SIMULATION BASED LEARNING IN UNDERGRADUATE NURSING EDUCATION

A Project

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Helay Kashkouli

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SIMULATION BASED LEARNING IN UNDERGRADUATE NURSING EDUCATION

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Department of Nursing
Abstract

of

SIMULATION BASED LEARNING IN UNDERGRADUATE NURSING EDUCATION

by

Helay Kashkouli

The purpose of this project was to develop additional curriculum for High-Fidelity simulation (HFS) in undergraduate nursing education at California State University Sacramento (CSUS), School of Nursing (SoN). The first part of this project developed pre-simulation content to bring together clinical knowledge and skills in performing nursing care on patients with seizure disorder. This content standardized student knowledge, which can contribute to quality and consistency in practice. The second part developed case based clinical scenarios, along with post simulation debriefing material, to support second semester Bachelor of Science in Nursing (BSN) students in linking theory to clinical practice.

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Chapter One

Introduction

Statement of Collaboration

Dr. Debra Brady, CSUS Simulation Learning Center Coordinator, served as my mentor for this project. I worked closely with Dr. Brady over the past three years, beginning as a graduate student learning the various aspects of simulation, followed by part-time simulation faculty for one year. I observed and assisted students in the simulation lab in order to familiarize myself with the phases of simulation and their implementation.

Finding simulation to be a very effective way to evaluate student knowledge, attitudes, skills, and communication ability, I chose to pursue certification courses through the California Simulation Alliance (CSA). I completed CSA Level I, II, and III Certifications over the past two years, preparing me to undertake this Master's project.

Level I training covered three key areas: using simulation as a teaching strategy, operating high-fidelity simulators, and writing basic simulation scenarios. Level II training, an interactive, hands-on course, expanded on the basics by addressing various simulation challenges, and introducing various forms of lab equipment. The Level III workshop, Scenario Writing and Debriefing, was such a useful experience and I took the course twice. The Debriefing Workshop has been an area of personal growth and allowed me to develop communication skills that facilitate student learning through use of clinical reasoning questions. This
certification process has prepared me to use the CSA-approved scenario template, describe the scenario writing process, and translate storyboard to simulation. Through the simulation courses and my experience thus far in the simulation lab, I have gained knowledge about creating active learning experiences for students that allow them to practice their skills and apply their knowledge in a safe learning environment. This simulation curriculum project will be a part of the curriculum of N123 Advanced Medical Surgical Nursing Neurological Module and will enable all students to experience care and management of a patient in active seizure.

**Purpose of the Project**

The purpose of this project is to develop additional curriculum for HFS in undergraduate nursing education at California State University Sacramento (CSUS), School of Nursing (SoN). The first part of this project will develop pre-simulation content to bring together clinical knowledge and skills in performing nursing care on patients with seizure disorder. This content will standardize student knowledge, which can contribute to quality and consistency in nursing education. The second part will develop case based clinical scenarios along with post simulation debriefing material to increase the tools available to nursing educators in supporting second semester Bachelor of Science in Nursing (BSN) students in linking theory to clinical practice.

**Statement of the Problem**

The nursing profession demands newly licensed Registered Nurses (RNs) who are well educated in the fundamentals of safe patient care, including the ability to
prioritize, delegate, and apply evidence-based practice. Registered Nurses also must possess confidence in their ability to make critical decisions and perform timely and appropriate nursing interventions. These essential skills of nursing practice are essential in providing safe and quality care.

Schools of Nursing (SoN) attempt to provide students with the most enriching educational experience possible. However, many system-based challenges exist. Three major factors include the short duration of nursing school programs, a decrease in funding for education, which has decreased internships and training, and limited clinical placement experiences for students. For example, the previously six-semester CSUS nursing program was reduced to a five-semester program, and eventually decreased even further to four semesters. Although tuition increases occur annually in California state schools, financial aid is limited. While nursing student internships formerly provided valuable supplementation to students’ clinical experiences and financial assistance, very few internship programs have survived the economic downturn that has occurred since 2008. In addition, clinical placements for students are limited, and it is difficult to predict quality of experience. For example, factors such as low patient census impact the student experience by limiting their exposure to a variety of disease processes (Azizi-Fini, 2015).

CSUS nursing students currently have four semesters to gain theoretical nursing knowledge, but only a brief component of this time is dedicated to attaining confidence in clinical practice. Site challenges faced by clinical faculty and students include limited preceptor availability, fluctuating numbers of patients of an
appropriate acuity level, and high patient discharge rates due to decreased length of hospital stays (Azizi-Fini, 2015). Though nursing students may absorb the essentials of theoretical knowledge and basic skills by the time of graduation and board licensure, they frequently lack the confidence to apply these concepts using critical thinking, prioritization, and delegation in a clinical setting.

According to Quality and Safety Education for Nurses (QSEN), undergraduate courses generally provide thorough coverage of theory and knowledge, but few opportunities exist for student application of this content (2012). Alternative experiences for undergraduate nursing students are currently needed. In addition, reports from the American Association of Colleges of Nursing (AACN) (2008) and the Institutes of Medicine (2003) recommend that faculty direct learning experiences toward the goal of: “preparing future graduates for patient-centered care delivery as members of an interdisciplinary team” (p.1). Such educational situations should emphasize evidence-based practice, quality improvement, and informatics. Therefore, teaching strategies must not concentrate solely upon acquiring theoretical knowledge, but on applying critical thinking, prioritization, and delegation of care within a simulation based learning (SBL) environment.

The Mission of the CSUS SoN is to provide “high quality education and well-prepared graduates who demonstrate proficiency, critical thought, leadership ability, creativity, and commitment, in current and future professional practice.” The SoN utilizes state-of-the-art simulation labs with high-fidelity human patient simulators to educate future nurses. However, since SBL is a more recently implemented teaching
pedagogy, certain subject matter areas would benefit from additional curriculum development, such as managing the acute and unstable patient. Simulation based learning prompts students to critically analyze multiple layers of data at bedside, synthesizing information, collaborate with other health care team members, and provide interventions that facilitate learning best practice for nursing care. Simulation experiences provide opportunities to foster development of interdisciplinary communication, collaboration, and problem-solving in a safe environment.

CSUS SoN students are prepared to begin nursing practice with strong foundational knowledge, but students need opportunities to receive timely feedback on their ability to translate theory into practice. Understanding evidence-based concepts and practicing clinical skills are both essential. The SoN faculty have identified that students need additional hands-on experience in managing patients with various neurological disorders. Therefore, additional curriculum for HFS is needed to reinforce the students’ theoretical knowledge in laboratory setting by simulating high acuity and low frequency clinical experiences. The U.S. is projected to experience a shortage of RNs that is expected to intensify as Baby Boomers age and their need for health care grows as well as healthcare reform provides preventative health coverage for millions of Americans (AACN, 2015). The Bureau of Labor Statistics (2015) projecting the need for more than 580,000 new and replacement registered nurses by the year 2018. Since a shortage of experienced nurses exists and projected to grow, the ability to perform skills competently and
with confidence is even more important for newly graduated RNs. Due to the aging workforce, changing economy and the Affordable Care Act, baccalaureate-prepared RNs entering the profession today face greater responsibility at an earlier stage in their careers than in times past. Nurses are expected to think critically in order to process complex data and reach rational decisions about patient care, which prove to be appropriate in preventing deterioration. Nurses must have the opportunity to see, practice and deliver care to unstable patients in order to develop this skill.

