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Development of Evidence-Based Scenario with High Fidelity Simulation to Improve Nursing Care of Chest Pain Patients

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
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Abstract

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MSN/Ed., Walden University, 2012

BSN, University of Santo Tomas, 1990

Project Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

Cardiovascular disease remains the leading cause of mortality in the United States, and a primary educational objective is to develop professional competency among nurses to ensure the provision of safe and effective care to the cardiac patient. Benner's theory of novice-to-expert led to the development of an evidence-based scenario for the care of the patient with chest pain using risk-free high-fidelity simulation environments that focused on assessment, history taking, and communication, while evaluating improvements in the competency of nurses providing care to chest pain patients. Thirty-six nurses volunteered in the study. Feedback from nurse educators, which led to modifications to the scenario, preceptor evaluation of participants during simulation, and post simulation feedback of participants, were analyzed using an inductive and exploratory theme analysis. Participants reported they learned meaningful information but felt somewhat confused regarding the correct course of action when multiple events occurred simultaneously. Preceptors' feedback identified participant failure to meet stated scenario expectations. Quantitative analysis of data, using one sample *t* test, compared the pre- and post-test scores measuring participant knowledge on assessment, history taking, and communication. Although knowledge scores increased, the difference was not clinically significant based on the negative feedback from both preceptor and participants. Accurate appraisal of nurses' competency in assessment, history-taking, and communication skills is needed prior to exposure to simulation. Simulation scenarios may be more clinically significant when tailored to an individual participant's competency levels.

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Dedication

This project is dedicated to my late father, Carmelo de la Resma, and late husband, Amado Branas. Both continually contributed to the development of my self-confidence and instilled in me a belief in my abilities, pride in my endeavors, and dedication to pursue excellence. I make a partial dedication to my fiancée, Denis Krajec, who supported my project efforts and helped me persevere in my efforts to complete this doctoral quest. Another partial dedication goes out to my children, Alastair and Gustav, who continuously encouraged me to dream big and fulfill those dreams. Finally, to my ever-lovable dog, Rocky, who sat by my side throughout the countless hours of research and writing.

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Section 1: Nature of the Project

Introduction

Healthcare faces many challenges to keeping current with the complexities and continual improvements in medicine and related healthcare delivery systems. It is in this environment that the professional competency among nurses providing safe and effective care plays a prominent role. Hospital-based and academic nursing programs that provide adequate orientation programs and continuing education are essential tools for ensuring these healthcare professionals maintain and improve their knowledge, expertise, and clinical decision-making skills. This attention to the ongoing development of professional nursing skills results in quality patient care, optimized outcomes via improved treatment techniques, and the reduction of medical errors (Reavy, 2008). One of the educational tools gaining prominence among students, educators, and practitioners is simulation. Simulation is not only a tool but a teaching strategy that integrates knowledge base, practical skills, and clinical judgment through a critical thinking process (National League for Nursing [NLN], 2012). Teachers use simulations both to prepare nurses for real patient scenarios in a low-risk environment as well as an option for the continual education of medical practitioners involved in clinical practice and the delivery of patient care on a day-to-day basis. The educational simulation tool strives to present the practitioner with an electromechanical replica of a real human-being (virtual patient) in a clinical environment (NLN, 20120. Through programming of this virtual patient, very realistic symptoms can be exhibited, requiring program participants to draw on their professional knowledge and experience to critically analyze the symptoms exhibited,

evaluate the alternative possible causes, and apply critical thinking to arrive at the best possible treatment response. Participants in simulation education learn in an artificially-created risk-free environment—an environment where nobody loses and everyone has the benefit of increasing their knowledge base and skills by participating in a group activity that allows for the sharing of professional talent and the exchange of personal experience. In short, simulation creates an interactive nonthreating risk-free environment that allows participants at all competency levels to participate in the treatment of a virtual patient and learn, sometimes from their mistakes (Society for Simulation in Healthcare, 2014). For learners, the feedback is immediate. Educators too can immediately correct errors in critical thinking and treatment, without risk to a real patient. Through the use of simulation and the virtual patients, program participants can gain compelling insight with regard to the consequences of their actions and learn from the knowledge and experience of other program participants, from students to experienced practitioners. (Society for Simulation in Healthcare, 2014).

The demand for quality care, keeping the patient safe, and producing the optimum outcome has led to the development of ongoing training and development, especially for nurses who are considered healthcare's first line of defense. The simulation environment offers the opportunity for nurses to gain expertise. Simulation benefits both new and experienced nurses. For new nurses, simulation offers them proficiency (Society for Simulation in Healthcare, 2014). Whether it is the nurse's first time experiencing handling the cases or if they had been exposed to those cases of patients but have not developed mastery of the skill, simulation produces a better outcome. Simulation offers

competency, increased confidence, and knowledge, especially for new graduate nurses (Bricker & Pardee, 2011).

For experienced nurses, simulation offers an opportunity to work collaboratively while building clinical competency and confidence, resulting in enhanced patient safety. The simulation experience provides a safe, secure environment that allows participants to hone their cognitive, psychomotor, and affective skills without risk to a patient (Society for Simulation in Healthcare, 2014). High-fidelity simulation provides an environment for nurses to practice critical assessment and communication skills before engaging in clinical practice (Birkhoff & Donner, 2010).

While there is a need for quantitative studies, there is an equally important need to establish standards for the clinical environment in which the study is to be conducted, as well as the quality of the simulated virtual patient, and the quality of symptoms exhibited by the virtual patient. With the physical environmental standards established, a well-indexed standardized list of virtual patient symptoms, possible symptomatic causes, alternative responsive actions or treatments, and probable or expected outcomes requires development. Currently, due largely to the lack of standards for conducting evidence-based quantitative projects to validate the benefits of high-fidelity simulation, there exists a shortage of hard evidence supporting the theory that high-fidelity simulation increases the skills, competency, and effectiveness of program participants. Consequently, the establishment of quality standards is a necessary prerequisite for the development of effective high-fidelity simulation learning experiences, from formulating objectives, to building a scenario, to utilizing these scenarios, to migrating what was learned in the

classroom setting to the actual clinical environment. Smith and Roehrs (2009) and Waxman (2010) supported the issue that there is a need to standardize the system of formulating objectives to build and present case scenarios in high-fidelity simulation. There is also a need to evaluate the outcomes of the program, using a specific measurement of nursing student competency in applying the lessons from the laboratory setting to the clinical environment.

In addition to quality standards, there are other issues relating to the specifics of creating templates and carrying out predetermined scenarios that need to be addressed (Waxman, 2010). Published evidence-based literature and scenarios should be evaluated annually to provide for the evolution of the current standards of practice (Waxman, 2010). Lastly, the National League for Nursing, now called the Accreditation Commission for Education in Nursing (ACEN, n.d.), advocates interprofessional team work in simulation, and suggests that scenarios should be shared and evaluated. This project sought to develop an evidence-based scenario in high-fidelity simulation specifically focused on the care of patients who develop chest pain. In order to maximize the effectiveness of this developed evidence-based scenario, the scenario, its standards, and the evaluative process it embodies must be shared among interprofessional and interdisciplinary teams.

Cardiovascular disease is still the leading cause of death for men and women in the United States (Center for Disease Control and Prevention [CDC], 2013). Coronary heart disease is the most common type of heart disease, which can and often does lead to heart attack. One of the most presenting and obvious symptoms of heart attack is chest

pain. For this reason, the evidence-based scenario used in this project focuses on the care of patients with chest pain. Development of a sound evidence-based simulation scenario becomes a significant asset to properly assess chest pain, to control or relieve the symptoms, and to be able to prevent or minimize complications. All of these actions/interventions are needed and incorporated in the evidence-based scenario using high-fidelity simulation.

In this chapter, I identify the problem statement, project objectives, and goals of the project. The relevance of this issue to society, the healthcare system, and nursing practice are also presented.

Problem Statement

The study sought to address the care of patients with chest pain. Statistical data show that heart disease, especially coronary heart disease, remains the leading cause of death in United States for both men and women (CDC, 2013). Because chest pain is a clinical priority, nurses should be capable of evaluating key signs and symptoms regarding the approach to properly assess the condition of patients experiencing chest pain. Communication skills is another equally-important priority in the care of chest pain patients. Meaningful communication between the patient and the healthcare professional is an essential element in ensuring proper care of a patient with chest pain. Instances where communication with the patient fails to elicit useful information such as medical history, severity of pain, duration of pain, or current state of medication can lead to poor outcomes. Moreover, the lack of information creates safety issues and elevates risks for both the patient and the nurse.

Because chest pain is the most common symptom of heart attack, pain assessment is a critical step in evaluating the condition and planning the care of chest pain cases. While coronary heart disease might not always present symptoms of chest pain, once an individual experiences the pain, the heart is not getting enough blood or oxygen (CDC, 2013). Pain induces many harmful effects, and not having the ability to adequately assess chest pain could easily lead to cardiovascular complications and death. Alternatively, when nurses are able to assess the patient's pain correctly, the patient can be treated more effectively and patient suffering can be mitigated (CDC, 2013).

The simulated environment offers a forum in which nursing students may achieve the mastery of skills necessary to adequately and effectively assess the patient with chest pain, but the environment must use proven, effective evidence-based scenarios with well-formulated objectives to allow for that mastery of skills (Reavy, 2008). In a simulated environment, participants are presented with factual case scenarios where electromechanical human replicas exhibit life-like signs and symptoms similar to those real patients with chest pain. Participating students learn and are able to master the skill of assessing these symptoms through collaborative repetition over time in a no-risk environment (Reavy, 2008). Due to their learned mastery in the simulated environment, nursing students eventually learn to correlate and recognize the simulated symptoms of a patient experiencing chest pain with those of a real patient in crisis. Ultimately, the student participants learn how to perform effectively under crisis conditions and provide excellent patient intervention. As chest pain maybe a warning sign of a life-threatening event, a perceptive and observant nurse possessing incisive skills will be able to

determine appropriate and effective treatment strategies. leading to a more positive outcome.

Assessment is the primary responsibility of a nurse. Bostock-Cox (2012) addressed the importance of the role that the practicing nurse plays in assessing patient chest pain as part of primary care. Effective assessment will alert the nurse of both positive and negative health findings, which in turn will impact the quality of care given to the patient. By obtaining accurate information and correctly identifying patient needs, the nurse learns to provide the appropriate prioritized patient care. The simulated environment, where nurses learn the skills to effectively assess chest pain, prioritize patient care, and deliver appropriate interventions, leads to superior nursing staff with better patient outcomes.

Purpose Statement

Healthcare simulation or high-fidelity simulation is an educational tool that serves to bridge the gap between the classroom education and the experience gained through actual clinical interaction with patients. High-fidelity simulation employs highly-advanced computerized mannequins—virtual humans that have the capability to reproduce many human functions and exhibit many of the symptoms associated with human illnesses. The use of these training simulations allows the health care practitioner to learn to identify problems and master specific response tasks or skills. without exposing a real patient to risk. In a simulated environment, the student or healthcare practitioner can make mistakes, discuss errors, collaborate with other participants, and learn in an environment without the fear of negative repercussions.

Additionally, simulation provides the students the opportunity to learn in an environment free of the pressures and stress typically associated with real patients, acute symptoms, critical time constraints, and a low tolerance for error. In short, the learning environment of simulation provides time without risk allowing for the evaluation of mistakes, analyses of alternatives, sharing of combined professional experience, and the potential for the development of new approaches for patient treatment, all of which results in a more experienced and capable nursing professional.

In this project, I evaluated a newly-developed evidence-based scenario for the care of patients with chest pain aimed at guiding the future development of scenarios designed for a quantitative simulation environment. Heart disease is still the leading cause of death for both men and women in United States (CDC, 2013). Furthermore, chest pain is one of the most common reasons of emergency visits for persons aged 15 years and older (CDC, 2013). Therefore, nurses need to receive enhanced training and more extensive experience in assessing and managing chest pain in order to become more capable of providing timely and proper intervention, especially in cases where the symptoms are indicative of a more serious illness.

Evidence-based Significance of Project and Impact on Practice

Few research studies and little information exist that provide guiding methodologies for formulating simulation scenarios. Typically, hospitals use prepackaged scenarios because:

1. There is insufficient staff available to allocate to simulation development;
2. The budget allocated to research and development is inadequate;

3. The purchase of a prepackaged simulation is less expensive than one developed in-house;
4. Prepackaged simulations are delivered ready for immediate use; and
5. Use of prepackaged simulations limits educational liabilities.

While hospitals continue to employ prepackaged simulation scenarios that have been validated and tested, these simulations are typically unidirectional in nature, thereby limiting creativity for the instructor and restricting opportunity for the students to provide alternative interventions. The majority of existing prepackaged simulation scenarios provides one cause of action, one approach to a specific event, or only one correct avenue for the delivery of patient care, whereas real-life situations present a multitude of possible approaches or solutions for addressing issues involving patient care. Therefore, there should be more involvement by nursing educators and simulation instructors during the formulation of simulation scenarios, allowing them sufficient time to build comprehensive and flexible scenarios. Simulation scenarios should contain well-defined learning objectives with sufficiently-formulated, clearly-established guidelines for assessing the symptoms displayed, and are tailored to the evolving educational needs of the nurse recipient.

There exists yet another class of simulation scenarios. Some simulations are independently developed by nursing staff or teaching practitioners, who are often thrust into a situation of composing scenarios only after the acquisition of a highly-advanced computerized mannequin or virtual human for the purpose of creating a simulation lab. Because the use of simulation scenarios is becoming more popular as a training and

educational tool, there is a corresponding need for simulation scenarios that provide a measurable increase in critical thinking, the ability to diagnose symptoms, and the ability to render appropriate patient treatment and care. Nevertheless, these hastily-developed and independent simulation scenarios suffer from the lack of a specific framework, the lack of a generally-accepted methodology for development, the lack of a systematic approach for peer review, and the questionable ability to remain current with the latest professional subject matter. These limitations have resulted in researchers questioning the reliability of these tools' measurements of competency levels.

A number of researchers have examined the efficacy of these prepackaged scenarios. Waxman (2010) claimed, "prewritten scenarios are flexible, but they do not always meet the individual's needs and cannot be shared with other hospitals" (p. 2). Prepackaged scenarios should be shared and used by all healthcare personnel, validated by peers annually, and updated regularly based on the literature to ensure that current practice standards are achieved and that the scenario remains evidence-based. Simulation continues to unfold in practice, and there is a growing need to develop scenarios that are well-researched, tested, and available to be shared in clinical practice. Using the evidence-based scenario in high-fidelity simulation provides a specific framework regarding how scenarios are built, how they are tailored to the needs of nurses, and how they address the specific competencies that nurses need to possess.

Evidence-based scenarios present a multitude of solutions for providing patient care in response to a variety of simulation-induced virtual patient events, displayed symptoms, or required service tasks. When shared among healthcare professions,

validated by peers, and kept up-to-date, these simulations can measure specific competency levels, encourage teamwork and collaboration, and provide an opportunity for safe and effective care through the mastery of particular tasks or skills through practice.

Implications of Social Change for Practice

Simulation is a strategy for enhancing the competency level of the nurse, and a well-constructed simulation scenario is necessary for achieving optimized education, the development of critical thinking and decision-making abilities, mastery of skills and performance, and growth in personal self-confidence and satisfaction (Waxman, 2010). Simulation continues to evolve in practice, along with the corresponding need for the formulation of simulation scenarios that are well-researched, tested, and widely available. Ultimately, the wide dissemination and use of well-constructed evidence-based simulations could contribute to the improvement of clinical practice, which in turn could produce more valuable learning experiences for nurses and more effective treatment for patients.

Assumptions

The project was based on the following assumptions:

1. Use of the evidence-based simulation scenarios improves nursing assessment and patient communication;
2. The evidence-based scenario design focuses on three theoretical frameworks:
    a. Constructivist learning theory states that learning is an active process, in which students construct ideas upon their current or past knowledge;

b. Sociocultural learning theory describes learning as a social process in which social interaction plays a role;
c. Learner-centered theory or student-centered learning has instructors or teachers focusing on student learning. Students take responsibility for their learning (NLN: SIRC, 2013).

Limitations of the Project

Limitations of the project might impact future efforts in the area of evidence-based simulation. First, a convenience sample from one or two participating simulation center(s) were used in the simulation scenario. Second, the utilization of multiple scenarios may reveal different results. Third, the project was undertaken for the purpose of developing only one evidence-based scenario incorporated into a longer-running, more-complex scenario. Fourth, the critique of this evidence-based scenario for chest pain will be performed by three nurse educators who are professionally involved in the actual conduction of the simulation scenarios or have experience handling simulation. Fifth, the project involves only nurses who are either novice or experienced nurses.

Delimitations

The objective or purpose of this project is the development of an evidence-based scenario that employs the National League for Nursing's (NLN) evidence-based scenario template. Use of the NLN template will ensure the incorporation of successful NLN standards into the developed scenario, as the NLN template contains information based on recent professional standards of practice on the care of patients with chest pain. The NLN evidence-based scenario template incorporates the Quality and Safety Education for

Nurses competencies of quality nursing care and patient safety. These competencies include: patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics.

Summary

In this section, I focused on the need to develop a well-structured evidence-based scenario for the care of patients with chest pain for use in a high-fidelity simulation environment. High-fidelity simulation presents a learning environment that accommodates students from all experience levels removing the overriding influence of experts in life-threatening circumstances involving live patients. Alternatively, the simulation scenario provides a nonthreatening low-risk learning environment using an electronic mannequin or virtual human. As previously stated, the CDC (2013) reported that heart disease is still the leading cause of death in United States, and the accompanying chest pain is the most common symptom reported in emergency room visits. There is a need for continual improvement in the competency level of nurses, and one method for achieving this goal involves the use of simulation scenarios. Simulation as an educational tool allows nurses to master the required skills by becoming more familiar with symptoms, diagnoses, appropriate courses of action, and methods of patient care. This in turn creates greater self-confidence, thereby resulting in faster and more-decisive intervening actions in dealing with chest pain and preventing the deterioration of the patient condition, while mitigating the potential of further complications.

Section 2: Review of Literature and Theoretical and Conceptual Framework

Introduction

In this project, I focused on the creation of an evidence-based simulation scenario for the care of patients with chest pain. The evidence-based simulation scenario was then used in assessing nurses and their learning experiences as part of a pilot study in a high-fidelity simulation environment. Current literature proved to be a limited resource for providing guidance in the structuring and the development of an evidence-based simulation scenario in a high-fidelity environment, and even less of a resource with respect to formatting it in a way that would foster a collaborative educational experience. This chapter addresses the topic of heart disease and identifies facts demonstrating how heart disease results in a burden on all Americans. Attention is given to the need for nurses to develop formidable expertise in assessing patients and rendering proper intervention for patients with chest pain. The role that high-fidelity simulation plays in healthcare education is also examined. Lastly, the components of an evidence-based scenario that are considered necessary to optimize the educational experience in high-fidelity simulation are identified.

Literature Search Strategy

The search for literature was conducted via the Internet. Articles older than 10 years were not considered. Key terms applied for the search included: *nursing assessment, chest pain, simulation, high-fidelity simulation, nurse/s competency, education,* and *evidence base*.

History of Simulation

The history of simulation spans many years. It originated to address the need for training in the military, the aviation industry, and the operation of nuclear power facilities (Sanford, 2010). During the last 20 years, simulation has impacted the healthcare industry, especially among doctors and nurses (Sanford, 2010). Asmund Laerdal developed the "Resusci-Anne," the part-task trainer that revolutionized resuscitation training (Bradley, 2006). During the late 1960s, Abrahamson and Denson developed a more sophisticated simulator that breathes and incorporates a heartbeat with temporal and carotid pulse, known as Sim One. Sim One failed due to the lack of a well-defined training for its use and cost effectiveness issues (Sanford, 2010). Subsequent to that, Stanford University and the University of Florida bought a high-fidelity simulator. Both universities focused on the anesthesia simulation environment, but Stanford University employed more collaborative simulation, which led to the development of clinical team-based training (Sanford, 2010). Simulation has progressed significantly and is widely used in medical education. It has kept pace with the need to produce better junior doctors and the demand for better methods of providing post-graduate training, continuing medical education, specialty education, and the perceived need for a revalidation (Sanford, 2010).

Simulation

Simulations are defined as "activities that mimic the reality of a clinical environment that are designed to demonstrate procedures, decision making, and critical thinking through techniques such as role playing and the use of devices such as

interactive videos or mannequins" (National League for Nursing, 2013, para. 1). Simulation involves learning by doing. It employs instructional scenarios, where the student is placed in a situation that depicts reality with the expectation that they will react with critical thinking, appropriate diagnoses, and the correct intervention procedures.

Simulation in Nursing Education

Simulation is an educational tool used to address real healthcare issues in a collaborative risk-free educational environment. High-fidelity simulation employs computerized mannequins or virtual humans to execute an array of functions from emergency situations to critical care issues. Simulation plays a role in bridging the gap between classroom learning and the real-life clinical experience. Mastery and competency evaluations of healthcare professionals should start in the laboratory, where simulated signs and symptoms exhibited by the virtual human can be evaluated and addressed by the students and critiqued by the teacher, all without risk to an actual patient's life. Furthermore, the self-confidence and competence of nurses has been impacted by simulation in a positive way.

A study by Blum, Borglund, and Parcells (2010) reported on the competence and confidence of entry-level nursing students. In the researchers' study, 53 baccalaureate students participated in a simulation-enhanced laboratory. Student self-confidence and the faculty perception of student clinical competence were measured by the Lasater Clinical Judgment Rubric and showed an overall improvement with self-confidence and clinical competence (Blum et al., 2010). Results suggested that in order to build better confidence for entry level nursing students, a continued transferability of knowledge from

the laboratory to the clinical environment must be encouraged (Blum et al., 2010). Similarly, Sportsman, Schumacker, and Hamilton (2011) evaluated the impact of scenario-based high-fidelity patient simulation (HFPS) on student academic success in the Associate Degree and Baccalaureate Degree Nursing Programs. The researchers showed that HFPS is equally effective in supporting the learning environment of nursing students, but showed no evidence of impact on the delivery of care.

Another study conducted by Stefanski and Rossler (2009) on a group of undergraduate nurses transitioning to critical care using high-fidelity simulation was accomplished in collaboration between a college of nursing and an area hospital. The study/course participants were composed of new graduate ICU nurses, nurses from long term and acute care units, and two pediatric ICU nurses. Over the course of 1 week, cases involving high-fidelity simulation were presented to the group each afternoon after their morning lectures (Stefanksi & Rossler, 2009). Results of the study revealed high satisfaction scores and enhanced levels of confidence reported by the nurse participants though competency levels were not addressed (Stefanski & Rossler, 2009). The study helped pave the way for recognizing high-fidelity simulation as a valuable tool in providing continuing education for nurses.

In the development of nursing education, a gap exists between learned knowledge and skills and the translation of that knowledge and those skills from the classroom environment to clinical practice. More than 10% of the hospital nursing workforce is comprised of new graduates, and based on a national survey supplied by the Nursing Executive Center, only 10% of nurse executives believed that their graduates were fully

prepared for providing safe and effective care (Berkow, Virkstis, Stewart, & Conway, 2008).

Simulation is an effective teaching strategy that fills the transferability gap of knowledge between the classroom and clinical practice, encouraging both critical and evaluative thinking. It bridges the gap between the subject material learned in a classroom and real-life clinical experiences. Kirkman (2013) used descriptive and inferential statistics during a time series respiratory assessment repeating measures with undergraduate nursing students in a Bachelor's of Science in Nursing (BSN) program. The results proved that a significance level in the transferability of learning occurred from classroom to clinical practice using high-fidelity simulation (Kirkman, 2013).

Another study conducted by Sparacino and Vecchia (2013) further supported the premise that high-fidelity simulation closed the gap between classroom learning and clinical experience. Using an investigative process that involved the gathering of data on the ability of the students to competently practice safe medication techniques, the results identified that 100% of students passed the skill of safe medication administration after four phases of the teaching experience: didactic (Phase 1), 2 clinical days concentrated on medication administration (Phase 2), use of high-fidelity simulation technology employing the evidence-based scenario adapted from the LNL (Phase 3), and combined clinical experience and skills lab on medication practice (Phase 4; Sparacino & Vecchia, 2013). Cant and Cooper (2010) performed a systemic analysis of 12 studies using experimental or quasi-experimental designs. All showed that medium and/or high-fidelity simulation was a valid teaching and learning strategy in which students gained

knowledge, developed better critical thinking skills, and experienced increased satisfaction during the learning experience.

Simulation in Nursing Practice

Simulation has been widely used in clinical practice. Hospitals have used simulation as part of their critical care orientation. For example, Georgetown University designed a simulation program for their new cardiac surgery unit. Feedback from the nurses was positive, providing a great learning experience without putting the life of a real patient at risk (Rauen, 2004).

Thompson, Yang, and Crouch (2012) reported on detecting critical event risks, using a quasi-experimental signal detection 2008-2009 study during which nurses were presented with 25 paper cases and 25 simulator cases based on real patient records. The nurses judged whether a simulated case was “at risk” or “not at risk” for a critical event. Results indicated that as fidelity of a simulation was increased, both novice and experienced nurses were able to separate important clinical risk (Thompson et al., 2012).

High-fidelity simulation has also been used as a tool for continuing education opportunities for anesthesia providers. Cannon-Diehl, Rugari, and Jones (2012) focused on a needs assessment survey, of which 22 out of 50 practicing nurse anesthetists responded. The study revealed that advanced cardiac life support scenarios, anesthesia machine mishaps, and malignant hyperthermia ranked as the most-effective uses of high-fidelity simulation (Cannon-Diehl et al., 2012).

Simulation has been used to enhance patient safety, improve clinical competence, and increase teamwork in hospitals. A pediatric hospital in Southeastern Pennsylvania

enhanced the traditional American Heart Association Pediatric Advanced Life Support (PALS) by integrating high-fidelity simulation into skills acquisition. Prior to the enhancement, Birkhoff and Donner (2010) addressed deficiencies at the pediatric hospital, based on analysis of the response to a critical resuscitation study, and found many errors during mock codes by pediatric physicians, the code team, and pediatric floor nurses. The researchers found that there was a delay of 1 to 6 minutes in response during a critical resuscitation effort. It took an average of 3 minutes for a pediatric physician to arrive, 6 minutes for the code team to arrive, and general pediatric floor nurses, the initial providers of care, did not initiate basic life support measures. High-fidelity training applied to this group of pediatric nurses improved their performance in providing proper intervention during mock codes. Moreover, communication and teamwork improved, thereby reducing safety risks to patients. One Canadian hospital, McMaster Children's Hospital (a 146-bed academic tertiary-care facility serving approximately 2.3 million), adapted a simulation program that started in 2005. This program was used to strengthen healthcare education like PALS, expanding it for use in enhanced patient safety initiatives (Huang, Norman, & Chen, 2010).

A study conducted by Bricker and Pardee (2011) employed expert staff nurses from a rehabilitation hospital to deliver a high-fidelity simulation scenario to new graduate nurses. The study disclosed that the level of confidence and knowledge among the new nurses rose with regard to patient care following a rare spinal cord procedure. The researchers identified the need for an evaluation of the efficacy of simulation in contributing to the transition of new nurses to expert care nurses. This question of

efficacy remains an important issue; the use of high-fidelity simulation (HFS) in nursing continues to grow, while the body of evidence that demonstrates the student's ability to increase their competence levels through the use of high-fidelity simulation remains inconsistent. Onello and Regan (2013) stated that there was a lack of clear evidence supporting increased clinical competence as a result of teaching methods related to HFS. This lack of evidence has posed a challenge for faculty seeking effective teaching strategies.

Presentation bias is yet another concern in the student nurse's response to clinical events. Students tend to be reactive rather than proactive when faced with clinical events involving conditions of uncertainty. The student's conditioning to provide a fast response may trigger emergency encounters as the student reacts to situations based on previous experience rather than truly evaluating and assessing the symptoms currently presented. Wotton, Davis, Button, and Kelton (2010) stated that during high-fidelity simulation, students reacted with confusion as they analyzed cues and acted on changes to clinical manifestations. A systematic review of literature from 2000 to 2011 by Yuan, Williams, and Fang (2012) revealed that qualitative studies presented positive results regarding students' confidence and competence, but that quantitative studies still need to examine whether or not high-fidelity simulation increases levels of confidence and competence. Furthermore, Yuan et al. suggested that there is a need to examine the transferability of high-fidelity simulation into real situations.

Simulation has been used to assist with the transition of new graduate nurses into the hospital setting (Stefanski & Rossler, 2009). A simulation technology was adapted

into a critical care orientation program for newly-graduated nurses with collaborative efforts between area hospitals and a college of nursing. The result of this study based on a survey regarding the effectiveness of the simulation course and reports of self-confidence revealed significant levels of confidence and satisfaction among newly graduated nurse participants transitioning to the intensive care environment (Stefanski & Rossler, 2009).

There is a need for additional studies that focus on the process by which novice critical care nurses transition into a healthy work environment, because healthy work environments result in improved staff retention, greater job satisfaction, lower turnover rates, and reduced incident of burn-out. These results have been attributed to a healthy work environment that fosters higher levels of job satisfaction and maintains a positive level of confidence among the novice nurse (Stefanski & Rossler, 2009).

Benner's Nursing Theory: From Novice to Expert

Benner introduced the concept of clinical competence, focusing on the process by which nurses develop skill levels from novice to expert. This nursing theory proposes that nurses develop skills and understanding of patient care over time, through proper educational background and personal experiences. The theory introduced five levels of nursing experience: novice, advanced beginner, competent nurse, proficient nurse, and expert nurse (Benner, 2013).

A novice nurse was defined as a beginner with no experience—for example, a student nurse. These nurses' behavior in the clinical setting is limited. Novice nurses possess very limited ability to predict the events that may occur in a particular patient situation (Benner, 2013). The advanced beginner exhibits acceptable performance in the

clinical setting. An example of this category is the newly-graduated nurse, who possesses knowledge but not in-depth experience (Benner, 2013).

The competent nurse has 2 to 3 years of experience in clinical practice. These nurses are more aware of long-term goals and have gained perspective in planning their own actions. These nurses recognize patterns and the nature of clinical situations to a greater extent than the advanced beginner (Benner, 2013). Proficient nurses have acquired a more holistic understanding of nursing that improves the accuracy of their decision-making process. They are able to modify plans during different level of situations (Benner, 2013). Lastly, an expert nurse has developed experiential depth and possesses an intuitive grasp of clinical situations. These nurses do not rely solely on rules to guide their actions, and their focus is on the most relevant issues (Benner, 2013).

Learning Needs of Novice Nurses Compared to Experienced Nurses

The assessment of learning needs begins with extent of knowledge that nurses possess, how well they understand the applications of that knowledge, and the extent of experience they have in applying that knowledge to clinical situations. It also includes understanding the nurses' motivation, their goals, and the desired learning outcome regarding their role as nurses. Both novice and experienced nurses need to develop and master skills of assessing the patient's condition, prioritization of patient needs, and providing intervention. Overall, the utmost focus of healthcare education is on patient safety.

Fero, Witsberger, Wesmiller, Zullo, and Hoffman (2008) conducted a study using a Performance Based Development System (PBDS). The researchers showed videotapes

of clinical problems that nurses may encounter in a medical-surgical unit, and required participants to state, in writing, their interpretation of the problem, the action(s) they would take, and their rationale. Study results showed that nurses with the least years of experience or without any experience had the highest rate of failing to meeting expectations (Fero et al., 2008). Expectations included: (a) recognition of the clinical problem, (b) safe prioritization of patient care, (c) initiation of proper interventions, (d) differentiating urgency from a non-urgency, (e) reporting essential clinical data, (f) anticipating relevant medical orders, and (g) conveying a clear rationale for the decision made. Additionally, the level of preparation of the nurses revealed a significant difference. A greater percentage of nurses who had been prepared on associate level and baccalaureate level performed far better with their assessment than nurses with only a diploma. These nurses' performance was attributed to their scope of experience and commitment to continuing education. The study suggested and recommended high-fidelity human simulation as a means of assessing critical thinking and decision-making, because it provides interactive activities including debriefing, involves no risk to the patient, and provides a more realistic assessment of learning needs.

