90.4 kg Height: 5'2"** **Major Support: Family** **Allergies: Penicillin** **Immunizations: Flu 2013** **Attending Physician/Team: Dr. House** **Past Medical History: migraines, HTN, asthma, smoker, depression** **History of Present illness: Acute onset of right-sided facial droop, right-sided weakness, and aphasia onset this AM.** **Social History: Smoker, social drinking** **Surgeries/Procedures & Dates: None**	**Cognitive Activities Required prior to Simulation [i.e. independent reading (R), video review (V), computer simulations (CS), lecture (L)]** **Lecture**

Simulation Learning Objectives

1. Prompt recognition of stroke symptoms and activation of stroke protocol.
2. Facilitate prompt neurological assessment including last known normal.
3. Recognize need for additional testing and diagnostic imaging as part of the stroke protocol.
4. Monitoring of vital signs per stroke protocol.
5. Verbalize the use of t-PA as a treatment for stroke as an option if appropriate.
6. Collaborate with multi-disciplinary team to appropriately expedite care.

Fidelity (choose all that apply to this simulation)

Setting/Environment	**Medications and Fluids**
☐ **ER**	☒ **IV Fluids: t-PA**
☒ **Med-Surg**	☐ **Oral Meds:**
☐ **Peds**	☐ **IVPB:**
☐ **ICU**	☐ **IV Push:**
☐ **OR / PACU**	☐ **IM or SC:**
☐ **Women's Center**	
☐ **Behavioral Health**	**Diagnostics Available**
☐ **Home Health**	☒ **Labs**
☐ **Pre-Hospital**	☒ **X-rays (Images)**
☐ **Other:**	☒ **12-Lead EKG**
	☐ **Other:**
Simulator Manikin/s Needed: SimMan	
Props: NIH Stroke Scale	Documentation Forms

Equipment attached to manikin:

- ☒ **IV tubing with primary line fluids running at mL/hr**
- ☐ **Secondary IV line running at mL/hr**
- ☒ **IV pump**
- ☐ **Foley catheter mL output**
- ☐ **PCA pump running**
- ☐ **IVPB with running at mL/hr**
- ☐ **02**
- ☒ **Monitor attached**
- ☐ **ID band**
- ☐ **Other:**

Equipment available in room

- ☐ **Bedpan/Urinal**
- ☐ **Foley kit**
- ☐ **Straight Catheter Kit**
- ☐ **Incentive Spirometer**
- ☐ **Fluids**
- ☒ **IV start kit**
- ☐ **IV tubing**
- ☐ **IVPB Tubing**

- ☒ **Physician Orders**
- ☒ **Admit Orders**
- ☒ **METS Documentation Sheet**
- ☐ **Medication Administration Record**
- ☐ **Kardex**
- ☐ **Graphic Record**
- ☐ **Shift Assessment**
- ☐ **Triage Forms**
- ☐ **Code Record**
- ☐ **Anesthesia / PACU Record**
- ☐ **Standing (Protocol) Orders**
- ☐ **Transfer Orders**
- ☐ **Other:**

Recommended Mode for Simulation (i.e. manual, programmed, etc.)
Manual

☒ **IV Pump** ☐ **Feeding Pump** ☐ **Pressure Bag** ☒ **02 delivery device (type) Nasal Cannula** ☐ **Crash cart with airway devices and emergency medications** ☐ **Defibrillator/Pacer** ☐ **Suction** ☐ **Other:**	
Roles/Guidelines for Roles ☒ **Primary Nurse** ☒ **METS Nurse** ☐ **Clinical Instructor** ☒ **Family Member #1** ☐ **Family Member #2** ☐ **Observer/s** ☒ **Recorder** ☒ **Resident Physician** ☒ **Respiratory Therapy** ☐ **Anesthesia** ☐ **Pharmacy** ☐ **Lab** ☐ **Imaging**	**Student Information Needed Prior to Scenario:** ☒ **Has been oriented to simulator** ☒ **Understands guidelines /expectations for scenario** ☒ **Has accomplished all pre-simulation requirements** ☒ **All participants understand their assigned roles** ☐ **Has been given time frame expectations** ☐ **Other:**