Nursing confidence directly affects patient care, since nurses play an important role in clinical decision-making regarding a patient’s care. When confident and proactive RNs care for patients, fewer quality concerns emerge. The Institute of Medicine (2000) identifies the components of quality care as safe, effective, patient centered, timely, efficient, and equitable (2000). Safety is the foundation of quality of care; nurses need both skills and confidence in order to provide safe care. QSEN (2012) recommends using simulation scenarios in undergraduate nursing education. Simulation is seen as a "highly effective method of instruction for use in facilitating the acquisition of skills and attitudes related to quality and safety in nursing leadership and management roles” (p. 1). Participating in simulation scenarios allows nursing students to gain confidence by accumulating patient care experience. This also promotes enhanced theoretical knowledge, refined skills performance, decreased anxiety levels and increased clinical judgment.
Chapter Two

Review of Literature

Theoretical Concepts

Four theoretical frameworks form the basis for this project, Bandura’s Social Learning Theory, Knowles’ principles of Adult Learning Theory, Kolb’s Experiential Learning Theory and Benner’s Novice to Expert, a nursing theory showing how practice expertise develops on an experiential continuum.

Process of learning. Learning is a process where a living being creates relationships between events, after which they can recognize the association and experience subsequent changes in behavior. There are two basic stages of learning: acquisition and maintenance. Acquisition involves absorbing information and maintenance is the phase of active information use (Sawyer et al, 2014). This project uses this model by providing essential theoretical information to all students in a module before observing its clinical application within a defined scenario in simulation. Individuals learn in several ways: instrumental learning, classical conditioning, non-associative learning, and social learning (Braungart, 2007; Haffer et al, 1998). Social learning is a form of learning that occurs as a result of being in social groups, such as a simulation lab group. People learn from others. In simulation, social learning occurs when an individual's behavior changes as a result of shared experience.

Bandura’s Social Learning Theory emphasized that most learning occurs through observing and modeling behaviors. Albert Bandura (1977) states that
learning from the environment takes place through the process of observational learning. Information is then stored and coded cognitively to be used as a guide for action. Bandura believed that the creation of a realistic learning setting fosters the acquisition of complex skills by incorporating the three areas of environment, behavior, and thought. In the context of nursing education, simulation opportunities function to provide clinical decision-making opportunities for students in a more controlled setting with realistic results. It also provides a venue for faculty to provide timely feedback regarding students’ direct interventions and interactions such as patient education and team communication. This aligns with Bandura’s assertion that “humans are active information processors and link the relationship between their behavior and its consequences (Bandura, 1977, page 24).

Simulation is a unique learning environment that facilitates both individualized and group learning. Simulation based learning allows faculty coverage of topics, though fewer, at greater depth to facilitate better understanding of the concepts most integral to nursing practice. Debriefing allows us to synthesize information to maximize all students’ learning. Simulation is used as a tool to build upon knowledge and critical thinking through case scenarios, topical content, and professional reflection. Commonly encountered patient situations, typically based on actual events that occur in hospitals, are used as exemplars within a nursing framework to build students’ situational context for clinical practice. Since contextual learning improves information retrieval, reflection during a facilitated
Debriefing helps integrate procedural skills with the consequences of personal and group decision-making.

The use of simulation with immediate debriefing is supported by Knowles’ (1984) principles of adult theory, in which adults learn most effectively when participating in interactive environments. Immediate feedback during debriefings is more valuable than delayed feedback. Consistent messages and standardized protocols reduce ambiguity and variation in practice. Concrete applications increase learner engagement and retention of information. In simulation, mistakes can lead to natural consequences without harming actual patients. The individualized learning environment of simulation allows for critical thinking development. Exposure to patient case-based scenarios allows nursing students to acquire virtual experiences and utilize their skills in a safe environment. These simulations become life experience, which in turn builds confidence in the ability to use those experiences to respond again in a similar situation.

Debrief sessions are a critical component of simulation and allow faculty time to evaluate the application of theory content. Faculty can correct any deficits in clinical reasoning, assessment or interventions that occurred in simulation. Faculty link errors that occur so that the standard of care for managing the patient with the disorder is addressed. This provides students with the experience from which they can draw meaning and apply it in the clinical setting when it arises. This method of learning is supported by theorist David Kolb who believes, “learning is a process whereby knowledge is created through the transformation of experience” (1984,
Based on this cycle of learning, students in simulation do, see, think and plan through concrete experience, reflective observation, abstract conceptualization and active experimentation (Kolb, 1984).

**Clinical judgment.** The foundation of nursing education is the development and enhancement of critical thinking and clinical reasoning. All activities are designed to move nursing students forward through the transition to competent and professional nurses. Critical thinking and clinical reasoning are central parts of clinical judgment (Khosravani et al., 2010). Accurate clinical judgment is an essential part of clinical nursing practice, but this develops over time for novice nurses. According to Benner’s theory of “Novice to Expert”, knowledge refinement and repetitive action that occurs with clinical experience can assist in moving the novice “from rule-based, context-free to a more analytical and rational pattern of deliberate critical thinking” (Benner, 1996). Building on theoretical knowledge from undergraduate education and refining this knowledge through repetitive application in clinical experiences helps the novice nurse transition through the stages toward becoming an expert nurse.

**Review of Research**

In recent years, simulation has become widely used in nursing education (Jeffries, 2007). Emerging literature provides data on the use of HFS to teach a wide range of clinical skills to nursing students, including emergency response and preparedness (Scott et al., 2012), critical care (Goldsworthy, 2012), maternity nursing (Hall, 2014), collaboration in clinical decision making (Maxson et al., 2011)
and cardio-pulmonary resuscitation (Agel et al., 2014) to name a few. Research demonstrates that simulation serves as a highly effective strategy for developing competency, confidence, and readiness for entry into practice (Beyea, 2007). The use of SBL has been found to increase knowledge retention (Ackermann, 2009) and build confidence and self-efficacy prior to transitioning into the practice area (Goldsworthy & Graham, 2013; Jeffries, 2007; Goldsworthy, 2012).

**Search strategy.** Search criteria included evidence-based full text articles that were written in English, available online, and published between 2005 and 2015. The first step included searching PubMed, CINAHL Plus with Full Text, and Science Direct conducted with CSUS’s online library system. Indexing terms and key words derived from the titles and abstracts were considered. Secondly, the identified keywords in the databases listed below were used in multiple searches. The search yielded approximately 150 articles and reports. Thirdly, the reference lists of all identified reports and articles were searched for additional studies and were considered. When assessing for relevance, the abstracts and titles of the identified studies were considered first. Only the articles published within the last five years were considered. Those meeting the inclusion criteria were retrieved as printed documents and further assessed for suitability. This review includes articles addressing specifically using simulation as the learning tool with nurses or nursing students.

**Search terms.** The following search terms were used: “Simulation Based Learning” OR, “Simulation”, “training” OR “education,” “Nursing Student OR
Student OR Undergraduate,” “Nurse OR Nursing OR RN,” and “High-Fidelity OR fidelity or HFS.”

**Research Findings**

**Emergency response and preparedness.** Scott, Maddux and Schnellmann found lack of emergency preparedness training (EPT) for patient care providers to be a significant risk to both patients and patient care providers. They cited the 1995 Tokyo sarin gas attacks, for example, where up to 80% of patients bypassed first responders and reported directly to hospitals. Hospital staff suffered secondary exposure to sarin due to inadequate personal protective equipment and training (Scott, 2012). Then again, during Hurricane Katrina, the lack of EPT was cited as a significant factor contributing to adverse patient outcomes (Scott, 2012).

