THE USE OF SIMULATION TO IMPROVE KNOWLEDGE RETENTION IN JUNIOR-LEVEL BACHELOR OF SCIENCE IN NURSING STUDENTS STUDYING CEREBRAL VASCULAR ACCIDENT

By

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Abstract

Retention of classroom learning is foundational to clinical reasoning and adequate practice for student nurses particularly when confronted with critical clinical situations such as acute stroke. Simulation has been successful in developing clinical reasoning, however little is known if it helps retention of key classroom material**.** This cross-sectional interventional project examined the use of simulation to improve knowledge retention in junior-level BSN students of classroom material about stroke. The intervention group was exposed to a simulation scenario along with usual classroom lecture and reading. Retention of classroom material was assessed in intervention and control groups by pretest and repeated post-test at one and six weeks.

One hundred forty-one participants (111 traditional undergraduates and 30 TTN) were enrolled from a gerontology course taught over fall and spring semesters. Mean delayed post-test scores of the intervention group (n=76, m=15.64, SD 2.62) were significantly higher than the control group (n=65,m =14.35,SD 2.35), (t(139) =-.3054, p=.003), with a moderate effect size Cohen's d = .52, indicating the simulation experience increased retention of classroom didactic material. No significant relationships were found between mean score and gender, previous exposure to a client or family member with stroke, or previous use of simulation. There was a significant difference (p <.05) between delayed mean post-test scores between traditional (n=110) and TTN students (n=31), however due to inequality in numbers this must be interpreted with caution. The use of simulation increased retention of classroom learning in prelicensure BSN students.

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Chapter One: Introduction

Nursing is an art. The patient population desires and expects nursing staff to perform with skill and competence. As the population continues to age, higher levels of complex, patient care situations are an expectation in healthcare. In January 2011, the first of the baby boomers reached 65 years of age (Eliopoulos, 2013). Baby boomers are individuals born between 1946 and 1964. By the year 2030, in the United States (US), all of the baby boomers will have moved into the ranks of the older population, which will result in a shift in the age structure from 13% of the older adults being 65 or older in 2010 to 19% by the year 2030 (US Census Bureau, 2013). An increase of healthcare professionals is necessary to meet the specific health challenges of baby boomers reaching retirement age (Eliopoulos, 2013). Medical technology is a contributing factor to the survival of older adults suffering from chronic conditions that would have resulted in death in the past. With the increased number of adults in the older population with co-morbid chronic diseases, more attention needs to be given to the care of this population. At least 80 percent of older adults live with at least one chronic illness; therefore, an increase of healthcare professionals understanding the specific care needs of the older adult population is necessary to meet the specific health challenges of baby boomers reaching retirement age.

Numerous nursing schools graduate nursing students with limited clinical experience (Secomb, McKenna, & Smith, 2012). As a result, the critical thinking skills and clinical reasoning needed for adequate clinical practice by nursing graduates may be lacking (Secomb et al., 2012). In addition, it is difficult to assess the student's retention of classroom learning, which is foundational to clinical reasoning and adequate practice,

with limited time to observe the student in a clinical practice setting. Traditional approaches to measure student skill acquisition were through checklists, but it is essential that teaching the importance of clinical reasoning during clinical application is emphasized to provide safe patient care in situations of an increasingly complex healthcare environment (Gonzol & Newby, 2013).

Sanford (2010) states the use of simulation has been in practice since World War II when it was utilized for training exercises for pilots. She continues that in 2003, the National League of Nursing (NLN) authorized the use of simulation experiences for nursing schools to improve critical thinking skills and self- reflection. She states nursing students, who were involved in an exploratory study, voiced that simulation experiences bridged the gap between the classroom and the laboratory setting. The students also voiced simulation was superior for learning in comparison to reading the information in a textbook.

Incorporating simulation into classroom experiences permits students to develop clinical nursing skills in a protected, non-threatening environment (Secomb et al., 2012). Simulations are learning opportunities that mimic a clinical setting, permitting students to practice procedures, the art of decision making, and critical thinking skills (Sexton, Stobbe, & Lessick, 2012). Simulation is a powerful teaching tool that enables nursing students to think critically because the experience provides students with specific learning opportunities to practice clinical situations studied in a classroom in a simplified environment, such as working with a patient experiencing a health problem such as stroke or heart attack (Benner, Hughes, & Sutphen, 2008).

The American Association of Colleges of Nurses (AACN) defines critical thinking as the deliberate nonlinear process of collecting, interpreting, analyzing, drawing conclusions about, presenting, and evaluating information that is both factual and belief based. Nursing demonstrates this through clinical judgment, which includes ethical, diagnostic, and therapeutic dimensions and research (AACN, 2008). The three important aspects of critical thinking are quick thinking (practice thinking on one's feet); creative thinking (thinking "outside of the box" – boundaries, stated parameters); and analytical thinking (solving problems logically, using a scientific approach of defining the problem, generating a list of possible solutions, selecting a solution, implementing, evaluating and making adjustments) (Smith & Stitts, 2012). However, little is known if exposure to simulation in addition to traditional classroom teaching increases the retention of basic knowledge that provides the necessary footing for critical thinking and clinical reasoning once the student is out in practice.

Background

Simulation has been utilized as an adjunct for learning within the pre-licensure division of nursing at a Midwestern Christian University. Faculty are not encouraged or discouraged from using simulation as a learning tool within the courses being taught.

Gerontology is the only course that provides information relating to cerebral vascular accidents (CVA) in the curriculum within this nursing division. It is imperative that nursing students learn the material presented in the text and the classroom, as well as the ability to identify specific criteria needed during the assessment process to avert the disastrous sequelae of a CVA if caught and acted upon in time. CVA is the fourth leading

cause of death in the United States (US) with at least 800,000 individuals in the US diagnosed each year (Center for Disease Control [CDC], 2014). On the average, one American dies from a CVA every four minutes (CDC, 2014). Three quarters of CVAs in the US occur in individuals older than 65 years of age (Internet Stroke Center, 2014). It is, therefore, imperative that nursing students are provided with the vital information that can avert the disastrous results that may occur for a person experiencing a CVA. Thus while simulation is becoming increasingly popular in undergraduate nursing education and may help develop the critical thinking skills necessary for novice nurses to apply didactic classroom information to the clinical setting, it is unclear if the use of simulation actually improves retention of this foundational knowledge over traditional classroom teaching.

Purpose of the Evidence Based Project

The purpose of this project was to determine if the addition of a simulation module would increase learning retention of the course material (CVA) in junior level baccalaureate nursing students enrolled in gerontology. Previously, students received the reading assignment and lecture over CVA content. Later in the semester, an exam was given to test the CVA knowledge retained by students. Since gerontology is the only course in which students receive CVA learning materials, a need was identified to assess the level of learning retention among gerontology students.

SWOT Analysis. Prior to initiating implementation of this project, a SWOT analysis was conducted to identify the strengths, weaknesses, opportunities and threats. Pearce (2007) stated that completing a SWOT analysis prior to a project implementation will assist the project manager to focus on opportunities and strengths for the project.

Strengths and opportunities identified specifically for this project included first, the simulation laboratory, which allowed for adequate time and space for students to practice in a nonthreatening, safe environment. The students utilizing kinesthetic learning to assist with retaining the material from the simulation experience was another identified strength. A third strength/opportunity included a pre-test/post-test and second post-test several weeks later to enable the project manager in effectively identifying the students' level of learning retention. The weaknesses identified in the SWOT analysis included inconsistencies with faculty utilizing simulation as a tool in classroom learning. Several faculty incorporated simulation as a clinical tool, but very few utilized it as a tool in the classroom.

Gap analysis. Upon completing a gap analysis, a gap in the literature was identified. Many published works relating to simulation, ascertained improvement in critical thinking skills and clinical reasoning. However, very little evidence acknowledged substantiation of an increase in learning retention. As mentioned earlier, CVA subject matter is taught only in gerontology and it is essential for nursing students to retain the material presented for this topic.

Significance of the Project

Upon completion of this project, validation was obtained to verify improvement of lack of improvement in learning retention among junior level nursing students after participating in a simulation module in addition to didactic classroom learning. Over the past few years, nursing students have been increasingly confronted with limited clinical exposure (Bambini, Washburn, & Perkins, 2009). To improve critical thinking and clinical reasoning that is normally developed during in the clinical setting, many

educational institutions have implemented the use of simulation in addition to clinical experiences (Bambini et al., 2009). Simulation is an effort to duplicate essential aspects of clinical situations so that one may more easily understand and manage the situation when it occurs in clinical practice (Victor-Chmil & Larew, 2013).

Norman (2012) states that having a simulation experience during nursing school contributes to knowledge, safety, skills, and confidence. Integration of simulation into nursing curricula provides an effective way to provide realistic and safe opportunities for students to develop clinical reasoning and critical thinking (Victor-Chmil & Larew, 2013). However, retention of basic classroom knowledge is foundational to developing these skills, and little is known about the relationship of simulation to retention of basic classroom learning. It is unknown if the addition of a simulation experience to traditional classroom teaching will increase retention of basic knowledge about CVA. Therefore, it was surmised that if this project does show promise in increasing retention, it is reasonable to consider a policy change to mandate the use of simulation in the curriculum for gerontology within this pre-licensure nursing program.