Novice nurses enter into a position based on certain set of expectations and anxieties regarding "what might be," while experienced nurses have a work history that shapes their decision process based on previously-assigned duties and responsibilities. Both categories of nurses, new and experienced, possess a set of expectations and anxieties but the new nurses' expectations and anxieties are based solely on their exposure to experiences encountered during new-hire orientation. Alternatively,

experienced nurses' expectations and anxieties are materially different due to their experience prior to transitioning to a new role. While experienced nurses tend to develop and cultivate higher levels of reasoning and skills, providing them better confidence than a novice nurse, nurses who are transitioning to advanced practice roles or novel specialty roles may require a completely new skill set that typical new-hire orientation programs often lack. Therefore, orientation programs for experienced nurses should use more specific educational strategies and content to promote their engagement in new positions, allowing them to achieve management expectations while allaying anxieties.

Role of Simulation in Bridging the Gap from Novice to Expert

The use of simulation in the healthcare field allows the participant to practice skills in an environment that allows error and achieves growth through repetitive practice without risk to a patient. Benner (2013) noted that in order for nurses to keep a solid educational background and develop competence, the nurse must make the connection between didactic information and clinical experience. To that end, simulation has been used in a variety of nursing specialty areas such as emergency, psychiatric/mental health, gerontology, oncology, and operating room settings. Simulation is a tool that can fill the gap between formal education and professional practices, providing the experiences that are hard to find, but are necessary for evolution to a higher level of competency (Galloway, 2009).

Scenarios in High-fidelity Simulation

Simulation is one strategy to enhance competency levels among nurses. However,it is evident that better simulation scenarios with more focused designs are

needed in order to optimize the learning experience through developing outcome evaluation, critical thinking, subject mastery, decision-making skills, performance, self-confidence, and satisfaction (Waxman, 2010). There exists little information, research studies, or guidelines regarding appropriate and effective procedures needed to formulate scenarios for simulation. Hospitals tend to utilize prepackaged scenarios that have been validated and tested, but these prepackaged scenarios are not tailored to the needs of the nurse. Simulation continues to evolve in practice, and there exists a need to develop scenarios that are well-researched, tested, and can be made easily available and widely shared in clinical practice.

Theoretical Framework of Evidence-based Scenario for Care of Chest Pain Patients

This simulation scenario template was predicated on the NLN simulation design template. In turn, the NLN approach to the development of simulation established a "framework which defines, organizes, and links the various components of a concept, and defines the relationships of the components" (National League for Nursing: Simulation Innovation Resource Center [NLN: SIRC], 2013). The NLN simulation design had its basis in three theoretical frameworks: the constructivist learning theory, sociocultural learning theory, and learner-centered theory.

Constructivist learning theory states that learning is an active process resulting from diverse experiences (NLN: SIRC, 2013). Consequently, a teacher cannot just present information to a student and expect them to correctly interpret, process, and apply it. The theory suggests that students learn best by attempting to interpret the information made available, to formulate a methodology for implementation of related activities

based on the information, and to execute the methodology for action while their teacher serves as a guide and mentor to assist with the learning process.

Rutherford-Hemming (2012) discussed the adult learning theory grounded on the cognitive learning theory, the social learning theory, and the constructivist learning theory. Cognitive learning theory addresses how the student processes information through their memory system (organ processor) and prior knowledge contributes considerable value (Rutherford-Hemming, 2012). The cognitive learning theory explains that individuals differ in how they discern and process information, which depends on each student's expectations, experiences, and goals. Rutherford-Hemming (2012) stated that, "experience is the one that decides how individual learns and the key to learning."

Constructivist learning theory diverges into two separate perspective viewpoints to explain the point at which the constructivism occurs. The first is *personal constructivism* and the second is *social constructivism*. Personal constructivism states that learning is based on previous knowledge and experience, while social constructivism focuses on learning via means of the social environment. Regardless of which is favored, it is important to note that individuals do not readily accept information they receive, but instead react by actively constructing and reconstructing the information based on their culture and consciousness.

Sociocultural learning theory is based on the work of Vygotsky, who stated that, "Students play an active role in their learning, as teachers collaborate with student learning; therefore, learning becomes reciprocal for both teacher and student."(NLN: SIRC, 2013).

Social learning theory states that people learn through observation. This theory is associated with the studies of Bandura (1971) who is credited for many assumptions of social learning. Bandura purported that learning is processed through behavior modeling. For example, the hostile attitudes exhibited by adolescents reflect the demonstrations of hostility by the parent.

Learner-centered theory is based on assisting students to develop better learning methodologies (NLN, 2013). Using this theory, the teacher identifies a student's weaknesses and strengths, and works with the student to develop their strengths. The role of teacher is to facilitate learning by shifting the responsibility of learning from the instructor to the student.

All of the aforementioned theories apply to simulation learning. Simulation provides an environment for active learning, as constructivist learning theory supports that learning is truly acquired through application (NLN, 2013). Students achieve learning through their participatory experiences in simulation and the associated collaborative transfer of information, all of which benefit the future treatment of patients (NLN, 2013). Simulation offers the participant an opportunity to view alternative ideas and methodologies, and to incorporate the most-appropriate ideas in developing a new learning approach in a low-risk and non-threatening environment (NLN, 2013). Simulation provides the opportunity for reflective thinking, providing the student challenging alternative courses of action in an effort to mentally prepare them for the many varied situations and circumstances presented in real-world clinical settings (NLN, 2013).

Summary

The lack of design standardization and formulation of specific achievement objectives have been identified as primary deficiencies contributing to inability to quantitatively measure the outcome expected from the evidence-based high-fidelity simulations. These simulations aim to increase levels of satisfaction and competency among nursing students, including their ability to apply laboratory learning experiences to the actual clinical environment. Smith and Roehrs (2009) and Waxman (2010) supported the need to standardize the system of formulating objectives in building and presenting evidence-based case scenarios in HFS. These researchers, among others, also recommended extending the measurement of educational outcomes by utilizing specific identified tools to evaluate the nursing students' competency.

Section 3: Methodology

Project Design/Methods

The purpose of the project was to evaluate a newly-developed evidence-based scenario for the care of patients with chest pain, aimed at guiding the future development of scenarios designed for a quantitative simulation environment. This scenario was formulated from a template recommended by experts (NLN, University of Washington Center for Health Science Interprofessional Education, Research and Practice) as well as recommendations from nursing standards of practice competency in caring for patients with chest pain.

This simulation scenario was intended to be incorporated into a longer-running, more-sophisticated scenario but evaluated as a separate component. The simulation was started with a predebriefing, during which I explained the purpose of the simulation, including its learning objectives. The predebriefing period allowed participants the opportunity to familiarize themselves with the expectations being placed on them and to develop an understanding of the role played in the simulation-based learning experience. Role expectations were discussed and the rules for debriefing were clarified prior to the start of the simulation experience. During this time, I reflected on the learning objectives and addressed the differential participants' needs for understanding, resulting from the varied background and experience of each student. Predebriefing was a time for an introduction to the setting and simulation equipment. It was important to set a tone of realism during this period, to reinforce the environment as one in which the mannequins (virtual humans) and other simulation participants were considered to be real people with

real medical concerns. The students were to immerse themselves in a situation requiring critical thinking and timely evaluation of the patient condition. It was very important to ensure that the objectives of the simulation and the expectations for performance of the participating individuals were clearly understood during the predebriefing period.

After prescenario debriefing, the actual simulation scenario began. The participants immersed themselves in their respective roles. The entire simulation process ran about 60 minutes; however, the patient with chest pain component scenario lasted approximately 20 minutes. The simulation scenario started with a 7- to 10-minute history taking period, followed by a 7- to 10-minute "head to toe" physical assessment period. The information obtained during these first two periods was used by both the overall scenario and the patient with chest pain component scenario. Subsequently, the focus shifted to the assessment and response phases; this took up the remaining 40 minutes of the scenario. The evidence-based scenario for the patient with chest pain was intended to run as a component part of a more-sophisticated, longer-running scenario.

Following the scenario implementation, postdebriefing occurred, which lasted approximately 20 minutes. This was arguably the most important phase; it was during this phase that participants engaged in critical reflection and assessment of the scenario experience. The presiding simulation instructor guided participants through a process designed to critique each event occurring throughout the scenario. The objective was for the students to develop an understanding of and an appreciation for the methods used to obtain information, evaluate physical condition, and consider alternative courses of action. Attainment of these objectives allowed participants to achieve their educational

goals and make the correct decisions involving the care and treatment of the patient during simulation. It was through this process (postdebriefing)—which involved open discussion, defense of reasoning methodologies, and the identification of critical factors used in the decision regarding patient treatment—that nurses derived meaning and educational value from the collaborative participation in the simulation event. The greatest educational impact of the scenario event occurred during this phase, whereby the instructor, participants, and nurses shared information, ideas, convictions, reasoning, and their understanding of medical concepts. Postdebriefing participants were able to develop a clearer view of the case presented, including differentiating between the urgent and nonurgent situations, reporting on essential data derived, anticipating relevant medical orders, evaluating the alternative interventions, deciding on actions for initial intervention, and cultivating an understanding of the rationale supporting their decisions.

Due to the need to conform to the standard operating procedures at the host Florida simulation center, the evidence-based scenario for the patient with chest pain was incorporated into a longer-running scenario, but was evaluated as a separate component. Additionally, the host simulation center routinely conducted the evidence-based simulation scenarios repetitively over a period encompassing 7 days. Day 1 and Day 2 provided an orientation to simulation and Advanced Cardiac Life Support (ACLS) skills training. Day 3 began with the actual simulation experience, and included a pretest composed of 15 questions to evaluate the nurse participants' communication and patient assessment skills before the first round of simulation. The same 15 questions were

administered again on Day 7, following several rounds of exposure to simulation scenarios.

Because learning itself is an iterative process, and because I sought to identify the educational value of the evidence-based simulation scenario, the project incorporated both pre- and post-testing. The testing attempted to evaluate the difference in answer quality among a set of 15 questions posed to nursing participants entering the 7-day series of simulation education, with answers provided to the same questions by same nursing participants at the conclusion of the 7-day series of simulation experiences. First, prior to experiencing any simulation, the 15 questions were administered to the participants as a means of establishing a baseline that reflected the participants' aptitude as well as their approach to patient assessment, communication, and management prior to exposure to the simulation experiences. In contrast, the same questions were then administered to the same group of participants upon completion of the 7-day series of educational high-fidelity simulations. I anticipated that exposure to repetitive scenarios and the collaborative nature of the simulation scenario process would enhance the participants' ability to more accurately and concisely answer the same set of questions, and that their answers would reflect an increased appreciation of the assessment and evaluation process as a result of observation and communications skills learned during the simulation period. Facilitation of the pre- and post-testing procedures required an additional period of approximately 20 minutes on Day 3 before the first simulation scenario, and again on Day 7 following the conclusion of the last simulation scenario. The set of 15 pre- and post-test questions were developed in conference with and agreement of the director of

the simulation center. After the director of the simulation center approved the questions, they were pilot-tested to ensure the accuracy of wording and ease of comprehension. Pilot testing was given to a group of nurses not involved in the actual study.

Setting and Resources

The project setting was the simulation laboratory of a large state university at two geographically-separate locations: one in a Southern Palm Beach County campus location, and the other in a Central Palm Beach County campus location. Simulation scenarios were conducted at each campus during separate weeks. The scenario used a well-written, evidence-based scenario based on a framework or template recommended by experts (NLN, University of Washington Center for Health Science Interprofessional Education, Research, and Practice) for the care of chest pain patients. The focus of the scenario centered on enhancing the assessment skills and communication of nurses for the purpose of rendering better quality care to patients with chest pain.

Participants

The participants represented a convenience sample based on the group that was available on the day the study was conducted. These participants were novice and experienced nurses more than 18 years old, both male and female, who were preparing for their new job or were preparing to go from a floor nurse to a more-specialized area. One simulation center had approximately 32 to 36 nurses, and the other simulation center had approximately 80 nurses, who experienced their simulation experience between January and February 2015, a period of almost 2 months. These participants were

composed of novice and experienced nurses seeking to be hired by various hospitals or moving into a more specialized care.

Protection of Human Subjects

Both novice and experienced nurses in this state university simulation center were requested to volunteer as participants of this simulation project. Written consent was obtained from each volunteer participant. This allowed for the use of their contributions during the simulation scenario and expressly informed them that their personal information would be kept confidential while incorporating their contributions into the project evaluation on an anonymous basis. The simulation center had glass viewing windows and the nurses were videotaped, so their responses could be reviewed with them later. The university simulation center conducted the videotaping. Permission was obtained to enable viewing and review the videotaped simulation scenario during and after conducting the study.

Data Collection and Analysis

In this DNP project, I focused on an evidenced-based scenario created using the NLN template. This scenario was critiqued via questionnaire by three nurse educators 2 weeks in advance of the actual conduction of the evidence-based scenario. This provided sufficient time to incorporate their input to enhance and improve the scenario. Subsequent to the conduction of the scenario, another questionnaire was provided to the three nurse educators as a guide to assist them in evaluating the evidence-based scenario. All critiques were analyzed to determine any positive contributions toward enhancing and improving the simulation scenario as a practical educational tool.

Before and after the simulation event, questionnaires were provided to nurse participants. On Day 1 of the simulation event, the first questionnaire, administered prior to the simulation scenario, obtained a basic profile of nurses attending the simulation, their level of experience and education, and identified any prior exposure to simulation scenarios. In addition to this, a second questionnaire was distributed to nurse participants assessing their level of knowledge in response to cardiovascular assessment and communication. During the simulated event of scenario on chest pain being incorporated into the longer-running scenario, nurses were rated by preceptors (the individuals presiding over the scenario) based on the assessment data. The rating was based the cardiovascular assessment of each team. Particular attention was focused on questions to be asked of the patient experiencing chest pain, the process of identifying an urgent or nonurgent situation, and the collection and communication of data collected. A third questionnaire was given to nurse participants for the purpose of assessing their personal simulation experiences, including both the cardiovascular assessment and communication components.

Findings from the quantitative data obtained through the responses to questionnaires were reported as raw frequencies and percentages, using a *t* test. Use of the *t* test analysis determined the difference between the pretest and posttest questionnaire answers. I administered a pretest to participants prior to starting the simulation focused on the evidence-based scenario for chest pain patients. This was followed by the implementation of the simulation scenario. I then administered a posttest to measure the

same variable of interest again. All yes or no and numerical response data were compiled and presented in a tabular format.

Qualitative data and information obtained from the responses to the open-ended questions were analyzed using NVivo software. This software helped to organize and analyze unstructured or nonnumerical data. It helped to classify, sort, and arrange information; examine relationships; and combine analysis by linking, shaping, and modeling, while contributing to a body of evidence that supported the DNP project. Open-ended question data analysis compared similarities of answers relating to content, topics, and responses containing a common theme determined to be significant. A high frequency of similar responses were regarded as important. As part of the data analysis and project evaluation, these responses were interpreted in relation to the simulation content, the project topic, and the importance to the nursing profession. The simulation evaluation analysis expanded on those important topics and helped identify what areas could be strengthened or put into greater focus in future simulations.

Project Evaluation Plan

The project was evaluated based on attaining the set of established objectives and the outcome that identified attainment of the project goal: to effectively assess the medical condition of and communicate with patients experiencing chest pain. The three nurse educators who critiqued the evidence-based scenario for the care of patients with chest pain focused on ensuring that relevant standards of nursing practice were portrayed in the scenario, including methods for effectively assessing and communicating with patients experiencing chest pain. The volunteer nurses who participated and observed the

simulation scenario shared feedback of their experience through discussions during the postsimulation debriefing and their answers to questionnaires. The project success was determined on the basis of attaining objectives formulated through use of the structured simulation and the impact of the simulation experience based on the postsimulation debriefing discussions, in conjunction with the questionnaire responses of nurse educators and nurse participants.

Summary

High-fidelity simulation may bridge the existing gap between classroom learning and the practical knowledge/experience required to master actual clinical skills. The evidence-based scenario is necessary for establishing a better framework for guiding the future development and evolution of simulation scenarios. If constructed correctly, the evidence-based scenario—predicated on up-to-date standards of nursing care and critiqued by well-qualified educators prior to implementation—can be a valuable educational tool. Participants should be evaluated and the educational tool should be assessed during postdebriefing sessions designed to reinforce the practical lesions learned, to ensure safety in practice for the patients, and to improve the nurses' performance.

The evidence-based scenario of this project is presented next, including the theoretical framework upon which the evidence-based scenario was formulated. Following that is the questionnaire that was provided to the three nurse educators to assist with their evaluation of the evidence-based scenario.

Section 4: Findings, Discussion, and Implications

Introduction

This doctoral project focused on the development of an evidence-based scenario focusing on three key areas—assessment, history taking, and communication—to improve the care of patients with chest pain using high-fidelity simulation. The purpose of the doctoral project was to evaluate a newly-developed evidence-based scenario for the care of patients with chest pain, intended to guide the future development of scenarios designed for the simulation environment. Project development was based on a comprehensive review of literature and on collaboration with main stakeholders. Results of this project will form the groundwork for the future evolution of this scenario in the simulation center, and other facilities that desire to follow the recommendations of the study. Tools developed during the course of this study, including the pre- and post-test assessment, preceptor evaluation tool, and after-simulation questionnaire, will assist the local facility and simulation center staff in further developing or improving tools using results from test questions, evaluation tools, and/or questionnaire responses obtained during this study.

The doctoral project was developed using a chest pain scenario following the NLN Template (see Appendix A). Use of the NLN template ensures the incorporation of successful NLN standards in the developed scenario, as the NLN template contains information based on recent professional standards of practice related to care of patients with chest pain. The results of nurse educator feedback related to the developed chest pain scenario follows.

Summary of Findings

Nurse Educator Response

While conducting the study, data were collected in partnership with the simulation center. Two weeks prior to conducting the study, I invited five nurse educators to provide their input via questionnaire regarding the development of the evidence-based scenario. The questionnaire was delivered as an attachment to a personal email invitation. A copy of the questionnaire given to nurse educators is present in Appendix B. Of the five nurse educators invited, only two responded. Their input toward enhancing and improving the scenario was summarized using NVivo qualitative analysis software using Word Cloud-Image (see Figure 1) and Cluster Analysis-Diagram (see Figure 2). A summary of the responses is presented in Table 1.

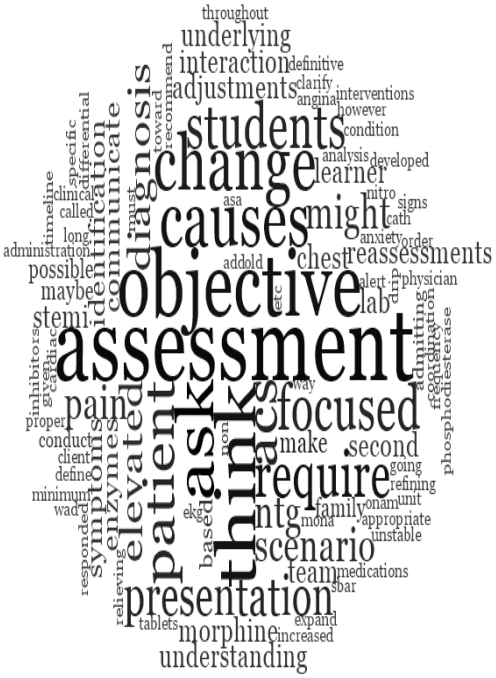

Figure 1. NVivo word cloud image. A representation of words frequently used by nurse educators toward enhancing and improving the evidence-based scenario for chest pain

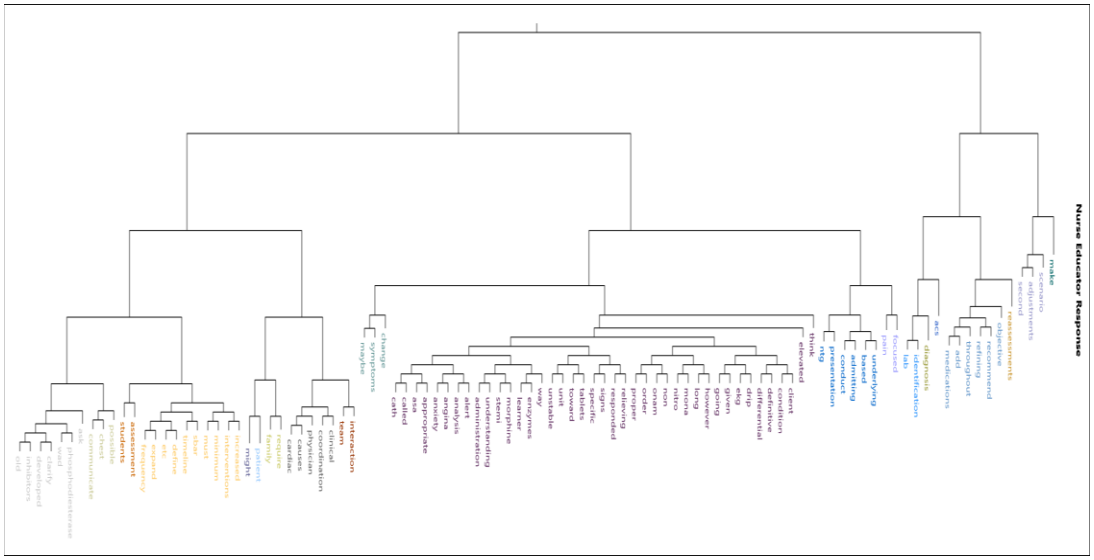

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Figure 2. N Vivo cluster analysis of the nurse educator response.

Table 1

Nurse Educator Feedback

Nurse educator	Learning objectives	Standards of practice	Meeting the learning objectives	Assessment and communication	Suggestion
Nurse educator 1	Re-think 2nd objective or make adjustments to the scenario for Acute Coronary Syndrome (ACS) diagnosis	Admitting diagnosis is unstable angina, however with ST elevation, elevated enzymes, and pain that has not responded to 3 sublingual (SL) nitroglycerine (NTG) tablets I would be thinking ST elevation myocardial infarction (STEMI) as the diagnosis. Based on what is written I think the students would conduct a focused assessment, give the aspirin (ASA) and more nitroglycerine (NTG) maybe a drip would be more appropriate and O2. There is no definitive order for morphine which might go a long way toward relieving some of his anxiety. A ST elevation myocardial infarct	Might want to re-think the second objective or make adjustments to the scenario for Acute Coronary Syndrome (ACS) diagnosis.	Ask the patient whether he takes phosphodiesterase inhibitors, and might want to ask how old the home nitroglycerine (NTG) is. What the students are to communicate and to whom should be further developed	Define how you will measure the objectives, in other words - at a minimum what must the students do during the focused assessment, communication, SBAR (situation, background ,assessment, recommendation) etc. If you do change to Acute Coronary Syndrome (ACS) - I would expect students to consider possible GI causes of chest pain. Will any team interactions be evaluated

Table continues

Nurse educator	Learning objectives	Standards of practice	Meeting the learning objectives	Assessment and communication	Suggestion
		(STEMI) alert would be called and the patient would go to the catheterization lab before going to the unit. If you were to focus on Acute Coronary Syndrome (ACS) the enzymes wouldn't be elevated and there would be non-specific electrocardiogram (EKG) changes			
Nurse educator 2	Add objectives for review and identification of Medications and Labs, as they would change throughout the scenario. b. Objective should be measureable, I would recommend refining the objectives	Proper administration of MONA (morphine, oxygen, nitroglycerine, aspirin), which I believe is now ONAM and learner understanding of why Nitro before Morphine; Learner understanding of underlying causes of changes in condition, signs, and symptoms; Identification of differential diagnosis and analysis of each given client presentation	Interaction and coordination with patient, family, physician, and clinical team are required in cardiac cases	Presentation with chest pain which would require a focused assessment with the need for further assessment to clarify potential underlying causes	Could expand the patient symptoms over a timeline, which would require varying interventions and increased frequency of reassessments

Summarizing the information obtained from NVivo, I identified that nurse educators recommended a focused assessment of needs, including clearly defined objectives. They recommended adjusting the scenario based on specific facilities' needs or employer practice because not all facilities practice the same intervention. Further, the educators reinforced that information needs to be properly communicated, and that it is important to identify the individuals in the communication loop. A determination must be made as to how stated objectives will be measured. The role of family members must be clearly identified and communicated. Suggestions were made to incorporate additional objectives, such as medication and laboratory review, proper intervention such as ONAM, and ensuring that the student understands the reason for the intervention. Educators recommended that the scenario should focus on distinguishing the underlying causes of changes, signs, and symptoms in the patient's conditions and establish a differential diagnosis. Increasing the frequency of reassessments in the scenario, especially for those requiring varying interventions, was also recommended. Lastly, the importance of proper communication, interaction, and coordination among the patient, family members, and other members of the healthcare team was stressed.

According to the simulation center staff, the newly developed chest pain scenario was determined to be similar to one of the center's own cardiovascular scenarios and most of the nurse educators' suggestions had already been built into the learning objectives for their cardiovascular scenario. Therefore, the evidence-based scenario for chest pain was not run by the simulation center; alternatively, center staff chose to run their own cardiovascular scenarios.

Next, the participant profiles and the result of the 25-item test questions were examined. Originally, the intent was to use a 15-question test item, but based on the suggestion of the simulation center staff, the number of test questions was increased to 25. The resulting 25-question test was the result of extensive effort involving a series of revisions resulting from pilot testing of the questions and frequent consultation with the simulation center staff and nurse educators.

Profile of Participants

Two weeks before conduction of the study, nurses attending the scheduled simulation were solicited to participate in the study. A group of 36 nurses initially agreed to join in the study, consented to provide their personal profiles, and agreed to participate in pilot testing of the test questions. The participants were drawn from a convenience sample based on the group that was available on the day the study was conducted. These participants were assigned an alpha-numeric code for confidentiality purposes to assist with data analysis, and to provide the ability to identify participants should they choose to withdraw from the study at a later date. I assigned the 36 nurse participants a letter and number code from A1 to A36. Participant A20 withdrew prior to the actual conduction of the study. Participant A20's data were not included in the study group, in order to maintain the integrity of the group. It should be noted that the same group of nurse participants was constant throughout the study, providing their personal profiles, participating in pilot testing, and participating in both pretesting and posttesting. A representation of the participants and their profiles follow in Tables 2-9. The visual representation of the data in the tables can be seen in Figures 3-11.

Table 2

Profile of Participants-Sex

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Female	33	94.3	94.3	94.3
	Male	2	5.7	5.7	100.0
	Total	35	100.0	100.0	

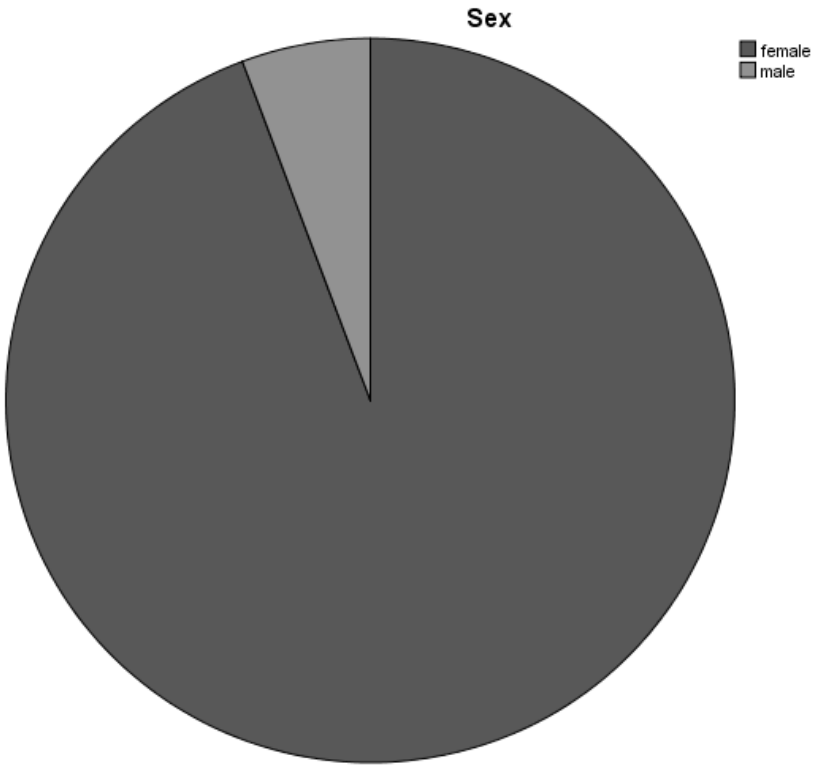

Figure 3. Profile of participants-sex using pie chart.

Table 3

Profile of Participants - Age Category

		Frequency	Percent	Valid percent	Cumulative percent
Valid	20-25 years old	7	20.0	20.0	20.0
	25-30 years old	8	22.9	22.9	42.9
	30-35 years old	7	20.0	20.0	62.9
	35-40 years old	6	17.1	17.1	80.0
	40-45 years old	3	8.6	8.6	88.6
	45-50 years old	3	8.6	8.6	97.1
	more than 50 years old	1	2.9	2.9	100.0
	Total	35	100.0	100.0	

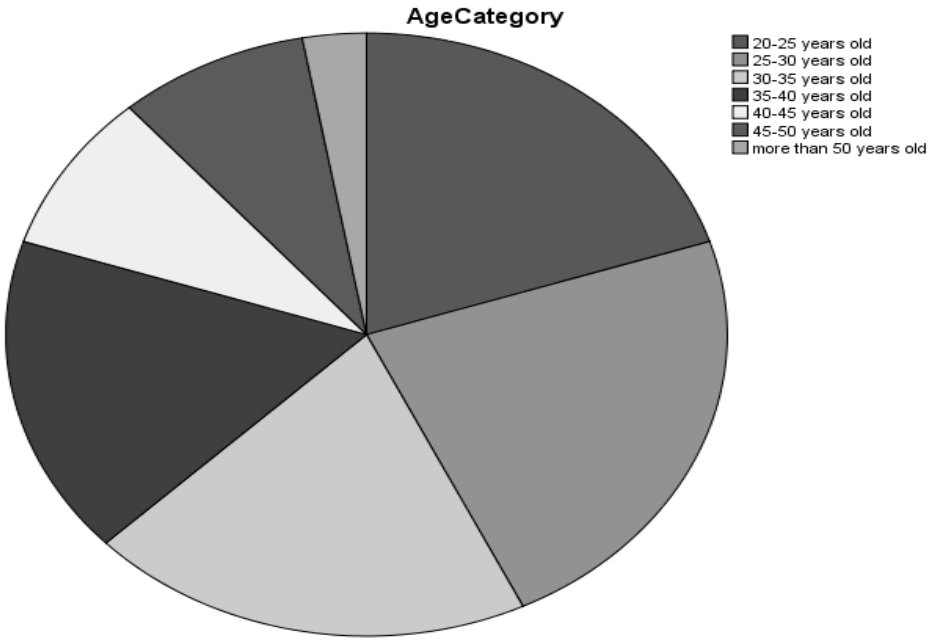

Figure 4. Profile of participants' age category using pie chart.

Table 4

Profile of Participants-Type of Nursing Experience

		Frequency	Percent	Valid percent	Cumulative percent
Valid	licensed RN with 3-5 years on the job	2	5.7	5.7	5.7
	licensed RN with less than one year on the job	1	2.9	2.9	8.6
	licensed RN with no experience	32	91.4	91.4	100.0
	Total	35	100.0	100.0	

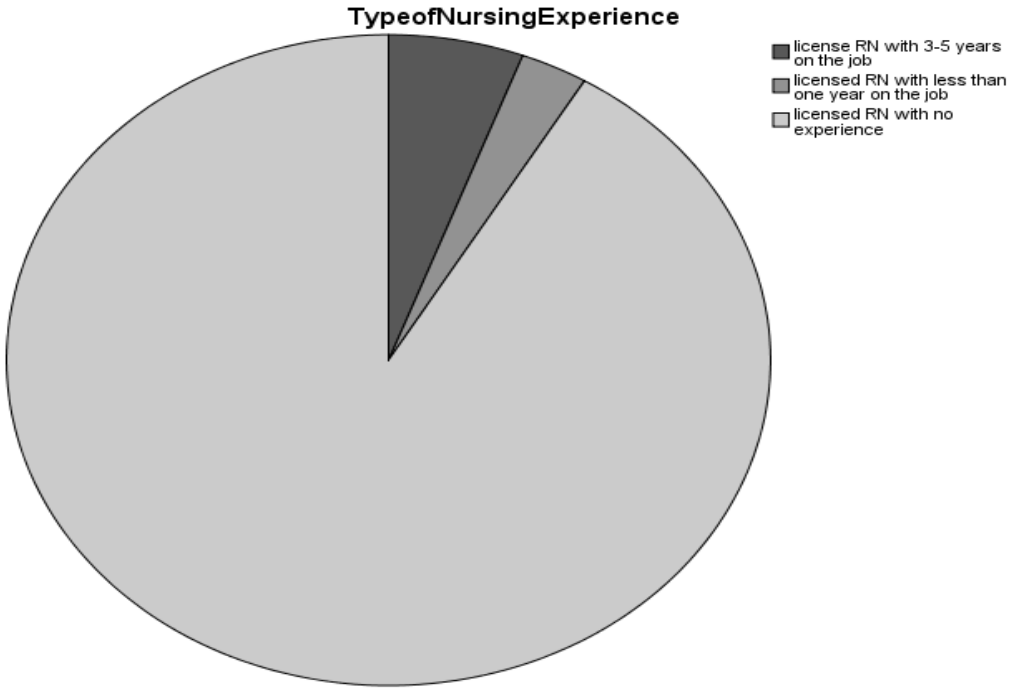

Figure 5. Profile of participants - type of nursing experience using pie chart.