Scott and Maddux found a solution in simulation-based EPT. Using a combination of live actors and high-fidelity human simulators, they recreated a curriculum simulating a moderately sized clinical disaster and assessed life-saving performance of patient care providers (Scott, 2012). They collected data from trainees through online two parts pre-test and post-test Likert-scare self-assessment questionnaire. In the first part the questionnaire-measured trainees’ sense of personal capability and comfort level to handle a disaster. The second part included 23 multiple-choice questions. Four to six months following training trainees completed the same post-test. During simulation mass casualty scenario trainees’ performance was checked off by researches observing trainees in human performance lab as “met or “unmet” and recorded as a percentage. Descriptive statistics such as mean,
standard deviations, and median were used to describe elements of the EPT training. This study was unable to link the pre-post test to each other because the tests were completely anonymous. Therefore they were not able to conduct a paired testing. The results showed trainees (70%) considered their EPT knowledge and/or skill average or below average before the training experience. After the curriculum, 100% of trainees considered their EPT knowledge and/or skill above average, and 90% would recommend the course to other patient care providers. The authors did not did not present trainee performance data in this publication however, concluded that providing comprehensive EPT for medical trainees, including medical and nursing students, was important to the future success of emergency preparedness operations in the US (Scott, 2012).

**Critical care.** Goldsworthy evaluated critical care education for nurses in Ontario, Canada where they use a three-pronged approach including online self-study, simulation and practicum components to educate their nurses (2012). She focused on the use of simulation to build confidence and prepare registered nurses for critical care nursing practice. Students were provided the necessary information then allowed time for hands-on application with immediate feedback and self-reflection. In her simulation design and implementation Goldsworthy used “scaffolding” approach, that allowed learners to build on previous successful learning experiences. Students started simulation with minor cases and rotated through a series of four learning stations, progressing to major case scenarios. Each station allowed opportunity for hands-on application, skill competency as well as
critical thinking and clinical reasoning. Once students were competent in the four skill stations they preceded to the minor critical care simulation cases. In the second half of their program they advanced to the major case scenarios. Her evaluation method is a pre-test post-test for each case. The pre-test questions were related to the pre-readings and simulation preparation, where the post-test is from the actual simulation case. Goldsworthy highlighted a few controversial aspects of simulation, such as summative and formative feedback in particular because summative evaluations can increase anxiety (Gantt 2011). Goldsworthy felt that, simulation should be used as a safe area for learning prior to moving into practice settings. She poses the question, “if summative high stakes testing is utilized will this impact the safe zone?” (p. 141).

Goldsworthy did not share any data or student scores, but gave an overview of the last five years critical care graduate certification program, which incorporated simulation as its key element of student learning (Goldsworthy, 2012). Goldsworthy’s recommendations were as follows: make SBL scenarios as realistic as possible, adhere to the learning objectives and timing of the scenarios, avoid role confusion, and ensure professional development and mentoring of the instructor team (2012). Most importantly, in Goldsworthy’s experience “students appreciate a supportive, encouraging learning environment with clear expectations and objectives, in addition to preparation whenever possible” (p. 143).

**Maternity nursing.** Hall constructed a non-experimental, retrospective, causal-comparative research study to determine the effectiveness of implementing
two different instructional methods: (a) high-fidelity simulation in addition to traditional hospital-based clinical experiences, and (b) traditional hospital-based clinical experience alone (Hall, 2014). Research questions focused on the effect of HFS on practical learning, critical thinking skills, and NCLEX performance potential (Hall, 2014). Scores from the Assessment Technologies Institute content mastery series test (maternal newborn module) were used to examine students' knowledge related to pregnancy-induced hypertension, placental abruption, and postpartum hemorrhage (Hall, 2014). Hall used independent sample $t$ tests to measure the outcome differences between the two instructional methods. Her results indicated significant differences between the simulation and non-simulation groups (p value $< .001$) with regard to the students’ practical learning, critical thinking skills, and NCLEX performance potential with the simulation group showing higher scores (Hall, 2014).

Hall concluded that HFS promotes improved student practical and critical thinking skills, which may foster competent and clinically successful nurses (Hall, 2014). Based on her research Hall recommends (a) using high-fidelity simulation to instruct senior maternity nursing students and (b) increasing staff support to implement the instruction (Hall, 2014). High-Fidelity Simulation instruction promoted social change by fostering competent and clinically successful nurses, translating to higher levels of patient care and safety in the hospital setting (Hall, 2014).

Collaboration in clinical decision-making. In this study Maxson (2011)
looked at whether interdisciplinary simulation team training can positively affect registered nurse and/or physician perceptions of collaboration in clinical decision-making. The authors used a convenience sample of volunteer nurses and physicians to undergo simulation team training. Participants completed the Collaboration and Satisfaction About Care Decisions (CSACD) survey at three points: immediately before simulation training, two weeks after training, and two months after training. The CSACD, a validated Likert-scaled questionnaire was designed to determine how well nurse-physician teams work together with a reliability of 0.90. Differences in survey summary scores among the time points were assessed with paired t tests (Maxson et al., 2011). Pretest data showed that physicians were more likely to perceive that open communication exists between nurses and physicians (p=0.04) and that both medical and nursing concerns influence the decision-making process (p=0.02). The overall summary pretest score trended toward significance (p=0.06); this difference in perceptions was statistically significant at 2 months (p=0.04). Their results showed team training using HFS scenarios promoted collaboration between nurses and physicians, increased awareness of barriers to good communication and enhanced the patient care decision-making process (Maxson et al., 2011).

**Cardio pulmonary resuscitation.** Aqel and Muayyad looked at HFS effects on cardio pulmonary resuscitation (CPR) knowledge, skills, acquisition, and retention in nursing students. They used an experimental, pretest-posttest design to examine the effectiveness of HFS training versus low fidelity simulation CPR training on the acquisition and retention of CPR knowledge and skills among 90
second-year nursing students (Aqel et al., 2014). The researchers used descriptive statistics (mean, median, standard deviation, percentage, and frequency) to analyze the demographic data of the study sample. Independent sample t tests were used to compare the mean differences in acquisition and retention of CPR knowledge and skills between the intervention and control groups at two time points. Paired t test was conducted to find significant differences of study groups. Their findings showed significant differences \( p < .001 \) in both acquisition and retention of knowledge for the students participating in the high-fidelity simulator group (Aqel et al., 2014). The researchers recommend integrating simulation training into nursing curricula to help overcome the challenge of shortage of clinical areas for training and the increase in numbers of nursing students (Aqel et al., 2014).
Chapter Three
Implementation of Project

Project Overview

This project expanded curriculum for Advanced Medical Surgical Nursing (N123) course by filling the gap related to nursing management of patients with a seizure disorder. All second semester N123 students participating in simulation completed the self-learning module prior to entering the simulation environment. Since the student population at CSUS is very diverse, the pre-simulation module provided each group of students with the same information about seizure recognition and management in the simulation lab. The self-learning module was provided a week in advance to facilitate the learners’ ability to process and synthesize new information before expecting them to apply it in the simulation environment. Module completion was projected to take approximately 45 minutes. It covered basic seizure content and safety information, including neurological assessment and interventions, labs, studies, medications, and documentation essentials. The students then applied the content during simulation at the Sacramento State Simulation Learning Center in Folsom Hall, on the quiz, midterm and final exams, and eventually in their own practice as RNs.