Theoretical Framework

Nursing theory. Benner's Novice to Expert theory emerges as the theoretical framework in relation to this evidence based project (EBP). The framework is appropriate as it represents moving baccalaureate nursing students from freshman to senior as analogous to novice-expert (Richardson & Claman, 2014). The seriousness/expectations of new nurses in practice in today's world is such that by the progression of baccalaureate nursing students from freshman to senior, there is an expectation of a novice nursing student progressing to a competent generalist nursing student by the time of graduation

(Nardi & Kremer, 2002). In addition, Benner's model is used in her book, *Educating Nurses,* pointing out the need for change to take place in how nurses are educated (Benner et al., 2008). A need was identified to improve the theoretical part of nursing education by making theory sufficiently relevant for clinical practice by using educational methods to assist students with transferring theory to specific patient situations (Tosterud, Hedelin, & Hall-Lord, 2013). The National League of Nursing's (NLN)/ Jeffries Theoretical Framework for Simulation Design was also utilized for the implementation and completion of this project.

Benner introduced her theory after operating as an acute medical-surgical nurse, critical care nurse, and home health nurse (Butts & Rich, 2013). She identified a need to measure clinical excellence. Benner was influenced by Virginia Henderson and Hubert Dreyfus. Dreyfus introduced phenomenology to Benner and also developed the Dreyfus Model of Acquisition which Benner applied to her work *From Novice to Expert* (Tomey & Alligood, 2013). Two aspects that differentiate the levels of clinical expertise in nursing include the understanding that clinicians live in different worlds relating to their practice, and clinicians develop a sense of responsibility toward patients (Tomey & Alligood, 2013). Nurses can learn to perform skills proficiently without learning the reasoning behind the skill. Benner's philosophy is considered a hybrid of theory and experience (Butts & Rich, 2013).

Benner describes five stages of clinical competence. Stage I of Benner's theory labels the beginning nurse as a novice. A novice nurse can be expounded as a nurse who has no prior experience and is acknowledged as a beginner. Stage II is described as an advanced beginner. The nurse in this stage of nursing development has attained some

experience either lived or mentored. Stage III is identified as competent. A competent nurse is one who has developed additional experience, with at least two-three years of practice. Stage IV in Benner's theory is recorded as proficient. A proficient nurse anticipates client needs based on the clinician's past experiences. Stage V in clinical competence is identified as expert. An expert nurse has extensive experience and understands situations in complexity.

Benner lists seven domains of nursing practice. These domains include:

a) a nurse in the helping role,
b) the nurse in a teaching or coaching role,
c) the nurse who functions to monitor changes in patient status and diagnostic studies,
d) a nurse manages rapidly changing situations,
e) a nurse administers and monitors therapeutic interventions,
f) a nurse ensures the quality of healthcare practices, and
g) a nurse remains involved in organizational/ work role competencies. (Butts & Rich, 2013)

The use of clinical simulation in nursing education allows student nurses to learn and apply theoretical principles of nursing care in a safe, risk-free environment. In a study completed by Bambini et al. (2009), a group of pre-licensure nursing students participated in a teaching/learning exercise to discover the effectiveness of simulation exercises in increasing self-efficacy. Results indicated that the students experienced a significant increase in self-efficacy (Bambini et al., 2009). Kaakinen and Arwood (2009) identified the benefit of improving learning outcomes with the use of simulation in nursing education.

Interprofessional theory. The NLN/Jeffries simulation framework was developed in 2005 during the NLN/Laerdal simulation study (Jeffries, 2012). Reese, Jeffries & Engum (2010), stated that collaborative interdisciplinary learning is a listed by the Institute of Medicine (IOM) as a core requirement in healthcare. Their study supported the Nursing Education Simulation Framework for designing simulations in interdisciplinary educational settings (Reese et al., 2010). The NLN/Jeffries simulation framework has five conceptual components with variables that make it operational which include (a) teacher factors (now facilitator), (b) student factors (now participant), (c) education factors that need to be included into instruction, (d) simulation design characteristics, and e) expected student outcomes (Jeffries, 2012).

The use of simulation in nursing education is often grounded in theories with emphasis on learner-centered exercises, constructivism, and socio-cultural collaboration between individuals from diverse socio-cultural circumstances (Jeffries, 2012). Jeffries states that many factors must be considered when implementing a simulation module. Several of the factors include processing information, experiential growth, and sociocultural dialogue. Each of these perspectives is relevant in simulation (Jeffries, 2012). Experiential growth was the specific learner centered activity utilized for this project. In clinical education, the teacher facilitates, guides, critiques and evaluates student performance, while simulation differs from the traditional teacher-centered education to a student centered focus on education (Jeffries, 2012). The participants in a simulation scenario are expected to be responsible for their own learning; they need to be motivated and self-directed (Jeffries, 2012). During the simulation experience, both response-based roles and process-based roles can be played by participants (Jeffries,

2012). There are many features that should be considered when designing a simulation with a goal of improving student performance and satisfaction for learning (Jeffries, 2012).

Active learning. Active learning is crucial in simulation as it reveals enhancement of critical thinking skills (Jeffries, 2012). It also provides an educator with an opportunity to assess the learner's problem solving and decision making as it relates to the simulation scenario (Jeffries, 2012). Active learning was assessed throughout the learning opportunity as the students could act as the healthcare provider and were challenged by the receipt of an acute CVA client. The students were required to prioritize the care that was required to facilitate the critical, time sensitive treatment the client needed.

Feedback. Feedback is another component included in the Jeffries simulation model. The facilitator must decide on the frequency of the feedback and be reminded that any simulation experience should be conducted within a safe environment (Jeffries, 2012). Feedback is also significant to simulation experiences and it should not be given until the completion of the experience (Jeffries, 2012). Feedback was provided during a debriefing period upon completion of the simulation scenario.

Diverse learning styles. When devising a simulation exercise, a facilitator must consider that students have different learning styles (Jeffries, 2012). Students might be auditory learners, visual learners, tactile learners, or kinesthetic learners and therefore, simulation scenarios should meet the needs of all learning styles (Jeffries, 2012). All of the elements listed within diverse learning styles were utilized prior to and during the simulation module. Student participants were provided with brief scenarios to read

through and then act upon. Student observers were also provided with access to the scenario and doctor's orders.

Student-Faculty feedback. The student-faculty relationship can influence a learning experience (Jeffries, 2012). For the simulation to have a positive impact the rapport must be collaborative and an exchange of information must occur (Jeffries, 2012). Feedback by student participants (both active and observers) was received via a brief survey following the debriefing.

Objectives. Objectives for simulations must reflect the desired outcomes and participants should receive the purpose and objectives prior to the simulation experience (Jeffries, 2012). Student participants were provided with the objectives prior to the beginning of the simulation module.

Fidelity. Fidelity refers to the degree to which the simulation mimics reality (Jeffries, 2012). Low fidelity simulation incorporates static tools, while high fidelity simulation incorporates a real life situation (Jeffries, 2012). The simulation experience utilized in this project reflected high fidelity as it demonstrated the care of an older adult being treated for an acute CVA.

Problem solving. Problem solving is dependent on the complexity of the simulation (Jeffries, 2012). The simulation should be challenging and attainable (Jeffries, 2012). The students participated in the simulation experience after receiving pertinent information related to stroke victims in the didactic classroom setting and from the reading materials provided in the text.

Participant support and cues. The facilitator provides support and direction that participants need (Jeffries, 2012). Cues are used during the scenario to provide a helpful

suggestion without affecting learner problem solving (Jeffries, 2012). Suggestions or cues were provided to the participants in the simulation to maintain focus upon the objectives.

Reflective thinking (debriefing). Reflective thinking should be incorporated into all simulation experiences and should always be guided by the facilitator (Jeffries, 2012). Discussion is often heightened if the facilitator develops detailed topics for analysis based upon the objectives (Jeffries, 2012). The debriefing session builds confidence in participants (Jeffries, 2012). Reflective thinking took place during the debriefing period immediately following the completion of the simulation scenario.

Figure 1.1 The Nursing Education Simulation Framework

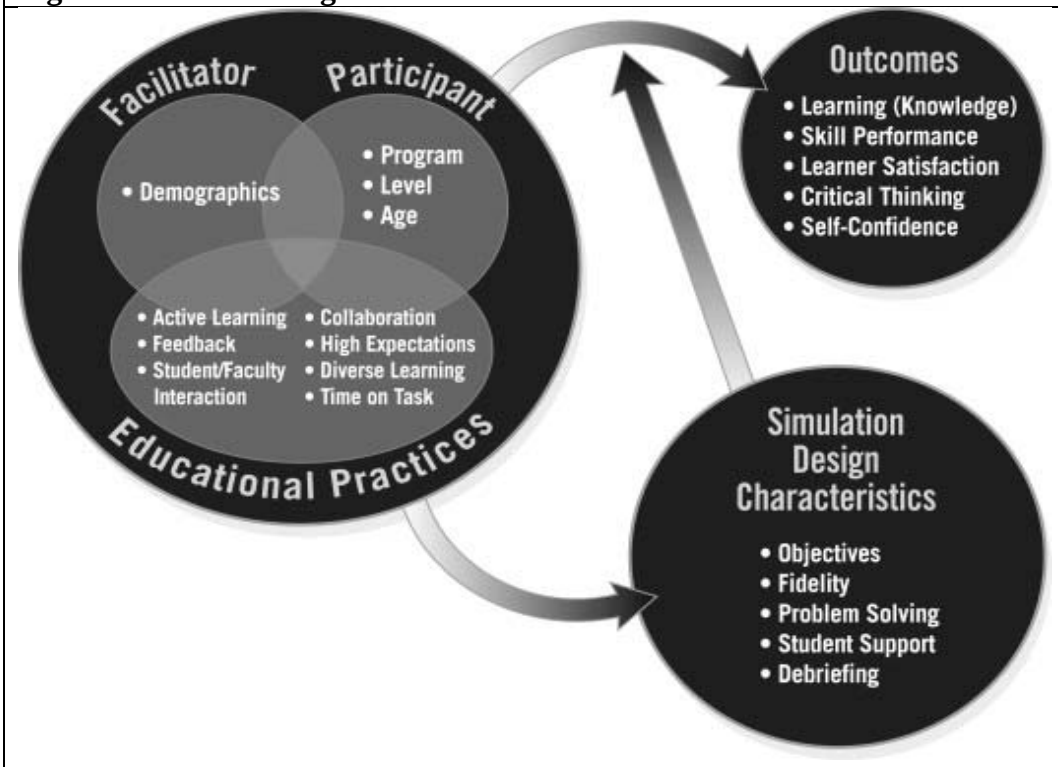


Figure 1.1 Jeffries. (2012). *Simulation in nursing education: From conceptualization to evaluation.* New York: National League of Nursing.