☐ **Social Services** ☐ **Clergy** ☐ **Unlicensed Assistive Personnel** ☐ **Code Team** ☐ **Other:**	

Scenario Story Boarding Tool: Acute Stroke

Participants: Critical Care Nurses in Rapid Response Training Education

Teaching Objectives:

1. Prompt recognition of stroke symptoms and activation of stroke protocol.

2. Facilitate prompt neurological assessment including last known normal.

3. Recognize need for additional testing and diagnostic imaging as part of the stroke protocol.

4. Monitoring of vital signs per stroke protocol.

5. Verbalize the use of t-PA as a treatment for stroke as an option if appropriate.

6. Collaborate with multi-disciplinary team to appropriately expedite care.

Location: Nursing Simulation Lab

Actors:
1. Patient
2. Patient's aunt (very concerned)
3. Primary nurse
4. Rapid Response Nurse
5. Medical Resident
6. Respiratory Therapist

Setting: Medical/Surgical Floor

Scripting:

Beginning of Simulation:
Patient lying in bed on Medical/Surgical floor with family member in room
Patient history known by nurse
Vital signs: HR: 89, BP 122/62, RR 20, SpO2: 98 on Room Air (Last set)
IV access PIV #22 R AC with NS 0.9 @ 75 ml/hr

Medications:
Coreg 6.25 mg po BID, Asprin 81 mg po Qday, Pepcid 20 mg po Qday, Tylenol 650 mg q6 hrs prn pain, Multivitamin 1 tab Qday

Name: Maria Lopez
Gender: Female
Age: 47

Race: Hispanic
Weight: 90.4 kg Height: 5'2"
Major Support: Family
Allergies: Penicillin
Immunizations: Flu 2013
Attending Physician/Team: Dr. House
Past Medical History: migraines, HTN, asthma, smoker, depression
History of Present illness: Acute onset of right-sided facial droop, right-sided weakness, dysarthria, and aphasia onset this AM.
Social History: Smoker, social drinking
Surgeries/Procedures & Dates: None

Lab Results:
WBC: 8.0
Hgb: 12
Hct: 36
Platelets: 250
Na: 135
K: 3.5
Cl: 102
CO2: 26
BUN: 10
Creat: 0.8
Random glucose: 168

Equipment:

NS @ 75 through PIV, Supplies to draw blood, cardiac monitor, NIH Stroke Scale

Scenario:

Patient's aunt called the nurse because she was concerned about her niece. She is being treated for migraines on the neuro floor. She became confused, couldn't speak and has a left sided facial droop. The current vital signs are HR: 120, BP 108/68, RR: 18, SpO2: 96. Patient cannot speak at this time and also has right sided weakness in arm and leg. The primary nurse recognizes that this could be an acute stroke and activates the Rapid Response Team.

References, Evidence-Based Practice Guidelines, Protocols, or Algorithms Used For This Scenario (site source, author, year, and page):

Gasper, M. & Dillion, P. (2012). *Clinical simulations for nursing education: Instructor volume.* Philadelphia, PA: F. A. Davis Company.

Gasper, M. & Dillion, P. (2012). *Clinical simulations for nursing education: Student volume.* Philadelphia, PA: F. A. Davis Company.

Stroke community resources and education. (2014). Retrieved from http://www.strokeassociation.org/STROKEORG/Professionals/Stroke-Resources-for-Professionals_UCM_308581_SubHomePage.jsp

Debriefing/Guided Reflection Questions for This Simulation (May not use all)

1. How did you feel throughout the simulation experience?
2. Describe the objectives you were able to achieve?
3. Which ones were you unable to achieve (if any)?
4. Did you have the knowledge, time, and skills to meet objectives?
5. How satisfied with your ability to work through the simulation?
6. To Observer: In what ways could the nurses have handled any aspects of the simulation differently?
7. If you were able to do this again, how could you have handled the situation differently?
8. What did the group do well?
9. What were the key assessments and interventions?
10. Is there anything else you would like to discuss?