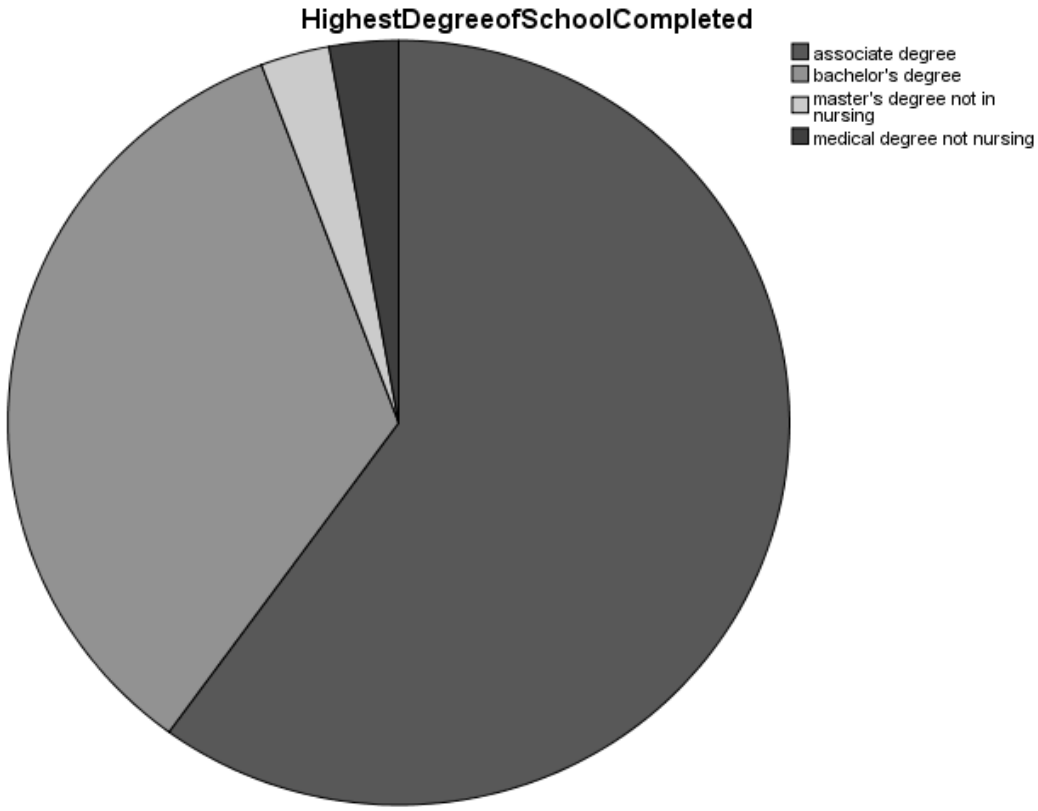

Figure 6. Profile of participants - highest degree completed, using pie chart.

Table 5

Profile of Participants-Previous Medical Background

		Frequency	Percent	Valid percent	Cumulative percent
Valid	No	22	62.9	62.9	62.9
	Yes	13	37.1	37.1	100.0
	Total	35	100.0	100.0	

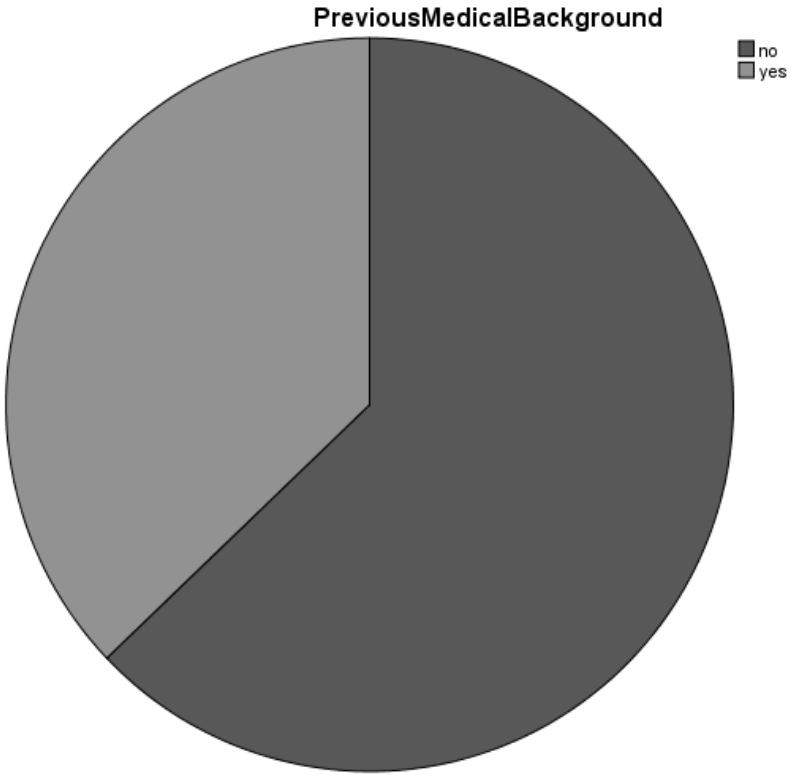

Figure 7. Profile of participants - previous medical background, using pie chart.

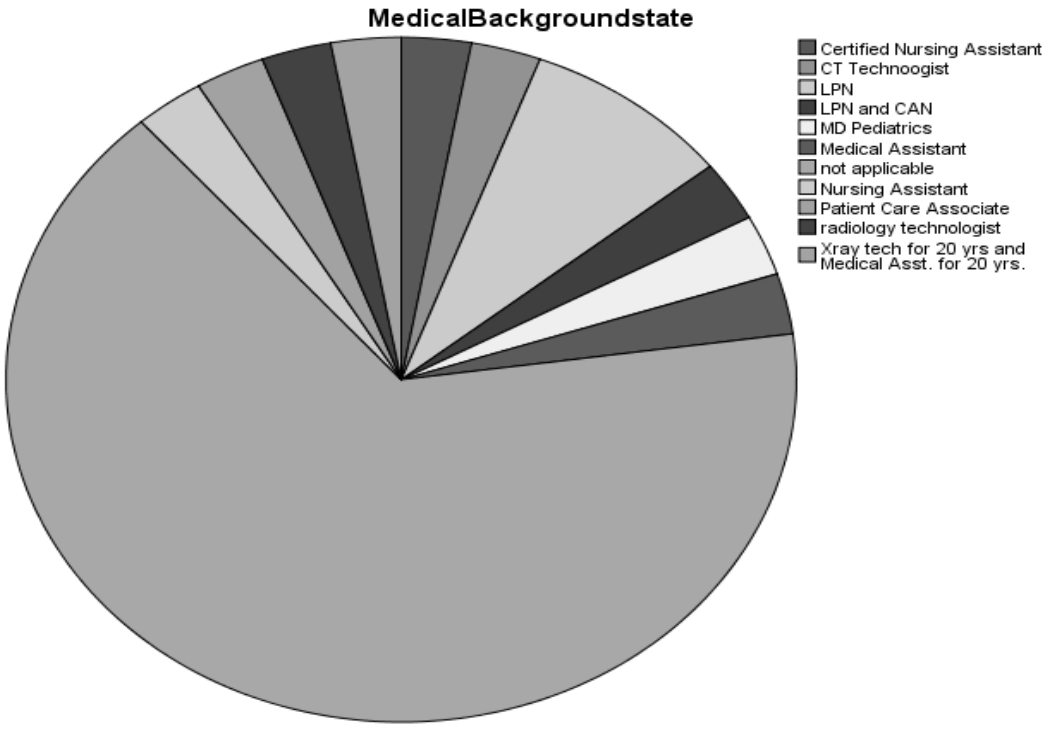

Table 6
Profile of Participants-Medical Background State

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Certified Nursing Assistant	1	2.9	2.9	2.9
	CT Technologist	1	2.9	2.9	5.7
	LPN	3	8.6	8.6	14.3
	LPN and CAN	1	2.9	2.9	17.1
	MD Pediatrics	1	2.9	2.9	20.0
	Medical Assistant	1	2.9	2.9	22.9
	not applicable	23	65.7	65.7	88.6
	Nursing Assistant	1	2.9	2.9	91.4
	Patient Care Associate	1	2.9	2.9	94.3
	radiology technologist	1	2.9	2.9	97.1
	X-ray tech for 20yrs & Medical Asst.20 yrs.	1	2.9	2.9	100.0
	Total	35	100.0	100.0	

Figure 8. Profile of participants - medical background state, using pie chart.

Table 7
First Exposure to High-fidelity Simulation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No	12	34.3	34.3	34.3
	No answer	4	11.4	11.4	45.7
	Yes	19	54.3	54.3	100.0
	Total	35	100.0	100.0	

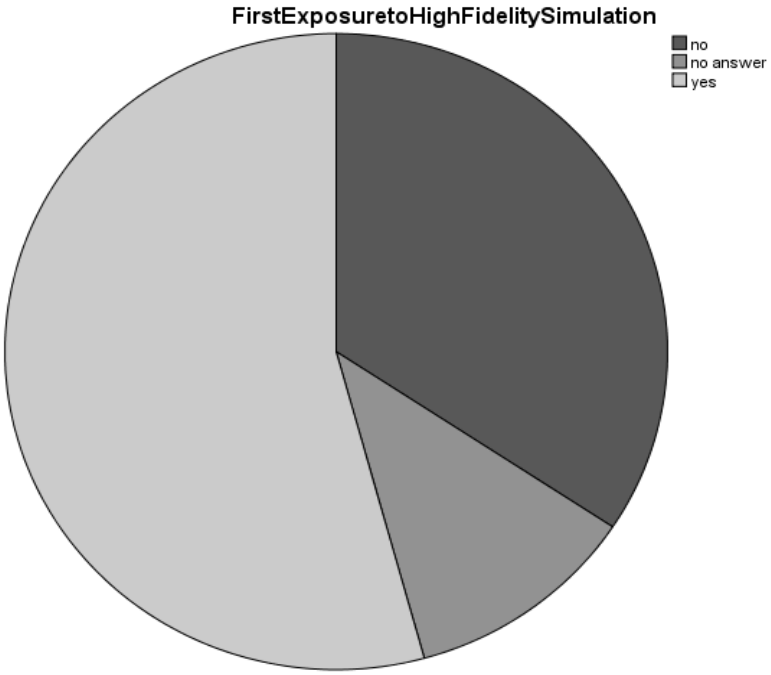

Figure 9. Profile of participants - first exposure to high-fidelity simulation, using pie chart.

Table 8

Profile of Participants - Number of Times Previously Exposed to High-fidelity Simulation

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Eight	1	2.9	2.9	2.9
	Five	3	8.6	8.6	11.4
	Four	2	5.7	5.7	17.1
	No answer	4	11.4	11.4	28.6
	Not applicable	19	54.3	54.3	82.9
	Seventy six	1	2.9	2.9	85.7
	Six	1	2.9	2.9	88.6
	Ten	3	8.6	8.6	97.1
	Twenty	1	2.9	2.9	100.0
	Total	35	100.0	100.0	

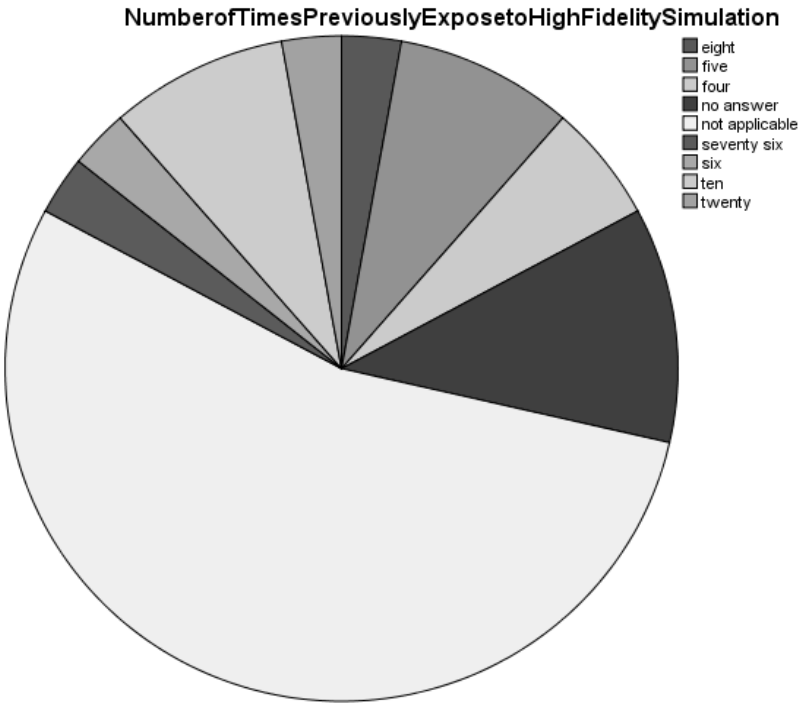

Figure 10. Profile of participants - number of times previously exposed to high-fidelity simulation, using pie chart.

Table 9

Place Attended High-fidelity Simulation Experience

		Frequency	Percent	Valid percent	Cumulative percent
Valid	Barry University	1	2.9	2.9	2.9
	Broward College	1	2.9	2.9	5.7
	Chamberlain College of Nursing	2	5.7	5.7	11.4
	City College	1	2.9	2.9	14.3
	Florida International University	1	2.9	2.9	17.1
	Fortis College	1	2.9	2.9	20.0
	Miami Dade College	2	5.7	5.7	25.7
	no answer	3	8.6	8.6	34.3
	not applicable	20	57.1	57.1	91.4
	Nova Southeastern University	2	5.7	5.7	97.1
	Western Governors University	1	2.9	2.9	100.0
	Total	35	100.0	100.0	

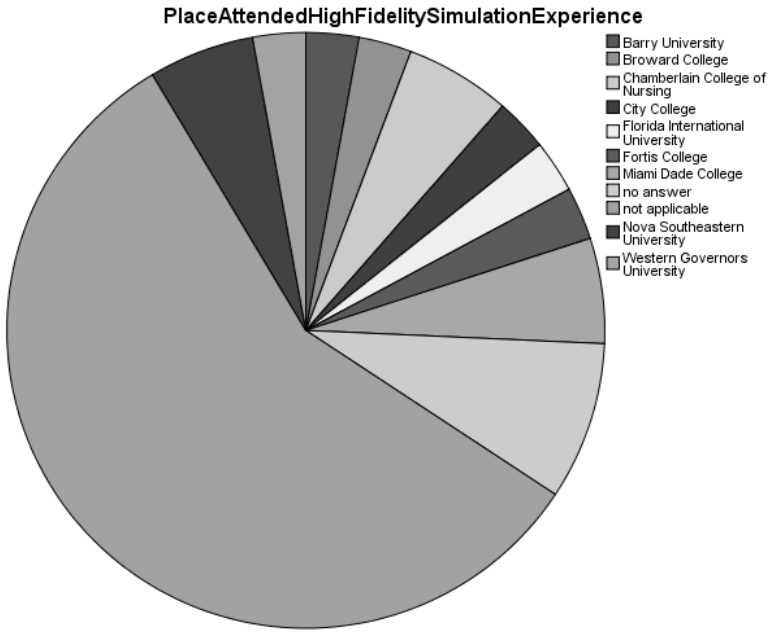

Figure 11. Profile of participants - place attended high-fidelity simulation experience, using pie chart.

The majority of the study participants were female, newly-graduated nurses with no nursing experience. Ages ranged from 20 years old to over 50 years old, but the overwhelming majority fell in the range from 20 to 40 years of age. More than half of the participants had Associate's degrees; some had Baccalaureate degrees, albeit with no previous nursing background. Most participants were preparing a new job experience. Some experienced nurses were preparing to move from a position as a "floor nurse" to more specialized areas. For the most part, participants were experiencing their first exposure to high-fidelity simulation. For those who had been exposed to high-fidelity simulation, their prior experiences covered a wide range of facilities identified in Table 10.

Result of the 25-Question Pilot Test

A 25-question pilot test, as opposed to the original 15 questions, was formulated based on the recommendation of simulation center staff. After receiving IRB approval of the 25-question pilot test questionnaire (Walden University approval number is 05-20-15-0185215 and expires May 19, 2016), the pilot test questions were administered to a convenience sample of volunteer participants present in the simulation center at that specific period of time. Thirty-six nurses originally consented to participate, although one later withdrew, leaving only 35 to actually participate. The 25-question pilot test was administered as a means of assessing the validity and reliability of the questions, while allowing for the evaluation of participant knowledge relative to cardiovascular assessment, history taking, and communication.

The following bar graph in Figure 12 depicts the results of the pilot test administered to the convenience sample of volunteer nurse participants. The X axis reflects the participant score as a percent of correct responses, while the Y axis identifies the individual nurse participants (A1 through A36). Participant number A20 opted out of the study and, as a result, there is no participant score associated with that participant. The pilot test questions can be found in Appendix F.

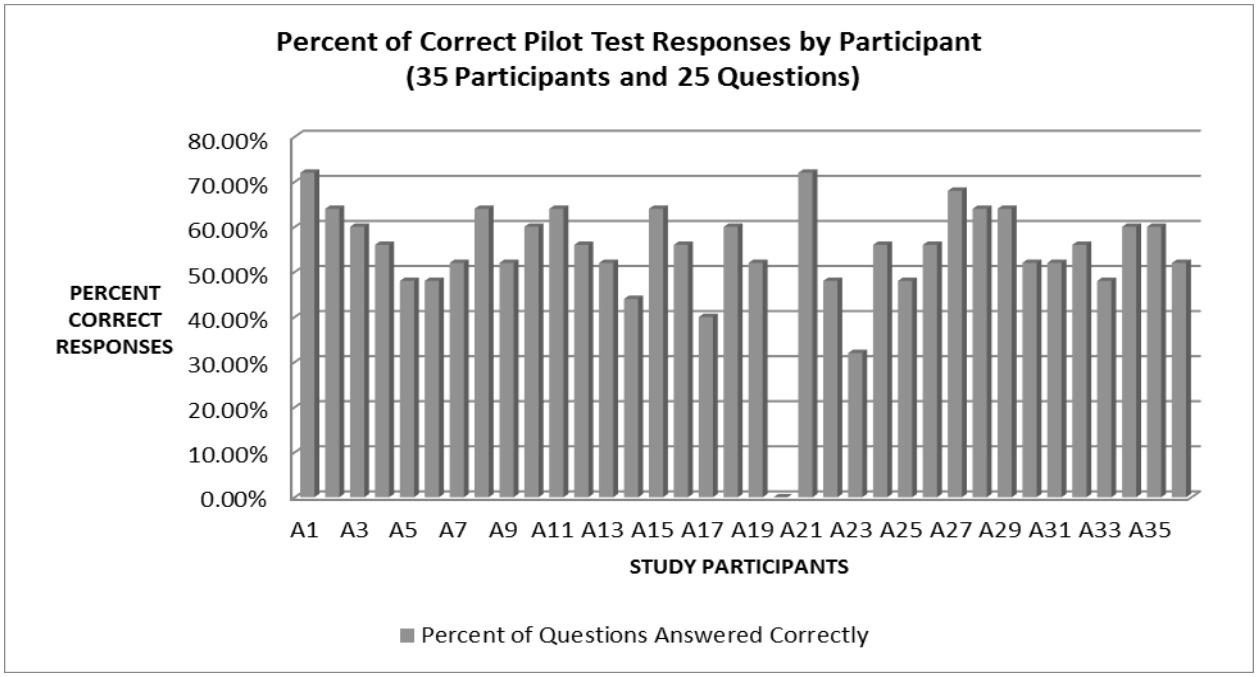

Figure 12. Percent of correct responses by participants to the piloted test questions.

Figure 12 identifies the lowest individual participant score for pilot test questions as 32% correct, or eight questions correct out of the total 25 questions. Alternatively, the highest individual participant score was 72% correct, or 18 questions correct out of the total twenty-five 25 questions. Pilot test questions were administered prior to the start of the simulation experience, prior to the orientation day, and prior to providing information to participants in reference to the simulation and classroom.

An item analysis of the pilot test questions was performed by comparing the correct responses of each participant in contrast to their incorrect responses. Figure 13 presents the frequency of pilot test questions answered incorrectly, while Figure 14 identifies the percent of the time that each pilot test question was answered incorrectly. Ten of the 25 questions were answered incorrectly by more than half of the nurse participants. The pilot test questions answered incorrectly were question numbers 3, 8,

10, 12, 14, 15, 17, 18, 23, and 25. Additionally, after conferring with the nurse educator and simulation center staff, pilot test question numbers 4, 10, 11, and 24 had two correct answers. Therefore, when the answers to test questions were verified, test questions numbered 4, 10, 11, and 24 were considered to be correct for scoring purposes.

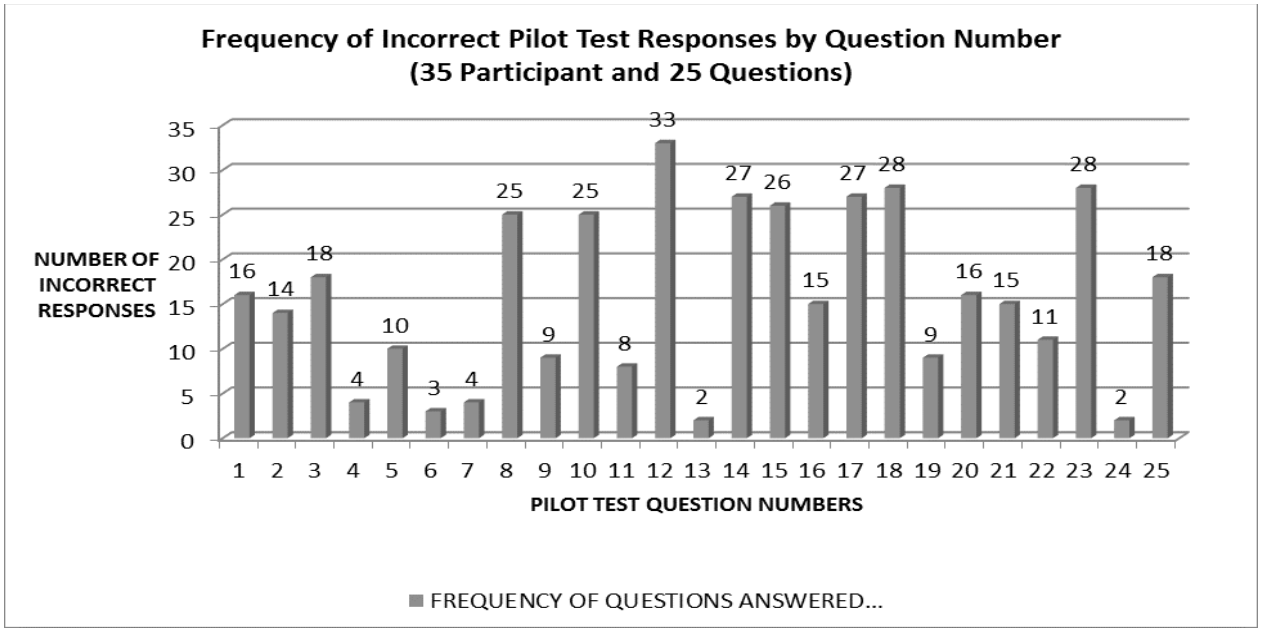

Figure 13. Frequency of incorrect pilot test responses by question number.

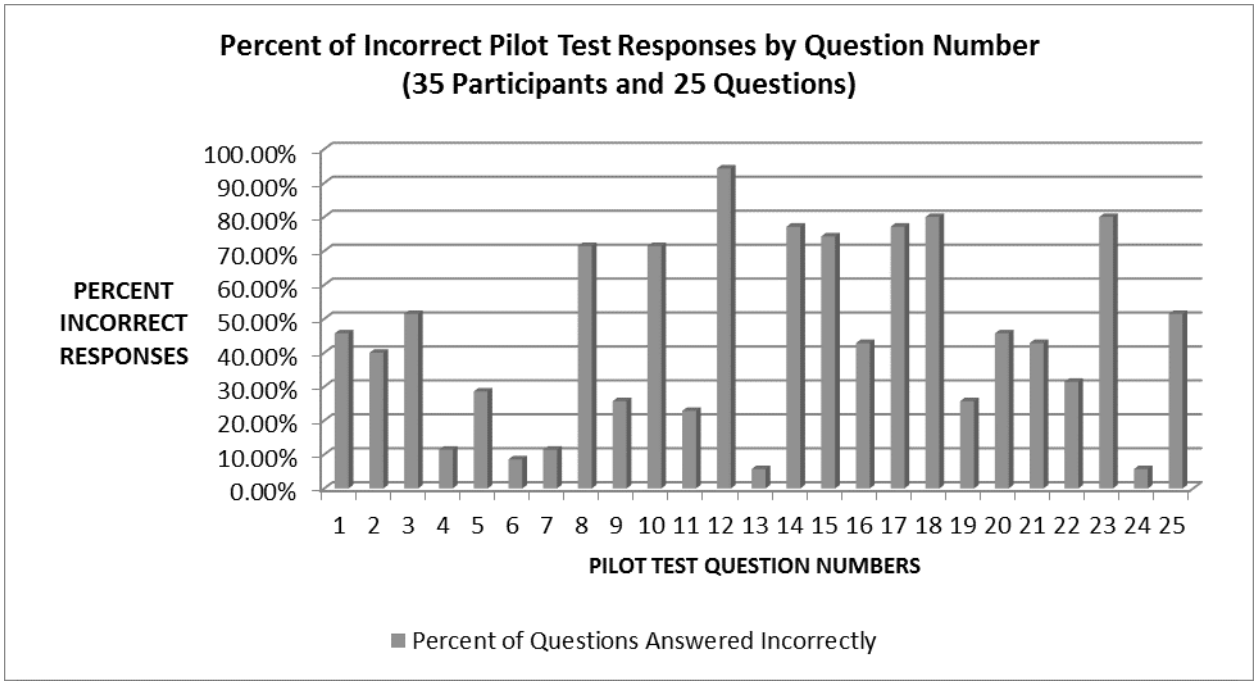

Figure 14. Percent of incorrect pilot test responses by question number.

In addition to the aforementioned critical review of the pilot test results, a content validity analysis was performed on the pilot test questions. Content validity was assessed in a three-stage process. During the first stage, I reviewed the pilot test questions to ensure their content was adequately addressed by the simulation scenario videos utilized by the XYZ simulation center. Second, I reviewed the test questions ensure that question formatting followed the type utilized by cardiovascular scenarios employed at the simulation center, especially the cardiovascular scenario that is closely related to the proposed evidence-based scenario for the care of chest pain patients. Third, a conference was convened at the simulation center to include simulation center staff, the center's nurse educator, and myself for the purpose of achieving consensus on wording, formatting, clarity, consistency, and ensuring that there was only one correct answer to

each of the 25 test questions. During implementation of the aforementioned three-step content validity process, it was determined that some of the test item questions again had two potentially-correct answers, and there still existed issues with test question wording, clarity, and formatting. All issues identified during the content validity process were adequately addressed prior to achieving a consensus on the final set of test questions.

A reliability analysis was performed on the test. The results are summarized in Table 10.

Table 10

Reliability

Case Processing Summary			
		N	%
Cases	Valid	25	92.6
	Excluded[a]	2	7.4
	Total	27	100.0
Reliability Statistics			
Cronbach's alpha		N of items	
	.768		2

I found that the pilot test had a reliability rating of .768, indicating the existence of a good level of consistency. Regardless of the favorable Cronbach's alpha rating, indicating a good level of consistency, test questions were further refined to achieve the best clarity, wording, and formatting, while striving to ensure that questions could have only one correct answer. Continued work on the original pilot test questions resulted in the evolution of a new enhanced final set of 25test questions that focused on assessment, history taking, and communication.

This final set of test questions was based on the piloted test question results and the cardiovascular scenario (Acute Coronary Syndrome) utilized by the simulation center.

The test included some ACLS questions, as well as questions directed to management of patients experiencing chest pain. An IRB request was sent the new set of 25 test questions and after approval, the new set of test questions was ultimately administered to the same group of volunteer nurse participants who initially provided their personal profiles and participated in the pilot test phase of this study.

I performed a post hoc analysis to ensure the adequacy of the proposed number of volunteer nurse participants, validating that the number of participants would constitute a valid representative sample. The G*Power analysis test was utilized for this purpose.

Assessing the Sample Size

A power analysis was performed to assess the necessary sample size for the specified desired power. A *t* test analysis was employed to determine the mean difference, based on a constant one-sample type case using 35 samples. The designated alpha level, or the Type I error rate, which is the probability of rejecting the null hypothesis when it is actually true, was set at a value of 0.05. The pre-specified or desired level of statistical power for calculating a good sample size was set to a value of 0.8, as this is considered a desirable power level. The pre-specified number of sample subjects for calculating the actual statistical power was set at the sample size of 35. The resulting actual statistical power rating was calculated to be 0.819536 or 81%, indicating that the sample size of 35 was a good sample size and key to good power analysis.

The cardiovascular scenario (Acute Coronary Syndrome) of the simulation center patterned after the proposed evidence-based scenario for patients experiencing chest pain was run. While the scenario was being run, the nurse educator presiding over the scenario

in the role of preceptor evaluated the participants and the results of that evaluation follow.

Result of the Preceptor Evaluation

On the day of cardiovascular simulation, after obtaining the nurse participants' ACLS didactic and mega codes skills and information, a preceptor evaluation tool was provided to each preceptor handling a nurse participant group. Coverage was provided for both the morning and afternoon sessions. Among the afternoon session case scenarios ran was the Acute Coronary Syndrome Case. The simulation center's Acute Coronary Syndrome Case was very closely related to the newly created evidence-based scenario for patients experiencing chest pain. As such, the simulation center director decided to run the center's own scenario as opposed to the one newly corrected, due to the close similarities of both simulation scenarios. Both scenarios included a 7-10 minute history taking and a 7-10 minute head to toe assessment. Assessment shifted to a cardiovascular-focused assessment when the simulation mannequin complained of chest pain. The preceptor's evaluation tool consisted of a series of questions soliciting a "yes or no" answer, followed by a numerical response and qualitative observations. The data collected from use of the preceptor's evaluation tool are presented in Table 11. Qualitative data and information obtained from preceptor responses to open-ended questions were later analyzed using NVivo.

The preceptor's evaluation tool results are presented in Table 11; these include the results of both the morning and afternoon simulation scenarios. The 35 volunteer nurse participants were grouped into eight groups, with four to five members in each group.

Each group attended both morning and afternoon simulation sessions, although the afternoon session incorporated the Acute Coronary Syndrome scenario, which was the Simulation Center Director's choice to run in place of the newly created evidence-based scenario for chest pain patients. Tabulated results are presented in Table 11.