Outcomes. Outcomes is the final component in the simulation model, such as knowledge gained, self-confidence, critical thinking skills performed and participant satisfaction (Jeffries, 2012). The students included in this project received the objectives and learning outcomes prior to the simulation experience**.**

Change theory. Prior to initiation of any planning and project building, a need was identified in a pre-licensure baccalaureate, nursing program within a School of Nursing at a Midwestern Christian University. Simulation is a tool that has been utilized by the faculty as a supplement. Using simulation within any course is an option but it is not a requirement. Pending the results of this project, a change in curriculum for the gerontology course is a goal. Requiring a simulation module in addition to didactic learning for CVA content will be requested.

The change theory most applicable to this TENPP project aligns with Lewin and his Unfreezing-Change-Refreezing theory. Marshall (2011) noted that Lewin used similar language to the nursing process with diagnosing the problem, assessing the ability or willingness to change, assessing motivation and resources of the change agent, selecting an objective, deciding on the appropriate role of change agent, maintaining change, and terminating the helping relationship. Stage one, unfreezing, identifies a need for change and maintaining movement beyond what is comfortable to a place of needed change (Marshall, 2011). Stage two, change or transition, is a process to make the needed changes (Marshall, 2011). Stage three, refreezing, establishes stability after the changes have been implemented (Marshall, 2011). Roussel and Swansburg (2013) concur that the theories are similar in a problem-solving process and that a manager must identify which theory he or she finds most applicable to the project.

Interprofessional Collaboration

The simulation specialist and the laboratory staff collaborated with the project manager to complete this evidence-based project successfully. The simulation specialist assembled the recording equipment for the students to examine during the debriefing phase. The laboratory staff were essential for collecting the necessary supplies to operate the simulation successfully.

Conclusion

Simulation is powerful as a teaching tool to enable the student nurses' ability to think critically by giving students the opportunity to practice in a simplified or controlled environment (Benner et al., 2008). As stated earlier, even though simulation in nursing education has been identified as a tool to improve clinical reasoning and critical thinking, it is unclear if simulation as well as didactic lecture will improve learning retention.

Chapter Two: Literature Review

Prior to entering the implementation phase of this project a literature review and meta-synthesis of the literature was conducted. A goal of the exploration was to identify if peer-reviewed published data reflected a correlation between simulation and learning retention. Inclusion and exclusion criteria narrowed the search and identified articles most applicable to the project.

Meta-Synthesis

A systematic literature search identified relevant evidence related to the advantages of simulation. The Cumulative Index to Nursing and Allied Health Literature (Cinahl) database and Proquest databases were both utilized to identify potential literature. Key words and multiple combinations of terms were utilized for the literature search. Inclusion and exclusion criteria were developed to organize the potential articles to be reviewed. Inclusion criteria included (a) simulation for undergraduate nursing students, (b) simulation in relation to critical thinking skills, (c) simulation in learning retention, (d) simulation with transition to nursing students, and (e) articles published after August 2009. Exclusion criteria were also developed. Literature excluded in this review included (a) graduate study simulations, (b) licensed nurse (LPN) simulation studies, (c) simulation in the work place, and (d) any studies prior to August 2009. Initially, 63 research articles were reviewed, with the hope of obtaining adequate information to contribute to the synthesis of literature. Review of the inclusion and exclusion criteria resulted in the selection of 18 articles for synthesis.

Table 2.1

Summary of Key Words and Data Bases for Simulation Research

Data Bases Key words listed in order of search	CINAHL	PROQUEST	World Wide Web
Simulation	9234	27,102	
High and low fidelity simulation in nursing	619	526	
Simulation in Nursing Education	632	2070	3
Met inclusion Criteria	16	0	0
Met Exclusion Criteria	10,469	27698	3
Final Total	16	0	0

CVA—new treatment modalities, and nursing education. A CVA is a neurological disorder caused either by a blockage to a cerebral artery or by a hemorrhage of a cerebral blood vessel (Catanqui, 2013). A blood clot is the source of blockage in 85% of CVA cases, preventing blood circulation through the affected blood vessel. A stroke thus caused is defined as an ischemic CVA (Catanqui, 2013). In the remaining 15% of cases, a CVA is caused by bleeding in the brain, which is identified as a hemorrhagic CVA (Catanqui, 2013). The interruption of blood flow to the brain by either ischemic or hemorrhagic CVA has overwhelming consequences (Nazarko, 2013). Every minute the brain is deprived of blood supply, 1.9 million neurons, the core components of the nervous system, (which includes the brain, spinal cord, and peripheral ganglia) perish (Nazarko, 2013). Every hour in which blood supply is interrupted leads to the brain aging 3.6 years (Nazarko, 2013). Delays in diagnosis and treatment can lead to death or severe disability (Nazarko, 2013). Many individuals who survive a CVA are discharged to a

rehabilitative facility (Eliopoulos, 2013). Individuals who experience a CVA often develop depression, which is often directly related to the individual's loss of independence (Eliopoulos, 2013).

Activase (Alteplase) is an injectable medication that dissolves blood clots and reduces neurological deficit and disability for patients experiencing a CVA (Catanqui, 2013). Administration of Activase must be within three to four and a half hours of CVA symptom onset and after exclusion of intracerebral hemorrhage, which can be identified with the use of a Computerized Tomography (CT) scan of the head or a Magnetic Resonance Imaging Scan (MRI) (Nazarko, 2013). Even though the MRI is superior to a CT of the head because it can identify blood flow in the brain, most clinicians prefer the CT because of the rapid delivery of results (Nazarko, 2013). Because of the narrow window for the potential candidate to receive Activase, it is essential for the student nurse to recognize CVA symptoms and understand the proper course of action when treating a patient with these symptoms.

In June 2006, Activase was approved in the treatment of acute ischemic CVA (National Stroke Association, 2014). Activase (tPA) works by dissolving a clot and improving blood flow to the part of the brain being deprived of blood flow (Lewis, 2011). If administered within three hours, tPA may improve the chances of recovering from a stroke (Lewis, 2011). Many stroke victims do not get to the hospital in time for tPA treatment; this is why it is so important to identify a stroke immediately. The American Heart Association recently released literature about the warning signs of CVA and the fact that if symptoms occur, 911 should be called immediately (AHA, 2014).

Simulation for undergraduate nursing students. The first profession documented to use simulation as a learning tool was the nursing profession early in the 1900s (Sexton et al., 2012). Hartford Hospital Training School requested the crafting of a doll to use as a teaching tool for nursing students (Sexton et al., 2012). Hartford Hospital received the life-size mannequin, Mrs. Chase, as a proxy patient (Sexton et al., 2012).

World War II incorporated simulation again when pilots utilized it for training exercises (Sanford, 2010). The National League of Nursing (NLN) authorized the use of simulation experiences for nursing schools to improve critical thinking skills and self-reflection (Sanford, 2010). Sanford discovered that nursing students, who were involved in an exploratory study, voiced simulation experiences bridged the gap between the classroom and the laboratory setting.

Studies have shown that simulation increased the ability of undergraduate nursing students to react correctly to emergent situations. Lindsey and Jenkins (2013) demonstrated increased critical reasoning scores on a post-test in students (n=79) exposed to a simulated near code blue situation versus those who were not. Although both the control and intervention groups showed improved scores on the post-test surveys, an independent samples t-test revealed nursing students who received the rapid response education intervention had significantly higher post-test scores

Kaplan, Connor, Ferranti, Holmes, and Spencer (2012) addressed the readiness of 90 senior level baccalaureate nursing (BSN) students to perform adequately during emergency scenarios using a simulated tornado landing in an assisted living community. Ninety-five percent of the student participants specified they “agreed or strongly agreed” that the experience in simulation increased confidence and increased knowledge when

exposed to an emergency. The study was flawed in that not all participants understood the instructions.

Bambini et al. (2009) completed a quasi-experimental, repeated measures design study spanning four semesters. The instructors created three evaluation techniques: a pre-test, a post-test, and a follow-up survey. Two hundred twenty-four students identified an increase in confidence and clinical judgment following a postpartum simulation scenario. Limitations in the study were identified as a risk for bias due to self-reported data. Recommendations from the study included expanding on the use of Benner's framework with simulation for nursing students and identifying behaviors that characterize the different educational levels would also be beneficial.