The clinical scenario developed addressed content area on seizure management required in the pre-licensure curriculum and fundamental patient safety skill needed in clinical by RNs in the acute care setting. The goal of the simulation was to deliver evidence-based, safe, patient centered care in the simulation setting. The scenario
provided opportunity for students to apply critical thinking and manage the adult patient in an emergent situation through assessment, prioritized interventions, communication and interdisciplinary teamwork. Simulation time parameters were as follows: 5 minutes for preparation time; 10 minutes for the simulation case study, 13 minutes for mentored debriefing and 5 minutes of self-reflection time. The rotation schedule was designed to allow sufficient time for pre-briefing, simulation case studies, and debriefing.

**Objectives for self study module.** After reviewing the pre-simulation study module the students will be able to:

1. Differentiate among the five types of seizures in adults.
2. State five potential causes of adult seizures.
3. Describe the rationale, side effects, and complications associated with the three most commonly prescribed seizure medications.
4. Implement priority assessment and interventions in a simulated emergent seizure experience.

**Objectives for high fidelity simulation.** By the end of the simulation scenario, participants will be able to:

1. Integrate principles of patient, family-centered care and the nursing process to provide nursing care to individuals and families within simulated setting.
2. Apply evidenced-based nursing care in the simulated setting.
3. Correctly prioritize interventions in an emergent event.
4. Safely administer required medications in a simulated emergency situation.

5. Demonstrate effective communication techniques with individuals, families, and professional colleagues as a collaborative member of the interdisciplinary healthcare team within the simulation environment.

**Scope and Setting**

The setting for this project was Sacramento State Simulation Learning Center in Folsom Hall. California State University Sacramento (Sacramento State) was founded in 1947 as a state college. In 2014, it graduated more than 200,000 students from seven academic colleges. The university offers 58 undergraduate majors, 41 graduate degrees, 6 post-baccalaureate certificates and 2 doctoral degrees. Sacramento State prides itself on having a diverse student body served by knowledgeable faculty, with “98 percent of full-time professors holding the highest degrees in their field” (p. 1).

**CSUS School of nursing.** The Mission of the School of Nursing is to provide “high quality education and well-prepared graduates who demonstrate proficiency, critical thought, leadership ability, creativity, and commitment, in current and future professional practice” (CSUS, 2015, p. 1). Therefore, this project fits within the mission of the School of Nursing by promoting interdisciplinary collaboration and cooperation, supporting academic leadership, engaging in creative problem solving, and reinforcing students’ theoretical knowledge by simulating clinical experiences in laboratory settings.
The School of Nursing is guided by its core values of caring, professionalism, integrity, diversity, and innovation (CSUS, 2015), taking pride in its tradition of preparing RNs who will strengthen the profession of nursing. Sacramento State has built strong relationships with hospitals in the surrounding communities, primarily in Sacramento and Placer Counties. Graduates of CSUS are in high demand, particularly due to the school’s progressive vision related to technology in healthcare, exampled in using simulation education to enrich students’ education (UCDMC, 2015).

**Learners.** The ages of the 78 male and female students participating in this simulation lab varied from 20’s to middle adulthood. The majority commute from around the local area, live in off-campus housing, and come from diverse cultural backgrounds. For many English is a second or third language. As college juniors or seniors, they have had recent undergraduate education. Upon their acceptance to the CSUS Nursing program in Fall 2014, this class of 78 students had an average grade point average (GPA) of 3.888 (CSUS, 2015).

**Prerequisites for learning.** A significant amount of previous knowledge is required before completing the self-study module and applying the content during the simulation experience. Each student has already successfully completed a full semester of theory, clinical, and lab courses in addition to all of their pre-requisite and co-requisite coursework. By the time of this simulation experience, they will also have completed three-fourths of their Advanced Medical Surgical, Mental Health, and Gerontology classes. Learning some new vocabulary will be necessary
to understand the content in the self-study module and the simulation case studies. Unfamiliar terms such as tonic-clonic, myoclonic, and EEG will be defined and explained in the module. In addition to providing written information, the module will also include embedded videos, and diagrams to facilitate learning through multiple modalities.

**Required Materials**

Requirements for students’ preparation included all prior coursework and clinical hours as well as a computer, Internet access and the self-study PowerPoint module. The PowerPoint self-study module was posted a week in advance for all students on SacCT, the web-based learning platform. The rotation schedule, including a time grid and case study locations, was posted a week in advance. On the actual day of simulation, space and equipment resources included the three High-Fidelity simulation suites, each including a patient room, control room, and Post-Simulation Conference rooms. Students secured their belongings while they were in simulation in the locker rooms. Personnel resources included N123 faculty and Teaching Assistants. Eight Lab Assistants were on site from 0615-1215 to set up, guide students through case-based learning, and break down equipment at the end of the simulation experience. The on-site computer lab was utilized for the post simulation quiz and survey.

**Development of self-study module.** PowerPoint software was used to create 35 slides (Appendix G) covering theory and clinical application of adult seizures. Four publically available videos on YouTube 44 seconds to 1.33 minutes
were uploaded and imbedded in the slides to support audio-visual learners in differentiating each type of seizure. Imbedded videos insured functionality.

**Development of pre and post quiz.** Ten multiple choice quiz questions with choice of four answers, only one of which was the correct answer, was written to determine baseline knowledge about seizures as well as determine learning from self–study module, simulation and debrief (Appendix B). The quiz was tested with two semester of students to determine clarity. Questions that students’ felt were confusing, unclear or could be rationalized as correct was rewritten and again tested with a new group of students.

**Development of confidence survey.** Ten Likert-scaled questions were developed in conciliation from three educational experts and one content expert in simulation to address student confidence in the following areas of nursing care: assessing, prioritizing, communicating, maintaining safety, interpreting laboratory data, identifying resources, delegating appropriately, managing medical equipment, managing conflict in the workplace, and having sufficient knowledge of medications (Appendix A).

**Development of simulation scenario.** High fidelity seizure clinical scenario was developed with assistance from clinical faculty Dr. Debra Brady and undergraduate nursing student, Sarah Blake (Appendix C). An Emergency Department (ED) clinical scenario with limited patient information, and without standing orders made this clinical scenario unique for N123 students. Another distinction was the use of Emergency Medical Technicians (EMTs) to directly report
off to ED nurses. In this simulation students receive report at bedside since it is important in the safe transfer of care. Students were also able to ask questions from EMTs directly added another layer of interaction for students as part of interdisciplinary team. Up to this point in their nursing education N123 students relayed heavily on standing orders in the patient’s chart however, in this simulation they are pressed to utilize nursing protocols and actively facilitate patient care orders. This allowed them to link theory content with to practice theory content that they can employ in their current clinical rotation. Practice actual nurse role and experience. Like they would in clinical rotation.

**Development of debrief focus questions.** A one page document highlighting essential nursing knowledge and skills so that all faculty and mentors can easily follow while debriefing students. This is a general outline of significant content to discuss and provides consistency and structured debrief in each debrief session (Appendix D).

**Beta testing and content validation.** All didactic, simulation, and assessment elements were beta tested for content validation and scenario flow with a small test group of N123 students. Faculty and student feedback was essential in identifying limitations and problematic area during the trial phase. Students’ feedback and support allowed quality improvement of the didactic content in the self-study module as well as the pre and post quiz. The WISER Professional Nursing Simulation Scenario Readiness Checklist was used in the final phase to complete beta testing (Nehring & Lashley, 2010).
Implementation at Sacramento State

The teaching plan was to facilitate meaningful learning through problem-based strategies and simulated patient scenarios. It was important for students to see the larger picture; not solely reviewing the module and memorizing facts, but understanding, analyzing, synthesizing, and applying the information from the module clinically. The objectives were focused towards the broader concepts students can gain from this experience, with the goal of improving thinking skills, identifying connections, and working within an interdisciplinary team to provide patient care.