Table 11

Preceptor Evaluation Feedback

	Feedback from the Preceptor in reference to the group performance (AM session, before the cardiovascular scenario related to evidence-based scenario)	Feedback from the Preceptor in reference to the group performance (PM session run a series of cardiovascular scenarios, including the acute coronary syndrome case related to evidence-based scenario for chest pain
Q1: Was the group able to recognize the problem? If no, state the reason.	Out of the 8 groups, 2 groups were not able to recognize the problem and reason stated were: no, didn't meet requirements for team leader decision making no, took too long to complete head to toe assessment	1 out of 8 groups did not recognize the problem, one group recognize the problem but was slow in confirming the issue/problem yes, but team was to slow to confirm problem with rapid 12 lead, cardiac enzymes etc. no, not at first went with MI before EKG then once come to VT to Vfib was able to treat
Q2: Was the group of nurses able to differentiate urgency from non-urgency of the situation? If no, state the reason.	Out of the 8 groups, 3 groups were not able to for differentiate urgency from non-urgency no, ignored patient complaints, focus on getting consults, orders, delay in treatment of chest pain no, slow no, able to recognize urgency but slow in action	2 out of 8 groups were not able to differentiate urgency from non-urgency, reason stated were: no, slow in action see the monitor but were not doing anything quickly no, not thinking about cathlab or fibrinolytics for STEMI once 12 lead showed ST elevation, slow to administer MONA
Q3: Was the group of nurses able to initiate independent nursing actions? If no, state the reason.	Out of the 8 groups, only one group was not able to perform independent nursing action and reason stated is: no, poor performance overall	2 out of the 8 groups were not able to initiate independent nursing action, reason stated were: no, were not stepping up to do actions yes, a little to independent, gave Aspirin without order
Q4: Was the group of nurses able to report essential clinical data? If no, state the reason.	Out of the 8 groups, 2 groups were not able to report essential clinical data, reason stated were: no, case scenario stopped no, did not ask all pertinent questions to patient, able to then report	All of the 8 groups were able to report essential clinical data but one group was not great as per preceptor comment
Q5: Was the group of nurses able to anticipate relevant medical errors? If no, state the reason.	2 out of the 8 groups were not able to anticipate relevant medical error, reason stated were: no, gave nitro and did not assess patient was taking sexually enhancement meds no, administered nitro 0.1 mg SL spray without inquiring whether patient on any erectile medications (ie. Viagra, Cialis, Levitro)	4 out of 8 groups did not anticipate relevant medical errors, reason stated were: No, no reason stated no, gave nitro 0.4 mg sl without assesing for erectile dysfunction meds no, not til I told them about the Aspirin and no order did they realize

Table continues

	Feedback from the Preceptor in reference to the group performance (AM session, before the cardiovascular scenario related to evidence-based scenario)	Feedback from the Preceptor in reference to the group performance (PM session run a series of cardiovascular scenarios, including the acute coronary syndrome case related to evidence-based scenario for chest pain no, did not reassess patient for pulse after rhythm change (VT), defibrillated patient in VT (with pulse) instead of cardioverting
Q6 Was the group of nurses able to collectively comeup with the best treatment option or intervention? If no, state the reason.	4 out of 8 groups collectively was not able to comeup with the best treatment option or intervention, reason stated were: no, only give one dose of nitro, did not give oxygen and morphine pain was 15/10 no, patient coded before they could intervene yes, went pacing bypassed atropine, did not know why thought because BP yes, with exception of above fatal error (referring to giving nitro without asking whether patient is on erectile medications)	2 out of 8 groups were not able to collectively comeup with the best treatment option, reason stated were: no, did not understand prioritization of treatment, wanted to give Aspirin or Plavix before Nitro because they stated pneumonia in their books had OAMN no,patient declined as a result of nitro administration with erectile dysfunction, E.D. meds have been taking within 48 hours and deteriorated to Vtach

Result of the Pretest and Posttest Focus on Assessment, History Taking, and Communication

Based on the result of the piloted test questionnaire, a 25-item finalized test questionnaire was formulated and administered to the same group of 35 volunteer nurse participants as part of their pretest. The pretest was administered to volunteer nurse participants on the first day of simulation scenarios after orientation, along with dissemination of other information regarding ACLS Didactic and ACLS Megacodes, ongoing head to toe assessment and evaluation. This was done prior to running the simulation scenarios for the first day.

In addition to data collection from the pilot test questionnaire, a basic profile of volunteer nurse participants was obtained. This same participant profile information was again utilized in the analysis of pre- and post-test data, as the same group of volunteer nurses participated in pilot testing as well as pre- and post-testing. These participants were assigned alpha-numeric codes to provide individual identification.

Post testing was administered on the Grand Rounds day, after the volunteer nurse participants had been exposed to cardiovascular, pulmonary, and multi-system simulation scenarios and after individual head-to-toe assessment had been performed. The posttest was administered on the fifth day of simulations. Comparison of the pre- and post-test results using *t* test quantitative analysis of data was obtained. The findings can be seen in Table 12-14, as well as Figures 15-18.

Table 12

Comparison of Pretest and Posttest Scores Using Frequencies and Percentages

		Participant code	Pretest scores	Percentage of pretestscores	Posttest scores	Percentage of posttestscores
N	Valid	36	35	35	35	35
	Missing	0	1	1	1	1
Mean			16.000	64.0000%	16.29	65.1429%
Std. Error of Mean			.3597	1.43895%	.368	1.47195%
Median			16.000	64.0000%	17.00	68.0000%
Mode			17.0	68.00%	17	68.00%
Std. Deviation			2.1282	8.51297%	2.177	8.70815%
Variance			4.529	72.471	4.739	75.832
Skewness			-.388	-.388	-.807	-.807
Std. Error of Skewness			.398	.398	.398	.398
Kurtosis			-.270	-.270	.531	.531
Std. Error of Kurtosis			.778	.778	.778	.778
Range			9.0	36.00%	9	36.00%
Minimum			11.0	44.00%	10	40.00%
Maximum			20.0	80.00%	19	76.00%

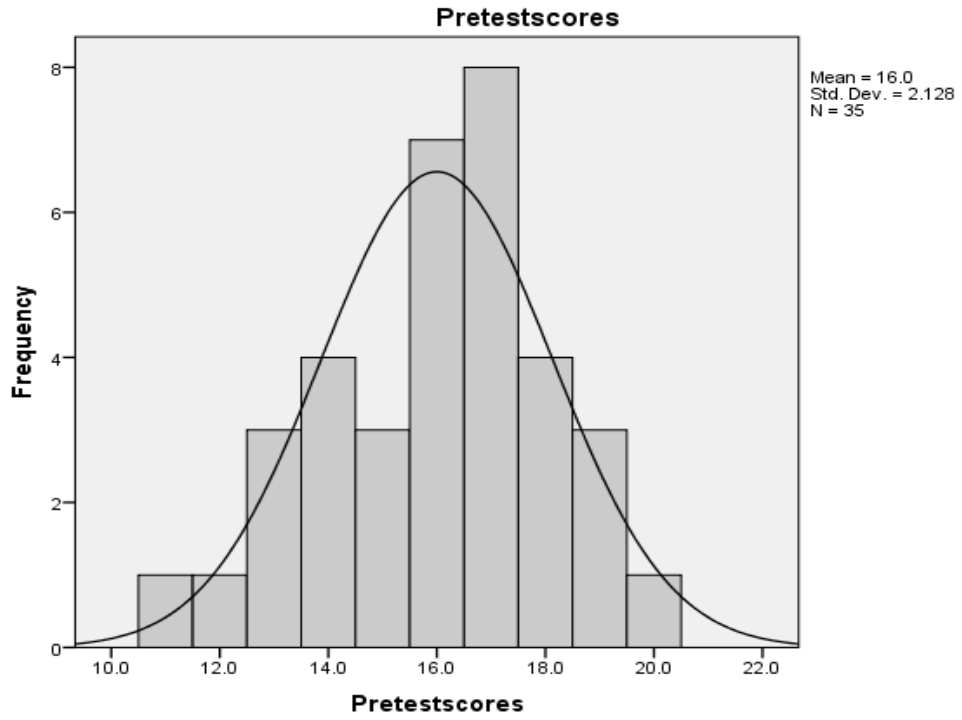

Figure 15. Frequency of pretest scores.

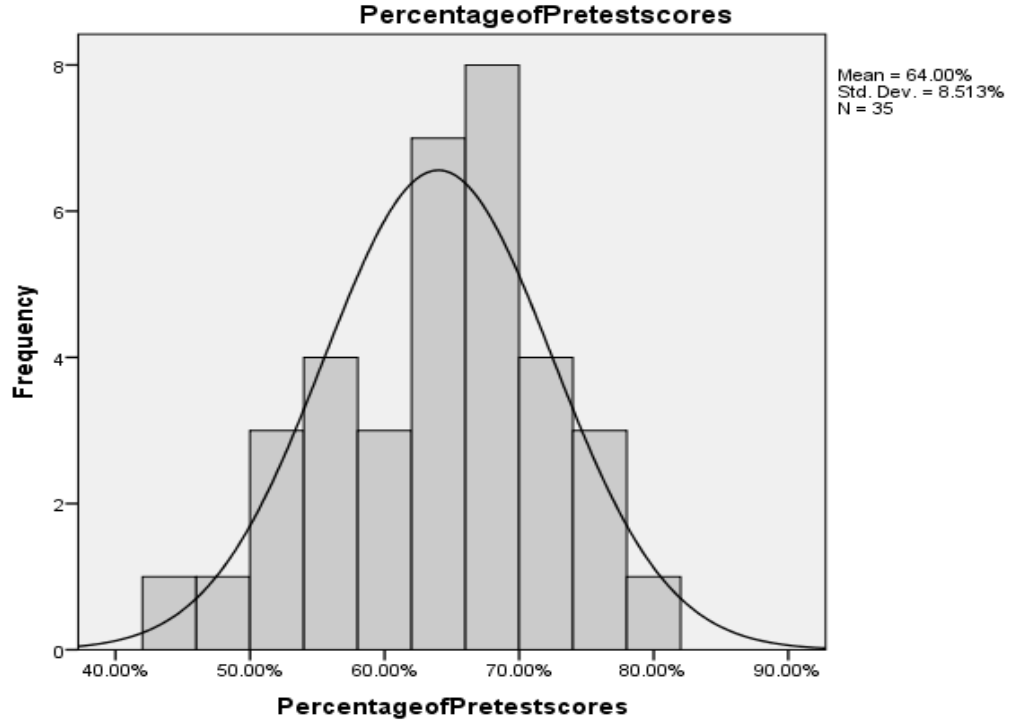

Figure 16. Percentage of pretest scores.

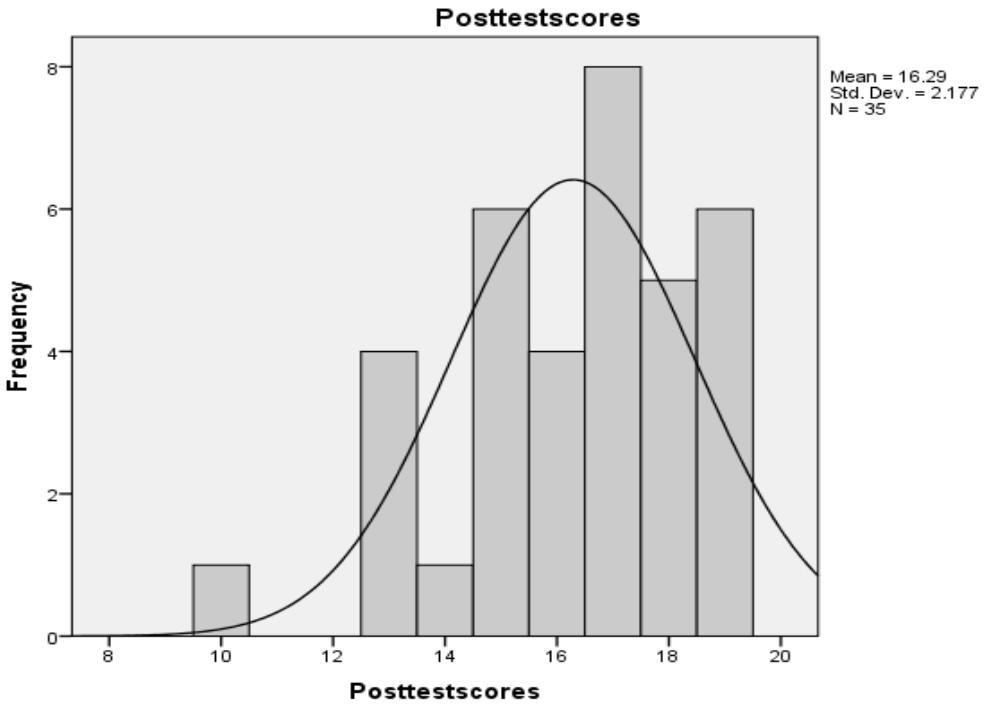

Figure 17. Frequency of posttest scores.

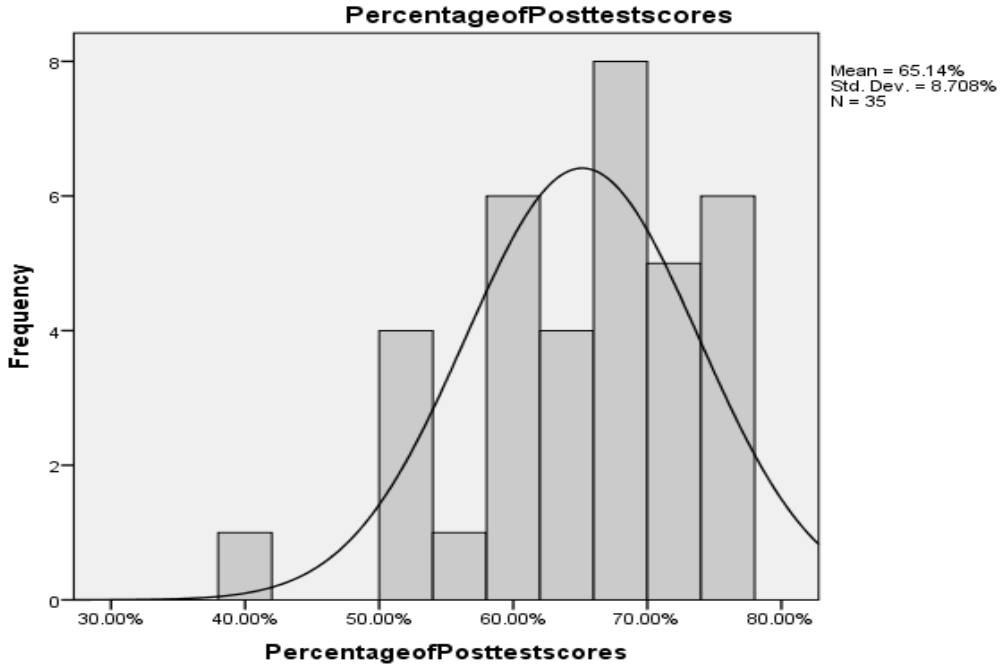

Figure 18. Percentage of posttest scores.

Table 13

T-Test Result-One Sample Statistics

	N	Mean	SD	SD Error Mean
Pretest Scores	35	16.000	2.1282	.3597
Percentage of Pretest Scores	35	64.0000%	8.51297%	1.43895%
Posttest Scores	35	16.29	2.177	.368
Percentage of Posttest Scores	35	65.1429%	8.70815%	1.47195%

Note: N=No. of Participants, SD=Standard Deviation

Table 14

T Test Result-One Sample Test

	Test Value = O					
					95% Confidence interval of the difference	
	T	*Df*	Sig (2 - Tailed	Mean Difference	Lower	Upper
Pretest Scores	44.477	34	.000	16.0000	15.269	16.731
Percentage of Pretest Scores	44.477	34	.000	64.00000%	61.0757%	66.9243%
Posttest Scores	44.256	34	.000	16.2860	15.54	17.03
Percentage of Posttest Scores	44.256	34	.000	65.14286%	62.1515%	68.1342%

The test value is the value entered in the one-sample *t* test window. In this case, the test value is 0. The test statistic of the one-sample *t* test resulted in 44.477 for pretest scores and 44.256 for posttest scores. The test statistic is calculated by dividing the mean difference by the standard error mean. The degrees of freedom (*df*) for the one-sample *t* test is 34, for both pretest and posttest. The two tailed *p*-value (sig., 2-tailed) corresponding to the test statistic is .000. The difference between the "observed" sample mean (from the one-sample statistics box) and the "expected" mean (specified test value) is 16.0000 (mean difference for pretest) and 16.286 (mean difference for posttest). The

confidence interval for the difference between the specified test value and the sample mean for the pretest score resulted in a lower value of 15.269 and an upper value of 16.731, while the difference between the specified test value and sample mean for the post test score resulted in a lower value of 15.54 and an upper value of 17.03.

The purpose of this project was to evaluate a newly-developed evidence-based scenario for the care of patients with chest pain aimed at guiding future development of scenarios designed for a quantitative simulation environment. One of the evaluation tools utilized in this doctoral project was administration of both pretest and posttest exams to assess any difference in the scores after exposure to an evidence-based scenario for the care of patients with chest pain patients using high-fidelity simulation. Using a one-sample *t* test, the obtained probability (*p*) value: $p < .005$, Sig. (2 tailed) value was .000. This rejected the null hypothesis that the sample mean is equal to the hypothesized mean. Therefore, results identified that there existed a statistically-significant difference between the two means, pretest and post test scores, after being exposed to an evidence-based scenario for the care of patient with chest pain using high-fidelity simulation. Nevertheless, due to the small sample size (35 participants) and the small .286 difference between the means of the pretest and posttest scores, the statistical significant difference determined by the one-sample t test was less impactful and did not support a finding of participant improvement. In this case, the numerical difference in mean pretest scores compared with mean post-test scores, even though statistically significant, was only .286—not likely to result in practical or observable significance, and certainly not enough

to justify a finding of improvement in the scores of participants after exposure to an evidence-based scenario for chest pain using high-fidelity simulation.

Result of the After Simulation Experience-Feedback From Nurse Participants

Figure 19 represents the NVivo word cloud and word frequency obtained from the after simulation experience feedback from nurse participants.

Figure 19. NVivo word cloud of after-simulation experience.

Use of NVivo's Word Cloud and Word Frequency functions obtained words used more than 50 times. These words included: *yes, condition, hear, instructions, know, knowing, knowledge, knowledgeable, learn, learned, learning, see, seeing, study, take, takes, taking, teach, teaching, watching, patient/s, build, cause, causes, clear, constructive, gain, gained, get, getting, give, gives, giving, make, makes, making, preparation, prepare, prepared, ready, realized, take, takes, taking, work, working, experience, feel, feeling, feels, get, getting, know, knowing, live, lives, see, seeing,*

advance, best, better, improve, improved, improvement, improvements, good, practice, practicing, proficient, skills, ask, asking, expect, expectation, expectations, expected, need, needed, requires, take, takes, taking, effective, effectively, good, just, right, safe, sounds, thorough, and *well*.

Figure 20 depicts the cluster analysis of the nurse educator responses using NVivo Cluster Analysis.

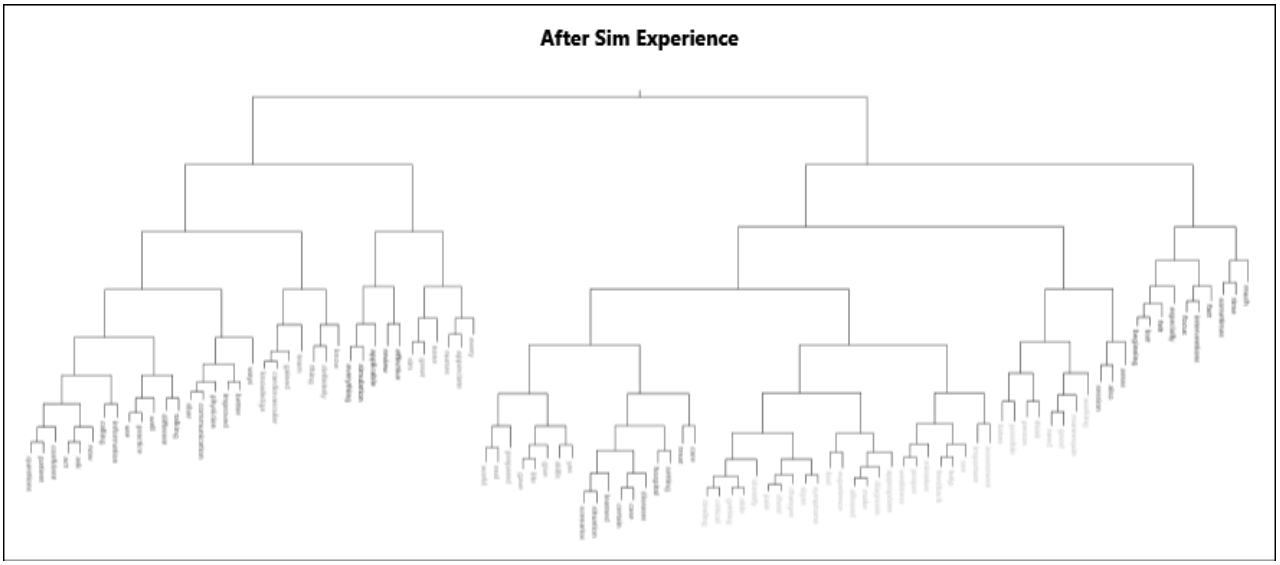

Figure 20. N Vivo cluster analysis of after-simulation experience

Summarizing the information obtained from the nurse participants' experience with simulation, the majority stated that they enjoyed simulation. Their perceptions included: improvement of their skills, which includes assessment, history taking, and communication that will help them in their jobs; experiencing a close to real-life situation; and allowing them to make mistakes and learn from those mistakes. In the question of how their assessment and communication skills were improved by simulation, feedback included: they received constructive advice from performance with the mannequin, that is, how they were able to improve their mistakes and respond to code scenarios much better; they were taught how to stay calm in emergency situations and pay attention to details of what is going on with the patient; going over and over the assessment of patient with chest pain helped them develop and master the assessment skill; learning how to prioritize is the key, because time is the biggest factor in responding to patient having chest pain; in the simulation they were allowed to ask questions, which gave them the avenues to clarify mistakes and confusions; active listening is learned, especially applying it when dealing with patient having chest pain; and confidence was developed in assessing and intervening with situations of patients having chest pain. In addition, the participants learned how to use open-ended questions and SBAR, they were given advice how to talk to patients and physicians and perform a good history by asking the right questions, they were told to ask questions and not assume, and their objective and subjective assessment improved.

On the question about how the post-simulation feedback helped, answers included: it helped identify areas to improve and how to avoid future mistakes; it enabled

them to review, go back, and analyze what was done wrong and what was missed and make future improvements; and it was helpful for confirming proper assessment and communication. Areas for improvement that was mentioned were: they needed more time and detailed feedback; they needed to improve their reaction time, SBAR, and IV insertion skills; they needed to know where the supplies are located so as not to waste time; that the mannequin lung and bowel sounds were at times hard to hear; that it was hard to think of the mannequin as a real person.

Nurses also responded that at times, they felt lost. Responses included: in the beginning they felt lost, but as days go by they become comfortable; problem with language, some participants cannot catch up to what is going on because of language deficiency as English is not their native tongue; nurse participants want to know the disease up ahead so they could review and they won't feel clueless; some verbalized that they were given different instructions which seemed conflicting for them; events were happening at the same time; they still don't know how to treat abnormal rhythms; at times they don't know if they need to perform the skill or verbalize their response to the scenario; people talk at the same time; dialogue during scenario were not clear. Participants also reported that the information given to them seemed vague on how much they are allowed to do or perform. They also mentioned that things happened so fast that they didn’t have time to react and didn’t know what they needed to do next; they also felt that sometimes, they provided the right treatment but the virtual patient died anyway.

Although the majority mentioned that they had gained knowledge and skills in meeting their objectives in reference to cardiovascular assessment and SBAR

communication, the missing elements identified by nurse participants were: more procedures and skills, cover more important areas that needed improvement, detailed explanation of each mistakes, reviewing the symptoms before the scenario would help them understand the scenario, they want to make sure that they are giving the right treatment to the symptoms, handouts describing the cases so they could review at home while watching the video, some mannequins didn't work properly, they want to do more interventions and not just simulate or verbally tell them, more time working on the head-to-toe assessment, charting, medication administration, repeat demonstrations, and more time in giving SBAR communications.

The participants also reported their perceived relevance of the simulation. Responses included: scenarios relate to real-life scenarios in the hospital, they experience real hands on experience, they were able to put into practice knowledge gained, simulation and lecture were not in sync or synchronized, they felt that they know it all but when exposed to simulation it shows they don't, they learned how to treat different diseases, and that every scenario was well thought-out and fills the missing piece of what was not experienced in nursing school.

Comments given by nurse participants included: that simulation would benefit new graduates, that it is an ideal environment to groom and equip new nurses for the real world, that simulation gave them a step up ahead in their career, that it was a great environment to practice critical thinking, and that taping the simulation was a great way to learn.

Discussion of Findings in the Context of Literature and Frameworks

The findings of the study represented high levels of satisfaction and confidence among nurse participants who were, for the most part, newly-graduated nurses with no experience. Moreover, some of these nurses were being exposed to high-fidelity simulation for the first time. The fact that this study found that high-fidelity simulation increased the level of confidence and satisfaction was not surprising, and is supported by the studies performed by Stefanski and Rossler (2009), Cant and Cooper (2010), and Yuan et al. (2012).

The findings of the study reported no significant improvement in the knowledge level of nurse participants in their assessment, history taking, and communication skills, based on the comparison of pretest and posttest results. Feedback obtained from volunteer nurse participants revealed that the high-fidelity simulation scenario resulted in a myriad of issues including: confusion; feelings of being overwhelmed or lost; problems managing time; speed of the scenario; conflicts arising due to differing instructions and conflicting interventions; lack of confidence necessary to take action; and the inability to interpret EKG's despite attending class on that specific topic. In addition to participant feedback, feedback from the nurse educator or preceptor was based on their direct observations and interactions with volunteer nurse participants during the course of the simulation scenario. Not surprisingly, nurse educator feedback also identified numerous issues including: ignoring patient complaints and communication; lack of leadership in decision making exhibited by the team leader; the inability to recognize correct EKG rhythms; poor task prioritization, possibly due to the lack of understanding as to

prioritizing symptoms and events; lack of initiative toward necessary action; an excessively-slow process for confirming the problem; inability to manage time appropriately; lack of proper assessment resulting in the inability to provide proper nursing intervention; and delayed patient treatment. These findings are supported by the research study of Sportsman et al. (2011) that evaluated the impact of scenario-based high-fidelity patient simulation (HFPS) on student academic success in nursing programs. Sportsman et al. (2011) reported no evidence of impact on the delivery of care by students exposed to scenario-based high-fidelity patient simulation (HFPS).

One of the recommendations of this study is the development of high-fidelity simulation training that is customized to its audience. Where the audience is comprised of newly-graduated nurses without nursing experience and possibly no prior exposure to simulation training, the simulation scenario will have to be developed with content and objectives that can be assimilated by that level of audience. In other words, the simulation scenario training is effective and able to reinforce classroom education only to the extent that it is customized toward the level of student in attendance. Simulation scenario topics can vary, as can their complexity, but must always be designed to recognize specific student capabilities and clearly-defined objectives. Complex simulation training scenarios should not be introduced to nurse participants that have yet to master key basic roles and responsibilities of a nurse. In short, until the basics are in place, advanced high-fidelity simulation training that focuses on multiple patient symptoms; multiple ailments; and the requirements of complex, fast, and decisive interventions is lost on new nursing

participants unable to comprehend and assimilate the lessons of the more advanced complex scenarios.

Assessment plays a key role in managing patient problems. If nurses have yet to acquire the ability to properly assess a patient by identifying key points of information via use of proper communication techniques, then proper intervention will not be rendered, creating a detrimental situation for the patient. Just as important are the skills relating to time management and task prioritization. Both are essential to effectively performing nursing interventions. If a nurse cannot efficiently identify and prioritize the issues and concerns of her patients, the resulting delay of treatment and intervention can have severe consequences. While the first step in formulating a high-fidelity simulation scenario may be the identification of learning objects, those scenarios must take into account the existing competency levels of the prospective nurse participants. The simulation scenario must be built upon certain assumptions of basic nursing competency, although the lack of those basic competencies can render the training experience ineffective.

The study results are well supported by the nursing theory of Benner, which states that clinical competence passes through stages that would categorize most participants as novices, in which they have no experience in the situations in which they are expected to perform. The novice lacks the confidence to demonstrate self-practice, and requires continual verbal and physical cues. Practice occurs within a prolonged time, during which the novice is unable to use discretionary judgment. This is further supported with information presented in the review of literature that identifies the assessment of learning

needs as a “must” in order to know where to begin the education process, based on the knowledge the learner possesses. Further, this literature includes understanding what motivates the learner, their goals, and the desired learning outcomes regarding their role as nurses. Additional support is contained in the study of Fero et al. (2008). The study results showed that those nurses with the least experience or without any experience had the highest rate of failing to meeting expectations. Expectations included: recognition of the clinical problem, safe prioritization of patient care, initiation of proper interventions, differentiating urgency from a non-urgency, reporting essential clinical data, anticipating relevant medical orders, and conveying a clear rationale for the decision made. All of the aforementioned markers of expectation were included in the preceptor evaluation tool utilized in this study. Ultimately, preceptor feedback identified failure of the participants to meet the stated expectations.

Implications

Impact on Practice/Action

The main focus of the study is the development of an evidence-based scenario that will help improve the care of patients with chest pain, using high-fidelity simulation. The study found evidence that nurses need to possess certain basic competency in providing patient care before a complex scenario can be utilized effectively in the high-fidelity simulation environment. This study provides direction for the structure and design of evidence-based simulation scenarios that adapt to the needs of the student participants and their learning objectives. It centers on meeting the goals nurses need to possess and how to master assessment, history taking, and communication prior to the

introduction of complex tasks such as handling priority issues concerning patient care and determining which tasks are relevant in a real situation. The term evidence-based is used to describe the simulation scenario, because it is formulated on the basis of a collaborative work effort by nurse educators who continually assess the needs of their student participants in high-fidelity simulation as a means of ensuring the best possible care for patients. In short, when adaptive modifications are incorporated to adjust training objectives based on participant competency, high-fidelity simulation is a useful educational tool to assist nurses, especially the novice nurses transitioning to becoming competent nurses, as part of a continual evolutionary process of training, where student can participate in a learning environment without patient risk.

Impact for Future Research

I identified a number of opportunities for research, both in terms of theory development and concept validation. First, the results of the study support Benner's theory of clinical competence, which states that in the acquisition and development of a particular skill, a learner passes through stages of clinical competence from a novice to an expert. Second, the study presents the concept that high-fidelity simulation impacts the experience of student participants, boosting their confidence and satisfaction levels—especially those exposed to the experience for the first time. Lastly, the concept of more well-defined simulation scenarios that can be structurally modified to adjust for student competency levels needs to be implemented. A novice nurse that can only effectively accomplish attribute tasks without the experience and ability to make discretionary judgements cannot be subjected to complex situations or simulation scenarios. Novice

nurses need to master basic skills of assessment, history taking, and communication before participating in complex simulation scenarios that require time-critical clinical judgments regarding the prioritization of effective intervention. Before novice nurses evolve into experienced nurses with a sense of focus, adept prioritization, critical thinking, and intuitive problem-solving skills, they pass through stages of development that begin with merely following rules and performing assigned tasks. Effective high-fidelity simulation scenarios must educate each group of student nurses, not only by exposure to new and complex situations but by recognizing their existing level of development.

Impact on Social Change

The results of the current study will lead to improvements in the formulation and administration of high-fidelity simulation, which in turn will lead to improvements in practice. In practice, skills need to be continually enhanced and ultimately mastered. High-fidelity simulation—when formulated and administered using a methodology that tailors each scenario with a clear understanding of existing participant competencies and a refinement that focuses on providing specific experience—will hone the skills necessary to enable nurses to make timely and effective discretionary judgements in real-life situations. High-fidelity simulation allows the goal of mastering skills to be achieved in an environment that is non-threatening to the student participant and risk-free to the patient. The experiences and skills learned during simulation provide the student participants with levels of self-satisfaction and the self-confidence that lead to enhanced patient care. Since nurses serve as the frontlines of defense in the healthcare industry,

there is a resulting “chain-reaction” impact; as nursing skills improve and self-confidence increases, the patient benefits through faster and more accurate assessments, better interventions, and safer overall patient care.

Project Strengths and Limitations

Strengths

The study clearly showed that simulation scenarios can be improved through use of a framework that is based on learners’ needs as well as their level of competency. The study presented clear evidence that student participants, many of whom were novice nurses, felt lost, confused, and unable to take timely and effective action when presented with complex simulation scenarios that require judgment regarding proper intervention and task prioritization. Essentially, this was because the student participants (novice nurses) had yet to master the fundamental assessment, history taking, and communication skills, and were at the developmental stage in their profession whereby they merely followed rules and instructions. They were not yet equipped with skills and experience that enable timely prioritized judgments regarding intervention recommendations.

Based on the sample size calculations, there were enough subjects to detect a difference in the outcome variable for both piloted test and actual test questions. When subjected to a reliability test (Cronbach's alpha), results showed that a consistency of formulated test questions existed.

Limitations

Although the sample size was adequate for study purposes, the one-sample *t* test calculated a statistically-significant difference in the outcome variable. Nevertheless, due

to the small sample size (35 participants) and the small .286 difference between the means of the pretest and post-test scores, the statistical significant difference determined by the one-sample *t* test was less impactful and did not support a finding of participant improvement. In this case, the numerical difference in mean pretest scores compared with mean post-test scores, even though statistically significant, was only 0.286—not likely to result in practical or observable significance, and certainly not enough to justify a finding of improvement in the scores of participants after exposure to an evidence-based scenario for chest pain using high-fidelity simulation.