Eggenberger, Keller, Chase, and Payne (2012) completed a correlational study to measure caring in a simulation environment with 57 junior nursing students. Pre-tests and post-tests were completed to evaluate student self-perceptions with faculty evaluation of caring during a simulation. The students' results identified a strong correlation to the objective findings (r = 0.345, 0.356). Limitations to the study revealed the sample was too small.

Blum, Borglund, and Parcells (2010) completed a quasi-experimental, quantitative study with 56 nursing students enrolled in a baccalaureate program to evaluate if high fidelity simulation improves clinical competence and confidence in junior level nursing clinical experiences. They sought to identify a relationship between simulation and student self-confidence and clinical competence. Even though students' scores reflected an increase in self-confidence and competence, the independent-samples *t*-tests revealed no statistically significant differences between mean self-confidence

scores of students in the two laboratory groups at either midterm or final assessment point. Limitations for the study were identified as the sample size being low and the homogeneity of the sample. Recommendations for this study include continuing longitudinal investigations of continued growth in student self-confidence. Prior to project implementation, the project manager of the current study identified a potential limitation of having too small of a sample size if the project only spanned one semester. Therefore, a second semester was added to the project. This study correlated with Blum's study by identifying an increase in self-confidence via the simulation experience, which also increased learning retention.

Johnson et al. (2013) completed a diverse quasi-experimental multisite study including five nursing schools: four from the United States and one from the United Kingdom to determine if there was any effect with expert role modeling on the clinical judgment of a student nurse in the care of simulated geriatric patients. Results from the study revealed that students noted an increase in self-confidence with mean ratings for these items ranging between 4.00 and 4.37 out of 5 on a Likert scale. A correlation between this study and the Johnson et al. (2013) study identified that as an increase self-confidence with the use of simulation, there was also an increase in learning retention.

Flo, Flaathen, and Fagerström (2013) conducted a case study of nursing students' learning experiences during the use of computer-driven patient simulators in preclinical studies at a baccalaureate nursing school in Norway. The study spanned two years with 216 participants. The descriptive case study design showed that the students considered the use of simulation in preclinical studies to be a positive experience with 84.3% of students stating their expectations for the day had been met to a great or very great extent.

Reierson, Hvidsten, Wighus, Brungot, and Bjørk (2013) completed a qualitative research study involving 87 first-year baccalaureate, nursing students to identify any issues that might result in barriers to learning in simulation. Six key issues were identified addressing debriefing, understanding and adapting the roles of facilitator and the student, understanding the theoretical model, curriculum consistency, and faculty engagement. A risk for bias was revealed as a limitation due to participants being closely connected within the same organization. Journaling was recommended to enhance the critical perspective and enhance the clinical perspective.

Sparacino and Vecchia (2013) completed a qualitative study consisting of 16 junior level baccalaureate, nursing students. The specific aims in the study were to identify student perceptions related to simulation in the laboratory setting and comparing the results of students who successfully completed the competencies without remediation to students from previous years. Findings revealed an increased confidence in medication administration, an increase in communication skills, and successful transfer of knowledge to theory and applying theory to practice. All of the participants successfully completed the competencies without need for remediation in comparison to 50% of the students needing remediation in previous years. Limitations to the study were related to the small sample. Recommendations included further investigation to evaluate the impact of each phase on improving student confidence with medication administration.

Kirkman (2013) completed a study in a college of nursing involving baccalaureate nursing students (n = 42) utilizing a series-repeated measures (RM) study. She based the study on the transfer of learning a theoretical framework: (a) transfer from prior knowledge to learning, (b) transfer from learning to new learning, and (c) transfer from

learning to application. The participants were given three separate observation opportunities: one following agreement to participate in the study, one following didactic lecture, and one following a simulation experience. Results revealed a transfer of learning was demonstrated and that simulation was identified as an effective teaching and learning tool.

Nevin, Neill, and Mulkerrins (2013) completed a qualitative study in a simulation laboratory in a baccalaureate nursing program in Ireland (N = 134). The participants were all third year nursing students with 87 responding to the evaluation. The aim of the study was to introduce students to the theory of a client having a critical crisis following an abdominal hysterectomy. Chronbach's alpha aided in the evaluation of the reliability of the questionnaire. A discussion of the questions' lack of guidance posted in the open responses section of the questionnaire preceded the findings from the closed Likert-style questions. The results revealed a high level of consistency for the simulation, the debriefing session and the evaluation of simulation as a teaching style. Simulation in addition to lecture was identified as being more beneficial than lecture alone to increase application in the clinical settings. A limitation identified in the study was the students' perception of a lack of guidance prior to the simulation experience. Recommendations for this study include a need for future investigation to determine if the learning outcomes that were met during the simulation scenario would be transferred to improved patient outcomes.

Simulation in relation to critical thinking skills. Disler, Rochester, Kelly, White, and Forber (2013) completed a large longitudinal study involving 452 student participants from cohorts associated with an Australian university. The purpose of the

study was to identify if simulation would improve critical thinking and confidence in baccalaureate nursing students. Students were divided into groups of 12. Pre and post surveys were completed by participants and paired *t-tests* were utilized to identify the change in confidence and critical thinking. Two hundred fifty-two (54%) participants noted an increase in self-confidence. Limitations to the study were the use of the self-reported surveys and the use of tools that had not been validated. Recommendations included validation of surveys, tracking student performance in simulation across the curriculum to identify specific benefits of simulation as a teaching and learning strategy, and performing future research with a focus on how curricula could optimize the combination of clinical experiences with simulation.

Secomb et al. (2012) completed a group parallel, randomized experimental study among three universities in Australia involving 77 junior level baccalaureate, nursing students. The purpose of the study was to identify if high fidelity simulation improved clinical reasoning among the student participants. The students selected for the experimental group worked autonomously with a simulator. The control group received a scenario and a clinical instructor to guide interventions. A pre-test and post-test identified the effectiveness of the intervention. Limitations to the study were a small sample size, some of the students did not interpret the tool correctly, and the pre-test and post-test were administered too closely to one another to have an accurate reading. Results indicated no significant difference in clinical reasoning following two simulation activities. Recommendations include embedding future studies in the curriculum to prevent absenteeism and increasing participant number. A comparison was identified between Secomb's study and this project as it relates to junior level nursing students and

a pre-test/post-test design with a second post-test to be taken later. Secomb et al. (2012) sought to determine if high fidelity simulation improved clinical reasoning and the purpose of this project was to identify if high fidelity simulation improved learning retention; both studies utilized pre-test/post-test to measure accuracy of the aims. Understanding the limitation of the pre-test/post-test being administered too closely together in Secomb's study, to rectify the limitation, the second post-test in the current study was completed by the students six weeks after the simulation experience.

Hart et al. (2013) completed a mixed methods quasi-experimental, repeated measures and a descriptive, qualitative design study in a BSN program. The study covered two semesters. A convenience sample of 48 BSN students was recruited. The purpose was to evaluate if BSN students with simulation training would recognize and respond to patients experiencing acute deterioration for first responders. A significant increase in scores related to knowledge, self-confidence and teamwork was identified. Qualitative questions that emerged from the study included: source of knowledge, knowledge as a person, knowledge as a group, reasoning under pressure, feelings, and real person versus simulation. Limitations in the study were identified as the study only taking place at one university and the finding that the students conversed from one semester to the next. Recommendations included adding innovative teaching strategies implemented in nursing education will provide knowledge to students and give students "hands on" opportunities.

Ashcraft, Opton, Bridges, Caballero, Veesart, and Weaver (2013) completed a descriptive study in a simulation laboratory evaluating senior level nursing students utilizing a modified version of the Lasater Clinical Judgment Rubric (LCJR). The study

was divided into two phases over two years in which 82 participants were involved in phase one of the study and 102 participants were a part of phase two. Analysis of the clinical judgment profile was completed and the formative evaluation scores ranged from 0-3 with a mean score of 2.27 (*SD* = 0.36). Paired *t*- tests showed significant differences between formative and summative performance (t = -5.83, df = 85, p = 0.000) indicating improved summative performance. Limitations to the study were recognized as students from the first semester told the students from the next semester about the scenarios and the faculty placed more focus on the simulation equipment than on student performance. Inconsistency in scoring was another limitation noted. Recommendations include continuing to develop simulation scenarios using a well-developed rubric to assess competency.

Roh and Kim (2014) completed a nonequivalent control group post-test only design with 213 BSN students to measure the effects of computer-based simulation on nursing students' performance, self-efficacy, post-code stress, and satisfaction between computer-based simulation plus instructor-led cardiopulmonary resuscitation training group and instructor-led resuscitation training-only group. Results of the study identified that nursing students' performance scores were higher in the computer-based simulation group than in the control group but there was no statistical significance. Recommendations for future studies included increasing the rigor in the computer simulation scoring rubrics.

Simulation in retention of knowledge. This evidence-based-practice (EBP) project attempted to identify if simulation utilized in classroom learning contributed to increased retention of information provided from lecture related to older adult stroke

victims. To understand retention in learning, one must be cognizant of active and passive learning styles. Active learners are responsible for their learning. For example, students engage in “doing things and thinking about what they are doing” in the classroom. Passive learners receive lecture from professors and there is little opportunity for student input through discussion or experiential exercises (Cui, 2013). Rauen (2004) quoted the Chinese proverb, “You hear, you forget; you see, you remember; you do, you understand” in her article about the use of simulation in nursing education. An interactive setting improves knowledge retention among adult learners in a classroom much more effectively than in a linear setting (Rauen, 2004). An evaluation and synthesis of literature verified the significance of utilizing simulation as a learning tool in nursing education.