Warm-Up, introduction, focus. The warm-up session began with the high-fidelity simulator programmed with simulated breath sounds, pupillary reflex and pulses, in addition to the ability to seize, become cyanotic and respond verbally to questions. Students were given an orientation to the room and equipment. The clinical scenario was presented verbally to all students, with a written version also provided. The overall process and role expectations were clarified. The active participants were selected for the hands-on activity, while the observation group moved into the debriefing room to observe the simulation via live video streaming. In order to provide students with direction and focus during this learning activity, students worked as a team to cover the various responsibilities during the scenario. In the active participants’ group, roles included lead nurse, medication administrator, and scribe. In the observation group, while watching the live video stream, two students scribed “things that went well” and “things that could be changed for next
time” in two columns on the dry-erase board. The other observing students actively participated by critiquing the simulation.

**The content.** As soon as all participants were ready and the simulated vital signs appeared on the telemetry monitor, the simulation began with Emergency Medical Technician (EMTs) giving report to hospital providers. The patient started seizing within seconds. The students’ ability to assess, manage and critically think about their approach was evaluated. As a group, students managed the patient’s airway to ensure patient safety, utilized appropriate resources, administered medications, and documented appropriately. Students were specifically observed for preforming the following actions during simulation: Placing patient on monitor and obtaining vital signs, assessment and GCS calculation, identification of causes of LOC changes, SBAR communication, basic airway management and oxygen delivery, initiate and maintain seizure precautions, medication knowledge and safe administration of Diazepam, Lorazepam and Phenytoin.

**Closure.** All students met in the debriefing room to discuss the simulation experience. A structured Plus/Delta/Discuss debriefing format was used to explore clinical performance and clinical reasoning. The facilitator engaged the students in dialogue to promote in-depth discussions. Students critiqued each other and provided peer feedback with mentor support. Positive discussion and feedback were used to evaluate level of retention from the self-study module and ability to apply this material during assessment and providing interventions to the simulated patient. Discussion focused on five broad categories: airway/oxygenation, causes/diagnostic
studies, medications/safety, and equipment/supplies. Five student groups rotated through this simulation, resulting in five unique simulation experiences; however, debriefing sessions addressed gaps in understanding with content reinforcement and streamlined review of key points. Faculty, mentors, and peers provided factual clarification and suggestions for improvement.
Chapter Four

Simulation Module Evaluation and Data Analysis

Collection of Data

Quantitative program evaluation data was collected from second semester nursing students in their N123 Advance Medical Surgical Nursing Course that participated in the simulation. The course uses an online course management system called “Blackboard”. To assess the effectiveness of the learning module design, data was collected via the online course management system Blackboard through pre-post self confidence questionnaires and quiz posted at two points: 1) immediately before self study module and 2) immediately after debrief. There are 78 registered students in the course and this simulation experience was scheduled during the regular weekly lecture time period. Pre and Post Confidence Survey (Appendix A) is designed to determine how confident students feel about their nursing skills. Pre and Post quizzes (Appendix B) to determine baseline student knowledge was distributed via Blackboard on April 13th, 2015 at 7am and was available until April 20th, 2015 at 7am. In order to ensure that students were not answering from memory, question orders and questions stems were randomized through Blackboard. Data was collected from 71 students.

Qualitative program evaluation data was collected from students in debriefing. Students were asked if they had any feedback about the simulation or module in small 10-15 student groups. Students provided valuable feedback during this open forum session.
**Pre-module survey.** The directions for the pre-module survey were as follows: “Please complete this short survey before you start the self-study module on seizures. Please rate your current confidence level using a 1-5 scale in which (1) represents Not at all confident and (5) represents Extremely confident. You will retake this survey again in one week. This data will be used to compare your confidence after participating in simulation as part of the evaluation of the Seizure Simulation Module. Participation in this survey is voluntary and will not influence students’ grades.”

**Pre-module quiz.** Students completed a pre-module quiz (Appendix D) to determine baseline level of knowledge about seizure and management of the seizure patient. Time limit for the pre-module quiz was set with a lockout of 15 minutes to deter students from looking up answers on the Internet.

**Seizure self-study module.** The seizure self-study learning module was open and available to students starting April 16, 2015. Email reminder to students encouraged completion of the Pre-Module Confidence Survey and Quiz prior to review of self-study module. Each student had unlimited time to review content from the self-study module.

**Post-simulation survey and quiz.** After simulation and post debrief, students were given access to computer lab number 1047 to log onto Blackboard and complete both post-simulation survey and quiz. The pre and post survey and quizzes were identical. The scores from this post-test was the students’ participation grade for this assignment.
Post-simulation student feedback. Open discussion post-debrief provided valuable feedback from students on the structure of the self-learning module and simulation experience. Areas of positive responses were actively sought from all groups. Students’ comments related to the self-study module focused on the following major themes regarding the simulation experience: “Self-study module was easy to follow.” “Provided only essential bedside information. “I had to think quick”, “Videos were effective in communicating complex information.” “Simulation was fast-paced and different because there was no standing orders on the patient chart.”, “Simulation was “fun” and pushed us to bounce ideas off each other.”, “The scenario was realistic.” Area for improvement noted by students included: a request for “list things not working with Sim Man prior to simulation”, since in one occasion Sim Man’s eye was dilated inappropriately and students weren’t sure if this was an error or actual change in patient condition. Students felt it would have been “nice to know about available resources at bedside, such as ability to call the physician to bedside if needed.” Students at this point acknowledged the limits of Sim Man in completing a neurological assessment and limitations of movement. Students felt “more orientation pre-simulation would have been helpful, such as: it is ok turn the patient as needed and only verbalize pushing intravenous medications.”
Organization and Analysis

Statistical Package for the Social Sciences (SPSS) program was used to code, organize, and run tests on the data. Each student’s data was linked on Blackboard to the same individual and followed from pre-post survey and quiz. This data was transferred to Excel spreadsheet and uploaded to SPSS. The responses to the 10 Likert questions were organized as Q1-10 with one to five values representing 1) not at all confident 2) slightly confident 3) moderately confident 4) very confident 5) extremely confident. Responses were then collated and summary scores were calculated for each time point. Student Pre and Post quizzes were coded for 1) correct and 2) incorrect answer. Individuals pre-module quiz was compared to their post-simulation quiz.

The Cronbach’s Alpha score of .81 was calculated for internal consistency and reliability for Pre-Post survey and Cronbach’s Alpha of .60 for Pre-Post quiz. Pre-Post survey responses were added for totaled confidence, 10 points minimum confidence score and 50 points for maximum confidence score using computer variables function. A SPSS program test frequency on pre and post quiz scores checked validity of data and obtained statistics for each quiz question. Paired sample statistics for Pre-Post quiz and pre-post confidence survey was run. Descriptive statistics such as mean, median, and standard deviations, was used in data analysis.