The finalized 25 test questions can be utilized as a tool that can be repeatedly employed for testing purposes until a larger sample size is obtained. Test questions should serve as a guide to concepts that require strengthening and follow-up based on participant scores. In this way, students' knowledge could be determined, additional education could be provided, and practice and skill retention could be evaluated. Participant follow-up was not performed, due to time constraints and the fact that participants attend simulation on a scheduled basis with a full agenda of activities planned for each day of their attendance.

Recommendation for Remediation of Limitations

The study revealed how the formulation of high-fidelity simulation scenarios could be improved. Simulation scenarios should be structured to provide the appropriate educational experience modified in complexity to fit the developmental stage of the student participant. Educational results of high-fidelity simulation scenarios will be improved by avoiding overly complex presentations to unprepared recipients. The level

of learning experience needs to be customized to the audience by first identifying levels of participant education, skill, and practical experience. Incremental educational objectives combined with incremental scenarios of simulation complexity is the key to improving the desired result. The educational experience must be based on the existing capability of student participants, their immediate developmental needs, and the achievement goals desired. In addition to formulating better simulation scenarios for the student participants, better student assessment tools are required. By better identifying student participant competency, refined simulation scenarios that reinforce existing skills can be developed. It is only through achievement of these enhancements to the existing approach to simulation training and education that an environment that is aligned to the needs of the student participants can been created.

Analysis of Self

As Scholar

Since my childhood, I have valued education highly—probably because my parents had been very committed to my personal growth and development. I was taught that each day is a learning process, and that the more I learn, the more I am able to improve my life as well as the lives of others. Every day offers new opportunities for improvement, but I have had my share of challenges in life. Learning different ways to cope and deal with those challenges has made me realize the fact that the processes of learning and developing understanding contribute to my personal growth, enable me to more effectively deal with the issues of life, provide me the capability of interacting with others professionally, and ultimately allow me opportunities to make a difference for the

better in all areas of personal endeavor. While scholarly focus is intended to be intellectual in nature, the motivation for that focus is important as well. I think that the more altruistic the motivation, the more dedicated the effort, and the better the outcome both on a personal level and in relation to contributions to a profession. I think that a motivational approach to personal learning, understanding, and growth is what matters most.

Pursuing my doctoral degree has posed many challenges for me personally and professionally. I have navigated through many stages of life and experienced the challenges each day offers, but nothing has ever stopped me from pursuing and accomplishing one of the most arduous tasks I have pursued thus far: obtaining my doctoral degree. I am filled with a high sense of satisfaction and personal accomplishment in the pursuit of this most challenging milestone of my life. I found that the many years I have invested in my nursing career from bedside practice, through nursing education and administrative work, through Walden's academic support and my doctoral practicum experience, have afforded me better opportunities and made me better-equipped to face the challenging task of improving the healthcare arena.

As Practitioner

Lifelong challenges that I have overcome during my years in nursing practice have molded me into the professional nurse I am today, and I know that I make a significant difference in my nursing practice. Originally, practicing professional nursing in the Philippines, then later coming to the United States with its diversity of healthcare needs, was challenging and required me to continually better my training, skills, and

experience to ensure success. The learning experience shared through Walden's online learning environment offered exposure to the experiences of other program students from all areas of the United States. Their experiences provided me a broader perspective on the future of healthcare systems.

As for the future of my professional nursing career, I think nurses need to continually engage in advanced education, in order to increase their knowledge base and improve their practice skills. I shall utilized my knowledge and experience gained through education at Walden University in making a difference in my working environment, while continuing to pursue improvements in nursing practice.

As Project Developer

I have been exposed to high-fidelity simulation for a number of years, recently holding a position as a Director of Simulation. It was this professional involvement in the field of simulation that initially developed my interest in pursuing this doctoral project. Being an experienced nurse educator and an inquisitive critical care nurse, I had always attempted to identify a methodology to fill the gap between the knowledge learned in the classroom setting and the practical experience acquired providing critical care nursing interventions during life-threatening situations. High-fidelity simulation seemed to be the up-coming educational tool that could fill that gap, but good simulation scenarios were lacking. During my review of literature in this doctoral study, I found that my ideas were on the right track and that subject literature suggested the need for well-developed, structured simulation scenarios to address the need for improving competency among novice nurses. The conduct of this study reinforced my initial ideas, confirmed some of

my suspicions, and led to the development of an approach to high-fidelity simulation that can effectively bridge the gap between classroom knowledge and experience developed by years of nursing practice in high-risk environments. Although I am no longer actively involved in simulation as part of my current job-related responsibilities as a charge nurse for an intensive care unit, I continue to make recommendations on the use of high-fidelity simulation to those involved with hospital training responsibilities to assist nurses at the bedside improve their practice without patient risk.

What This Project Means for the Future of Professional Development

This doctoral project contributes to the future development of enhanced evidence-based simulation scenarios—not only for the care of patients experiencing chest pain, but for scenarios that address all types of patient intervention. The project provides another piece of professional evidence in support of future scenario development that is customized to student participant needs and that recognizes that each novice nurse goes through different stages or levels of competency during their professional career. It is not merely the passage of time or the longevity of the exposure to concepts that refine nursing skill, but the identification of skills that need to be taught and the existence of a simulation based educational process that incrementally builds on existing competency using a measurable and verifiable methodology. Well-formulated high-fidelity simulation scenarios are able to refine nursing skills by exposing student participants to a situation or scenario multiple times, allowing them to relive the experience again and again until refinement of ability and the presumption of skill can be established. This opportunity can best be offered in the safe, risk-free high-fidelity simulation learning environment.

Summary and Conclusions

High-fidelity simulation offers a wide range of opportunities for student participants to refine their classroom knowledge by putting their skills into action in a safe risk-free environment. As a result of the high-fidelity simulation scenarios experienced by volunteer nurse participants during this study, the study found that a simulation scenario needs to consider the participants' level of competency and existing skills. Accurate determination of competency and skill assessment is required prior to exposure to any simulation scenario. The findings of this doctoral project clearly identified that the volunteer nurse participants move through varying stages of competency; this level of competency must be a determinate factor in the complexity of simulation scenarios they are exposed to and the tasks they are expected to perform. Experience is the fundamental component in the acquisition of expertise. Well-formulated high-fidelity simulation scenarios are able to refine nursing skills by exposing student participants to a situation or scenario multiple times, allowing them to relive the experience again and again until refinement of ability and the presumption of skill can be established. This opportunity is best offered in the safe risk-free high-fidelity simulation learning environment.

Section 5: Scholarly Product

Scholarship and research are hallmarks of doctoral education (American Association of Colleges of Nursing [ACN], 2006). A scholarly activity of doctoral students involves the discovery of new knowledge or phenomena and an application of that new knowledge or phenomena in practice. This DNP project was developed to identify a methodology to fill the gap between the knowledge learned in the classroom setting and the practical experience acquired providing critical care nursing interventions during life-threatening situations. Findings include a well-supported theory that guides the practice and concept toward making improvements in patient care.

In the DNP project, I focused on high-fidelity simulation scenarios, and those scenarios could be enhanced to offer improved learning, more-specific refinement of learning objectives, and a quantification of the results as a means of verifying the acquisition of objective nursing skills. Well-formulated high-fidelity simulation scenarios are able to refine nursing skills by exposing student participants to a situation or scenario multiple times, allowing them to relive the experience again and again until the refinement of ability and the presumption of skill can be established. The project provides another piece of professional evidence in support of future scenario development that is customized to student participant needs and that recognizes that each novice nurse goes through different stages or levels of competency during their professional career. High-fidelity simulation scenarios must be customized to the competency of student participants to provide an environment for incremental learning in a safe risk-free

environment. In the final DNP project, I will present findings regarding how simulation scenarios can be structured and formulated to improve effective education and skills development as novice nurses develop into expertly competent nurses capable of handling more complex issues and interventions in healthcare delivery.

Project Dissemination

Dissemination of findings is an essential part in making the scholarly product known and to reach a wider sector. Journal publications, posters, and podium presentations are venues to disseminate findings. The International Nursing Association for Clinical Simulation and Learning (INACSL) disseminates findings in their journal, *Clinical Simulation in Nursing*, and presentations made at their annual conference provide great opportunities to reach out to those involved in practice, education, and research. The INACSL annual conference provides a great venue for networking, the sharing of ideas, and research projects.

Another means of presenting findings is the local facility where the study was conducted, in order to assist stakeholders and administrators to strengthen existing simulation scenarios and build better ones. Opportunities for reaching a broader audience include nursing conferences both local and international, reaching out to community schools and colleges of nursing, and hospitals that currently employ high-fidelity simulation or plan to use high-fidelity simulation in the future.

Project Summary and Evaluation Report

High-fidelity simulation remains one of the most-used tools for training nurses. It assists novice nurses in making the transition from the academic environment to the work

environment by bridging the gap between scholastic knowledge and the application of nursing skills acquired through experience. High-fidelity simulation enables participants to pool their collective knowledge in a collaborative effort while practicing to gain mastery of nursing skills in a risk-free environment. In this project, I focused on innovative methods to improve the care of patients experiencing chest pain though the use of high-fidelity simulation. This topic is important, as cardiovascular disease remains the number cause of mortality in the United States (CDC, 2013).

During the development stages of this doctoral project, especially the literature review, I sought information from other studies and published articles that provided insight for the development of improved high-fidelity simulation scenarios. In addition to the literature review, simulations were observed in-progress at the simulation center, continuing education related to the development of evidence-based high-fidelity simulation scenarios was attended, and experts in the field of simulation were engaged in communication on the topic. All contributed to the development of this project. Project development was mindful of the differential educational, experience, and skills of nurses as they pass through developmental stages on their way to becoming expert nurses, as discussed in the theory of Benner. The evidence-based scenario for chest pain was created using the NLN template and design that focuses on three theoretical frameworks: constructivist learning theory, sociocultural learning theory, and learner-centered theory. These three theories explain the processes in which students formulate their ideas, based on their past knowledge, social interaction, and student-centered learning.

The findings of this doctoral project revealdc that prior to introducing participants to high-fidelity simulation scenarios that involve a myriad of complex patient issues and intervention requirements, there must be an assessment of participant competency. Accurate determination of competency and skill assessment is required prior to exposure to any simulation scenario. This doctoral project clearly identified that the volunteer nurse participants move through varying stages of competency, and that their level of competency must determine the complexity of simulation scenarios they are exposed to and the tasks they are expected to perform. Experience is a fundamental component in the acquisition of expertise. It is not merely the passage of time or the longevity of the exposure to concepts that refine nursing skills and result in expertise, but the identification of skills that need to be taught and the existence of a simulation-based educational process that incrementally builds on existing competency using a measurable and verifiable methodology. Well-formulated high-fidelity simulation scenarios are able to refine nursing skills by exposing student participants to a situation or scenario multiple times, allowing them to relive the experience again and again until refinement of ability and the presumption of skill can be established. Novice nurses, when given complex tasks in which they have not mastered simple tasks, will result to feelings of being overwhelmed, anxious, and unreceptive to learning, which will only lead them to failure and might compromise patient safety.

I recommend that educators assess the level of competency for each participant in order to match the complexity of the high-fidelity simulation scenario presentation to the capabilities of participants. Additionally, recommendations include development and

presentation of the simulation scenarios that introduce one patient problem at a time. While this may be considered unrealistic due to the time and cost of such a modification, it should be considered in cases where assessment initially indicates low competency levels. This allows the participant to address the problem and obtain feedback regarding patient status that reinforces the skills and the intervention applied. As an alternative to introducing a multitude of problems and complex patient care needs, it allows the mastery of individual nursing skills by narrowing the learning objective to something manageable. In addition, it reduces the likelihood of participants developing frustration and confusion that prevents effective assessment and intervention. Educators need to encourage participants to master the basic skills of assessment, history taking, and communication, including the ability to identify, assess, and recommend the less-complicated patient interventions with confidence, before introduction of participants to simulation scenarios that require more-advanced levels of expertise and more-focused assessment skills.

As stated in the recommendations included in this study, educators should provide better evaluation tools that enable participants to assess their existing skill set and abilities, as well as to assist with the identification of training needs. As a contribution of this doctoral project, a scholarly product, the preceptor evaluation, was developed and used during this doctoral project. It is being provided to share with the nursing profession and others involved with the development of high-fidelity simulation (Appendix E). This preceptor evaluation tool was formulated based on a review of literature and expert

consult. The preceptor tool will provide guidance for appraising the competency levels of participants.

The plan of this doctoral project includes presentation of results and findings both to stakeholders and simulation center (study location) staff involved in its conduction. It is intended that the study results and findings will enable simulation center staff to formulate simulation scenarios more customized to the participant needs and their level of competency. The result of this study can serve as a basis for formulating standardized, clinically-accurate, patient simulated experiences or simulation scenarios. Finally, the findings of this study will serve as an example in formulating simulation scenarios that are suited to participant needs and proficiency.

Manuscript for Publication

Background

The care of patients with chest pain is the topic that the study addressed. Statistical data show that heart disease, especially coronary heart disease, remains the leading cause of death in United States for both men and women (CDC, 2013). Because chest pain is a clinical priority, nurses should be capable of evaluating key signs and symptoms regarding the approach to properly assessing the condition of patients experiencing chest pain. Communication skill is another equally important priority in the care of chest pain patients. Meaningful communication between the patient and the healthcare professional is an essential element in ensuring proper care of the patient with chest pain. Instances where communication with the patient fails to elicit useful information such as medical history, severity of pain, duration of pain, or current state of

medication can lead to poor outcomes. Moreover, the lack of information creates safety issues and elevates risks for both the patient and the nurse.

The simulated environment offers a forum to achieve mastery of skills necessary to adequately and effectively assess the patient with chest pain, but the environment must utilize proven, effective, evidence-based scenarios with well-formulated objectives necessary to educate nurses and allow for that mastery of skills. In a simulated environment, participants are presented with factual case scenarios where electromechanical human replicas exhibit life-like signs and symptoms similar to real patients with chest pain. Participating students learn and are able to master the skill of assessing these symptoms through collaborative repetition over time in a no-risk environment. Due in part to mastery of skills acquired in the simulated environment, nursing students eventually learn to correlate and recognize the simulated symptoms of a patient experiencing chest pain with those of real patients in crisis. Ultimately, these student participants should learn how to perform effectively under crisis conditions and provide excellent patient intervention. As chest pain maybe a precursor to a life-threatening event, the perceptive and observant nurse possessing incisive skills will be able to determine appropriate and effective treatment strategies, leading to a more positive outcome.

Literature Review

Simulation

Simulations are defined as, “activities that mimic the reality of a clinical environment and are designed to demonstrate procedures, decision making, and critical

thinking through techniques such as role playing and the use of devices such as interactive videos or mannequins" (National League for Nursing [NLN], 2013, para. 1). Simulation is learning by doing. It employs instructional scenarios, where the student is placed in a situation that depicts reality with the expectation that they will react with critical thinking, appropriate diagnosis, and the correct intervention procedures.

Simulation in Nursing Practice

Simulation has been widely used in numerous ways in clinical practice. Hospitals have used simulation as part of their critical care orientation, for example, Georgetown University in Washington D.C. designed a simulation program for their new cardiac surgery unit. Feedback from the nurses is positive providing a great learning experience without putting at risks the life of a real patient (Rauen, 2004).

Thompson et al. (2012) reported on detecting critical event risk using a quasi-experimental signal detection 2008-2009 study during which nurses were presented with 25 paper and 25 simulator cases based on real patient records from a UK National Health Service Hospital. The nurses judged whether a simulated case was at risk or not at risk for critical event. Results indicated that as fidelity of a simulation was increased both novice and experienced nurses were able to separate important clinical risk.

High-fidelity simulation had been used as a tool for continuing education opportunities for anesthesia providers. Cannon-Diehl, Rugari, and Jones (2012) focused on a needs assessment survey, of which 22 out of 50 practicing nurse anesthetists responded. The study revealed that advanced cardiac life support scenarios, anesthesia

machine mishaps, and malignant hyperthermia ranked as the most-effective uses of high-fidelity simulation.

Simulation has been used to enhance patient safety, improve clinical competence, and increase teamwork in hospitals. A pediatric hospital in Southeastern Pennsylvania enhanced the traditional American Heart Association Pediatric Advanced Life Support (PALS) by integrating high-fidelity simulation into skills acquisition. Prior to the enhancement, Birkhoff and Donner (2010) addressed deficiencies at the pediatric hospital based on their analysis in response to a critical resuscitation study and found many errors during mock codes by pediatric physicians, the code team, and pediatric floor nurses. They found that there was a delay of 1 to 6 minutes in response during a critical resuscitation effort. It took an average of 3 minutes for a pediatric physician to arrive, 6 minutes for the code team to arrive, and general pediatric floor nurses, initial providers of care, did not initiate basic life support measures. High-fidelity training applied to this group of pediatric nurses improved their performance in providing proper intervention during mock codes. Moreover, communication and team work improved thereby reducing safety risks to patients. One Canadian hospital, McMaster Children's Hospital (a 146 bed academic tertiary care facility serving approximately 2.3 million) adapted a simulation program which started 2005. Their program was used to strengthen healthcare education like PALS (Pediatric Advanced Life Support), expanding it for use in enhanced patient safety initiatives (Huang et al., 2010).

A study conducted by Bricker and Pardee (2011) employed expert staff nurses from a rehabilitation hospital to deliver a high-fidelity simulation scenario to newly

graduate nurses. The study disclosed that the level of confidence and knowledge among the newly graduate nurses rose with regard to patient care following a rare spinal cord procedure. A recommendation of the study identified the need for evaluation of the efficacy of simulation in contributing to the transition of newly graduate nurses to expert care nurses. This question of efficacy remains an important issue as the use of high-fidelity simulation" (HFS) in nursing continues to grow while the body of evidence that demonstrates the student's ability to increase their competence levels through use of high-fidelity simulation remains inconsistent. Onello and Regan (2013) stated that there is a lack of clear evidence supporting increased clinical competence as a result of teaching methods related to HFS. This lack of evidence poses a challenge for faculty seeking effective teaching strategies.

Presentation bias is another concern in the student nurse's response to clinical events. Students may tend to be reactive than proactive when faced with clinical events involving conditions of uncertainty. The student's conditioning to be critical may trigger emergency encounters as they react to situations that they had experienced and learned in the past rather than truly evaluating and assessing the symptoms currently presented. Wotton et al. (2010) stated that during high-fidelity simulation students' reactions are portrayed by confusion as they analyzed cues and act on changes to clinical manifestations. In a systematic review of literature from 2000 to 2011 by Yuan, Williams, and Fang (2012) stated that qualitative studies presented positive results regarding increasing the students' confidence and competence but quantitative studies still need to examine whether or not high-fidelity simulation increases level of confidence

and competence. Furthermore, the systematic review of Yuan et al. (2012) suggests that there is a need to examine the transferability of high-fidelity simulation into real situations.

Simulation is used to assist with the transition of newly graduate nurses into the hospital setting (Stefanski and Rossler, 2009). A simulation technology was adapted into a critical care orientation program for newly graduate nurses with collaborative efforts between area hospitals and a college of nursing. The result of this study based on a survey regarding the effectiveness of the simulation course and reports of self-confidence revealed significant levels of confidence and satisfaction among newly graduate nurses participants transitioning to intensive care environment. Additional studies need to focus on the process by which novice critical care nurses transition into a healthy work environment because the healthy work environment results in: improved staff retention; greater job satisfaction; lower turnover rates; and, reduced incident of burn-out. This is primarily because the healthy work environment fosters higher levels of job satisfaction and maintains a positive level of confidence among the novice nurses. Nevertheless, more detailed studies need to be undertaken in reference to this matter.

Patricia Benner's Nursing Theory From Novice to Expert

Patricia Benner introduces the concept of clinical competence, focusing on the process by which nurses develop skills from novice to expert. This nursing theory proposes that nurses develop skills and understanding of patient care over time through proper educational background and personal experiences. The theory proposes five levels

of nursing experience: Novice; Advanced Beginner; Competent Nurse; Proficient Nurse; and, Expert Nurse (Benner, 2013).

Learning Needs of Novice Nurses Compared to Experienced Nurses

Fero, Witsberger, Wesmiller, Zullo, & Hoffman (2008) conducted a study using a Performance Based Development System (PBDS) that consisted of showing videotaped clinical problems that nurses may encounter in a medical-surgical unit and requiring participants to state, in writing, their interpretation of the problem, the action(s) they would take, and their rationale. Study results showed that those nurses with the least experience (years of experience) or without any experience had the highest rate of failing to meeting expectations. Expectations included: recognition of the clinical problem; safe prioritization of patient care; initiation of proper interventions; differentiating urgency from a non-urgency; reporting essential clinical data; anticipating relevant medical orders; and, conveying a clear rationale for the decision made. Additionally, the level of preparation pointed out a significant difference. A greater percentage of nurses who had been prepared on associate level and baccalaureate level performed far better with their assessment than nurses in their diploma level. This was attributed to their scope of experience and commitment to continuing education. The study suggested and recommended High-fidelity Human Simulation as a means of providing a better option in assessing critical thinking and decision making because it provides interactive activities including debriefing, is no risk to a patient, and provides a more realistic assessment of learning needs.

Novice nurses enter into a position based on certain set of expectations and anxieties of "what might be," while experienced nurses have a work history that shapes their decision process based on previous assigned duties and responsibilities. Both categories of nurses, new and experienced, possess a set of expectation and anxieties but the new nurses' expectations and anxieties are based solely on their exposure to experiences encountered during new-hire orientation whereas experienced nurses' expectations and anxieties are materially different due to their transitioning from a prior role to a new one. While experienced nurses tend to develop and cultivate higher levels of reasoning and skills providing them better confidence than a novice nurse, nurses who are transitioning to advanced practice roles or novel specialty roles may require a completely new skill set that typical new-hire orientation programs often lack. Therefore, orientation programs for experienced nurses should use more specific educational strategies and content to promote their engagement in new positions allowing them to achieve management expectations while allaying anxieties.

Scenarios in High-fidelity Simulation

Simulation is one strategy to enhance competency levels among nurses although it is evident that better more clearly designed simulation scenarios are needed in order to optimize the learning experience through developing: outcome evaluation; critical thinking; subject mastery; decision making skills; performance; self-confidence; and satisfaction (Waxman, 2010). There exists little information, research studies, and/or guidelines regarding appropriate and effective procedures needed to formulate scenarios for simulation. Hospitals tend to utilize prepackaged scenarios that had been validated,

tested and evidence-based, but are limited by the fact that these prepackaged scenarios are not tailored to the needs of the nurse. Scenarios can be written, but the lack of specific framework and availability of reliability reliable methodologies to quantitatively evaluate the impact of the scenarios on the student's level of competency leave open the question as to whether simulation scenarios truly optimize learning outcome. "Prewritten scenarios can be flexible but often do not meet the individual's needs and cannot be easily shared with other hospitals" (Waxman, 2010, p. 2). Simulation continues to evolve in practice and there exists a need to develop scenarios that are well researched, tested, and can be made easily available and widely shared in the clinical practice.

Project Design/Methods

The purpose of the project was to evaluate a newly-developed evidence-based scenario for the care of patients with chest pain aimed at guiding future development of scenarios designed for a quantitative simulation environment.

Setting and Resources

The project setting was the a simulation center, and the newly-developed scenario was predicated on the National League for Nursing (NLN) simulation design template. In turn, the NLN approach to the development of simulation establishes a "framework which defines, organizes, and links the various components of a concept, and defines the relationships of the components" (NLN: SIRC, 2013). The NLN simulation design has its basis in three theoretical frameworks: the constructivist learning theory, sociocultural learning theory, and learner-centered theory.

Participants

Two weeks prior to actual conduct of the study, nurses attending the scheduled simulation were solicited to participate in the study. A group of 36 nurses initially agreed to join in the study, consented to provide their personal profiles, and participate in pilot testing of the test questions. The participants were drawn from a convenience sample based on the group that was available on the day the study was conducted.

Project Procedures

This newly-developed simulation scenario was designed to be incorporated into a longer running, more sophisticated scenario. The simulation scenario was subjected to a critique by three nurse educators, who focused on ensuring the scenario portrayed relevant standards of nursing practice, including methods for effectively assessing and communicating with patients experiencing chest pain. Results of the nurse educator feedback was analyzed using NVivo qualitative data analysis, and appropriate modifications were made. The simulation started with a pre-debriefing, during which the facilitator explained the purpose of the simulation, including its learning objectives. After pre-scenario debriefing, the actual simulation scenario began and nurses as well as other participants immersed themselves in their respective roles. During the time that scenario ran, the preceptor evaluated the participants using a preceptor evaluation tool, developed as part of this study. Evaluation of the results were interpreted using NVivo qualitative data analysis. The actual entire simulation process ran about 60 minutes; however, the evidence-based scenario for chest pain patients was not run because the simulation facility's director recommended use of the center’s simulation scenario, based on its

similarity to the cardiovascular scenario. Following the scenario implementation, post-debriefing occurred and lasted approximately 20 minutes. This was arguably the most important phase; it was during this phase that participants engaged in their critical reflection and assessment of the scenario experience.

Volunteer study participants were assigned an alpha-numeric code for confidentiality purposes, to assist with data analysis, and to provide the ability to identify a participant should anyone choose to withdraw from the study at a later date. There were 36 nurse participants assigned an alpha-numeric code from "A1" to "A36." Participant "A20" later withdrew prior to the actual conduct of the study. Consequently, participant "A20" data was not included in the study group, so that the integrity of the group was maintained. It should be noted that the same group of nurse participants was constant throughout the conduct of the study providing their personal profiles, participating in pilot testing, and participating in both pre-testing and post-testing processes. Participant profiles were analyzed using SPSS data analysis.

Because learning itself is an iterative process, and because this study seeks to identify the educational value of the "evidence-based" simulation scenario, the project incorporated both pre and post testing. A 25-question pilot test was formulated based on the recommendation of simulation center staff.

Based on the result of the 25-item piloted test questionnaire, a 25-item finalized test questionnaire was formulated and administered to the same group of 25volunteer nurse participants as part of their pretest. The pretest was administered to nurse volunteer participants on the first day of simulation scenarios after orientation, along with

dissemination of other information regarding ACLS Didactic and ACLS Megacodes, including ongoing head-to-toe assessment and evaluation. Post-testing was administered on the Grand Rounds day, after the volunteer nurse participants had been exposed to cardiovascular, pulmonary, and multi-system simulation scenarios and after individual head-to-toe assessment had been performed. Comparisons of the pre- and post-test results were made and data obtained were analyzed using the quantitative *t* test analysis. Analysis of participants experience on high-fidelity simulation was examined using NVivo qualitative data analysis.

Project Results

Profile of Participants

The majority of the study participants were female, newly-graduated nurses with no nursing experience. Ages ranged from 20 years old to over 50 years old, but the overwhelming majority fell in the range from 20 to 40 years of age. More than half of the participants had Associate's degrees; some had Baccalaureate degrees, albeit with no previous nursing background. Most participants were preparing a new job experience. Some experienced nurses were preparing to move from a position as a "floor nurse" to more specialized areas. For the most part, participants were experiencing their first exposure to high-fidelity simulation.

Pilot Test Result of the 25 Item Questions

During the first stage, the pilot test questions were reviewed by author/researcher to ensure their content was adequately addressed by the simulation scenario videos utilized by the XYZ simulation center. During the second stage, test questions were

reviewed by the author/researcher to ensure that question formatting followed the type utilized by cardiovascular scenarios employed at the simulation center, especially the cardiovascular scenario that is closely related to the proposed evidence-based scenario for the care of chest pain patients. During the third stage, a conference was convened at the simulation center composed of simulation center staff, the center's nurse educator, and myself for the purpose of achieving consensus on question wording, formatting, clarity, consistency, and ensuring that there was only one correct answer to each of the test questions. Results of implementing the aforementioned three stage content validation process determined that some of the test item questions continued to have two potentially-correct answers, and there still existed issues with test question wording, clarity, and formatting. All issues identified during the content validation process were adequately addressed prior to achieving a consensus on the final set of test questions. A Reliability Analysis was performed on the 25-question test. The Chronbach's alpha model resulted in a reliability rating of 0.768, indicating the existence of a good level of consistency. Regardless of the favorable Cronbach's Alpha rating indicating a good level of consistency, I continued to hone the test questions to achieve the best clarity, wording, and format, while striving to ensure that questions could have only one correct answer. The continual work on the original pilot test questions resulted in the evolution of a new enhanced final set of 25 test questions that focused on assessment, history taking, and communication. Furthermore, this final set of test questions addressed all issues identified from results of the piloted test questions and covered the essential aspects of the cardiovascular scenario (Acute Coronary Syndrome) utilized by the simulation center.

The test includes ACLS questions, as well as questions directed to management of patients experiencing chest pain.

Nurse Educator Feedback Result

They recommended adjusting the scenario based on specific facilities' needs or employer practice because not all facilities practice the same intervention. Further, the educators reinforced that information needs to be properly communicated, and that it is important to identify the individuals in the communication loop. A determination must be made as to how stated objectives will be measured. The role of family members must be clearly identified and communicated. Suggestions were made to incorporate additional objectives, such as medication and laboratory review, proper intervention such as ONAM, and ensuring that the student understands the reason for the intervention. Educators recommended that the scenario should focus on distinguishing the underlying causes of changes, signs, and symptoms in the patient's conditions and establish a differential diagnosis. Increasing the frequency of reassessments in the scenario, especially for those requiring varying interventions, was also recommended. Lastly, the importance of proper communication, interaction, and coordination among the patient, family members, and other members of the healthcare team was stressed.

According to the simulation center staff, the newly developed chest pain scenario was determined to be similar to one of the center's own cardiovascular scenarios and most of the nurse educators' suggestions had already been built into the learning objectives for their cardiovascular scenario. Therefore, the evidence-based scenario for chest pain was

not run by the simulation center; alternatively, center staff chose to run their own cardiovascular scenarios.

Pre and Posttest Result of the 25 Questions

The test value is the value entered in the one-sample *t* test window. In this case, the test value is 0. The test statistic of the one-sample *t* test resulted in 44.477 for pretest scores and 44.256 for posttest scores. The test statistic is calculated by dividing the mean difference by the standard error mean. The degrees of freedom (*df*) for the one-sample *t* test is 34, for both pretest and posttest. The two tailed *p*-value (sig., 2-tailed) corresponding to the test statistic is .000. The difference between the "observed" sample mean (from the one-sample statistics box) and the "expected" mean (specified test value) is 16.0000 (mean difference for pretest) and 16.286 (mean difference for posttest). The confidence interval for the difference between the specified test value and the sample mean for the pretest score resulted in a lower value of 15.269 and an upper value of 16.731, while the difference between the specified test value and sample mean for the post test score resulted in a lower value of 15.54 and an upper value of 17.03.

The purpose of this project was to evaluate a newly-developed evidence-based scenario for the care of patients with chest pain aimed at guiding future development of scenarios designed for a quantitative simulation environment. One of the evaluation tools utilized in this doctoral project was administration of both pretest and posttest exams to assess any difference in the scores after exposure to an evidence-based scenario for the care of patients with chest pain patients using high-fidelity simulation. Using a one-sample *t* test, the obtained probability (*p*) value: $p < .005$, Sig. (2 tailed) value was .000.

This rejected the null hypothesis that the sample mean is equal to the hypothesized mean. Therefore, results identified that there existed a statistically-significant difference between the two means, pretest and post test scores, after being exposed to an evidence-based scenario for the care of patient with chest pain using high-fidelity simulation. Nevertheless, due to the small sample size (35 participants) and the small .286 difference between the means of the pretest and posttest scores, the statistical significant difference determined by the one-sample t test was less impactful and did not support a finding of participant improvement. In this case, the numerical difference in mean pretest scores compared with mean post-test scores, even though statistically significant, was only .286—not likely to result in practical or observable significance, and certainly not enough to justify a finding of improvement in the scores of participants after exposure to an evidence-based scenario for chest pain using high-fidelity simulation.

Preceptor Evaluation Feedback Results

Preceptor expectations included: recognition of the clinical problem, safe prioritization of patient care, initiation of proper interventions, differentiating urgency from a non-urgency, reporting essential clinical data, anticipating relevant medical orders, and conveying a clear rationale for the decision made. All of the aforementioned markers of expectation were included in the preceptor evaluation tool utilized in this study. Ultimately, preceptor feedback identified failure of the participants to meet the stated expectations.