Simulation is an essential teaching tool that can enable a nurse’s ability to think critically by giving students the opportunity to practice in a simplified and controlled environment (Benner et al., 2008). The use of simulation triggers the student nurse to critically think; however, does it help retention of knowledge? Initially, peer-reviewed article searches focused mainly on simulation experiences in undergraduate nursing students. Numerous materials identified an increase in critical thinking. Very few identified an increase in student learning retention. A number of sources noted an increase in employment retention among new graduate nurses, but of 260 potential sources, very few articles addressing retention in learning related to simulation were identified. Prior to completion of this project, it was unknown if simulation might improve retention in learning in this educational setting. Because of the narrow window provided for a potential CVA candidate to receive Activase, it is essential for the student

nurse to retain the knowledge to be able to recognize CVA symptoms and understand the proper course of action when treating a patient with the symptoms.

Transition to nursing. Three hundred forty-four articles were reviewed relating to BSN students in an accelerated nursing program. Only one article was identified relating to simulation and an accelerated nursing program. The basis of the article revealed that simulation increased critical thinking skills.

Boellaard, Brandt, Johnson, and Zorn (2014) completed a pilot mixed-method descriptive survey design with 17 accelerated nursing students to identify if simulation would prepare the students for practice. Students responded to the student evaluation of simulation (SES) and two qualitative questions. The students responded that the simulations were helpful as they learned about the nursing care of patients. Limitations were identified by the small sample size and the homogeneity of the sample. Another limitation identified was the lack of reliability and validity of the tool.

Conclusion

Simulation experiences in nursing curricula can contribute to progression through the stages of clinical competence. Nursing faculty have implemented the use of simulation to supplement clinical experiences for undergraduate nursing students. Simulation literature revealed an increase in student confidence, clinical judgment, and communication following a simulation scenario (Bambini et al., 2009). A profound positive finding with the use of simulation is the increase in student self-confidence and the improvement in critical thinking and clinical reasoning. While many studies have shown the efficacy of simulation in increasing knowledge and critical thinking, few

specifically address the use of simulation in retention of learning about the treatment of acute CVA in the junior-level baccalaureate program.

Chapter Three: Method

Purpose and Design

It is imperative that students retain material presented in the text and the classroom regarding the assessment process of an acute CVA to translate evidence into practice for improved patient outcomes. The purpose of this project is to examine if use of simulation improves knowledge retention, using an interventional cross-sectional pilot design.

Specific aims include:

1. Does a simulation experience increase retention of CVA-related knowledge as evidenced by scores on a repeated post-test given several weeks after the educational module?
2. Are demographic variables related to post-test scores?
3. Is there a difference in test scores between transition to nursing (TTN) and traditional students?

Setting and Population

The project was conducted over the fall 2014 and spring 2015 semesters in a faith-based university in the Midwestern US. The university's School of Nursing enrolls greater than 2000 students among three divisions: pre-licensure, post-licensure, and graduate.

All BSN students enrolled in the junior-level gerontology course participated in the study. The Transition to Nursing (TTN) is a 14-month baccalaureate nursing program

for individuals who hold a bachelor's degree in another field. The course of study includes 63 credit hours of nursing coursework, which leads to the BSN degree. Gerontology is a course offered during the junior portion of the 14-month program. The CVA simulation included TTN Gerontology students. Traditional students, also recognized as residential students, are students who are enrolled in the traditional four-year plan of study for a baccalaureate in nursing degree.

Two traditional classes of approximately 30 students each and one TTN class with approximately 20 students were enrolled in Gerontology each semester, with identical course content taught by two different instructors. The sample included traditional and TTN students. During each semester, one of the classes served as a control group and received the usual lecture material and reading assignments for the one-week module related to CVA content. The other class also received the usual lecture material and reading assignments, and in addition, participated in a CVA-focused simulation. To minimize error, the same instructor (the investigator) delivered the CVA lecture materials to all courses, appearing as a guest-lecturer in the other faculty's class during that week. Approximately 13 TTN students and 30 traditional students served as the control group during the first semester and approximately 30 traditional students served as the intervention group. During the second semester, approximately 30 traditional students served as the control group, while 18 TTN students and 30 traditional students served as the interventional group. Thus, over the course of the study it was expected that about 151 students would participate: 73 in the control group and 78 in the intervention group.

Human Subjects Protection

All data was collected and stored in a de-identified manner using a study subject number, in a secure, password-protected electronic data base. A linkage log, connecting the study subject number with the student's identification, was maintained in a separate file in a locked drawer for purposes of data audit only. After the completion of the project, all collected data will be stored for the institutions' required time period, then shredded and appropriately disposed.

As this was evaluation of an educational intervention, no consent was required. However, the study was submitted to and received approval from the university Institution Review Board (IRB) prior to any study procedures taking place (See Appendix B).

Risks and Benefits

A potential limitation was identified in that the students who were in the control group might feel cheated due to not receiving the simulation. To remedy this potential complication, the same simulation exercise was provided for all control group participants following the second post-test. Another potential limitation was identified as the students all received the same test three times.

A benefit for including this simulation scenario study into classroom content related to CVA course materials is to identify if simulation and usual classroom learning will increase retention of learning in junior level nursing students. Another benefit of this study included the hands -on exposure to CVA clients for nursing students who might not have the opportunity otherwise.

Intervention and Variables

A pre-test/post-test design was included in the project. The project manager worked closely with the simulation specialist, who prepared the laboratory space and provided items needed to complete the simulation exercise. The project manager also collaborated with the other faculty who was responsible for facilitating the other Gerontology class (Control group). The project manager provided the lecture materials to all student participants. The need to present the same lecture content and to give the same pre- and post-test was essential.

All participants completed a pre-test prior to the CVA-specific lecture material and completed the same test one week post lecture, and again approximately six weeks post lecture (to assess retention). The CVA module was taught during two separate class periods over one week during the semester-long geriatric course.

The control group received the usual CVA lecture material during the first class of the one-week module. The intervention group received the usual CVA lecture material during the first class of the one-week module and participated in a simulation experience during the second class period.

The pre/post-test (see Appendix A) consisted of 20 multiple-choice questions. Each question was worth one point. The pre/post-test was written by the investigator, who has been teaching the gerontology course in the BSN program for the past five years. The test was assessed for content reliability by three other faculty with expertise in the field. Validity was assessed by giving the test to approximately 10 students who had taken the course in previous semesters to calculate Cronbach's alpha. The pre/post- test was given to 10 former students who had taken the regular gerontology course in the

previous year for validation, with a resulting moderate Cronbach's alpha (0.40).

The simulation module was co-created by the investigator and the simulation lab director. The simulation module included a patient, Georgia Sanders, a 63-year-old black female admitted to the Emergency room with complaints of sudden onset of slurred speech, facial drooping and left sided weakness. She was accompanied by her two daughters. Three nurses worked directly with her care, a charge nurse, a staff nurse and a certified nurse assistant. Five student participants were utilized acting as the nurses and the family. A faculty volunteer acted as the patient.

The length of the simulation was 20 minutes, during which the students completed the National Institute of Health Stroke Scale (NIHSS), tPA screening form and assessment data. During the simulation exercise, the student participants (nurses) were required to identify three separate concerns related to Georgia Sanders' care. Initially, the students needed to identify the time that symptoms started. TPA could only be given in the first three and half hours after start of symptoms. Another concern that the students were required to identify was the correct response when Georgia's family asked that she receive a drink of water. If the student nurses responded correctly that Georgia could not receive anything by mouth until a swallow screen was completed, the scenario would continue. If it was not identified by the student nurses that Georgia was ordered to have nothing by mouth (NPO), then within a few minutes, Georgia's oxygen saturations would drop significantly due to aspiration. The final problem the students were responsible to identify was to check Georgia's blood sugar when her stroke symptoms started to worsen. When blood glucose was checked, a result of 40 was obtained and an order for dextrose 50% was given. Within a few minutes, Georgia's symptoms improved. At the conclusion

of the simulation scenario, all exclusion criteria for tPA (Activase) had been met and the order was received to infuse the medication.

The simulation scenario was completed in 20 minutes. Following the simulation exercise, a 40-minute debriefing period took place. The students watched much of the videotaped simulation and then discussed their feelings as they answered the 15 debriefing questions. The debriefing questions are included in the simulation outline (see Appendix B). Participant demographics include age, gender, whether the student is TTN or traditional, previous exposure to stroke clients (work, clinical setting, a family member, or a previous classroom setting) and previous exposure to simulation. Demographics were collected by a questionnaire included with the pre-test.

Method of Data Collection

The pretest/post-tests were distributed to students at the beginning of specified classroom periods. The tests were paper and pencil including an electronic scantron form. The tests were collected and handed to the investigator by the faculty teaching the course for analysis and grading purposes.

Data Analysis

Data analysis was conducted using the Statistical Package for Social Sciences (SPSS) Statistical program, version 22. Descriptive statistics were used to describe the sample and sample demographics. To meet study aim #1, mean scores on the repeated post-test were compared between control and intervention groups using independent *t*-tests. Analysis of Variance (ANOVA) identified how each group performed on the pre-test versus the post-test. To meet study aim #2, correlational analysis was performed between the demographic variables and the mean post-test scores. To meet study aim #3,

independent t-tests were used to compare mean scores between TTN and traditional students.

Conclusion

As the patient population continues to age and the illnesses for the population continue to become more complex, it is essential for nurses to understand the importance of timely assessment and treatment implementation for a person suffering from a CVA. The results of the project helped to identify if simulation in addition to lecture material would increase retention of learning for junior level nursing students.