Appendix F

Acute Respiratory Distress Syndrome (ARDS) Simulation

Date: June 27. 2014
File Name: ARDS
Discipline: METS/RRT Training
Student Level: RRT Training
Expected Simulation Run Time: 15 mins
Guided Reflection Time: 45 minutes
Location: Simulation Lab

Admission Date: June 24th, 2014 **Today's Date: June 27, 2014** **Description of Client** **Name: Ty Nguyen** **Gender: Male** **Age: 55** **Ethnicity: Vietnamese** **Weight: 78.4 kg Height: 5'8"** **Major Support: Family** **Allergies: NKDA** **Immunizations: Flu 2013** **Attending Physician/Team: Dr. Jones** **Past Medical History: COPD** **History of Present illness: Acute onset of shortness of breath including accessory muscle use. Increased number of neb treatments requested.** **Social History: Smoker (60 pack years)** **Surgeries/Procedures & Dates: Appendectomy 1989, Bowel resection 1992**	**Cognitive Activities Required prior to Simulation [i.e. independent reading (R), video review (V), computer simulations (CS), lecture (L)]** **Lecture**

Simulation Learning Objectives

1. Prompt recognition of ARDS symptoms and need to facilitate prompt intervention.

2. Focused respiratory assessment including onset of symptoms.

3. Recognize need for additional lab and diagnostic testing.

4. Monitoring of vital signs and advanced monitoring.

5. Verbalize the need to escalate care including intubation.

6. Collaborate with multi-disciplinary team to appropriately expedite care.

7. Verbalize drugs and equipment used for intubation and how to prepare for procedure.

Fidelity (choose all that apply to this simulation)

Setting/Environment	**Medications and Fluids**
☐ **ER**	☒ **IV Fluids: t-PA**
☒ **Med-Surg**	☐ **Oral Meds:**
☐ **Peds**	☐ **IVPB:**
☐ **ICU**	☒ **IV Push:**
☐ **OR / PACU**	☐ **IM or SC:**
☐ **Women's Center**	
☐ **Behavioral Health**	**Diagnostics Available**
☐ **Home Health**	☒ **Labs**
☐ **Pre-Hospital**	☒ **X-rays (Images)**
☐ **Other:**	☒ **12-Lead EKG**
	☐ **Other:**
Simulator Manikin/s Needed: SimMan	
Equipment attached to manikin:	Documentation Forms
☒ **IV tubing with primary line fluids running at mL/hr**	☒ **Physician Orders**
☐ **Secondary IV line running at mL/hr**	☒ **Admit Orders**
☒ **IV pump**	☒ **METS Documentation Sheet**
☐ **Foley catheter mL output**	☒ **Medication Administration Record**
☐ **PCA pump running**	☐ **Kardex**
☐ **IVPB with running at mL/hr**	☐ **Graphic Record**
☐ **02**	☐ **Shift Assessment**
☒ **Monitor attached**	☐ **Triage Forms**
	☐ **Code Record**

☒ **ID band** ☐ **Other:** Equipment available in room ☐ **Bedpan/Urinal** ☒ **Foley kit** ☐ **Straight Catheter Kit** ☐ **Incentive Spirometer** ☐ **Fluids** ☒ **IV start kit** ☐ **IV tubing** ☐ **IVPB Tubing** ☒ **IV Pump** ☐ **Feeding Pump** ☐ **Pressure Bag** ☒ **02 delivery device (type) Nasal Cannula** ☐ **Crash cart with airway devices and emergency medications** ☐ **Defibrillator/Pacer** ☐ **Suction** ☐ **Other:**	☐ **Anesthesia / PACU Record** ☐ **Standing (Protocol) Orders** ☐ **Transfer Orders** ☐ **Other:** **Recommended Mode for Simulation (i.e. manual, programmed, etc.)** Manual
Roles/Guidelines for Roles ☒ **Primary Nurse**	**Student Information Needed Prior to Scenario:**