After Simulation Experience, Feedback From Participants

Summarizing the information obtained from the nurse participants' experience with simulation, the majority stated that they enjoyed simulation. Their perceptions included: improvement of their skills, which includes assessment, history taking, and communication that will help them in their jobs; experiencing a close to real-life situation; and allowing them to make mistakes and learn from those mistakes. In the question of how their assessment and communication skills were improved by simulation, feedback included: they received constructive advice from performance with the mannequin, that is, how they were able to improve their mistakes and respond to code scenarios much better; they were taught how to stay calm in emergency situations and pay attention to details of what is going on with the patient; going over and over the assessment of patient with chest pain helped them develop and master the assessment skill; learning how to prioritize is the key, because time is the biggest factor in responding to patient having chest pain; in the simulation they were allowed to ask questions, which gave them the avenues to clarify mistakes and confusions; active listening is learned, especially applying it when dealing with patient having chest pain; and confidence was developed in assessing and intervening with situations of patients having chest pain. In addition, the participants learned how to use open-ended questions and SBAR, they were given advice how to talk to patients and physicians and perform a good history by asking the right questions, they were told to ask questions and not assume, and their objective and subjective assessment improved.

On the question about how the post-simulation feedback helped, answers included: it helped identify areas to improve and how to avoid future mistakes; it enabled them to review, go back, and analyze what was done wrong and what was missed and make future improvements; and it was helpful for confirming proper assessment and communication. Areas for improvement that was mentioned were: they needed more time and detailed feedback; they needed to improve their reaction time, SBAR, and IV insertion skills; they needed to know where the supplies are located so as not to waste time; that the mannequin lung and bowel sounds were at times hard to hear; that it was hard to think of the mannequin as a real person.

Nurses also responded that at times, they felt lost. Responses included: in the beginning they felt lost, but as days go by they become comfortable; problem with language, some participants cannot catch up to what is going on because of language deficiency as English is not their native tongue; nurse participants want to know the disease up ahead so they could review and they won't feel clueless; some verbalized that they were given different instructions which seemed conflicting for them; events were happening at the same time; they still don't know how to treat abnormal rhythms; at times they don't know if they need to perform the skill or verbalize their response to the scenario; people talk at the same time; dialogue during scenario were not clear. Participants also reported that the information given to them seemed vague on how much they are allowed to do or perform. They also mentioned that things happened so fast that they didn’t have time to react and didn’t know what they needed to do next; they also felt that sometimes, they provided the right treatment but the virtual patient died anyway.

Although the majority mentioned that they had gained knowledge and skills in meeting their objectives in reference to cardiovascular assessment and SBAR communication, the missing elements identified by nurse participants were: more procedures and skills, cover more important areas that needed improvement, detailed explanation of each mistakes, reviewing the symptoms before the scenario would help them understand the scenario, they want to make sure that they are giving the right treatment to the symptoms, handouts describing the cases so they could review at home while watching the video, some mannequins didn't work properly, they want to do more interventions and not just simulate or verbally tell them, more time working on the head-to-toe assessment, charting, medication administration, repeat demonstrations, and more time in giving SBAR communications.

The participants also reported their perceived relevance of the simulation. Responses included: scenarios relate to real-life scenarios in the hospital, they experience real hands on experience, they were able to put into practice knowledge gained, simulation and lecture were not in sync or synchronized, they felt that they know it all but when exposed to simulation it shows they don't, they learned how to treat different diseases, and that every scenario was well thought-out and fills the missing piece of what was not experienced in nursing school.

Comments given by nurse participants included: that simulation would benefit new graduates, that it is an ideal environment to groom and equip new nurses for the real world, that simulation gave them a step up ahead in their career, that it was a great

environment to practice critical thinking, and that taping the simulation was a great way to learn.

Discussion

The findings of the study represented high levels of satisfaction and confidence among nurse participants who were, for the most part, newly-graduated nurses with no experience. Moreover, some of these nurses were being exposed to high-fidelity simulation for the first time. The fact that this study found that high-fidelity simulation increased the level of confidence and satisfaction was not surprising, and is supported by the studies performed by Stefanski and Rossler (2009), Cant and Cooper (2010), and Yuan et al. (2012).

The findings of the study reported no significant improvement in the knowledge level of nurse participants in their assessment, history taking, and communication skills, based on the comparison of pretest and posttest results. Feedback obtained from volunteer nurse participants revealed that the high-fidelity simulation scenario resulted in a myriad of issues including: confusion; feelings of being overwhelmed or lost; problems managing time; speed of the scenario; conflicts arising due to differing instructions and conflicting interventions; lack of confidence necessary to take action; and the inability to interpret EKG's despite attending class on that specific topic. In addition to participant feedback, feedback from the nurse educator or preceptor was based on their direct observations and interactions with volunteer nurse participants during the course of the simulation scenario. Not surprisingly, nurse educator feedback also identified numerous issues including: ignoring patient complaints and communication; lack of leadership in

decision making exhibited by the team leader; the inability to recognize correct EKG rhythms; poor task prioritization, possibly due to the lack of understanding as to prioritizing symptoms and events; lack of initiative toward necessary action; an excessively-slow process for confirming the problem; inability to manage time appropriately; lack of proper assessment resulting in the inability to provide proper nursing intervention; and delayed patient treatment. These findings are supported by the research study of Sportsman et al. (2011) that evaluated the impact of scenario-based high-fidelity patient simulation (HFPS) on student academic success in nursing programs. Sportsman et al. (2011) reported no evidence of impact on the delivery of care by students exposed to scenario-based high-fidelity patient simulation (HFPS).

One of the recommendations of this study is the development of high-fidelity simulation training that is customized to its audience. Where the audience is comprised of newly-graduated nurses without nursing experience and possibly no prior exposure to simulation training, the simulation scenario will have to be developed with content and objectives that can be assimilated by that level of audience. In other words, the simulation scenario training is effective and able to reinforce classroom education only to the extent that it is customized toward the level of student in attendance. Simulation scenario topics can vary, as can their complexity, but must always be designed to recognize specific student capabilities and clearly-defined objectives. Complex simulation training scenarios should not be introduced to nurse participants that have yet to master key basic roles and responsibilities of a nurse. In short, until the basics are in place, advanced high-fidelity simulation training that focuses on multiple patient symptoms; multiple ailments; and the

requirements of complex, fast, and decisive interventions is lost on new nursing participants unable to comprehend and assimilate the lessons of the more advanced complex scenarios.

Assessment plays a key role in managing patient problems. If nurses have yet to acquire the ability to properly assess a patient by identifying key points of information via use of proper communication techniques, then proper intervention will not be rendered, creating a detrimental situation for the patient. Just as important are the skills relating to time management and task prioritization. Both are essential to effectively performing nursing interventions. If a nurse cannot efficiently identify and prioritize the issues and concerns of her patients, the resulting delay of treatment and intervention can have severe consequences. While the first step in formulating a high-fidelity simulation scenario may be the identification of learning objects, those scenarios must take into account the existing competency levels of the prospective nurse participants. The simulation scenario must be built upon certain assumptions of basic nursing competency, although the lack of those basic competencies can render the training experience ineffective.

The study results are well supported by the nursing theory of Benner, which states that clinical competence passes through stages that would categorize most participants as novices, in which they have no experience in the situations in which they are expected to perform. The novice lacks the confidence to demonstrate self-practice, and requires continual verbal and physical cues. Practice occurs within a prolonged time, during which the novice is unable to use discretionary judgment. This is further supported with

information presented in the review of literature that identifies the assessment of learning needs as a "must" in order to know where to begin the education process, based on the knowledge the learner possesses. Further, this literature includes understanding what motivates the learner, their goals, and the desired learning outcomes regarding their role as nurses. Additional support is contained in the study of Fero et al. (2008). The study results showed that those nurses with the least experience or without any experience had the highest rate of failing to meeting expectations. Expectations included: recognition of the clinical problem, safe prioritization of patient care, initiation of proper interventions, differentiating urgency from a non-urgency, reporting essential clinical data, anticipating relevant medical orders, and conveying a clear rationale for the decision made. All of the aforementioned markers of expectation were included in the preceptor evaluation tool utilized in this study. Ultimately, preceptor feedback identified failure of the participants to meet the stated expectations.

Strength and Limitations

The study clearly showed that simulation scenarios can be improved through use of a framework that is based on learners' needs as well as their level of competency. The study presented clear evidence that student participants, many of whom were novice nurses, felt lost, confused, and unable to take timely and effective action when presented with complex simulation scenarios that require judgment regarding proper intervention and task prioritization. Essentially, this was because the student participants (novice nurses) had yet to master the fundamental assessment, history taking, and communication skills, and were at the developmental stage in their profession whereby they merely

followed rules and instructions. They were not yet equipped with skills and experience that enable timely prioritized judgments regarding intervention recommendations.

Based on the sample size calculations, there were enough subjects to detect a difference in the outcome variable for both piloted test and actual test questions. When subjected to a reliability test (Cronbach's alpha), results showed that a consistency of formulated test questions existed.

Implications for Nursing Practice

The main focus of the study is the development of an evidence-based scenario that will help improve the care of patients with chest pain, using high-fidelity simulation. The study found evidence that nurses need to possess certain basic competency in providing patient care before a complex scenario can be utilized effectively in the high-fidelity simulation environment. This study provides direction for the structure and design of evidence-based simulation scenarios that adapt to the needs of the student participants and their learning objectives. It centers on meeting the goals nurses need to possess and how to master assessment, history taking, and communication prior to the introduction of complex tasks such as handling priority issues concerning patient care and determining which tasks are relevant in a real situation. The term evidence-based is used to describe the simulation scenario, because it is formulated on the basis of a collaborative work effort by nurse educators who continually assess the needs of their student participants in high-fidelity simulation as a means of ensuring the best possible care for patients. In short, when adaptive modifications are incorporated to adjust training objectives based on participant competency, high-fidelity simulation is a useful

educational tool to assist nurses, especially the novice nurses transitioning to becoming competent nurses, as part of a continual evolutionary process of training, where student can participate in a learning environment without patient risk.

Recommendations for Research

I identified a number of opportunities for research, both in terms of theory development and concept validation. First, the results of the study support Benner's theory of clinical competence, which states that in the acquisition and development of a particular skill, a learner passes through stages of clinical competence from a novice to an expert. Second, the study presents the concept that high-fidelity simulation impacts the experience of student participants, boosting their confidence and satisfaction levels—especially those exposed to the experience for the first time. Lastly, the concept of more well-defined simulation scenarios that can be structurally modified to adjust for student competency levels needs to be implemented. A novice nurse that can only effectively accomplish attribute tasks without the experience and ability to make discretionary judgements cannot be subjected to complex situations or simulation scenarios. Novice nurses need to master basic skills of assessment, history taking, and communication before participating in complex simulation scenarios that require time-critical clinical judgments regarding the prioritization of effective intervention. Before novice nurses evolve into experienced nurses with a sense of focus, adept prioritization, critical thinking, and intuitive problem-solving skills, they pass through stages of development that begin with merely following rules and performing assigned tasks. Effective high-fidelity simulation scenarios must educate each group of student nurses, not only by

exposure to new and complex situations but by recognizing their existing level of development.

Key Points

The study found that a simulation scenario needs to consider the participants' level of competency and existing skill set. Accurate determination of competency and skill assessment is required prior to exposure to any simulation scenario. Nurse participants move through varying stages of competency, and their level of competency must be a determinate factor in the complexity of simulation scenarios they are exposed to and the tasks they are expected to perform. Experience is fundamental component in the acquisition of expertise. It is not merely the passage of time or the longevity of the exposure to concepts that refine nursing skills and result in expertise, but the identification of skills that need to be taught and the existence of a simulation-based educational process that incrementally builds on existing competency using a measurable and verifiable methodology.

Well-formulated high-fidelity simulation scenarios are able to refine nursing skills by exposing student participants to a situation or scenario multiple times, allowing them to relive the experience again and again until refinement of ability and the presumption of skill can be established. This opportunity is best offered in the safe, risk-free high-fidelity simulation learning environment.

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Appendix A: Simulation Design Template

Date: 01/2015 Filename: Care of Patient with Chest Pain

Discipline: Nursing Nurses Level: Novice and Experienced

Expected Simulation Run Time: 15 mins. Guided Reflection Time: 20 mins.

Location: Simulation Lab Location for Reflection: Lab

Admission Date: 1/1/2015 Today's Date: 1/1/2015 Brief Description of Client Name: A.B. Gender: Male Age: 56 y/o Race: Hispanic Weight: 127.006 kg Height: 180.34 cm Religion: Christian Major Support: Wife (Maria) Phone: (305) 898-3390 Allergies: Iodine (hives and short of breathe) Immunizations: Pneumonia and flu shot current this year (2014) Attending Physician/Team: Dr. Alex Smith Past Medical History: Hypertension (usually controlled), Hyperlipedemia, Diabetes Mellitus Type 2, CAD, GERD, anxiety, no history of asthma nor COPD, no history of arthritis History of Present illness: Presented to emergency department with chest pain described as," I am feeling sick, nauseated, and my chest is heavy, had never had this kind of pain before "(pointing to his midchest), radiates to left shoulder, pain 8/10. Took 3 OTC ibuprofen tablets but without any relief. Took 3 tablets of	Psychomotor Skills Required Prior to Simulation Assessment Skills especially Cardiovascular Assessment Taking Vital Signs SBAR Medication Administration IV administration (starting and maintenance) Recording intake and output Cognitive Activities Required prior to Simulation [i.e. independent reading (R), video review (V), computer simulations (CS), lecture (L)] In class Lecture on Cardiovascular System and Assessment, Coronary Artery Disease, Angina (stable vs. unstable)

nitroglycerin sublingual before coming to E.R. but still no relief. Looks very anxious and is hyperventilating as observed. No trauma to chest noted. Social History: Businessman, smokes cigarette 1 pack/day, alcohol on holidays, no street drugs, exercise sometimes (not regularly). Under a lot of stress due to recent financial losses in the insurance business. Married with 2 children (teenager boys). Family History: father has DM and died of heart attack, mother alive but with hypertension problem. Primary Medical Diagnosis: Unstable Angina Surgeries/Procedures & Dates: Cataract surgery (left eye) 3 years ago Nursing Diagnoses:	

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Simulation Learning Objectives
For a patient with chest pain, the learner will be able to:

1. Perform focus cardiovascular assessment

2. Initiate appropriate intervention for a patient with chest pain in a safe manner

3. Communicate effectively with patient and family

4. Demonstrate proper communication with physician using SBAR to effectively communicate patient needs.

5. Evaluate effectiveness of the care provided

Fidelity (choose all that apply to this simulation)

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

Simulator Manikin/s Needed: ×

Props: patient with chart with, cardiac monitor, patient, family and clinician name tag, wheelchair, oxygen nasal cannula, water.

Equipment attached to manikin:
- ☐ IV tubing with primary line fluids running at ml/hr
- ☐ Secondary IV line running at ml/hr
- ☐ IV pump
- ☐ Foley catheter ml output
- ☐ PCA pump running
- ☐ IVPB with running at ml/hr
- × 02 2-3 l/nasal cannula
- × Monitor attached
- × ID band
- × Other: water

Equipment available in room
- × Bedpan/Urinal
- ☐ Foley kit
- ☐ Straight Catheter Kit
- ☐ Incentive Spirometer
- ☐ Fluids

Medications and Fluids
- ☐ IV Fluids:
- × Oral Meds: Nitroglycerin 0.4mg sublingual tablet bottle, aspirin 325 mg bottle
- ☐ IVPB:
- ☐ IV Push:
- ☐ IM or SC:

Diagnostics Available
- × Labs (cbc, cmp, ua, cardiac enzymes eg.troponin I and T, cpk, ck-mb, A1c and random blood sugar.
- × X-rays (Images shows normal)
- × 12-Lead EKG (shows ST elevation)
- ☐ Other:

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:

Recommended Mode for Simulation

(i.e. manual, programmed, etc.)

Manual and programmed

☐ IV start kit ☐ IV tubing ☐ IVPB Tubing ☐ IV Pump ☐ Feeding Pump ☐ Pressure Bag × 02 delivery device (type) nasal cannula × Crash cart with airway devices and emergency medications × Defibrillator/Pacer ☐ Suction ☐ Other:	
Roles/Guidelines for Roles ×Primary Nurse ☐ Secondary Nurse ☐ Clinical Instructor × Family Member #1 ☐ Family Member #2 ☐ Observer/s ☐ Recorder X Physician/Advanced Practice Nurse ☐ Respiratory Therapy ☐ Anesthesia ☐ Pharmacy ☐ Lab ☐ Imaging ☐ Social Services ☐ Clergy ☐ Unlicensed Assistive Personnel ☐ Code Team ☐ Other: Important Information Related to Roles: Patient is very anxious that he might be having heart attack and die like his father. Significant Lab Values: Elevated cardiac enzymes (CPK, CK-MB, troponin I and T), Elevated lipids esp. LDL and Triglycerides. ST elevation noted on EKG. Blood sugar 250mg/dl thru random sampling, A1c 7.5.	Nurses 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 Nurses Will Receive Before Simulation Time: 0900 Mr. A.B., a 56 year old Hispanic male came to E.R. with chief complaint of chest pain 8/10 described as feeling sick, nauseated, heaviness on midchest radiating on the left arm, neck and jaw. Patient took 3 OTC Ibuprofen and 3 tablets of Nitroglycerin sublingual but to no affect. That's what prompted him to seek care. Past medical history hypertension which usually is controlled, hyperlipedemia, CAD, diabetes mellitus type 2, GERD, anxiety, no history of asthma or COPD or arthritis. He looks very anxious, hyperventilating, no trauma to the chest as noted. Surgical history of cataract left eye 3 yrs ago. He is a businessman who smokes 1 pack

Physician Orders: CHEST PAIN - STAT ORDERS Aspirin – 81 mg chewable tabs x 4, STAT EKG:"Chest Pain", Initial Cardiac Isoenzymes (CK-MB, Troponin and Myoglobin) then every 3 hours x 4 then every 6 hrs x 2 for the first 24 hrs. Stat EKG. Report to MD immediately for any abnormal findings noted. Notify physician of chest pain requiring PRN medication or significant arrhythmia Arrhythmia treatment per ACLS protocol pending specific orders If not given in ED, Aspirin – 81 mg chewable tabs x 4 STAT, then Aspirin 81mg orally daily Nitroglycerin 0.4 mg S.L. chest pain for coronary vasodilatation, may repeat every 5 minutes up to 3 xs for pain. Do not administer Nitroglycerin if SBP 100 or less or signs of cardiogenic shock. Check BP after each dose. If chest pain persists, or SBP less than 100, Morphine Sulfate may be used as below. Notify physician if given Acetaminophen (Tylenol) 325mg tablets, two orally every 4hrs PRN mild pain Maximum dose : 12 tablets or 4grams per day from any source Docusate Calcium (Surfak) 240mg orally at bedtime PRN constipation Admitting Orders: Admission for Inpatient Critical Care: Admit to Coronary Care Unit and if unavailable admit to ICU. Monitoring: Vital Signs: per unit protocol, Strict I & O, hooked to EKG monitor, Weigh on admission and daily. Activity: Complete bed rest with bathroom privileges Diet: 3 gm Na, low fat IV fluid: Saline lock	cigarette/day, alcohol occasionally on holidays. His father dies of heart attack and had DM, and his mother is alive but has hypertension. He is married with 2 teenage boys. Lately had been having a lot of stress because of financial losses in the insurance business. Patient is hyperventilating and sweating with BP 136/82, Pulse 102, RR 32, and O2 Sat 95%, oriented to 3 spheres (person, place and time). Laboratory tests and a 12-lead electrocardiogram (ECG) have been ordered. He is on continuous ECG monitoring, and oxygen has been started @ 2l/nasal cannula. Patient home medications are as follows: Simvastatin 20 mg daily, Ibuprofen 200 mg 2 tabs tid for pain, Nitroglycerin sublingual prn for chest pain, Xanax 0.25 to 0.5 mg 3x/day as needed for anxiety. Metformin hydrochloride extended release 500 mg once to be taken @ evening meal. Patient has allergy to iodine which makes him itchy/hives and cannot breathe.

Education: provide smoking cessation counseling and diabetes counseling and management Respiratory Care: continuous pulse oximetry check, if O2 sat is less than 95% consult respiratory therapist, place on appropriate O2 device and increase 1 liter per minute or 5% increments until O2 sat reaches 95% Lab: Cardiac enzymes at 6 hrs and 12 hrs, Magnesium, BMP, PT/PTT, fasting lipid profile in AM, CBC notify MD if platelet is less than 100,000. Chest X-ray (PA and Lateral) and EKG in AM. Blood sugar checks every 6 hrs before meals and at bedtime. Discontinue Metformin and Ibuprofen as ordered. Relay blood sugar results of more than 120 mg/dl on 2 occurrences possibly to start insulin per sliding scale.	

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Scenario Progression Outline

Timing (approximate)	Manikin Actions	Expected Interventions	May Use the Following Cues
First 5 minutes	Patient is sitting up in bed. Temp. 37.7 BP: 136/82 Pulse: 102, regular, tachycardic (fast heart rate) Respiratory Rate: 32, regular Spo2: 95% Use of staff as patient voice: "I feel sick, deep breathing makes my chest pain even worst." "I took	Wash hands Introduction, address patient and his wife Position patient comfortably high fowlers, perform assessment, and focus on cardiovascular assessment, heart sounds and asking questions on the nature and description of chest pain. Patient is places on 2l	Role member providing cue: Patient's wife Cue: "His father dies of heart attack, my husband is so afraid right now. He had been having problem with many losses in the insurance business"

	Ibuprofen and Nitroglycerin tablet but the chest pain is still there, I am very worried it does not go away."	nasal canulla. Teamwork, primary and secondary nurse work together to assess and perform interventions	
Next 10 minutes	Patient verbalized," My chest pain is 8/10 and goes to my left shoulder"	Nurse continues focus cardiovascular assessment and nursing history for patient with chest pain. Properly communicate to patient about his condition. Check lab results and EKG and chest X-rays. Identifies Cardiac enzymes are abnormal and EKG shows ST elevation changes. Calls the physician immediately to relay patient symptoms, lab and EKG results and shows proper communication to get physician orders.	Role member providing cue: Patient Cue: "Did my results come back? What did it shows and what is going on with me?"
Final 5 minutes		Physician gave orders for patient admission to coronary care unit or intensive care unit	Role member providing cue: Cue:
			Role member providing cue: Cue:
			Role member providing cue: Cue:

Complexity – Simple to Complex

Suggestions for Changing the Complexity of This Scenario to Adapt to Different Levels of Learners

Patient Mr. A.B. blood pressure could fall, along with losing his level of consciousness after talking to him when history taking was being done. This could require more complex treatment and intervention.

Appendix B: Questionnaire for Nurse Educator Critiquing the Evidence-based Scenario for the Care of Patient With Chest Pain

1. Looking at the evidence-based scenario, describe how the simulation learning objectives could be better defined?
2. Looking at the evidence-based scenario for the care of patient with chest pain, described how it followed the standards of practice for the care of chest pain patient?
3. Looking at the evidence-based scenario, describe how it meets the learning objectives?
4. Looking at the evidence-based scenario, how did it focus on properly assessing and communicating with patient with chest pain?
5. What can you suggest to improve the evidence-based scenario for the care of patient with chest pain?

Appendix C: Questionnaire for Nursing Participants to be Given Before the Simulation Experience

1. Please indicate your gender using a check mark: _____ Male - _____Female
2. Please select a category that includes your age with a check mark:

_____ 18-20 years of age _____35-40 years of age

_____20-25 years of age _____40-45 years of age

_____25-30 years of age _____45-50 years of age

_____30-35 years of age _____more than 50 years of age

3. What type of nursing experience you have?

_____ licensed registered nurse with no nursing experience

_____ licensed registered nurse with less than one year on the job, please state what area did you work? _____ (example: medical surgical floor, nursery, telemetry floor)

_____ licensed registered nurse with 1 to 2 years on the job, please state what area did you work? _____ (example: medical surgical floor, nursery, telemetry floor)

_____ licensed registered nurse with 3-5 years on the job, please state what area did you work? _____ (example: medical surgical floor, nursery, telemetry floor)

_____licensed registered nurse with 6-10 years on the job, please state what area did you work? _____ (example: medical surgical floor, nursery, telemetry floor)

_____licensed registered nurse with more than 10 years on the job, please state what area did you work? _____ (example: medical surgical floor, nursery, telemetry floor)

4. What is the highest degree or level of school you have completed?

   _____ Associate degree

   _____Bachelor's degree

   _____Master's degree

   _____Doctoral degree

5. Do you have previous medical background before becoming a nurse?

   _____Yes _____No

   If Yes, state _____ (for example LPN, EMT, Respiratory Therapist)

6. Is this the first time you were exposed to high-fidelity simulation? (High-fidelity simulation involves immersing in a scenario where a mannequin responds to uses of assessments and intervention) Please indicate if today was your first exposure to high-fidelity simulation by placing a check mark on the adjacent line: _____ (check here). I**f you have had previous exposure, leave blank.**
7. If you had been exposed to high-fidelity simulation previously, please indicate the number of previous times on the adjacent line: _____. If today was your first exposure to high-fidelity simulation, please enter "0" on this line.
8. If you had been exposed to high-fidelity simulation previously, please indicate where did you have your simulation experience?

   _____school attended

   _____ Present workplace

   _____others please state

Appendix D: Questionnaire for Nurse Participants to be Given After the Simulation Experience

1. Did you enjoy working with the "Sim Man"? Check ___Yes or ___No and Explain why yes or why no.

2. Did the experience improve your assessment skills for dealing with a patient experiencing chest pain? Explain how.

3. Did the experience improve your communication skills with patient? With family members? With physician? Explain.

4. During the post simulation feedback session, did you find it helpful confirming proper assessment and communication with patients? Explain.

5. What area(s) working with Sim Man did you think require improvement? Explain.

6. At any time did you feel lost during the simulation? If yes, explain what happened.

7. Do you think you have gained knowledge and skills from the simulation that assisted you in meeting the objectives? (objectives focus on cardiovascular assessment and SBAR communication with patient, family and physician).

8. Where there missing elements that could have made the simulation more effective in meeting the objectives? If yes, explain.

9. Was the simulation session relevant as it showed usefulness of what I was learning? Please explain.

10. Are there any other comments you would like to make? State here.

Appendix E: Preceptor's Evaluation Tool

1. Was the group of nurses able to recognize the problem? ___Yes ___No
2. Was the group of nurses able to differentiate urgency from non-urgency of the situation? ___Yes ___No
3. Was the group of nurses able to initiate independent nursing actions? ___Yes ___No
4. Was the group of nurses able to report essential clinical data? ___Yes___No
5. Was the group of nurses able to anticipate relevant medical errors? ___Yes--- ___No
6. Was the group of nurses able to collectively come up with the best treatment option or intervention? ___Yes ___No
7. Was the group of nurses able to provide relevant rationale with the best treatment option or intervention and able to support their decisions? ___Yes ___No

Appendix F: Piloted Pre- and Post-Test Questions Regarding History Taking and the Physical Examination to be Given to Nurse Participants

1. When a new patient is admitted into the hospital, the nurse should begin which of the following discussions? Select all that apply.

a. "Tell me more about your chest pain."
b. "Do you or did you recently have a cold?"
c. "Is your stool black?"
d. "Please describe your recent bowl movements. What did your stool look like"
e. "What brings you into the hospital today?"
f. "Did you or do you have any crushing pain in your chest?"
g. "What is your pain like? Please try to describe your pain to the best of your ability."

Correct Answers: a, d, e, g. The open-ended question should begin every discussion. If the patient is answering yes and no, chances are, you aren't asking enough open-ended questions. Whenever you elicit a positive response, it is important to learn more if you can.

2. The History is the patient's medical history. In asking the History of the present patient illness, what is your goal?

a. Diagnose the patient
b. Intervene properly
c. Identify the symptoms how it begun
d. Report immediately to the physician concerns raised by the patient

Correct Answer: c. Your goal is to identify the symptoms, exactly how (In what setting) and when the symptoms began, and how symptoms have evolved since the initial onset.

3. Upon entering a newly admitted patient's room, the patient verbalizes a shortness of breath. What should the nurse do first?

a. Position the patient upright and adding more pillows if needed.
b. Request a patient chest x-ray.
c. Auscultate the patient's chest to check for any abnormalities.
d. Intubate the patient.

Correct Answer: c. This helps you confirm suspicions of a disorder, such as cardiovascular or respiratory disorders, and assists with assessment of the adequacy of patient's breathing.

4. The reliability of the information given by a newly admitted conscious, coherent patient during history taking can be verified by:

a. Ask the patient's immediate family members about the information given by the patient in an effort to determine whether the information provided by the patient is correct or not.
b. Ask the patient's previous physician regarding the reliability of the information provided by the patient.
c. Present the patient information obtained during the history taking session to the patient for verification.
d. You do not need to verify, anyway the patient is conscious and coherent.

Correct Answer: c. This confirms your understanding of the patient's initial response and allows the patient to correct any errors made during their initial response.

5. A patient has just finished giving information about the reason(s) he is seeking care. When reviewing the data, the nurse finds that some information is missing. What would be the most appropriate statement by the nurse to gather data?

a. " Mr. A.B., I just need your permission to get your medical information to X hospital"
b. "Mr. A. B., you mentioned that you had been hospitalized on several occasions. Can you tell me more about that?"
c. "Mr. A.B. I just need to get some additional information_____, when was the last time you were admitted for _____?"
d. "Mr. A.B., looking at your clinical condition, it appears as though you have been hospitalized many times before."

Correct Answer: c. The nurse should use direct questions to fill out missing information that had been left out before, especially when specific facts are required such as collecting data about past health problems or during review of systems (physical assessment).

6. Things nurses should never say to a doctor when on a telephone call about a patient's condition. Select all that apply.

a. Doctor: "The patient you saw earlier is having chest pain again"
   Nurse: "Doctor, Mr. A.B. the patient with asthma is not feeling well"
b. Doctor: "What are his O2 saturation and vital signs?"
   Nurse: "I don't know. I didn't check them. I thought I'd call you first"
c. Nurse telephones at 2 am. "I know you don't have Mr. A.B., but do you think the Vancomycin I gave him 3 days ago could have caused his creatinine level to increase?"
d. Nurse states, "I know you said to call you if there was a problem, but I was not sure this was serious enough?"

Correct Answer: a, b, c, d. All of these information does not convey effective communication (SBAR)

7. In your recommendation to the physician, the nurse should

a. Clearly let the physician know if you disagree with their treatment plan.

b. Make appropriate suggestions of what actions to take.
c. Provide a list of treatment options.
d. None of the above.

Correct Answer is: b, involves making proper recommendation is suggesting what actions is necessary to take, which is part of SBAR, "R" for making recommendations.

8. Which of the following phrases is appropriate for "B"-Background in the SBAR technique for communication?

a. "Vital signs are….."
b. "The patient's treatment is…."
c. "I suggest you …."
d. "I am not sure about the patient's condition, but I think you should see him"

Correct Answer: b, "B" means Background and includes the presenting complaint and relevant history

9. The patient vital signs for the last hour were BP 110/70, HR 110, RR 19. Patient is on 2 liters nasal cannula and O2 sat 95%. You notice of changes in patient O2 sat from 95% to 88%. What would you do now?

a. Call code response team.
b. Increase oxygen per nasal cannula from 2 liters to 10 liters oxygen.
c. Change oxygen nasal cannula to non-rebreather mask @ 5 liters oxygen.
d. Do nothing, observe the patient, probably the O2 sat will go up again close to 95%

Correct Answer: a, A hospital usually has a set of criteria that signify a patient's condition is deteriorating and require the staff nurse to activate the RRT. The goal is to treat these warning signs early so that the patient's outcome may be improved and a cardiac arrest prevented. Changes in oxygen status indicate a patient's condition is deteriorating. The Rapid Response Team needs to be called.

10. Before entering a patient room, the nurse should first check:

a. Presence of any visitor's in the room
b. Posted condition such as isolation precaution, fall precautions

c. Patient's general appearance
d. Patient's input and output from previous chart

Correct Answer: b. Before entering patient's room, the nurse should assess any precautions such as falls, latex allergies, isolation, etc.

11. The nurse is performing cardiac assessment to a newly admitted patient. What assessment finding should be reported to the physician?

a. Bounding peripheral pulses
b. Blood pressure of 140/90 mm Hg
c. Bruit heard on the side of the neck
d. Pulse rate of 100 beats/min

Correct Answer: c, Bruit is a sound that maybe developed in narrowed arteries, this finding maybe indicative of atherosclerotic disease of the carotid arteries and further evaluation is needed.