Chapter Four: Results

This project examined the effect on retention of classroom lecture content with implementation of a simulation module in a junior level baccalaureate nursing program gerontology course regarding assessment and care of acute CVA. The simulation module was implemented fall 2014 and spring 2015 semesters, with approximately one-half of the students receiving usual lecture plus simulation (intervention) and one-half only receiving usual lecture material (control). Retention of classroom lecture material was measured in both groups by a pre-test, post-test, and delayed post-test.

Results

One hundred forty-one students took part in the project, 65 in the control and 76 in the intervention group. Although all students were junior level and enrolled in the geriatrics course, 31(22%) were TTN and 110 (78%) were traditional undergraduates. Seventy-one students (11 TTN) participated in the fall semester and 70 students (19 TTN) in the spring. Student demographics were collected and are displayed in Table 1.

Transitions to nursing (TTN) students are individuals who have completed a bachelor's degree in another discipline prior to enrolling in the 14-month accelerated nursing prelicensure program. To be selected for the program, an application process, (which includes, electronic application into the program, a writing sample explaining why the candidate should be selected to participate in the program, and an interview process conducted by two TTN nursing faculty) must be completed.

An independent samples *t*-test was conducted to meet study aim number one: Does a simulation experience increase retention of CVA-related knowledge as evidenced by scores on a repeated post-test given several weeks after the educational module? The

mean delayed post test score for the intervention group (*n*=76, *m*=15.64, SD 2.62) was significantly higher than the control group (*n*=65, *m*=14.35, SD 2.35), (*t* 39) =-3.054, *p* =.003). Data for the TTN and the traditional students are displayed in Figure 4.1.

Table 4.1

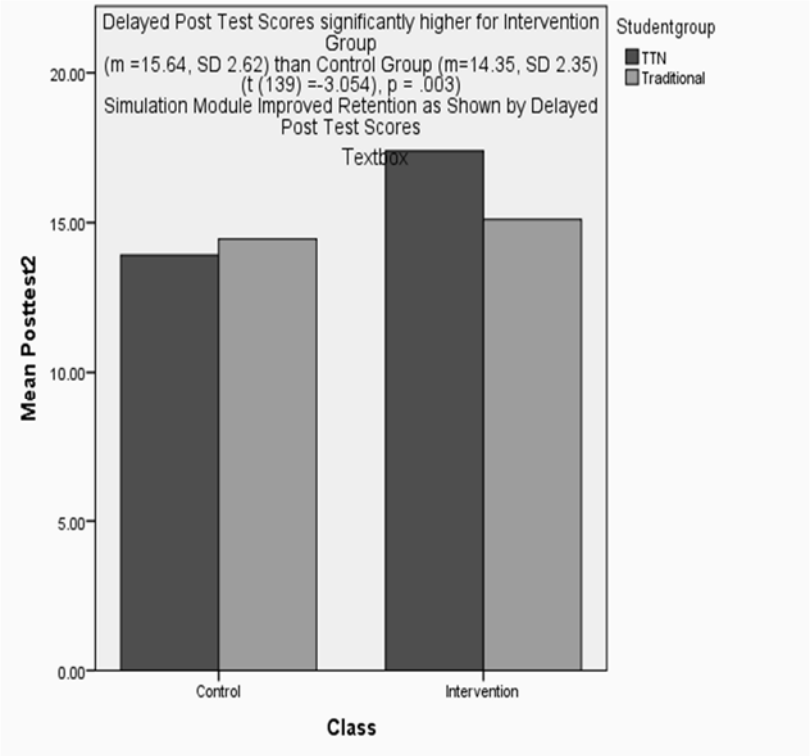
Demographic Table

Student Group	Gender *n* (%) 0-Female 1-Male	Age *n* (%) 1 = 20-25 2 = 26-30 3 = 31-35 4 = 36-40 5 = 41-45 6 = 46-50	Previous exposure to CVA *n* (%)	Previous Exposure to Simulation *n* (%)
TTN (*n* 30)	0-28 (93) 1-2 (6%)	1-1(3) 2-17 (57) 3-8 (27) 4-2 (6) 5-2 (6) 6-1 (3)	12 (40)	30 (100)
Traditional (*n* 111)	0-103 (93) 1-8 (7)	1-103(93) 2-6 (5) 3-2 (2) 4-0 5-0 6-1 (0.9)	37 (33)	111(100)

Correlational analysis was conducted to meet study aim number two: Are demographic variables related to post-test scores? A weak but significant correlation was found between age and delayed post test scores (Spearman's *rho* =.220, *p* =.009). Gender was not found to be significantly related to delayed post-test scores (Pearson's *r* =-.027, *p* .752). A weak but significant inverse relationship was found between student group (TTN or traditional) and delayed post-test scores (Pearson's *r* = -.193, *p* =.022).

The variable, previous exposure to CVA, was not calculated due to all of the students having previous exposure to CVA. There was no significant relationship between previous exposure to CVA and delayed post-test scores (Pearson's *r*=.093, *p*= .270).

Comparison scores between Control and Intervention group
Figure 4.1



To meet study aim number three, is there a difference between TTN and traditional students' delayed post test scores, an independent samples *t* test was conducted. The TTN mean delayed post test scores were significantly higher (16.00 SD 2.46) than the traditional students (14.79, SD 2.55), (*t*(139) =2.313, *p* .022).

Evaluation and Discussion

This study had three important findings: (a) the simulation module intervention did improve retention of classroom lecture material as shown by significantly increased mean delayed post-test scores, (b) there was a relationship between student age and test scores, and (c) the TTN students' scored significantly higher on the delayed post-test scores than did the traditional students.

Simulation intervention

Retention of classroom lecture material was significantly improved in those students exposed to the simulation module intervention, as shown by delayed post-test scores. A delayed post-test was utilized because the primary rationale in incorporating a pretest/ post-test intervention was to identify if simulation as a teaching tool, would increase retention of classroom learning. The post-test taken one week following the simulation module identified that simulation increased immediate learning. However, the delayed post-test taken six weeks after the simulation module, identified learning retention. Students who participated in the simulation module scored higher on the delayed post-tests. The Cohen's *d* effect size was large, supporting the fact it is very likely the simulation module was the reason the delayed post-test scores were higher in the intervention group.

Correlations

Two significant correlations were noted in this study sample. The age of the student was found to be related to the test score. Pearson's correlation showed the older the student, the higher the test score tended to be. The demographic variable for age was divided as follows: 20-25, of which there were 104 student participants, 26-30, of which

there were 23 student participants, 31-35, of which there were 10 student participants, 36-40, of which there were two student participants, 41-45, of which there were two student participants and 46-50, of which there were two student participants. Secondly, Pearson's correlation showed an inverse correlation between being a traditional student and test scores, and indeed the TTN students' scores were found to be higher. Students who were enrolled in the TTN nursing program had previously completed a bachelor's degree in another discipline and had therefore learned to develop successful study habits, time management and prioritization. No relationship was found between male and female student participants. No relationship was found between students who did or did not have previous exposure to CVA, although 39.5% (*n*=45) of students had previous exposure to CVA. Reasons for these findings might include that in depth information was not provided earlier, or that these students might have just forgotten what was previously taught.

TTN vs. Traditional

When comparing test scores of the traditional student participants with the TTN student participants, results revealed that the scores of the TTN students were higher than the scores of the traditional students. When considering the differences between the scores, one must also remain cognizant of the reality that there were many more traditional students enrolled in the study (*n*= 111) than were TTN students (n-30), so this has to be interpreted with caution. Many of the TTN participants voiced concern about scoring well on the test, which might have resulted in increased study time for the TTN students. In the fall semester, the TTN students were involved with the study as the control group. The students voiced dissatisfaction with the study because they stated that

it was not fair that they were being tested over the same material that other students were being tested over, but that the other students were also receiving simulation to assist with learning. Explanations were given that every student (both control and intervention) would receive the same simulation, but that the control group would receive it following the post-tests. The TTN control remained dissatisfied, even after explanations were given that the test would not affect their grades. The following semester the TTN group served as the intervention group. Many of the students voiced satisfaction and even excitement over the learning opportunity that they experienced with the simulation module. Including simulation into classroom learning is essential for TTN students when creating and developing curriculum.

Significance to Nursing Practice

Upon completion of this project, validation was obtained to verify improvement in learning retention among junior level nursing students after participating in a simulation module in addition to didactic classroom learning. Nursing education has seen an increase in incorporating simulation into nursing skills laboratories or as a replacement for limited clinical exposure (Bambini et al., 2009). If simulation is incorporated into classroom learning experiences to be utilized in conjunction with usual classroom lecture, students will retain the material presented as evidenced by this pretest/post-test study.

Project Implementation Strategies

Simulation is not only beneficial for a replacement of clinical hours, but data reveals that it actually improves retention of critical classroom lecture material. As the treatment for CVA continues to evolve, the necessity for accurate, rapid recognition of CVA symptoms is essential. However, it also imperative that even a novice understand

proper time sensitive assessment data, critical treatment measures, and criteria for inclusion or exclusion for administration of Activase to prevent harm.

Recommendations

Recommendations from this study include incorporating simulation related to CVA content in corroboration with didactic classroom teaching into the curriculum for junior level baccalaureate nursing students enrolled in Gerontology. Prior to this study, inclusion of simulation was entirely optional, depending on how each faculty member viewed simulation. With the documented results verifying retention of classroom learning, in addition to a simulation module, a recommendation will be communicated to the junior level team of the pre-licensure nursing department to include the simulation into every Gerontology CVA lecture.