☒ **METS Nurse** ☐ **Clinical Instructor** ☒ **Family Member #1** ☐ **Family Member #2** ☐ **Observer/s** ☒ **Recorder** ☒ **Resident Physician** ☒ **Respiratory Therapy** ☒ **Anesthesia** ☐ **Pharmacy** ☐ **Lab** ☐ **Imaging** ☐ **Social Services** ☐ **Clergy** ☐ **Unlicensed Assistive Personnel** ☐ **Code Team** ☐ **Other:**	☒ **Has been oriented to simulator** ☒ **Understands guidelines /expectations for scenario** ☒ **Has accomplished all pre-simulation requirements** ☒ **All participants understand their assigned roles** ☐ **Has been given time frame expectations** ☐ **Other:**

Scenario Story Boarding Tool: Acute Respiratory Distress Syndrome (ARDS)

Participants: Critical Care Nurses in Rapid Response Training Education

Teaching Objectives:

1. Prompt recognition of ARDS symptoms and need to facilitate prompt intervention.

2. Focused respiratory assessment including onset of symptoms.

3. Recognize need for additional lab and diagnostic testing.

4. Monitoring of vital signs and advanced monitoring.

5. Verbalize the need to escalate care including intubation.

6. Collaborate with multi-disciplinary team to appropriately expedite care.

7. Verbalize drugs and equipment used for intubation and how to prepare for procedure.

Location: Nursing Simulation Lab

Actors:
1. Patient
2. Patient's wife (very concerned)
3. Primary nurse
4. Rapid Response Nurse
5. Medical Resident
6. Respiratory Therapist

Setting: Medical/Surgical Floor

Scripting:

Beginning of Simulation:
Patient lying in bed on Medical/Surgical floor with family member in room
Patient history known by nurse
Vital signs: HR: 132, BP 140/72, RR 28, SpO2: 92 on Room Air (Last set)
IV access PIV #20 L FA with NS 0.9 @ 75 ml/hr
Medications: Albuterol/Atrovent neb treatments Q4hrs, Albuterol/Atrovent neb treatments Q2hrs PRN, Heparin 5000 units SQ q8.

Lab Results:
WBC: 9.0

Hgb: 14
Hct: 42
Platelets: 300
Na: 136
K: 3.6
Cl: 102
CO2: 22
BUN: 21
Creat: 1.1
Random glucose: 100

Name: Ty Nguyen
Gender: Male
Age: 55
Ethnicity: Vietnamese
Weight: 78.4 kg Height: 5'8"
Major Support: Family
Allergies: NKDA
Immunizations: Flu 2013
Attending Physician/Team: Dr. Jones
Past Medical History: COPD
History of Present illness: Acute onset of shortness of breath including accessory muscle use. Increased number of neb treatments requested.
Social History: Smoker (60 pack years)
Surgeries/Procedures & Dates: Appendectomy 1989, Bowel resection 1992

Equipment:

NS @ 75 through PIV, Supplies to draw blood, cardiac monitor, glidoscope, intubation kit

Scenario:

Patient's wife called the nurse because she was concerned about her husband. He is being treated for a COPD exacerbation on the medical-surgical floor. He became very short of breath and can only speak two words at a time. He became very agitated and restless. The primary nurse initiated a rapid response call. The current vital signs are HR: 140, BP 98640, RR: 34, SpO2: 88. Patient is using accessory muscles and gasping for air. The Rapid Response Team arrives…

References, Evidence-Based Practice Guidelines, Protocols, or Algorithms Used For This Scenario:

Gasper, M. & Dillion, P. (2012). *Clinical simulations for nursing education: Instructor volume.* Philadelphia, PA: F. A. Davis Company.

Gasper, M. & Dillion, P. (2012). *Clinical simulations for nursing education: Student volume.* Philadelphia, PA: F. A. Davis Company.

Debriefing/Guided Reflection Questions for This Simulation (May not use all)

1. How did you feel throughout the simulation experience?
2. Describe the objectives you were able to achieve?
3. Which ones were you unable to achieve (if any)?
4. Did you have the knowledge, time, and skills to meet objectives?
5. How satisfied with your ability to work through the simulation?
6. To Observer: In what ways could the nurses have handled any aspects of the simulation differently?
7. If you were able to do this again, how could you have handled the situation differently?
8. What did the group do well?
9. What were the key assessments and interventions?
10. Is there anything else you would like to discuss?