Evaluation of students in simulation. Students’ performance in simulation is examined using measures of behavioral processes, such as assessment and skills of the student. The assessment and evaluation of learners was divided into two
components. The first part of the evaluation involved assessment of learning from the self-study module. A pre and post quiz was used to determine learning from the module and simulation experience. The post-quiz determined competency in the self-study module. The second part involved evaluation based on demonstration of knowledge gained from the module during active simulation. The students reviewed the self-study module and did very well with the post-test. However, for most students, this was their first experience with a seizure patient. The situation itself was new knowledge for the students. Even though we used the same clinical case, with each session the outcome was different. The simulation experience allowed identification of the following lack of skills.

1. Students did not know how to maintain the airway after head tilt chin lift.

2. Students administered medications without order.

3. Students selected BVM instead of non-rebreather to oxygenate patient with spontaneous respirations.

The students did show appropriate knowledge of:

1. Recognizing seizure activity and initiated response.

2. Proper protocol in management of ictal and postictal periods with appropriate seizure precautions.

3. Student appropriately assessed, reassessed and attempted to find cause appropriately.
4. Oropharyngeal and nasopharyngeal airway devices: Indication for use, contraindications, appropriate fitting and insertion. Head tilt-chin lift: indications, contraindications, and demonstration of skill.

5. Suction: indications, contraindications, appropriate set-up, troubleshooting, and demonstration of skill.

6. Student SBAR reports, on the whole, were prioritized correctly, timely, and organized.

7. Students showed appropriate knowledge of medications, and safe administration.

8. Overall students worked as a cohesive unit by being engaged in simulation and contributing ideas.
Chapter Five

Findings and Interpretations

Out of 71 students that participated in data collection 33 students completed both the Pre-Module and Post-Simulation Confidence Survey (n = 33) and 58 completed both Pre-Module and Post-Simulation Quiz (n = 58). Based on this inclusion and exclusion criteria, 38 students were excluded from the confidence survey analysis and 13 students excluded from the pre-post quiz analysis. One week after self-study online module and right after simulation, the Post-Simulation Confidence Survey mean scores for each item improved significantly (Pre-Module Confidence 30 points vs. Post-Simulation Confidence 35), as did the overall Post-Simulation Quiz scores. There was significant increase of 5 points in student confidence from Pre-Module Confidence Survey to Post-Simulation Confidence Survey. Student mean for Pre-Module quiz to Post-Simulation quiz improved from 6.55 to 8.65 points with (p value < .05). The pre to post confidence survey item analysis revealed that respondents were more confident with t value of -6.28, and did better t value of -6.17 in the Post-Simulation Quiz.

This project intended to provide students with the opportunity to understand, analyze, synthesize, and apply the information from online self-study module clinically and determine if this method of learning impacted student confidence. Pre-simulation module helped to standardize the process, by providing all students with the same knowledge which can contribute to quality and consistency in practice. The data from this program evaluation project showed participants were more confident after reviewing the module and participating in simulation. This data supports prior findings from literature
review and theory that simulation based learning works. Utilizing online self-study modules with audiovisual material, interactive hands on experiences through simulation and structured debrief offers a rich medium for learning.

**Conclusions and Recommendations**

Nursing students lack control over the events and types of patients they may encounter in the clinical setting. Providing consistency in clinical experience is essential to learning. In High-Fidelity Simulation each student has the opportunity to be presented with the same clinical problem during simulation, and experience taking care of high-acuity patients in a low-risk environment. In HFS students have exposure to low frequency, high-risk patients that foster critical thinking in a low risk environment and is beneficial in increasing student knowledge and confidence. The feeling of being prepared for practice improved when students demonstrated their nursing skills in a nonthreatening environment. Further, they believed these skills would translate to the clinical environment. Nursing confidence is important for safe patient care. Based on the above data, as well as student feedback, confirm that students find self-study followed by simulation method rewarding and perceive it to be of value.

Findings from this project evaluation are consistent with those reported in the nursing education literature on the effectiveness of simulation education (Goldsworthy & Graham, 2013; Jeffries, 2007; Goldsworthy, 2012). Based on highly positive student response from students’ feedback this was an effective use of lecture time. Active learning with hands on nursing care or observation increases student post test scores on how to manage the seizure patient. Therefore, the module addresses the curriculum need
and is effective. Recommendation is to use this content in N123 curriculum at Sacramento State. In addition, continue to use the Pre-Module and Post-Simulation quizzes as part of the course grade. And finally, implement the seizure simulation scenario as designed.
Appendix A:

Pre-Module and Post-Simulation Confidence Survey

Directions: Please rate your current confidence level using 1-5 scale in which (1) represents Not at all confident and (5) represents Extremely confident. Your answers will be anonymous. You will retake this survey again in one week. This data will be used to compare your confidence after participating in simulation. Participation in this survey is voluntary and will not influence students’ grades.

1. I am confident prioritizing which patients to assess first in the hospital from report.
   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

2. I am confident in safely managing a patient with medical devices (C collar, IV devices, Ambu bag, Oral/Nasal Airway).
   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

3. I am confident identifying abnormal assessment findings and changes in patient condition.
   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

4. I am confident interpreting basic laboratory data (CBC, Chem 7, ABG, LFT, Cardiac panel).
   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident
5. I am confident in my knowledge of medications and their nursing considerations.

   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

6. I am confident communicating abnormal assessment findings and changes in patient condition to physicians.

   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

7. I am confident in communicating with patients and their families.

   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

8. I am confident identifying resources and asking for help when priorities change quickly.

   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

9. I am confident managing conflict in the workplace.

   1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident

10. I am confident delegating to members of the healthcare team.

    1 – Not at all confident  2 – slightly confident  3 – moderately confident  4 – Very confident  5 – Extremely confident
Appendix B:  
Pre-Module and Post-Simulation Quiz  

1. All of the following are various adverse effects associated with antiepileptic drugs, except for?  
   a. Sleepiness  
   b. Dizziness, drowsiness, weakness.  
   c. Stroke  
   d. Liver Toxicity  

2. Which of the following is NOT considered a seizure precaution intervention.  
   a. Padded side rails, bed in low position at all times.  
   b. Suction and oxygen at bedside.  
   c. Restraint order in chart.  
   d. Patients should have a saline lock throughout hospital stay.  

3. Your patient is hospitalized with a seizure disorder. The patient is on a bed with padded side rails, has a tonic-clonic seizure. The nurse should do which of the following? Select all that apply.  
   a. Call a code blue and assist with respirations.  
   b. Turn the patient to the side, protect from injury and call for assistance.  
   c. Suction the airway, place on oxygen and call MD.  
   d. All of the above  

4. Nursing care for a client who has a history of alcohol abuse should be directed toward preventing what complication?  
   a. Seizure  
   b. Hyperglycemia  
   c. Hypotension  
   d. Infection  

5. Adult seizures can be caused by:  
   a. Traumatic Brain Injury  
   b. Hyperglycemia  
   c. Alcohol Intoxication  
   d. Anemia  

6. Absence seizures are most common in:  
   a. Men  
   b. Women  
   c. Children  
   d. Elderly
7. What are myoclonic seizures?
   a. Brief jerking or stiffening of extremities, singly or in groups lasting a few seconds
   b. Brief loss of consciousness, staring.
   c. Sudden loss of muscle tone causing person to drop to floor, followed by confusion.
   d. Continuous seizure activity lasting longer than 10 minutes.

8. Which of the following statements are true?
   a. Intravenous diazepam is associated with a high risk of respiratory depression.
   b. Phenytoin intravenously should be infused with an infusion pump IVPB.
   c. Lorazepam (Ativan) can be given every 5 minutes with a max dose of 4mg.
   d. All of the above.