Summary

Even though there has been an increase in the utilization of simulation into nursing education, most often simulation is partnered with clinical experiences, or lack thereof. A pretest/post-test and delayed post-test study was conducted with junior level baccalaureate nursing students enrolled in Gerontology. Previous studies reveal simulation is effective in increasing critical thinking and clinical reasoning (Victor-Chmil & Larew, 2013). However, retention of basic classroom knowledge is foundational to developing these skills, and little was known about the relationship of simulation to retention of basic classroom learning. The results of this study identify that simulation when utilized with usual classroom teaching will increase student learning retention.

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Appendices

Appendix A: Permission to use

Dear Debra:

The NLN has received your request for permission to include the figure of the NLN/Jeffries Simulation Framework. We are pleased to grant you copyright permission according to the following.

"The NLN/Jeffries Simulation framework," developed as part of the 2003- 2006 NLN/Laerdal Simulation Study and most recently published on page 37 of the work noted below, may be used within your dissertation."

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

In granting permission to use this Framework, it is understood that the following assumptions operate and "caveats" will be respected.

- The Framework will only be used for the purpose outlined above.
- The Framework will be included in its entirety and not modified in any way.
- The National League for Nursing is the sole owner of these rights being granted.
- No fees are being charged for this permission.

The NLN is pleased that this material is seen as valuable to you in your research, and I am pleased that we are able to grant permission for its use. Should you have any questions, please contact me directly.

Respectfully,

Amy

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

amcguire@nln.org | Tel: 202-909-2509 | The Watergate | 2600 Virginia Avenue NW, 8th Fl, Washington, DC 20037

Appendix B: IRB Exempt Status

INDIANA WESLEYAN UNIVERSITY

ɔard

4201 South Washington Street
Marion, IN 46953

Tel: 765-677-2090
Fax: 765-677-1200

Notice of Exemption

The Use of Simulation to Improve Knowledge Retention in Junior-Level BSN Students

Title of Research Topic

Debra Parker

Investigator

The IWU Institutional Review Board has reviewed your proposal and has determined that:

Check One:

X 1. Your proposal is exempt from further review from the IRB. If the project extends beyond the one year period, a new proposal must be submitted to the IRB for review.

_____ 2. Your proposal is not exempt and must be forwarded to the Chair of the University Institutional Review Board.

The reason your proposal is not exempt is:

Ph.D.

Division/Department Chair, IRB Chair, IRB Committee Member

September 16, 2014

Date

Appendix C: Pretest/Post-test

1. Identify the types of stroke (Choose all that apply)

   a. Embolic
   b. Hemorrhagic
   c. Afferent
   d. Thrombotic
   e. Cerebellar Cephalic

2. A patient with right-sided weakness that started 90 minutes earlier is admitted to the emergency department and all these diagnostic tests are ordered. Which test should be done first?

   a. Electrocardiogram (ECG)
   b. Complete blood count (CBC)
   c. Chest radiograph (Chest x-ray)
   d. **Noncontrast computed tomography (CT) scan**

3. Identify the following symptoms of a stroke. (Choose all that apply)

   a. Severe headache
   b. Weakness or numbness to face, arm, leg
   c. Abdominal pain
   d. Speech difficulties
   e. Severe dyspnea

4. A patient with a stroke has progressive development of neurologic deficits with increasing weakness and decreased level of consciousness (LOC). Which nursing diagnosis has the highest priority for the patient?

   a. Impaired physical mobility related to weakness
   b. Disturbed sensory perception related to brain injury
   c. Risk for impaired skin integrity related to immobility
   d. **Risk for aspiration related to inability to protect airway**

5. A noncontrast CT scan shows which of the following?

   a. Blood vessels
   b. Carotid arteries
   c. **Intracranial hemorrhage**
   d. Blood flow to the brain

6. Which patient is most at risk for a stroke?
   a. A 28-year-old male who uses marijuana after chemotherapy to control nausea.
   b. A 42-year-old female who takes oral contraceptives and has migraine headaches.
   c. **A 72-year-old male who has hypertension, diabetes mellitus, and smokes heavily.**
   d. An 82-year-old female who takes warfarin (Coumadin) for atrial fibrillation.

7. An elderly client is being admitted to the ICU with the diagnosis of a stroke. The nurse understands that the most likely cause of the condition, based on the client's age, would be:

   a. Thrombosis
   b. Intracranial hemorrhage
   c. Pneumonia
   d. Post myocardial infarction
   e. Hypertension

8. Aspirin is ordered for a patient who is admitted with a possible stroke. Which information obtained during the admission assessment indicates that the nurse should consult with the health care provider before giving the aspirin?

   a. The patient has dysphasia.
   b. The patient has atrial fibrillation.
   c. **The patient states, "My symptoms started with a terrible headache."**
   d. The patient has a history of brief episodes of right-sided hemiplegia.

9. Conditions that can mimic ischemic stroke include:

   a. Hypoglycemia and unrecognized seizures
   b. Cardiac arrest and hypoglycemia
   c. Unrecognized seizures and fatigue
   d. Hemiplegia and heart attack

10. While providing stroke prevention health promotion materials to a group of adults at a local senior center, the nurse emphasizes the teaching toward:

    a. Female smokers
    b. African Americans
    c. The obese adults who consume high fat foods
    d. Individuals with hypertension and diabetes

11. A patient with a history of several transient ischemic attacks (TIAs) arrives in the emergency department with hemiparesis and dysarthria that started 2 hours previously. The nurse anticipates the need to prepare the patient for

    a. surgical endarterectomy.
    b. transluminal angioplasty.
    c. intravenous heparin administration.
    d. **tissue plasminogen activator (tPA) infusion**.

12. The nurse identifies the nursing diagnosis of impaired verbal communication for a patient with expressive aphasia. An appropriate nursing intervention to help the patient communicate is to

    a. have the patient practice facial and tongue exercises.
    b. **ask simple questions that the patient can answer with "yes" or "no."**
    c. develop a list of words that the patient can read and practice reciting.
    d. prevent embarrassing the patient by changing the subject if the patient does not respond.

13. The nurse obtains all of the following information about a 65-year-old patient in the clinic. When developing a plan to decrease stroke risk, which risk factor is most important for the nurse to address?

    a. The patient has a daily glass of wine to relax.
    b. The patient is 25 pounds above the ideal weight.
    c. The patient works at a desk and relaxes by watching television.
    d. **The patient's blood pressure (BP) is usually about 180/90 mm Hg.**

14. The medication that may reverse an ischemic stroke given in the first 3 hours from symptom onset is:

    a. Heparin
    b. Integrillin
    c. **Activase**
    d. Plavix

15. A patient with sudden-onset right-sided weakness has a CT scan and is diagnosed with an intracerebral hemorrhage. Which information about the patient is most important to communicate to the health care provider?

    a. The patient's speech is difficult to understand.
    b. The patient's blood pressure is 144/90 mm Hg.
    c. The patient takes a diuretic because of a history of hypertension.
    d. **The patient has atrial fibrillation and takes warfarin (Coumadin).**

16. A client had an embolic CVA. Which of the following conditions places the client at risk for the CVA?

    a. **Atrial Fibrillation**
    b. Bradycardia
    c. DVT
    d. History of MI

17. After receiving change-of-shift report on the following four patients, which patient should the nurse see first?

    a. **A patient with right-sided weakness who has an infusion of tPA prescribed**
    b. A patient who has atrial fibrillation and a new order for warfarin (Coumadin)
    c. A patient who experienced a transient ischemic attack yesterday who has a dose of aspirin due
    d. A patient with a subarachnoid hemorrhage 2 days ago who has nimodipine (Nimotop) scheduled

18. A white female client is admitted to an acute care facility with a diagnosis of cerebrovascular accident (CVA). Her history reveals bronchial asthma, exogenous obesity, and iron deficiency anemia. Which history finding is a risk factor for CVA?

    a. Caucasian race
    b. Female sex
    c. Obesity
    d. Bronchial asthma

18. The nurse is teaching a community group about signs and symptoms of a stroke. Which statement by the nurse would provide accurate information?

    a. **“Call 911 immediately if someone suddenly has slurred speech or difficulty speaking.”**
    b. “If a headache lasts for more than 24 hours, the person should go to the hospital.”
    c. “A person with a transient ischemic attack will have mild symptoms that go away.”
    d. “Stroke symptoms will usually start when the person is awake and physically active.”

20. A client arrives in the emergency department with an ischemic stroke and receives tissue plasminogen activator (t-PA) administration. Which is the priority nursing assessment?

    a. Current medications.
    b. Complete physical and history.
    c. **Time of onset of current stroke**.
    d. Upcoming surgical procedures.