Appendix G

Shock Simulation

Simulation Design Template

Date: June 27. 2014
File Name: Shock
Discipline: METS/RRT Training
Student Level: RRT Training
Expected Simulation Run Time: 15 mins
Guided Reflection Time: 45 minutes
Location: Simulation Lab

Admission Date: June 26th, 2014 **Today's Date: June 27, 2014** **Brief Description of Client** **Name: Harold Dunbrow** **Gender: Male** **Age: 63** **Ethnicity: American** **Weight: 98.4 kg Height: 5'11"** **Major Support: Family** **Allergies: Asprin** **Immunizations: Flu 2013** **Attending Physician/Team: Dr. Smith** **Past Medical History: GERD, Diabetes, Type II, HTN** **History of Present illness: Gastric ulcer** **Social History: No smoking or illicit drug use** **Surgeries/Procedures & Dates: None**	**Cognitive Activities Required prior to Simulation [i.e. independent reading (R), video review (V), computer simulations (CS), lecture (L)]** **Lecture**

Simulation Learning Objectives

1. Prompt recognition of symptoms of shock and need to facilitate prompt intervention.

2. Focused cardiovascular assessment including onset of symptoms.

3. Recognize need for additional lab and diagnostic testing.

4. Monitoring of vital signs and advanced monitoring.

5. Verbalize the need to escalate care including expert consultation.

6. Collaborate with multi-disciplinary team to appropriately expedite care.

7. Verbalize drugs and equipment used for treatment of shock and how to prepare for fluid resuscitation.

Fidelity (choose all that apply to this simulation)

Setting/Environment

- ☐ **ER**
- ☒ **Med-Surg**
- ☐ **Peds**
- ☐ **ICU**
- ☐ **OR / PACU**
- ☐ **Women's Center**
- ☐ **Behavioral Health**
- ☐ **Home Health**
- ☐ **Pre-Hospital**
- ☐ **Other:**

Simulator Manikin/s Needed: SimMan

Props: None

Equipment attached to manikin:

- ☒ **IV tubing with primary line fluids running at mL/hr**
- ☐ **Secondary IV line running at mL/hr**
- ☒ **IV pump**
- ☐ **Foley catheter mL output**
- ☐ **PCA pump running**
- ☐ **IVPB with running at mL/hr**
- ☐ **02**

Medications and Fluids

- ☒ **IV Fluids: NS 0.9 1 L Bag; Norepinephrine IV**
- ☐ **Oral Meds:**
- ☐ **IVPB:**
- ☒ **IV Push: Phenylephrine**
- ☐ **IM or SC:**

Diagnostics Available

- ☒ **Labs**
- ☒ **X-rays (Images)**
- ☒ **12-Lead EKG**
- ☐ **Other:**

Documentation Forms

- ☒ **Physician Orders**
- ☒ **Admit Orders**
- ☒ **METS Documentation Sheet**
- ☒ **Medication Administration Record**
- ☐ **Kardex**
- ☐ **Graphic Record**
- ☐ **Shift Assessment**
- ☐ **Triage Forms**
- ☐ **Code Record**

☒ **Monitor attached** ☒ **ID band** ☐ **Other:** Equipment available in room ☐ **Bedpan/Urinal** ☐ **Foley kit** ☐ **Straight Catheter Kit** ☐ **Incentive Spirometer** ☐ **Fluids** ☒ **IV start kit** ☐ **IV tubing** ☐ **IVPB Tubing** ☒ **IV Pump** ☐ **Feeding Pump** ☐ **Pressure Bag** ☒ **02 delivery device (type) Nasal Cannula** ☐ **Crash cart with airway devices and emergency medications** ☐ **Defibrillator/Pacer** ☐ **Suction** ☐ **Other:**	☐ **Anesthesia / PACU Record** ☐ **Standing (Protocol) Orders** ☐ **Transfer Orders** ☐ **Other:** **Recommended Mode for Simulation (i.e. manual, programmed, etc.)** Manual
Roles/Guidelines for Roles ☒ **Primary Nurse**	**Student Information Needed Prior to Scenario:**