9. Which of the following medications is correctly dosed for an adult patient in active seizure.
   a. Phenytoin: 1gram IV as an initial bolus over 30 minutes.
   b. Lorazepam (Ativan): 1mg as an initial dose repeat IV dose may be given every 5-15mins IVPB.
   c. Diazepam (Valium): 5 mg IV as an initial dose repeat IV dose may be given every 5-10mins.
   d. None of the above

10. The difference between generalized seizure and partial seizure is that the generalized seizure is characterized by ______, whereas the partial seizure is characterized by ______.
    a. No change in EEG; focal discharges
    b. Seizures seen in bilateral EEG; more focal discharge
    c. The absence of seizures; the presence of seizures.
    d. The presence of seizures; the absence of seizures
Appendix C: N123 Seizure High-Fidelity Scenario

Created by: Debra Brady DNP RN CNS, Helay Kashkouli RN BSN

Philip Smith
DOB 4-6-12
Sim Program Seizure Program Phillip Smith

Simulator Set up:
Sim Man in bed, HOB 30 degree
Pillow under patient’s neck
Nasal Cannula with 2 liters of O2.
Monitor off
1 IV right arm with NS TKO
Med: Ativan 2mg/ml X2 syringes
Flushes X6
NS bag infusing TKO
Dilantin 1gm IVPB premixed 100ml NS solution

IV Pump
Penlight, Thermometer, Glucometer,
Stethoscope,
Oral and Nasal Airways 2 adult sizes
ECG wires; NC, Non-rebreather, Ambu bag,
Suction
Side Rail Padding
Faculty:
Clinical experience in ER/Neuro
Technical programing assistance if faculty not familiar with

Learning Goals:
1. Initiates VS check, places patient on ECG monitor.
3. Assesses airway and oxygen needs and administers oxygen as needed.
4. Implements seizure precautions/patient safety measures to protect patient during seizure.
5. Initiates call to physician using SBAR communication and obtain assistance.
6. Administers appropriate medications: Phenytoin (Dilantin), Valium, and Ativan.

Case Scenario: EMT giving report to ED nurse.
Situation: Good morning this is Philip Smith, 29 y/o old male, onset of seizure activity today while at home playing video games with a friend. Witnessed tonic-clonic seizure lasting about 1 min reported by friend. Prior Medical history of Asthma, not currently on any medications. Occasionally smokes marijuana, last time was 10 days ago. Vital signs are stable. Currently patient is in postictal state with GCS 13 in route. We haven’t given any medications. We established an IV 20 g right AC, NS is infusing TKO.

EMT additional information if requested:
Blood Glucose: 90mg /dl
Vital signs: 134/90 HR. 118, RR 24, O2 Sats 92% 2L NC
Allergies: Unknown
Temp: We don’t take temperature in route, but he didn’t feel hot.
Family: Sister was called and registration has her phone number.

Student Roles:
Primary ED RN (1) Direct team to assess patient
Second ED RN (1) Part of team, initiate assessment along with Primary RN
Medication RN (1) Administer medications
Documenting RN (1) Records VS and patient data on white board
Family member (1) Optional role via telephone
EMT (1) Gives report to nurses in person
Appendix D: Debrief Focus Questions

- Student introductions foaming in & out
- Assessment/vitals
  - Temp/BS check
  - Notes onset of seizure activity, describes/documents seizure.
  - Implements seizure precautions/patient safety measures to protect patient during seizure.
    - Before, during and after seizure
- Assesses airway and oxygen needs and administers oxygen as needed.
- Manage airway: Effective head tilt chin lift or Jaw trust
  - Indications and contraindications
- Initiates call to physician using SBAR communication to obtain assistance.
- Made suggestions
  - Labs/studies
    - CT head (head trauma, bleed, occlusive stroke, mass, infection, Alzheimer disease)
    - CBC: WBC c differential (infection), platelets (head bleed)
    - Chemistry: electrolytes imbalance
      - Low sodium: hyponatremia
      - Low glucose; usually hypoglycemia, Non-ketotic hyperglycemia (only)
      - Low calcium; hypocalcaemia (rare but happens children),
      - Low magnesium (<0.8meq/L)
      - Renal function test (BUN over 100) uremic syndrome
      - Liver function tests: hepatic encephalopathy
    - Coag INR/PTT: coagulation disorders or medications (warfarin)
    - Toxicology Screen (Urine/serum ETOH)
      - Alcohol withdrawal: (7 to 48 hours) of the last drink
      - Benzodiazepine, or barbiturate withdrawal
      - Meth and cocaine use
    - Drug levels: such as Dilantin
    - EKG: dysrhythmias
    - Chest X-ray (aspiration/ infection)
    - LP (infection): Lumbar puncture for cell count, protein, glucose, and stains with cultures should be performed whenever there is suspicion of meningitis or encephalitis.
    - EEG: abnormal electrical activity in the brain (once patient is more stable)
- Administer medications safely
  - Ativan or Valium, Dilantin
    - Indication/safe dose/contraindications/nursing considerations
    - Indication/safe dose/administration safety
- Continually reassess VS/O2 Sat/neuro checks
- Review learning goals/objectives for further discussion
Appendix E:

Online Self-Study Learning Module

Seizures
Phenomenon and Management in Adults
Objectives
By the end of the learning module on seizures the students will be able to:
1. Differentiate among the five types of seizures in adults.
2. State five potential causes of adult seizures.
3. Explain six seizure precaution interventions.
4. Describe the rational, side effects, and complications associated with the three most commonly prescribed seizure medications.
5. Implement priority assessment and interventions in a simulated emergent seizure experience.

Seizure Definition
Sudden, abnormal electrical discharges from the brain that result in changes in sensation, behavior, movements, perception, or consciousness.

Seizures Classification
Partial / Focal
- Simple Partial Seizures (SPS)
- Complex Partial Seizures (CPS)
Generalized (loss of consciousness)
- Tonic-Clonic (grand mal)
- Absence Seizures (petit mal)
- Myoclonic Seizures

Simple Partial Seizures (SPS)
- Usually lasts 5-30 seconds
- Symptoms can present in variety of ways
- Dependent on cortical area involved
- Both visible manifestations and subjective experience (jerking of limbs & abdominal pain)
- No loss of consciousness or postictal state
- EEG - normal or focal spikes
- Can be immediately followed by CPS

SPS Example
Complex Partial Seizures
- Most common type of seizures in adults
- Variable duration, but typically less than 3 minutes
- Appears awake, but not responsive, impaired consciousness
  - Staring and repetitive motor behaviors (automatisms)
- If restrained, may become hostile or aggressive
- Postictal period: no memory of what took place during seizure
  - Somnolence, confusion, and headache up to several hours
- EEG: focal activity spreading to involve one or both hemispheres
- Can evolve to a secondary generalized seizure.

Tonic-Clonic Seizures
- Usually lasts 1-2 minutes
- Abrupt loss of consciousness
- All muscles become stiff (tonic) followed by twitching/jerking movements (clonic)
- Expect cyanosis, mouth injuries, or other bodily injuries
- Can be preceded by any partial seizure
- Postictal period
  - Usually deep sleep with hyperventilation then gradual wakening with complaint of headache
  - EEG: series of generalized, high-amplitude spikes

Thinking Like a Nurse?
If you were in this restaurant...
How would you manage this situation differently to promote safety?