Appendix D: Demographics

Demographic Information

Age ( ) 20-25 ( ) 26-30 ( ) 31-35 ( ) 36-40 ( ) 41-45 ( ) 46-50

Gender ( ) Male ( ) Female

TTN Student ( ) Traditional student ( )

Previous exposure to stroke Yes ( ) No ( )

Previous Exposure to Simulation Yes ( ) No ( )

Appendix E: Simulation Outline

Simulation Design Template

Date: 7/23/14 **File Name: Acute Ischemic CVA**

Discipline: Nursing **Student Level: Junior**

Expected Simulation Run Time: 20 minutes minutes **Guided Reflection Time: 40**

Location: Simulation Laboratory **Location for Reflection: Reflection**

room Simulation Lab

Introduction to students:
We have a patient who has been admitted to the ED
(Read Learning objectives)

Admission Date: 9/15/14 **Today's Date: 9/15/14** **Brief Description of Client** **Name: Georgia Sanders** **Gender: F Age: 63 Race: Black** **Weight: 90kg Height: 152.4 cm (5ft)** **Religion: P Major Support: Sister, Husband** **Phone: 555-6666** **Allergies: PCN** **Immunizations: UTD** **Attending Physician/Team: Dr Smith/ Stroke team** **Past Medical History: HTN, NIDDM, Hyperlipidemia** **History of Present illness: Family brought to ER after client experienced sudden onset of left facial drooping, slurred**	**Psychomotor Skills Required Prior to Simulation** **Assessment skills acquired in Nursing 260 (Physical assessment) and nursing skills acquired in Nur 221, 232 (Principles of intervention)** **Cognitive Activities Required prior to Simulation [i.e. independent reading (R), video review (V), computer simulations (CS), lecture (L)]** **R;L** **Home medications:** **Lisinopril 20 mg daily** **Metoprolol 25 mg daily** **Metformin 500 mg bid** **Lipitor 40mg daily** **Levemir 25 units each evening** **Multivitamin daily** **Vitamin E 40 u daily** **Calcium 500 mg daily** **HCTZ 25 mg daily**

speech and weakness on Left side of body **Social History: smokes 2ppd for 40 years Drinks 2-3 alcoholic beverages each week** **Primary Medical Diagnosis: R/O CVA** **Surgeries/Procedures & Dates: T/A as a child; Appendectomy 10 years ago** **Nursing Diagnoses: Alteration in cerebral perfusion**	

Report to the Nursing Staff
I'm so glad that you are here! We just received a patient in bed one from home. Her name is Georgia Sanders
She is 63 years old Black Female
Her family states: Sudden onset of Left facial drooping, slurred speech, weakness on the left side of the body
She has a history of: Hypertension, non- insulin dependent diabetes mellitus, Hyperlipidemia, smoker, consumes 2-3 alcoholic drinks per day
The family has a list of her meds… They said that she hasn't taken her BP meds for 2 weeks due to patient feeling too ill to get refills… No medications today…

Simulation Learning Objectives

1. Describe signs and symptoms of a CVA

2. Identify factors in a patient's history that increase the risk of a CVA

3. Identify appropriate interventions for the patient with CVA

4. Perform appropriate assessment for a patient with altered perfusion to the brain

5. Identify appropriate interventions to initiate when responding to a patient with an acute stroke emergency

6. Reflect on performance in the care of a patient with acute stroke symptoms

Fidelity (choose all that apply to this simulation)

Setting/Environment	**Medications and Fluids**
☒ **ER**	☒ **IV Fluids: NS; Activase**
☐ **Med-Surg**	☐ **Oral Meds:**

☐ **Peds** ☒ **ICU** ☐ **OR / PACU** ☐ **Women's Center** ☐ **Behavioral Health** ☐ **Home Health** ☐ **Pre-Hospital** ☐ **Other:** **Simulator Manikin/s Needed: Students and guest will serve as staff and patient and family** **Props:** **Equipment attached to manikin:** **IV tubing with primary line NS fluids running at 125 mL/hr** **Secondary IV line running at 20 mL/hr** **IV pump** **Foley catheter mL output** **PCA pump running** **IVPB with running at mL/hr** **02 2lpm** **Monitor attached** **ID band and allergy band** **Other: glass of juice** **Equipment available in room** **Bedpan/Urinal** **Foley kit** **Straight Catheter Kit** **Incentive Spirometer** **Fluids** **IV start kit** **IV tubing** **IVPB Tubing** **IV Pump** Wall **Suction** **Pressure Bag** **02 delivery device (type) Nasal Cannula** **Crash cart with airway devices and emergency medications** **Defibrillator/Pacer** **Suction** **Other:**	☐ **IVPB:** ☐ **IV Push:** ☐ **IM or SC:** **Diagnostics Available** ☒ **Labs (CBC, PT/INR/ CMP)** ☒ **X-rays (Images) CXR** ☒ **12-Lead EKG** ☒ **Other: CT head** **Documentation Forms** ☒ **Physician Orders** ☐ **Admit Orders** ☒ **Flow sheet** ☒ **Medication Administration Record** ☒ **Kardex** ☐ **Graphic Record** ☐ **Shift Assessment** ☐ **Triage Forms** ☐ **Code Record** ☐ **Anesthesia / PACU Record** ☒ **Standing (Protocol) Orders** ☐ **Transfer Orders** ☒ **Other: TPA Exclusion; NIH stroke scale** **Recommended Mode for Simulation (i.e. manual, programmed, etc.)** **Manual**

Roles/Guidelines for Roles ☒ **Primary Nurse** ☐ **Secondary Nurse** ☐ **Clinical Instructor** ☒ **Family Member #1** ☐ **Family Member #2** ☐ **Observer/s** ☐ **Recorder** ☒ **Physician/Advanced Practice Nurse** ☐ **Respiratory Therapy** ☐ **Anesthesia** ☒ **Pharmacy** ☐ **Lab** ☐ **Imaging** ☐ **Social Services** ☐ **Clergy** ☐ **Unlicensed Assistive Personnel** ☐ **Code Team** ☒ **Other: Charge Nurse, CNA, Triage nurse** **Important Information Related to Roles:** **Sister is a retired nurse; very anxious** **Husband fearful** **Significant Lab Values:** **PT/INR: 10.3/ 1.1** **CBC and CMP : WNL** **Cardiac Profile: WNL** **Physician Orders:** **Diet: NPO pending swallow screening** **Activity: Bedrest** **IV: 1000ml 0.9 NS @ 125 ml/hr** **Start 2 IV lines** **Medications: 0.9 mg Activase. Give 10% bolus over 1-2 minutes. Hang the remaining 90% to infuse over 1 hr. Total dose should not exceed 90mg** **Physician orders cont.** **Labetalol 10-20 mg IV q 10 minutes if SBP > 185 or if DBP >105 Notify PCP For SBP >185 or <110** **DBP> 105 or <60; pulse < 50; respirations <24 or <10** **Non-contrast CT head**	**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:** **Report Students Will Receive Before Simulation** **Time: 0800** **63 year old Caucasian female presented to ER with complaints of sudden onset of Lt facial droop, slurred speech and weakness on Lt side of body** **States ran out of blood pressure medicines 2 weeks ago** **The client appears anxious with elevated BP and increased respirations and decreased O2 saturation** **Hand off report to primary nurse: 63 year old female with stroke symptoms: <3 hr; BP 185/100; HR 98; RR 26; R/A O2 sat 90%**

CBC, CMP, Cardiac enzymes, Coag studies **Document Vital signs and Neuro checks q 15 minutes for 2 hr, then q 30 minutes for 6hr, and then q1hr for 16 hrs** **NIH Stroke Scale on admission and if any neurological worsening**	

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

NIH Stroke scale
TPA screening list

Scenario Progression Outline

Timing (approximate)	Client Actions	Expected Interventions	May Use the Following Cues
0-10 minutes	**Anxious, appears fearful, weakness of Lt side and difficulty forming words**	**Initial Assessment: History (what questions should be asked of the family? (Last time noticed normal speech and behavior… What medications have been taken today? Advanced directive? Completes NIH stroke scale Reviews inclusion/exclusion criteria for stroke**	**Role member providing cue: When did symptoms first appear? Cue: Must identify symptom start time to receive T-PA**
	Laying on cot, follows commands	**Physical Assessment: HEENT: possible cranial nerve involvement relating to swallowing** Respiratory: WNL unless aspirated saliva or food… (then increased respirations, decreased breath sounds might be noted) CV: increased heart rate, elevated blood pressure, Neuro: will depend upon what part of the brain is affected(will often see facial droop, motor weakness, Musculoskeletal: Motor weakness Mental status: alert/Oriented Starts IV, Orders labs, Orders stat CT head,	**Role member providing cue: System assessment Cue: Glass of water at bedside Cue: Can she have something to drink? Students need to know that swallow screen needs to be completed before anything po is given**

		EKG	
10-30 minutes hypoxia	**Anxious, Fearful**	**Lung sounds decreased Pulse Ox 89% Apply 02 call PCP Elevate HOB**	**Role member providing Cue: Family: Is that 89 ok? Did he anything by mouth? Could he have aspirated on his own saliva?**
Decreased blood sugar	**Sweaty, confused, anxious, shaky**	**Check BGM (result 40) Call MD Dextrose order given**	**Role member providing cue: Family: Why is he shaking? He's sweaty Cue: Staff Nurse: Does he have diabetes?**
45-60 minutes Meet criteria for T-PA	**Less confused Speech remains slurred**	**Carefully calculate correct dosage of T-PA using weight based formula Correctly programs pump**	**Role member providing cue: Cue:**

Debriefing/Guided Reflection Questions for This Simulation
(Remember to identify important concepts or curricular threads that are specific to your program)

Video tape scenario
Debriefing in the debriefing room will last at least 40minutes… twice the length of the scenario
Debriefing will begin with the class watching the video tape of the scenario

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 and skills to meet objectives?

5. Were you satisfied with your ability to work through the simulation?

6. To Observer: 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 did the team feel was the primary nursing diagnosis?

10. What were the key assessments and interventions?

11. Review NIH stroke scale

12. What were the warning signs of the stroke?

13. What risk factors could you identify?

14. If you could do this scenario again, what would you do differently?

15. Is there anything else you would like to discuss?