☒ **METS Nurse** ☐ **Clinical Instructor** ☒ **Family Member #1** ☐ **Family Member #2** ☐ **Observer/s** ☒ **Recorder** ☒ **Resident Physician** ☒ **Respiratory Therapy** ☒ **Anesthesia** ☐ **Pharmacy** ☐ **Lab** ☐ **Imaging** ☐ **Social Services** ☐ **Clergy** ☐ **Unlicensed Assistive Personnel** ☐ **Code Team** ☐ **Other:**	☒ **Has been oriented to simulator** ☒ **Understands guidelines /expectations for scenario** ☒ **Has accomplished all pre-simulation requirements** ☒ **All participants understand their assigned roles** ☐ **Has been given time frame expectations** ☐ **Other:** **Report Students Will Receive Before Simulation** **Time:**

Scenario Story Boarding Tool: Shock

Participants: Critical Care Nurses in Rapid Response Training Education

Teaching Objectives:

1. Prompt recognition of symptoms of shock and need to facilitate prompt intervention.

2. Focused cardiovascular assessment including onset of symptoms.

3. Recognize need for additional lab and diagnostic testing.

4. Monitoring of vital signs and advanced monitoring.

5. Verbalize the need to escalate care including expert consultation.

6. Collaborate with multi-disciplinary team to appropriately expedite care.

7. Verbalize drugs and equipment used for treatment of shock and how to prepare for fluid resuscitation.

Location: Nursing Simulation Lab

Actors:
1. Patient
2. Patient's wife (very concerned)
3. Primary nurse
4. Rapid Response Nurse
5. Medical Resident
6. Respiratory Therapist

Setting: Medical/Surgical Floor

Scripting:

Beginning of Simulation:
Patient lying in bed on Medical/Surgical floor with family member in room
Patient history known by nurse
Vital signs: HR: 114, BP 100/62, RR 20, SpO2: 95 on Room Air (Last set)
IV access PIV #20 L AC with NS 0.9 @ 100 ml/hr
Medications: Protonix 40 mg IV BID, Sliding Scale Insulin AC/HS-Insulin Aspart, Heparin 5000 units SQ q8 hours, Oxycodone 5 mg po prn pain Q6 hrs

Lab Results:
WBC: 14.0
Hgb: 13
Hct: 39
Platelets: 150
Na: 137
K: 3.5
Cl: 102
CO2: 26
BUN: 10
Creat: 0.9
Random glucose: 272

Name: Harold Dunbrow
Gender: Male
Age: 63
Ethnicity: American
Weight: 98.4 kg Height: 5'11
Major Support: Family
Allergies: Asprin
Immunizations: Flu 2013
Attending Physician/Team: Dr. Smith
Past Medical History: GERD, Diabetes, Type II, HTN
History of Present illness: Gastric ulcer
Social History: No smoking or illicit drug use
Surgeries/Procedures & Dates: None

Equipment:

NS @ 100 through PIV, Supplies to draw blood, pressure bags, cardiac monitor

Scenario:

Patient's wife called the nurse because she was concerned about her husband. He is being treated for a gastric ulcer on the medical-surgical floor. He became very nauseated and began vomiting bright red blood with clots. He became very lethargic and pale. The primary nurse initiated a rapid response call. The current vital signs are HR: 130, BP 80/40, RR: 22, SpO2: 95. Patient states he is not feeling well and may have to vomit again. The Rapid Response Team arrives…

References, Evidence-Based Practice Guidelines, Protocols, or Algorithms Used For This Scenario:

Gasper, M. & Dillion, P. (2012). *Clinical simulations for nursing education: Instructor volume.* Philadelphia, PA: F. A. Davis Company

Gasper, M. & Dillion, P. (2012). *Clinical simulations for nursing education: Student volume.* Philadelphia, PA: F. A. Davis Company

Debriefing/Guided Reflection Questions for This Simulation (May not use all)

1. How did you feel throughout the simulation experience?
2. Describe the objectives you were able to achieve?
3. Which ones were you unable to achieve (if any)?
4. Did you have the knowledge, time, and skills to meet objectives?
5. How satisfied with your ability to work through the simulation?
6. To Observer: In what ways could the nurses have handled any aspects of the simulation differently?
7. If you were able to do this again, how could you have handled the situation differently?
8. What did the group do well?
9. What were the key assessments and interventions?
10. Is there anything else you would like to discuss?