12. Your patient complains about tightness in his chest, and has a BP of 140/80 with a HR of 110, the nurse should:

a. Call a Code Blue.
b. Defibrillate the patient.
c. Administer MONA protocol.
d. Request a 12 Lead EKG.

Correct Answer: c. MONA is a mnemonic that stands for Morphine, Oxygen, Nitrates and Aspirin and are four (4) primary interventions given to patient being ruled out for heart attack or myocardial infarction in which chest pain is the common symptom. In the medical setting oxygen is given first to decrease cardiac oxygen demand by supplying oxygen, second is nitrates, next is aspirin then morphine. Proper assessment is required if patient is safe to take nitrates which would include asking questions if patient had taken performance enhancing drugs within the last 24-72 hours.

13. A nurse is completing assessment of a patient who was just admitted in the emergency room. Which assessment findings require prompt attention? Select all that apply.

a. Temperature of 101.5 degrees Fahrenheit
b. Respiratory rate of 23 breaths/minute
c. Oxygen saturation of 95%
d. Patient suddenly became restless.
e. Heart rate of 140 beats/min

Correct Answer: a, d, e. A high or low temperature (less than or equal to 97 degrees Fahrenheit or greater than or equal to 100 degrees Fahrenheit); a high or low heart rate (less than or equal to 60 or more than 100); sudden restlessness; change in level of consciousness; and, confusion or difficulty arousing require prompt attention.

14. A nurse is performing an admission assessment to an older client with multiple chronic diseases. The nurse checks the heart rate and establishes it at 45 beats/minute. What will the nurse do first?

a. Administer 1 mg Atropine.
b. Document the finding in the chart.
c. Assess the client's medications.
d. Check for edema.

Correct Answer: c. The nurse should check the client's medication reconciliation that might cause a drop in heart rate. The heart rate is not that low and Atropine 1 mg is not required. It is important to document the finding on the chart but is not a priority action. Checking for edema is not related to the question.

15. What information collected from the patient would be suggestive that the patient is having AMI (acute myocardial infarction)?

a. Pain is increasing with deep breathing.
b. Pain worsens when the arm is raised.
c. Pain persists longer than 30 minutes.
d. Pain is relieved after resting or taking nitroglycerin.

Correct Answer: c. Chest pain that lasts more than 20 minutes is suggestive of AMI. Pain that worsens/increases when the arm is raised or with deep breathing is typical of pericarditis or musculoskeletal pain. Stable angina is usually relieved by rest or nitroglycerin.

Piloted 25 item test questions regarding communication, history taking and the physical examination to be given to nurse participants before simulation.

The following questions (1-4) refer to Patient X case scenario:

Patient X, 54 years old who presented to emergency room with complaints of chest pain…tightness or fullness.

1. Patient X rated his pain as 10 out of 10 and located on the left side of his chest, substernal region. He is diaphoretic, lightheaded, short of breath, with a BP of 170/90 mmhg, HR 110 beats/minute. Knowing these presenting symptoms as:

a. Acute coronary syndrome
b. Heart Failure
c. Chronic Obstructive Pulmonary Disease

d. Ischemic Stroke

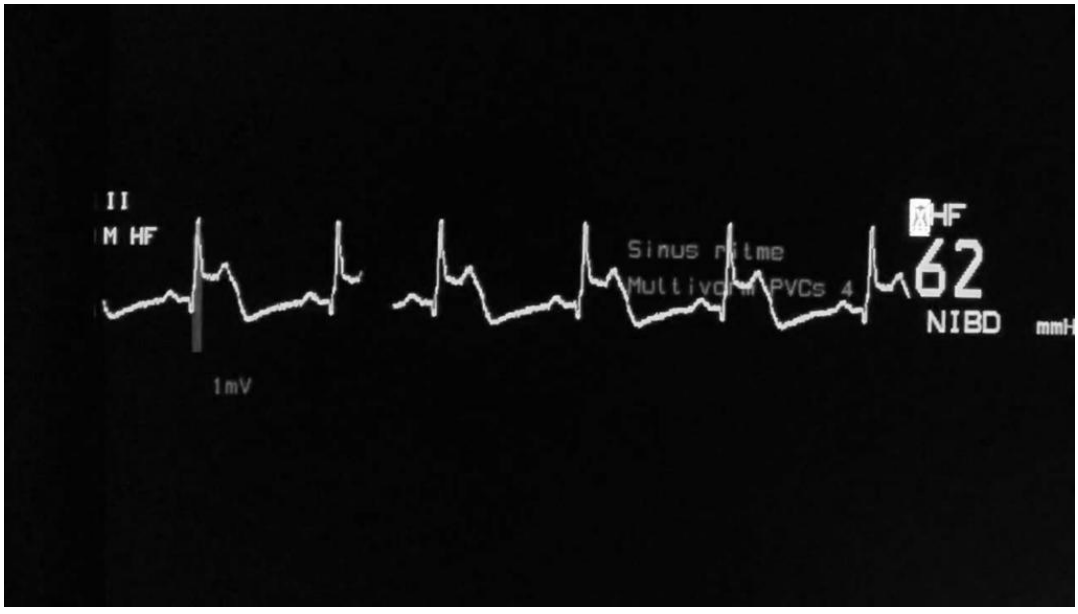
Ans. A. Acute Coronary Syndrome has the above presenting symptoms. Chest pain or discomfort may immediately signal to you that something's wrong with your heart. Other symptoms, however, may leave you unsure of what's wrong. Take note of these common signs of an acute coronary syndrome:Chest pain or discomfort, which may involve pressure, tightness or fullness, Pain or discomfort in one or both arms, the jaw, neck, back or stomach, Shortness of breath, Feeling dizzy or lightheaded, Nausea, Sweating (taken from the American Heart Association website).

2. Patient X verbalized he had been having chest pain which is frequently triggered by same level of exertion and is readily relieved by rest and nitroglycerin. But, lately the chest pain attacks occur more frequently and are not relived by nitroglycerin and rest. As the nurse taking care of this patient, which is a priority intervention at this time:

a. Give another dose of nitroglycerin to see if the chest pain will be relieved
b. Careful history can provide information necessary to triage patient who present with chest pain and stratify the risk of seriousness such as acute MI
c. Give morphine 2 mg IV as patient is not relieved by nitroglycerin
d. Wait for the emergency physician response and orders as he would know better how to handle this case

Answer: b. Careful history taking determines what's causing the symptoms and so proper intervention will be rendered.

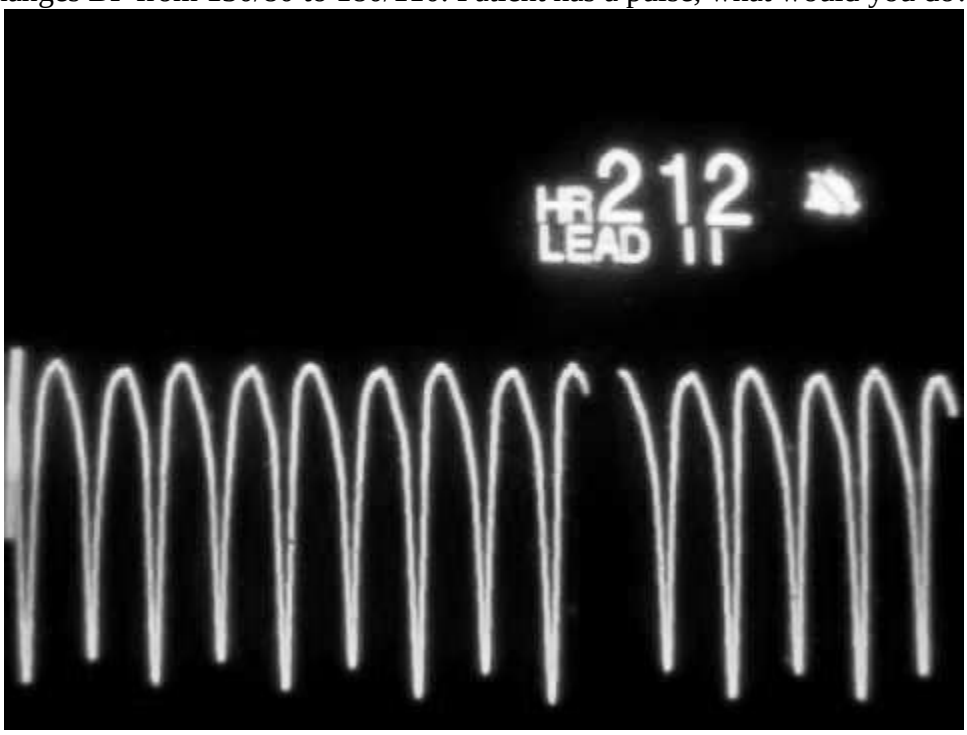
3. While you were taking care of Patient X, on the monitor, this EKG changes showed, also patient complained of lightheadedness, diaphoretic and BP of 90/40. What is your priority at this time?



a. Request for 12 lead EKG
b. Give morphine 2 mg IV as ordered
c. Position patient upright to help him breathe better
d. Give nitroglycerin drip as the sublingual nitroglycerin is not working anymore

Answer: A. Requesting 12 lead EKG confirms a diagnosis if STEMI occurs and in addition cardiac enzymes is also ordered. Then a PCI might be required as an intervention. B,C,D will not help diagnose or treat STEMI.

4. Patient X showed this EKG change on the monitor accompanied by confusion and vital signs changes BP from 130/80 to 180/110. Patient has a pulse, what would you do?



a. Call and activate code blue, Cardiovert the patient
b. Call and activate rapid response, Cardiovert the patient
c. Call and activate code blue, Cardiovert the patient
d. Call and activate rapid response, Defibrillate the patient

Answer: B. Patient still has a pulse, change in condition is noted, a rapid response is called and cardioversion is carried out immediately.

5. As part of the quality core measure for Acute MI, all of the following are quality indicator for Acute MI except;

a. PCI received within 90 minutes of hospital arrival
b. Aspirin upon hospital arrival and discharge

c. Appropriate use of ACE (Angiotensin Converting Enzymes) inhibitors or ARB (Angiotensin Receptor Blockers) drugs
d. Blood culture before starting any antibiotics

Answer: D is not a core measure for Acute MI. It is for Pneumonia core measure.

6. What symptoms signal heart disease?
a. Nausea, sweating, dizziness, sore muscles
b. Nausea, sweating, short of breathe, weakness
c. Sweating, dizziness, muscle aches, weakness
d. Sweating, sore muscles, muscle aches, dizziness

Answer: B. Sore muscles or muscle aches are not symptoms of heart disease but could be warning signs of a heart attack.

7. How fast should treatment be started to save a patient with heart attack symptoms?

a. Within 12 hours of the start of heart attack symptoms
b. Within 6 hours of the start of heart attack symptoms
c. Within an hour of the start of heart attack symptoms
d. Within 1 day at the start of heart attack symptoms

Answer: C. Treatment for heart attacks works best within an hour after the start of heart attacks symptoms.

8. A patient comes to you in emergency room. What is the most patient-specific, and accurate way of gathering information?

a. "How is your breathing?
b. "Are you feeling sick today?"
c. "Are you having difficulty breathing?"
d. "Do you have chest pain?"

Answer: A. Open-ended questions is the most-specific, accurate way of gathering information.

9. The patient verbalized to you," My chest feels tight", what would be your response?
a. " Do you have chest pain?"
b. "So how is your breathing?"
c. "Tell me about this chest tightness"
d. "Do you get short of breathe with chest tightness?"

Answer: C. Labeling the patient is a bad habit. Do not used any term the patient has not used like" do you have chest pain?" in which patient mentioned chest tightness

and not chest pain. Misrepresenting a patient's complaint can lead to misdiagnosis and inappropriate or delay of treatment.

10. When asking about radiating complaints like for example chest pain, how would you ask this question?

a. "Does your chest discomfort go anywhere?"
b. "What else is bothering you?"
c. "Does your chest pain radiate to your arms and jaw?"
d. "Do you have any complaints associated with chest pain?"

Answer: B. "What else is bothering you?" You decide what patients complain is radiating complaints or associated complaints. Does your chest discomfort go anywhere?" signifies closed-ended question. "Does your chest pain radiate to your arms and jaw?" Patient does not understand the word radiating, same word as associated.

11. "When asking patient about their allergies, how would you state it properly?"

a. "Are you allergic to any medication?"
b. "Are you allergic to any foods?"
c. "What are you allergic to?"
d. " Are you allergic to any substances?"

Answer: C. This is an open ended question and points out directly to what the patient allergy is, the other choices requires a longer amount of time to obtain information.

12. In asking medication questions provide clues to patient medical history. How would you ask the patient about medication questions?

a. "What medications do you take that are prescribed by a doctor?"
b. "What medications do you take everyday?"
c. "What medications you're supposed to be taking but are not?"
d. "Do you know the names of the medications you are taking?"

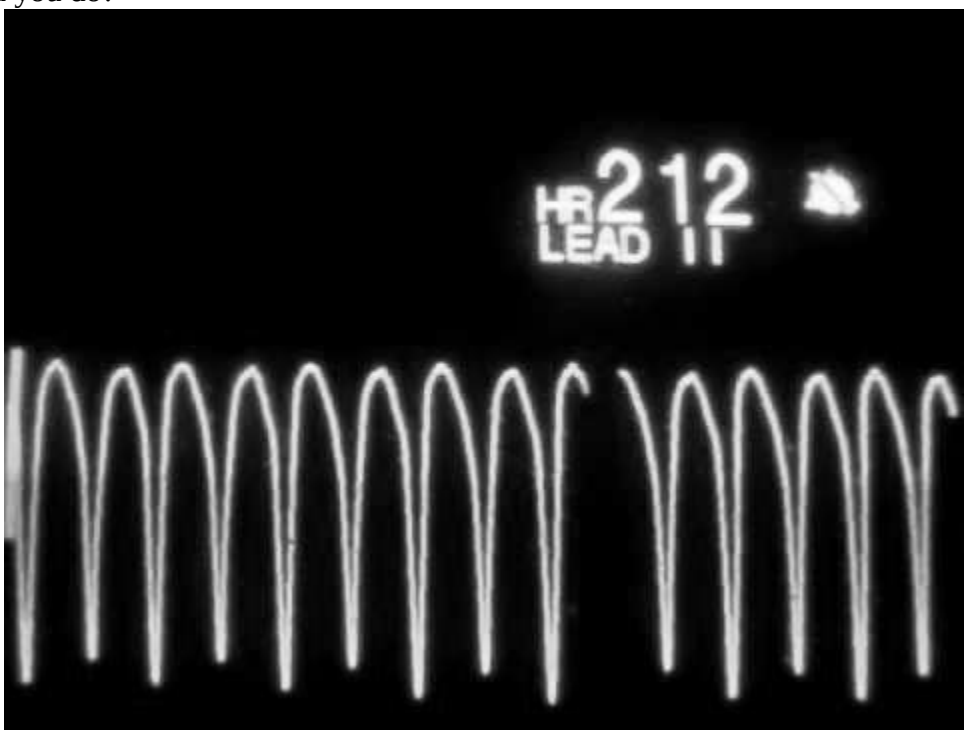
Answer: C. You might want to find out the lists of medications patient should be taking but missing, which could affect the medical problem he/she is facing right now. Selections A, B, D only gives you the information what the patient wants to tell you.

13.In asking the patient past medical history, it is best to state…

a. "Had you been sick?"
b. "Do you have diabetes?"
c. "What are the pertinent past history you had?"
d. "What medical problems you had in the past and when did you have them?"

Answer: D. This points directly to the information you want to collect, rather than to a lengthy closed-ended questions.

14. Patient A.B. showed this EKG change on the monitor now does not have a pulse, what would you do?



a. begin CPR 5 cycles
b. perform synchronized cardioversion
c. shock 200 joules again if necessary
d. shock 120-200 joules

Answer: D. Vtach without pulse needs defibrillation action.

15. You had delivered a shock of 120 joules, as a team leader what is your next intervention?

a. give vasopressin 40 U IV
b. give CPR (5 cycles)
c. check rhythm
d. give atropine 0.5mg IV

Answer: B. After a shock is delivered, continue CPR for 5 cycles.

16. You had completed 5 cycles of CPR, what is your next intervention as a team leader?

a. shock with 120 to 200 joules
b. give epinephrine 1 mg IV
c. give adenosine 6 mg IV Push
d. check rhythm

Answer: D. After completing 5 cycles of CPR, it is necessary to check the rhythm if it requires a shock or medication to be given.

17. Patient's rhythm persists pulseless Ventricular Tachycardia. What is your next intervention as a team leader?
a. give vasopressin 40 U IV
b. perform CPR (5 cycles)
c. shock with 200 joules
d. synchronized cardioversion

Ans. C.Pulseless Vtach is a shockable rhythm especially if there is no pulse.

18. As you continue CPR, you need to prepare this medication to be given after the first or second dose of epinephrine?
a. asopressin 40 U IV
b. adenosine 4 mg IV
c. atropine 0.5 mg IV
d. amiodarone 100 mg IV

Ans. A. **Vasopressin is the drug of choice to give after the first or second dose of epinephrine.**

19. What is the correct dose of epinephrine for a pulseless arrest algorithm?
a. epinephrine 0.1 mg IV
b. epinephrine 0.01 mg IV
c. epinephrine 1 mg IV
d. epinephrine 10 mg IV

ANS. C, epinephrine 1mg iv is the correct dose for PEA.

20.You gave an antiarrythmic drug followed by a flush and continue CPR.After CPR, you perform a rhythm check which reveals continued VT. What do you do after rhythm check?
a. give epinephrine 1 mg IV
b. defibrillate 300 joules
c. start antiarrythmic infusion
d. give adenosine 6 mg IV

Ans. B. Vtach is a shockable rhythm

21.The patient is in a second degree (type 1). You gave Atropine 0.5 mg IV push followed by 20 ml NS flush. The atropine does not increase the rate. What is your next intervention?

a. give another atropine 1 mg IV
b. give epinephrine 1 mg IV
c. ttempt transcutaneous pacing
d. continue CPR

Ans. C.Transcutaneous pacing as atropine fails to alleviate the symptomatic bradycardia.

22.You started transcutaneous pacing with rate of 60.Vital signs shows HR 60, bp 90/50, RR=14, patient remains unresponsive. What would be the mostlikely cause of sudden cardiac arrest?

a. hypovolemia
b. Acute Myocardial Infarction
c. Respiratory Aidosis
d. hypothermia

Ans. B.Acute MI is the cause of sudden cardiac death. Sudden death is a catastrophic complication of coronary artery disease and frequently the consequence of an acute ischemic event.

23. If the cause of sudden cardiac death is acute MI, how would you handle the pacing?

a. pace at a higher rate since patient cannot achieve the needed rate
b. pace at lower rate because higher rate increase incidence of ischemia
c. keep the same pace rate, so as not to develop complications
d. not a,b,c

Ans. B. Pace the rate lower so as not to cause ischemia.

The following questions (24 and 25) refer to Mr. A.B.'s condition. Mr. A.B. 58 years old male who presents to the floor complaining of chest discomfort.

24. Mr. A.B. just finish giving information about the reason he is seeking care. When reviewing the data, nurse finds that some information is missing. What would be the most appropriate statement from the nurse to gather the missing data?

a. 'Mr. A.B. I just need your permission to get your medical information to X hospital"
b." Mr. A.B. you mentioned that you had been hospitalized several occasions. Can you tell me more about that?"
c. "Mr. A.B. I just need to get some additional information, had you ever been admitted for chest pain?"

d. “Mr. A.B. looking at your clinical condition, please tell me the truth, you must have been hospitalized many times before”

Ans. C. Some information is missing, so best way is to get additional information and verify history of previous chest pain.

25.Mr. A.B.’s vital signs @ 10 am shows BP 110/70, HR 110, RR 19 and O2 sat 95% on 2 liters nasal cannula. You check the patient @ 11 am, O2 sat dropped to 84% and pulse oximetry is functioning properly. What would you do now?

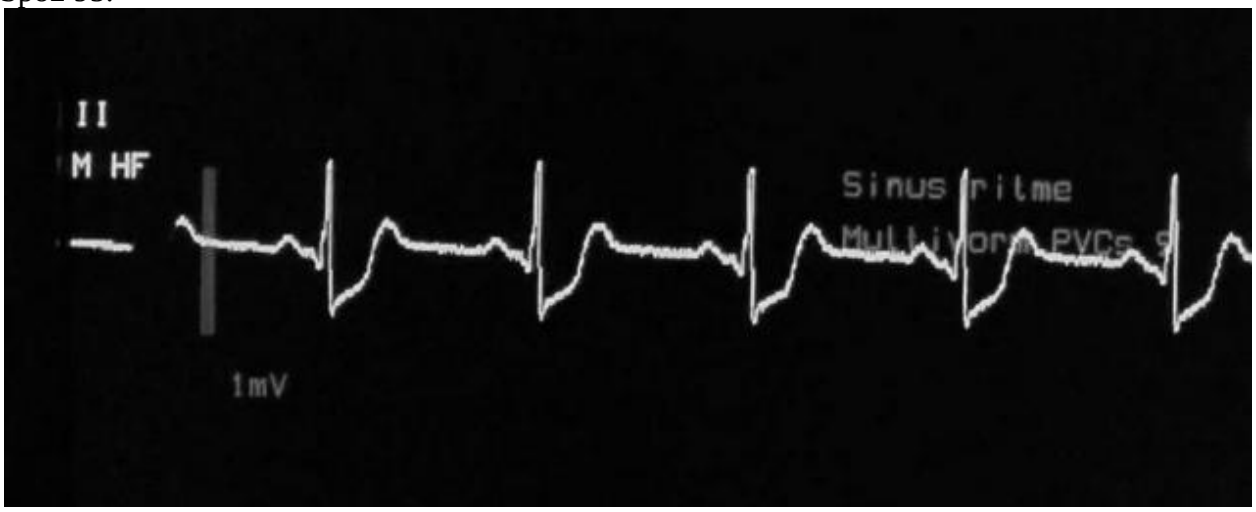
a. Call rapid response team, needs to intervene right away
b. Call code blue team, needs to intervene right away
c. Increase oxygen to 10 liters
d. Do nothing, observe the patient probably the O2 sat will go up again

Ans. Calling rapid response team preventing patient codes and ICU transfers having a significant impact on patient mortality and quality care.

Appendix G: Finalized Pretest and Post Test Questions

The following questions nos. 1-6 refers to Mr. C.L. case.
Mr. C.L. 54year old male who has history of diverticulitis and had an onset of vague left arm discomfort earlier which he tried to ignore. Patient admitted to the unit for monitoring and evaluation.
The following is Mr. C.L. History:
Medical: borderline hypertension, high cholesterol and diverticulitis
Surgical: Tonsillectomy as a child
Family: Father dies years ago at age 60 unknown cause
Onset: earlier at rest (vague left arm discomfort)
Provocation/palliation: none, it is just "there"
Quality: vague discomfort
Severity: 4
Time: approximately 2 hours
Allergy: Aspirin (ASA)
Medications: Plavix, Lipitor

Question no. 1
Mr. C.L. presents with mild distress and describe his discomfort as mild burning if pushed. This is the rhythm that displayed on the monitor. BP 140/80, HR 84, RR 20, Spo2 95.



As the nurse taking care of Mr. C.L. what is your priority intervention this time:

a. Give patient Aspirin as ordered
b. Give Morphine as ordered
c. Request a 12 lead ECG

d. Give nitroglycerin sublingual as ordered

Ans. C.12 lead ECG is performed to confirm ST depression and Acute MI involvement.

Question no.2

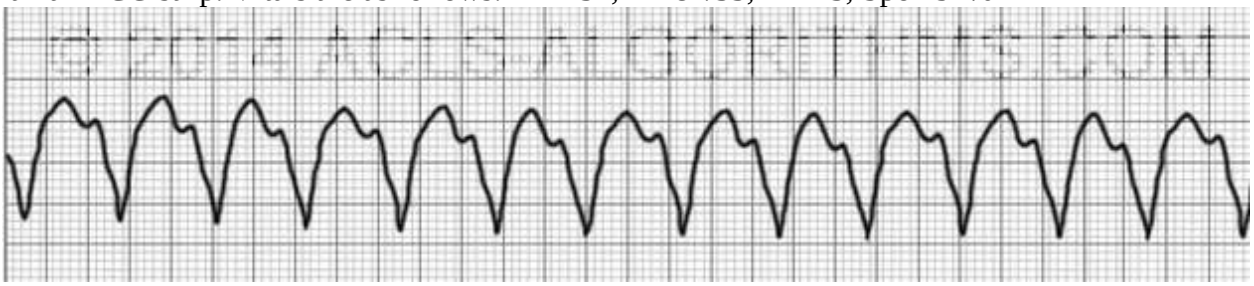
The result of the tests reveals Acute Anterior Wall MI, what will be your next step?

a. Give oxygen first, then nitrates then aspirin then morphine
b. Give Morphine first, then oxygen then nitrates then aspirin
c. Give oxygen first, then nitrates then morphine
d. Give morphine first, then oxygen then nitrates

Ans. C. MONA is a mnemonic that stands for Morphine, Oxygen, Nitrates and Aspirin that are performed when treating a patient having a heart attack or Acute Myocardial Infarction. MONA does not represent the order in which a nurse should administer these treatments. In a medical setting is giving oxygen first, then nitrates then aspirin then morphine but since the patient has allergy to aspirin, we cannot give aspirin. The 2 therapeutic goals are to decrease cardiac oxygen demand and increase available oxygen.

Question no. 3

The patient verbalized he feels worse and chest is now burning (sub-sternal). The patient develops a left bundle branch block with increasing PVC's then this occurs next after you run an ECG strip. Vitals are as follows: HR 151, BP 82/55, RR 25, Spo2 91%



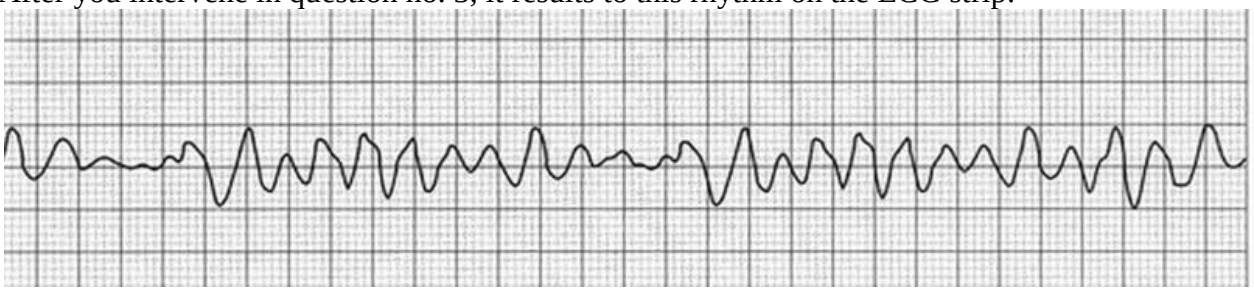
Upon assessment you also note a pulse along with this ECG strip. What is your priority intervention this time?

a. Cardioversion
b. Defibrillation
c. CPR
d. Give epinephrine

Ans. A. Cardioversion is carried out with patient that has a pulse. Sustained Ventricular Tachycardia may lead to hemodynamic collapse, these patients may

require urgent conversion to sinus rhythm. In this case patient is unstable considering patient has worsening chest pain, hypotension, oxygen saturation drops and is showing ventricular tachycardia with HR of 151.
Question no. 4

After you intervene in question no. 3, it results to this rhythm on the ECG strip:



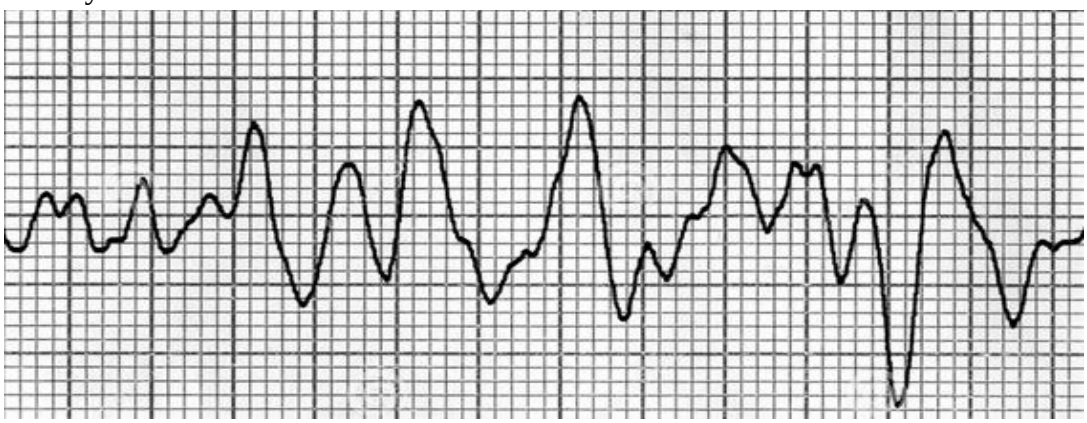
What will you do next?

a. Cardioversion
b. Defibrillation
c. No interventions needed
d. Pacing is applied

Ans. B. Defibrillation is carried out with Ventricular Fibrillation rhythm. Ventricular Fibrillation is treated with high energy unsynchronized shocks (reference AHA ACLS Provider Manual 2011 p. 60).

Question no. 5

The rhythm shows



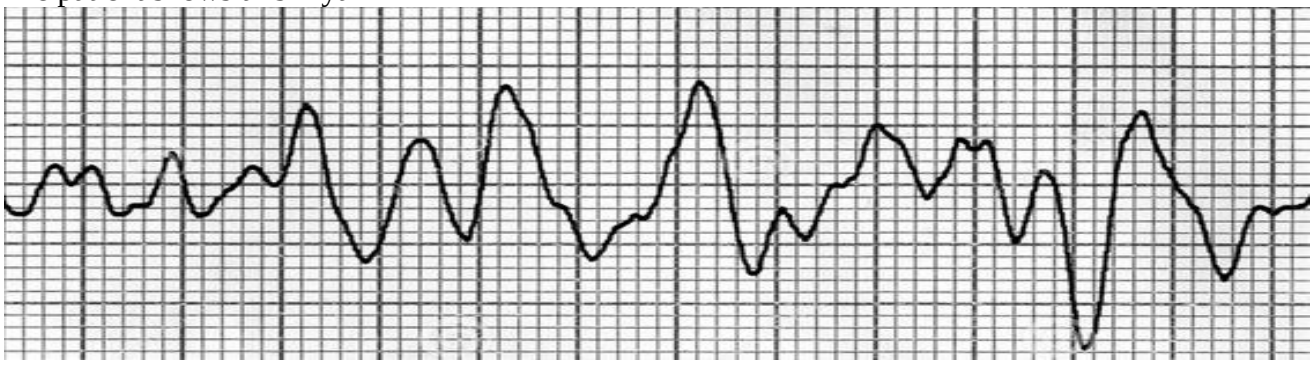
What other intervention will you carry out aside from your answer in no. 4?

a. CPR must be started in 2 minute cycles and epinephrine 0.1 mg IV/IO every 3-5 minutes
b. CPR must be started in 2 minute cycles and epinephrine 0.01 mg IV/IO every 3-5 minutes
c. CPR must be started in 2 minute cycles and epinephrine 10 mg IV/IO every 3-5 minutes
d. CPR must be started in 2 minute cycles and epinephrine 1 mg IV/IO every 3-5 minutes

Ans. D. CPR must be started in 2 minute cycles and epinephrine 1 mg IV/IO every 3-5minutes

Question no. 6

The patient shows this rhythm



Then it shows this rhythm after you gave epinephrine IV. The patient is unstable with persistent chest pain, short of breathe, SPO2 81% and BP 83/43.

What will be your priority intervention?

a. CPR
b. Pacemaker
c. Give Atropine as ordered
d. Give Amiodarone as ordered

Ans. B. Pacemaker.

The following questions nos. 7-11 are not related to the case scenario, they are individual questions unrelated to each other:

Question no.7

If you noticed this on the cardiac monitor and patient is unresponsive, no pulse and not breathing, what will you do as a priority intervention?

a. Initiate CPR and Epinephrine
b. Ventilate the patient
c. "Look, listen and feel" to assess breathing
d. Give Epinephrine IV

Ans. A. Initiate CPR and give Epinephrine 1 mg IV/IO right away based on the 2010 AHA guideline, CPR before ventilations. No look, listen and feel anymore based on latest 2010 AHA guideline and just giving epinephrine 1V is not enough.