Absence Seizure
- Usually lasts between 5-10 seconds; but frequently in clusters
- Considered a seizure disorder of childhood
- Sudden staring with impaired consciousness with eye blinking and lip smacking
- EEG - characteristic generalized, 3 per second, spike and wave
Absence Seizure Example

Myoclonic Seizure
- Consciousness is usually not impaired
- Involve sudden jerking movements of either a single muscle group or multiple muscle groups
- Usually occurs in the morning
- Patients often report that they spill their coffee

Etiology of Seizures
Most Common
- Traumatic brain injury
- Hypoglycemia
- Brain tumor and infection
- Anoxia
- Stroke
- Alcohol withdrawal
- Substance abuse (cocaine, methamphetamine)
- High fever
- Electrolyte imbalance
- Idiopathic (unknown cause)

Acute Management of Inpatient Seizure
The following factors are a priority in managing a patient in active seizure
- Airway management and Safety
- Vitals signs, assessment and patient monitoring
- Identification of cause
- Anticonvulsant treatment when appropriate

Airway Management
Hypoxemia can be both the cause and the consequence of a seizure. Airway management this the first step in assailing a patient in active seizure.
- Airway Maneuvers: Two positions maneuvers can be performed to improve airflow in the patient receiving basic airway management.
  - Head-tilt chin-lift
  - Jaw-thrust

Head-tilt chin-lift Maneuver
The head-tilt chin-lift is used in any patient in whom cervical spine injury is NOT a concern. The clinician uses two hands to extend the patient’s neck and open the airway. While one hand applies downward pressure to the patient’s forehead, the tips of the index and middle finger of the second hand lift the mandible at the mentum, which lifts the tongue from the posterior pharynx.
Jaw-thrust Maneuver

The jaw-thrust maneuver is used in the patient in whom cervical spine injury is a concern. This maneuver moves the tongue anteriorly with the mandible, preventing the tongue’s ability to obstruct the airway. With the patient supine and the clinician standing at the head of the bed, the technique is performed by grasping the proximal part of the mandible on each side of the patient’s head, then grasping the angles of the mandible with the index and long fingers, and depressing the jaw anteriorly.

Airway Management

Once an open airway has been established, it must be maintained.

Airway Adjuncts:
- Oropharyngeal and nasopharyngeal airway devices can be utilized.

Airway Management

Oxygenation (provide O2 source) and ventilate (assist respirations) appropriately.
- Nasal Cannula
- Non-rebreather oxygen mask
- Bag Valve Mask

Vital Signs and Monitoring

Hypotension can potentiate or exacerbate any derangement in cerebral physiology and function.
- Check vital signs including blood pressure, HR, RR and O2 saturation.
- Keep patient on Cardiac monitor.

All patients should have prompt measurement of blood glucose.
- Glucose of <40mg/dl can cause seizures

Anticonvulsant Treatment

The goal of anticonvulsant treatment is the rapid termination of clinical and electrical seizure activity by the prompt administration of appropriate drugs in adequate doses, with attention to the possibility of complicating apnea, hypoventilation, and other metabolic abnormalities.

Benzodiazepines

Benzodiazepines are used to prevent or stop seizures by slowing down the central nervous system. They are often used to treat prolonged seizures of status epilepticus. They are not usually the first choice for long term treatment of epilepsy.
**Benzodiazepines**

Lorazepam (Ativan)
- Dose: Adult IV 4 mg as an initial IV dose, repeat dose may be given q15-60 min (maximum dose 8 mg).
- Hold Lorazepam if seizure stops, maximum dose is reached, there is evidence of respiratory depression or hypotension.

 Diazepam (Valium)
- Dose: Adult IV 5 mg as an initial IV dose, repeat IV dose may be given every 5-10 min (maximum dose 50 mg).
- Hold Diazepam if seizure stops, maximum dose is reached, there is evidence of respiratory depression or hypotension.

**Anticonvulsants**

Commonly used seizure management medications and their side effects.

<table>
<thead>
<tr>
<th>Medication</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phenytoin (Dilantin)</td>
<td>Drowsiness, insomnia, motor twitching, rash, gum hyperplasia, photosensitivity, depression of hepatic enzymes</td>
</tr>
<tr>
<td>Carbamazepine (Tegretol)</td>
<td>Drowsiness, dizziness, blurred vision, diplopia, skin rash</td>
</tr>
<tr>
<td>Valproate (Depakote)</td>
<td>Seizures, agitation, altered mental status, tremors, fatigue, rash, weight gain</td>
</tr>
<tr>
<td>Levetiracetam (Keppra)</td>
<td>Fatigue, dizziness, joint pain</td>
</tr>
</tbody>
</table>

**Anticonvulsant**

Phenytoin (Dilantin)
- Dose: Adult IV loading dose 10-15 mg/kg
- Administration: Max rate of infusion 30 mg/min, even slower rate for geriatrics
  - Must use IV pump, and micron filter to infuse
  - Check IV for patency by flushing with NS before and after administration and monitor during infusion, extravasation can cause severe tissue necrosis
  - Can cause hypotension, bradycardia, dysrhythmias
  - Avoid small veins “purple glove syndrome”

**Seizure Precautions**

The key to seizure precautions is to be ready to manage the seizure by having all equipment available and set-up.
- Padded side rails.
- Suction setup and available.
- Oxygen and equipment at bedside.
- Provide continuous pulse oximetry.
- Patients should have a saline lock throughout hospital stay.

**...Seizure Precautions**

- Observe patient while out of bed.
- Patient should always be escorted to rest room.
- Bathroom door should be left unlocked.
- Bed in low position all the times.
- When possible arrange for patient to be close to the nursing station.

**Nursing Care During Seizure**

- Call for help and have sufficient staff to assist you.
- Perform general safety survey.
- Record time of onset and duration of seizure.
- Initiate ABC’s of life support including:
  - Lower the head of bed and turn patient to the side and maintain an open airway.
  - Place patient on O2, insert nasal airway, suction to clear secretions.
  - Goal is to protect patient from harm during seizure.
- Loosen restrictive clothing.
- Pad side rails if not done so already.
- Assess patient, obtain vital signs and check blood glucose.
- If hypoglycemic, treat as per hypoglycemia protocol.
**RN Interventions After Event**

Notify MD
- Provide detail on seizure activity
- Time, duration and what you observed
- Report blood glucose, vitals and any interventions you have completed
- Provide recommendations appropriately
- Labs and imaging studies
- Anticonvulsant medications

**Notify MD**

MD should be notified immediately if onset:
- New onset seizure
- Seizure lasts more than 2 minutes.
- More than two events occur within an hour period.
- Persistent hypoxia (SPO2 < 95%)
- No recovery from postictal period within 15-30 minutes.
- Patient has not been able to be aroused in 15 minutes after the end of the seizure or patient is agitated.
- Patient has bradycardia, hypotension or arrhythmias.

**Documentation Requirements**

Patient's presenting signs and symptoms
- Including vital signs and level of consciousness, and blood glucose.
- History of seizure (s) features, and duration.
- Medication given
- Dose and time(s) for each drug dose used, and resulting clinical effects.
- Repeat assessment and vital signs, as indicated.
- Mets wasted
- Amount of diazepam or Lorazepam discarded, if any.

**Myths and Misconceptions**

- You can swallow your tongue during a seizure.
- It is physically impossible to swallow your tongue.
- You should force something in to the mouth of someone having a seizure.
- Absolutely not! That is a good way to chip teeth, puncture gums, or even break someone’s jaw. The correct first aid is simple: just gently roll the person onto their side and put something soft under the head to protect from injury.
- You should restrain someone having a seizure.
- Never use restraint! The seizure will run its course and you cannot stop it.

**References**


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