Appendix H

Demographic Questions

Please circle the letter in front of the correct response.

1. Indicate your age range
    a. 18-30
    b. 31-40
    c. 41-59
    d. Greater than 60 years old

2. Number of years of experience as a registered nurse
    a. 1-5 years
    b. 6-10 years
    c. 11-15 years
    d. More than 20 years

3. Number of years of experience in critical care nursing
    a. 1-5 years
    b. 6-10 years
    c. 11-15 years
    d. More than 20 years

4. Indicate the number of years in current position
    a. 1-5 years
    b. 6-10 years
    c. 11-15 years
    d. More than 20 years

5. Highest degree obtained
    a. Diploma
    b. Associate degree
    c. Bachelor's degree
    d. Master's degree

Participation in demographic data process is voluntary. Your information will be respected for privacy and anonymity.

Appendix I

Student Satisfaction and Self-Confidence in Learning

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

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

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

 Revised December 22, 2004

Appendix J

Permission for Tool Use

NLN/Laerdal Medical Simulation Template:

Downloaded from http://sirc.nln.org with the permission of the National League for Nursing and Laerdal Medical. This document may be reproduced as long as it retains the following copyright statement:

Student Satisfaction and Self-Confidence in Learning:

Dear Stephanie,

It is my pleasure to grant you permission to use the "Educational Practices Questionnaire," "Simulation Design Scale" and "Student Satisfaction and Self-Confidence in Learning" NLN/Laerdal Research Tools. (I typically send all 3 at the same time, so you won't have to make another request).

In granting permission to use the instruments, it is understood that the following caveats will be respected:

1. It is the sole responsibility of (you) the researcher to determine whether the NLN questionnaire is appropriate to her or his particular study.

2. Modifications to a survey may affect the reliability and/or validity of results. Any modifications made to a survey are the sole responsibility of the researcher.

3. When published or printed, any research findings produced using an NLN survey must be properly cited. If the content of the NLN survey was modified in any way, this must also be clearly indicated in the text, footnotes and endnotes of all materials where findings are published or printed.

I am pleased that material developed by the National League for Nursing is seen as valuable as you evaluate ways to enhance learning, and I am pleased that we are able to grant permission for use of the "Educational Practices Questionnaire," "Simulation Design Scale" and "Student Satisfaction and Self-Confidence in Learning" instruments.

Warm Regards, Amy

Amy McGuire | Administrative Coordinator, NLN Chamberlain Center | National League for Nursing | www.nln.org |

Appendix K

Data Collection for Pretest-Posttest

Descriptive Statistics (Wilcoxon Signed-Rank Test)

	N	Mean	Std. Deviation	Minimum	Maximum
Pre Test	14	7.93	1.07	6	10
Posttest	14	9.07	0.73	8	10

Ranks (Wilcoxon Signed-Rank Test)

		N	Sum of Ranks
Posttest Pretest	Negative Ranks Positive Ranks Ties Total	11 11 3 14	66 0

Test Statistics (Wilcoxon Signed-Rank Test)

	Posttest Pretest
Z Asymp. Sig. (2-tailed)	-2.93 p=0.00338

Appendix L

Data Collection for Student Satisfaction and Self Confidence in Learning Tool

Student Satisfaction and Self-Confidence in Learning

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Student Satisfaction	6	4.80	0.36	4.08	5.00

Appendix M

Demographic Data

Age (years)		n	%
	18-30	6	43
	31-40	3	21
	41-59	5	36
	>60	0	0
Years as RN		n	%
	1-5	7	50
	6-10	3	21
	11-15	2	14.5
	>20	2	14.5
Years as Critical Care RN		n	%
	1-5	9	64
	6-10	3	21
	11-15	0	0
	>20	2	15
Years in Current Positon		n	%
	1-5	9	64
	6-10	3	21
	11-15	0	0
	>20	2	15
Highest Degree Obtained		n	%
	Diploma	0	0
	Associates	7	50
	Bachelors	7	50
	Masters	0	0

Appendix N

A Model of Nursing as a Complex Adaptive System