Question no. 8

You note this on the monitor when you are preparing your patient for pacing. Patient has extreme bradycardia and symptomatic.

What is your priority intervention?

a. Set the rate on the pacer, increase the current until you see a spike followed by the QRS until you see the threshold of the initial capture then check patient pulse making sure it is adequate
b. No need to do any intervention, the monitor shows good capture and is pacing well
c. Set the rate on the pacer, increase the current until ECG tracing indicates a wide QRS complex and broad T wave after each pacer spike then add 2 mA or set the output 10%output 10% higher than the threshold of the initial capture then check patient femoral pulse making sure it is adequate
d. Set the rate on the pacer, increase the current until ECG tracing indicates a wide QRS complex and broad T wave after each pacer spike then add 2 mA or set the **output** 10%output 10% higher than the threshold of the initial capture then check patient carotid pulse making sure it is adequate

Ans. C. Needed to achieve consistent capture. It is needed to confirm also mechanical capture by checking patient pulse on the femoral area because electrical stimulations causes jerky muscle contractions that might confuse with carotid pulsations.

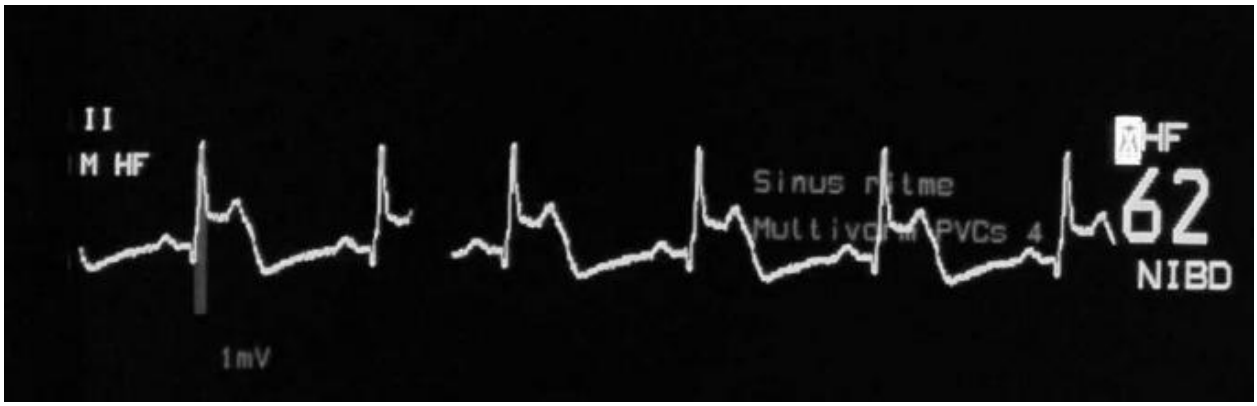
Question no. 9.
When patient chest discomfort does not respond to sublingual or spray nitroglycerin given for 3 doses and is having a STEMI (ST elevation MI), what is your intervention as authorized by protocol or medical control?

a. Morphine is given
b. Aspirin is given
c. Another extra dose of nitroglycerin is given
d. No need to give anything since patient does not respond to nitroglycerin

Ans. Morphine is given for chest discomfort unresponsive to sublingual or spray nitroglycerin

Question no. 10

This is the rhythm shown on the monitor. This was confirmed by a qualified physician with a 12 lead ECG and proper screening was done to allow the priority intervention.



What is your priority intervention?

a. Fibrinolytic therapy, an ED door-to needle time of 30 minutes and PCI ED-to door balloon inflation time is 90 minutes
b. Fibrinolytic therapy, an ED door-to needle time of 60 minutes and PCI ED-to door balloon inflation time is 90 minutes
c. Troponin and start adjunctive treatments
d. No need for any intervention, the rhythm on the monitor is normal

Ans. A. Fibrinolytic therapy, an ED door-to needle time of 30 minutes and PCI ED-to door balloon inflation time is 90 minutes (reference AHA ACLS Provider Manual 2011 p. 100-102).

Question no. 11

A patient comes to emergency room with complaint of chest pain r/o Myocardial Infarction. Before you give nitroglycerin, what question would you ask?

a. Had you taken any sildenafil (Viagra) within the previous 24 hours or tadalafil (Cialis) within 48 hours?

b. Had you taken any sildenafil (Viagra) within the previous 48 hours or tadalafil (Cialis) within 72 hours?
c. Had you taken any sildenafil (Viagra) or tadalafil (Cialis) within 48 hours?
d. Had you taken any sildenafil or tadalafil within 72 hours?

Ans. A. Avoid the use of nitroglycerin if it is suspected or known that the patient has taken any sildenafil (Viagra) or vardenafil within the previous 24 hours or tadalafil (Cialis) within 48 hours. Nitroglycerin is a venodilator and needs to be used cautiously or not at all in patients with inadequate ventricular preload (reference AHA ACLS Provider Manual 2011 p. 97).

The following questions nos. 12-25 relate to cardiovascular assessment, history taking and communication. They are individual questions not related to each other.

Question no. 12
In asking the history of the patient present illness, what is your priority goal?
e. diagnose the patient
f. intervene properly
g. identify the symptoms how it begun
h. report immediately to the physician concerns raised by the patient

Ans. C. Priority goal is to identify the symptoms, exactly how (In what setting) and when the symptoms began, and how symptoms have evolved since the initial onset. After identifying the symptoms, intervene properly and report immediately to the physician concerns raised by patient but nurses do not diagnose patient

Question no. 13
In your recommendation to the physician, the nurse should…
e. Clearly let the physician know if you disagree with their treatment plan.
f. Make appropriate suggestions of what actions to take.
g. Provide a list of treatment options.
h. None of the above.

Correct Answer is: b, involves making proper recommendation is suggesting what actions is necessary to take, which is part of SBAR, "R" for making recommendations.

Question no. 14
The patient vital signs for the last hour were BP 110/70, HR 110, RR 19. Patient is on 2 liters nasal cannula and O2 sat 95%. You notice of changes in patient O2 sat from 95% to 88%. What would you do now?

e. Call code response team.

f. Increase oxygen per nasal cannula from 2 liters to 10 liters oxygen.
g. Change oxygen nasal cannula to non-rebreather mask @ 5 liters oxygen.
h. Do nothing, observe the patient, probably the O2 sat will go up again close to 95%

Correct Answer: a, A hospital usually has a set of criteria that signify a patient's condition is deteriorating and require the staff nurse to activate the RRT. The goal is to treat these warning signs early so that the patient's outcome may be improved and a cardiac arrest prevented. Changes in oxygen status indicate a patient's condition is deteriorating. The Rapid Response Team needs to be called.

Question no. 15
A nurse is performing an admission assessment to an older client with multiple chronic diseases. The nurse checks the heart rate and establishes it at 45 beats/minute. What will the nurse do first?

e. Administer 1 mg Atropine.
f. Document the finding in the chart.
g. Assess the client's medications.
h. Check for edema.

Correct Answer: c. The nurse should check the client's medication reconciliation that might cause a drop in heart rate. The heart rate is not that low and Atropine 1 mg is not required. It is important to document the finding on the chart but is not a priority action. Checking for edema is not related to the question.

Question no. 16
When patient are admitted for STEMI (ST Elevation MI) the nurse needs to check that the patient will not be given this kind of drugs or if they are taking these drugs it needs to be discontinued as it will increase mortality, reinfarction, hypertension, heart failure and myocardial rupture:

a. Patients who had taken NSAIDS except aspirin (non selective and COX-2 selective) routinely before STEMI should discontinue those agents
b. Clopidogrel (Plavix)
c. Aspirin, Naproxen (Naprosyn), Ibuprofen (Advil) , Diclofenac (Voltaren)
d. Aspirin, meloxicam (Mobic), piroxicam (Feldene)

Ans. A. Use of NSAIDS except for aspirin is contraindicated. Both nonselective as well as COX-2 selective should not be administered during hospitalization for STEMI as it will increase mortality, reinfarction, hypertension, heart failure and myocardial rupture.

Question no. 17
When communicating with resuscitation team members, the team leader uses a closed-loop communication. A good example is:

a. Team Leader: " Give the patient sedation medication before shocking the patient"
Team Member: Give the sedation medication right away

b. Team Leader: "Give epinephrine, continue CPR and check rhythm"
Team Member: gave the epinephrine, continues the CPR and check the rhythm

c. Team Member: "The IV is in"
Team Leader: "Now that the IV is in, give epinephrine"
Team Member: "How much is the dose of epinephrine you want to give?"

d. Team Member: : The IV is in"
Team Leader: "Now that the IV is in, give epinephrine 0.1mg IV"
Tem Member: "Okay, giving epinephrine 0.1 mg IV"

Ans. C, Verification of the dose is needed before giving the medicine is the best practice. D is not the right answer because a wrong does of epinephrine is given and no clarification was given. A and B also no feedback was given to team leader which is not a good practice in giving proper communication.

Question no. 18
Effective communication during a code when a physician is present and is carried out by stating:

a. Shout or yell at team members when one person raises his voice because during a code most often times it is a chaos, so yell or shout that everyone could hear
b. Read back is utilized when confirming if an order is correct during emergency resuscitation efforts
c. Question a colleague who is about to make a mistake
d. Take on too many assignments at a time when assistance is readily available

Ans. C. refer to ACLS by AHA 2011 Provider Manual p. 21-23.

Question no. 19.

When interviewing patient, what is the best remark:

a. ”Are you having difficulty breathing?”
b. ”How does your chest feel?”
c. ”Do you have any allergies?”
d. ”Are you having chest pain?”

Ans. B. Use open ended questions to allow patients describe their complaints. Closed ended questions is answered by “yes” or “no” and does not give adequate information.

Question no.20

When a patient states,” My chest feels tight”, what is your response?

a. “Are you short of breathe?”
b. “Do you have chest pain?”
c. “How is your breathing?”
d. “Tell me more about this chest tightness”

Ans. D. When you use words that patient uses it means you are listening to them and you want to know more about what they are feeling.

Question no. 21

When asking about the signs and symptoms patient reports, how would you ask the question?

a. “What made you call us today?”
b. “Why did you call us?”
c. “What is bothering you?”
d. “What made you come to see me today?”

Ans. C. You want to know quickly the patient complaints (signs/symptoms) using open-ended questions.

Question no. 22

When interviewing patients, you want to know if there are radiating complaints or associated symptoms. How would you ask this question?

a. “Do you have any complaints associated with chest discomfort?”
b. “Does your chest discomfort go anywhere?”
c. “Is your pain radiating to your jaw and upper back?”
d. “What else is bothering you?”

Ans. D. Patients should never, ever be expected to decide what is “radiating” complaint or not, as well as associated symptoms, since they do not understand the significance of those words nor do they even recognize what a radiating or

associated complaint is. "Does your chest discomfort go anywhere?" is a closed-ended question.

Question no. 23

During assessment and history taking, when a patient denies any complaint in an area, how would you respond?

a. Nurse: "How does your belly feels?"
   Patient: "Fine"
   Nurse: "Okay"
b. Nurse: "So how is your breathing?"
   Patient: "It is fine I told you it is my chest that hurts"
   Nurse: "Okay"
c. Nurse:"How does your back feels?"
   Patient: "Fine"
   Nurse:"So, your back feels absolutely normal?"
d. Nurse: " How is your breathing?"
   Patient: "I breathe fine"

Ans. C. Whenever patient Denis complaint in an area, require him to confirm denial, closed-ended question is fine as long as you are confirming absence of a complaint.

Question no. 24.

25. When asking about allergies, it is best to ask:
    a. "What are you allergic to?"
    b. "Are you allergic to any medications?"
    c. "Are you allergic to any foods?"
    d. "Are you allergic to other substances?"

Ans. A. Answers B, C, D are all closed-ended questions and you might miss vital allergy questions.

Question no. 25

25. In asking about past medical history, it is best to ask:
    a. "Have you been sick?"
    b. "Do you have diabetes?"
    c. Do you have heart disease?"
    d. "What medical problems y
    ou had in the past and when did you have them?"

Ans. D. It is best to state what medical problems patient had and when did they have them.

Appendix H: Cardiovascular Assessment Subjective Data Cardiovascular Assessment

(Jarvis, 2012)

- Chest pain
- Dyspnea
- Orthopnea
- Cough
- Fatigue
- Cyanosis or pallor
- Edema
- Nocturia
- Past cardiac history
- Family cardiac history
- Personal habits (cardiac risk factors)

Chest pain

- Any chest pain or tightness?
- Onset: When did it start? How long have you had it this time? Had this type of pain before? How often?
- Location: Where did the pain start? Does the pain radiate to any other spot?
- Character: How would you describe it? Is it crushing, stabbing, burning, or viselike? (Allow the person to offer adjectives before you suggest them.) (Note if uses clenched fist to describe pain.)
- Is the pain brought on by activity (what type), rest, emotional upset, eating, sexual intercourse or cold weather?
- Any associated symptoms, such as sweating, ashen gray or pale skin, heart skipping a beat, shortness of breath, nausea or vomiting, or racing of the heart?
- Is the pain made worse by moving the arms or neck, breathing, or lying flat?
- Is the pain relieved by rest or nitroglycerin? How many tablets?

Dyspnea

- Any shortness of breath?
- What type of activity and how much brings on shortness of breath? How much activity brought it on 6 months ago?
- Onset: Does the shortness of breath come on unexpectedly?
- Duration: Is it constant or does it comes and goes?
- Does it seem to be affected by position, such as lying down?
- Does it awaken you from sleep at night?
- Does the shortness of breath interfere with activities of daily living?

Cough

- Do you have a cough?
- Duration: How long have you had it?
- Frequency: Is it related to time of day?
- Type: Is it dry, hacking, barky, hoarse, or congested?
- Do you cough up mucus? What color is it? Does it have any odor? Is it blood-tinged?
- Associated with activity, position (lying down), anxiety, or talking?
- Does the activity make it better or worse (sit, walk, exercise)?
- Is it relieved by rest or medication?

Orthopnea
- How many pillows do you use when sleeping or lying down?

Cyanosis or pallor
- Have you ever noticed your facial skin turn blue or ashen?

Edema
- Do you have any swelling of your feet and legs?
- Onset: When did you first notice this? Any recent change?
- What time of the day does the swelling occur? Do your shoes feel tight at the end of day?
- How much swelling would you say there is? Are both legs equally swollen?
- Does swelling go away with rest, elevation, or after a night's sleep?
- Do you have any associated symptoms, such as shortness of breath? If so, does shortness of breath occur before leg swelling or after?

Cardiac history
- Do you have a history of hypertension, elevated cholesterol or triglycerides, heart murmur, congenital heart disease, rheumatic fever or unexplained joint pains as child or youth, recurrent tonsillitis, or anemia?
- Have you ever had heart disease? When was this? Was it treated by medication or heart surgery?
- When was your last ECG, stress ECG, serum cholesterol measurement or other heart tests?

Nocturia
- Do you awaken at night with an urgent need to urinate? How long has this been occurring? Any recent change?

Family cardiac history
- Any family history of hypertension, obesity, diabetes, coronary artery disease (CAD), sudden death at younger age?

Personal habits (cardiac risk factors)

Nutrition

- Please describe your usual daily diet (Note if this diet is representative of the basic food groups, the amount of calories, cholesterol and any additives such as salt)
- What is your usual weight? Has there been any recent change?

Smoking

- Do you smoke cigarettes or use other tobacco products?
- At what age did you start?
- How many packs per day?
- For how many years have you smoked this amount?
- Have you ever tried to quit? If so, how did this go?

Alcohol

- How much alcohol do you usually drink each day or week? When was your last drink? What the number was of drinks that episode? Have you ever been told you had a drinking problem?

Exercise

- What is your usual amount of exercise each day or week?
- What type of exercise (state type or sport)?
- If a sport, what is your usual activity level (light, moderate, and heavy)?

Personal habits (cardiac risk factors)

- Drugs
- Do you take any antihypertensive, beta-blockers, calcium channel blockers, digoxin, diuretics, aspirin/anticoagulants, over-the-counter, or street drugs?

Additional history for the pregnant woman

- Have you had any high blood pressure during this or earlier pregnancies?
- What was your usual blood pressure level before pregnancy? How has your blood pressure been monitored during the pregnancy?
- If high blood pressure, what treatment has been started?
- Do you have any associated symptoms, such as weight gain, protein in the urine, or swelling in feet, legs, or face?
- Have you had any faintness or dizziness with this pregnancy?

Additional history for aging adult

- Do you have any known heart or lung disease, such as hypertension, CAD, chronic emphysema, or bronchitis?
- What efforts to treat this have been started?

- What usual symptoms changed recently? Does your illness interfere with activities of daily living?
- Do you take any medications for your illness such as digitalis? Are you aware of side effects? Have you recently stopped taking your medication? Why?

Additional history for aging adult
Environment
- Does your home have any stairs? How often do you need to climb them? Does this have any effect on activities of daily living?

Objective Data: Cardiovascular Assessment

Preparation
- To evaluate carotid arteries, person can be sitting
- To assess jugular veins and precordium, person should be supine with head and chest slightly elevated
- Stand on the person's right side; this will facilitate your hand placement and auscultation of precordium
- Room must be warm, chilling makes person uncomfortable and shivering interferes with heart sounds
- Take scrupulous care to ensure quiet; heart sounds are very soft, and any ambient room noise masks them
- Ensure woman's privacy by keeping her breasts draped
- Woman's left breast overrides the part of area you will need to examine; gently displace breast upward, or ask the woman to hold it out of the way
- When performing a regional cardiovascular assessment, use this order: pulse and blood pressure, extremities, neck vessels, precordium
- Logic of this order is that you begin observations peripherally and move in toward heart

Equipment needed
- Marking pen
- Small centimeter ruler
- Stethoscope with diaphragm and bell end pieces
- Alcohol wipes to clean end piece

Neck vessels
- Palpate carotid artery
- Yields important information on cardiac function
- Palpate each carotid artery medial to the sternomastoid muscle in the neck; palpate gently
- Palpate only one carotid artery at a time to avoid compromising arterial blood to the brain
- Feel contour and amplitude of the pulse

- Normally contour is smooth with a rapid upstroke and slower down stroke, and the normal strength is 2+ or moderate
- Findings should be same bilaterally
- Auscultate carotid artery
- For persons middle-aged or older, or who show symptoms or signs of cardiovascular disease, auscultate each carotid artery for presence of a bruit
- This is a blowing, swishing sound indicating blood flow turbulence; normally none is present
- Lightly apply bell of the stethoscope over carotid artery at three levels: Angle of jaw, midcervical area, Base of neck
- Auscultate carotid artery
- Avoid compressing artery because this could create an artificial bruit, and could compromise circulation if carotid artery is already narrowed by atherosclerosis
- Ask the person to take a breath, exhale, and hold it briefly while you listen so that tracheal breath sounds do not mask or mimic a carotid artery bruit
- Holding breath on inhalation will also tense levator scapulae muscles, which makes it hard to hear carotids
- Sometimes you can hear normal heart sounds transmitted to neck; do not confuse these with a bruit
- Inspect jugular venous pulse
- From jugular veins, you can assess central venous pressure (CVP) and judge heart's efficiency as a pump
- Although external jugular vein is easier to see, internal (especially the right) jugular vein is attached more directly to superior vena cava and more reliable for assessment
- You cannot see internal jugular vein itself, but you can see its pulsation
- Position person supine anywhere from a 30- to a 45-degree angle, wherever you can best see pulsations
- In general, the higher the venous pressure, the higher the position you need
- Inspect jugular venous pulse
- Look for pulsations of internal jugular veins in area of the suprasternal notch or around origin of sternomastoid muscle around clavicle
- You must be able to distinguish the internal jugular vein pulsation from that of carotid artery
- It is easy to confuse them because they lie close together
- Estimate jugular venous pressure
- Use the angle of Louis as arbitrary reference point, and compare it with highest level of venous pulsation
- Hold a vertical ruler on sternal angle
- Align a straight edge on ruler like a T-square, and adjust the level of horizontal straight edge to level of pulsation
- Read level of intersection on the vertical ruler; normal jugular venous pulsation is 2 cm or less above sternal angle

- State person's position, e.g., "internal jugular vein pulsations 3 cm above sternal angle when elevated 30 degrees."
- Estimate jugular venous pressure
- If you cannot find internal jugular veins, use external jugular veins and note point where they look collapsed
- If venous pressure is elevated, or if you suspect heart failure, perform hepato-jugular reflux
- Position person comfortably supine and instruct him or her to breathe quietly through open mouth
- Hold your right hand on right upper quadrant of person's abdomen just below the rib cage
- Watch level of jugular pulsation as you push in with your hand
- Estimate jugular venous pressure
- Exert firm sustained pressure for 30 seconds
- This empties venous blood out of liver sinusoids and adds its volume to venous system
- If the heart is able to pump this additional volume (i.e., if no elevated CVP is present), jugular veins will rise for a few seconds, then recede back to the previous level

Precordium

- Inspect anterior chest
- Arrange tangential lighting to accentuate any flicker of movement
- Pulsations: you may or may not see apical impulse, pulsation created as the left ventricle rotates against the chest wall during systole
- When visible, it occupies the fourth or fifth intercostal space, at or inside mid clavicular line
- Easier to see in children and in those with thinner chest walls
- Palpate apical impulse
- Localize apical impulse precisely by using one finger pad
- Asking the person to "exhale and then hold it" aids examiner in locating pulsation; may need to roll person midway to left to find it; note that this also displaces apical impulse farther to left
- Palpable in about half of adults; is not palpable in obese persons or in persons with thick chest walls
- With high cardiac output states (anxiety, fever, hyperthyroidism, anemia), apical impulse increases in amplitude and duration
- Palpate across precordium
- Using palmar aspects of your four fingers, gently palpate apex, left sternal border, and base, searching for any other pulsations
- Normally none occur
- If any are present, note timing
- Use carotid artery pulsation as a guide, or auscultate as you palpate

- Percussion
- Used to outline heart's borders, but its use has often been displaced by chest x-ray or echocardiogram
- Much more accurate in detecting heart enlargement
- When right ventricle enlarges, it does so in anteroposterior diameter, which is better seen on x-ray film
- Also, percussion is of limited usefulness with female breast tissue or in an obese person or a person with a muscular chest wall
- There are times when your percussing hands are only tools you have with you
- When you need to search for cardiac enlargement, place your stationary finger in person's fifth intercostal space over on the left side of the chest near anterior axillary line
- Slide your stationary hand toward yourself, percussing as you go, and note change of sound from resonance over lung to dull over heart
- Precordium
- Normally, left border of cardiac dullness at midclavicular line in fifth interspace and slopes in toward the sternum as you progress upward so that by second interspace border of dullness coincides with the left sternal border
- Right border of dullness normally matches sternal border
- Precordium-Auscultation
- Identify auscultatory areas where you will listen; these include four traditional valve areas
- Valve areas are not over actual anatomic locations of valves but sites on chest wall where sounds produced by valves are best heard
- Sound radiates with blood flow direction; valve areas are:
- Second right interspace: aortic valve area
- Second left interspace: pulmonic valve area
- Left lower sternal border: tricuspid valve area
- Fifth interspace at around left midclavicular line: mitral valve area
- Do not limit your auscultation to only four locations
- Sounds produced by valves may be heard all over precordium
- Thus, learn to inch your stethoscope in a rough Z pattern, from the base of the heart across and down, then over to apex; or start at apex and work your way up
- Although all heart sounds are low frequency, diaphragm is for relatively higher pitched sounds, and bell is for relatively lower pitched ones
- Before you begin, alert person that you always listen to heart in a number of places on chest, and just because you are listening a long time does not necessarily mean that something is wrong
- After you place stethoscope, try closing your eyes briefly to tune out any distractions
- Concentrate, and listen selectively to one sound at a time

- Consider that at least two, and perhaps three or four sounds may be happening in less than 1 second
- You cannot process everything at once
- Begin with diaphragm end piece and use following routine
- Note rate and rhythm
- Identify S_1 and S_2
- Assess S_1 and S_2 separately
- Listen for extra heart sounds
- Listen for murmurs
-

Aging adult

- Gradual rise in systolic blood pressure common with aging
- Diastolic blood pressure stays fairly constant with a resulting widening of pulse pressure
- Some older adults experience orthostatic hypotension, a sudden drop in blood pressure when rising to sit or stand
- Use caution in palpating and auscultating carotid artery
- Avoid pressure in carotid sinus area, which could cause a reflex slowing of heart rate
- Also, pressure on carotid artery could compromise circulation if artery is already narrowed by atherosclerosis
- When measuring jugular venous pressure, view right internal jugular vein
- Aorta stiffens, dilates, and elongates with aging, which may compress left neck veins and obscure pulsations on the left side
- Chest often increases in anteroposterior diameter with aging
- This makes it more difficult to palpate apical impulse and to hear splitting of S_2
- S_4 often occurs in older people with no known cardiac disease
- Systolic murmurs common, occurring in over 50% of aging people
- Occasional premature ectopic beats are common and do not necessarily indicate underlying heart disease
- When in doubt, obtain an ECG
- However, consider that ECG only records for one isolated minute in time and may need to be supplemented by a test of 24-hour ambulatory heart monitoring

Abnormal Findings:

Systolic Extra Sounds

- Ejection click
- Aortic prosthetic valve sounds
- Midsystolic click

Abnormal Findings:
Diastolic Extra Sounds

- Opening snap
- Mitral prosthetic valve sound
- Third heart sound
- Fourth heart sound
- Summation sound
- Pericardial friction rub

Abnormal Findings:
Abnormal Pulsations: Precordium

- Thrill at the base
- Lift (heave) at the sternal border
- Volume overload at the apex
- Pressure overload at the apex

Abnormal Findings:
Congenital Heart Defects

- Patent ductus arteriosus
- Atrial septal defect
- Ventricular septal defect
- Tetralogy of Fallot
- Coarctation of the aorta

Abnormal Findings:
Murmurs Due to Valvular Defects

- Midsystolic ejection murmurs
- Aortic stenosis
- Pulmonic stenosis

Pansystolic regurgitant murmurs

- Mitral regurgitation
- Tricuspid regurgitation

Abnormal Findings:
Murmurs Due to Valvular Defects
Diastolic rumbles of atrioventricular valves

- Mitral stenosis
- Tricuspid stenosis

Early diastolic murmurs

- Aortic regurgitation
- Pulmonic regurgitation

Bedside Assessment Summary Checklist
Neck

1. Carotid pulse—assess only one side at a time (should correlate with auscultation of S1)
2. Bruits
3. Jugular venous distention

Precordium

1. Heaves, lifts, thrills
2. Point of maximal impulse
3. Rate, rhythm, rate
4. Extra sounds (locations of murmurs, where is S1/2 heard best)
5. Can S1/2 be found, heard well? (If not, that is the first sign that something may be abnormal.)
6. Left-lying position or leaning forward may enhance sounds.
7. Study history/prior data to ensure that findings are a change from before.
8. Note when certain medications are given to determine related affects.
9. Listen with bell and diaphragm

Appendix I: Situation, Background, Assessment and Recommendation (SBAR) Communication

S = Situation and includes introduction of the nurse and client/setting.

B = Background and includes the presenting complaint and relevant history.

A = Assessment and includes current vital signs and other information.

R = Recommendations and includes an explanation of why you are calling or a suggestion about which action should be taken.

Appendix J: Result of the After Simulation Experience-Feedback From Nurse Participants

After Simulation Experience Questions	
Q1 Enjoy working with Simulation Mannequin, yes or no and why	**Yes, reasons provided were:** • develop critical thinking in a safe environment • able to evaluate strength and weaknesses, better assessment skills and intervene properly, improve communication especially history taking • helps interact with real patients and provide opportunity to learn and grow as healthcare practitioner • helps interact with real patients and provide opportunity to learn and grow as healthcare practitioner • allow to visualize a real person and imagine how a real situation will be • able to experience close to real life situations • allow me to critically think on my feet, how to communicate effectively and how to do focus assessment, proper overall assessment, history taking to come down to a possible diagnosis • gave me some experience how to act during emergency situations • it gave a great hands on experience allowing mistakes and improvement • I was able to experience the real situation that can happen to my patient • I feel as it I have learned a lot • demonstrates signs and symptoms as a real life patient or event • simulation mannequin gave me the opportunity to make mistakes and learn proper assessment, intervention and skills to assist the patient • by working with the mannequin I was able to get some hands-on practice, have a feel for what my job entails and also I was able to retain a lot more information • it was a learning experience sometimes the mannequin will malfunction as in no pulse can be

	felt but trying to diagnose them even though stressful was educational • sessions are very real, improved my critical thinking, as well as how to prioritize my patient, recognize changes and act quickly in order to achieve better outcome • I enjoyed working with the simulation mannequin because the scenarios were as if it was a real patient. I am very more prepared to start my clinical rotations • because it gives you the idea about the real world, how important a good assessment and need to listen to your patient • learned a lot about the importance and benefits of working in a team • gives us the opportunity to see and have better feeling of the situation we will face once we start the hospital, gives us the opportunity to practice and learn skills, experience life situations and learn from our mistakes • it makes think and it feels like you are in a real situation • I felt like I was almost dealing with a real person • it was a great experience working with fellow nurses, experience EMT, professors and simulation mannequins to help with my critical thinking skills • enough time was given with mannequins 1-2 hours wasted in the morning that could have been used for doing/reviewing relevant material • It is a great learning experience to practice scenarios with mannequins rather than people's lives • provided a great learning experience to practice nursing interventions on realistic scenarios that we encounter in the clinical setting • able to participate with scenarios that I might experience one day • it gave me the chance to use my knowledge in nursing interventions especially how to put IV's and how to use IV pumps etc… • I obtain knowledge on what I need to do during certain emergencies • even those mannequins not shows more signs and symptoms but the organization is well organized and maintained with them I could see where is my weakness • have most of the characteristics of a human i.e. lung and breathe sounds, heart, etc.

	• very good preparation as well as learning from my mistakes and those of others. This will reinforce so as not to make similar mistakes in the future • they were real to a life situation • simulations allowed us to learn how to properly treat and identify the signs and symptoms associated with cardiovascular disease, as well as proper diagnostic testing and procedures **No response, reason/s provided: (1 out of 35)** • No, although I appreciate the experience it was difficult to actually work with the Sim because it was not easy to identify certain symptoms relevant to whatever disorder was being simulated and if we did't ask for that symptom we would not know it was present
Q2 Improvement of assessment skills, yes or no and how	yes, help recognize important symptoms and act accordingly yes, good assessment requires good history taking, knowledgeable on what kind of questions to ask and how to ask them yes, help ask more thorough questions yes, was given constructive advice from performance with the mannequin, able to improve mistakes or corrections during codes or scena yes, was able to assess rhythm and intervene with necessary action yes, emergency situation stay calm and pay attention sign and symptoms, diagnose assess as possible, time is a must yes, there are certain protocols that must be followed with chest pains and my skills improved with dealing with chest pain yes, because we went over and over the assessment of patient with chest pain during different scenarios yes, it gave good insight and appropriate steps to take when encountering a patient with chest pain yes, I was able to see and critically think of what to do and able to see the changes the patient experience yes, by allowing us to use critical thinking yes, I know what to do during any time a patient complains of chest pain (oxygen, nitro, aspirin, morphine) yes, the experience allowed me to focus on signs and symptoms of chest pain to provide timely and effective interventions yes, helped me to better assess my chest pain patient, what to expect and what my interventions should be yes, feel more confident on the steps to take to help my patient yes, chest pain has a wide variety of causes but if we recognize on time other symptoms associated it will help differentiate a life threaten my experience did definitely improve when assessing patient with chest pain. I understand now that many patients might have chest pain We have to treat and assess each patient individually. I believe it did enhance my assessment skills yes, how to treat a patient with chest pain and important to do a good assessment, ask proper questions yes, I learned to identify rhythm as well as presenting symptoms Definitely, I have better understanding of the treatment plan and shy we do certain things. It teach us how to critically think the steps of t first for the sake of our patients yes, by knowing the symptoms and how to react as quickly as possible can save someone's life yes, chest pain is a big concern, my skills have a lot improve knowing that is this issue is not taking care rapidly it can be fatal

	yes, I am more quick to respond to change in patient status and my interventions to stabilize them in a timely matter but with continuous more comfortable and confident
	yes, become better at giving in depth assessment and I am now able to ID key signs and symptoms of heart disease and chest pain
	yes, I learned to ask more questions to find the underlying cause of any discomfort or chest pain. Though the ONAM acronyms I was abl the right treatment until more helped arrived
	the experience improved my assessment skills for patients dealing with chest pain by allowing us to practice our assessments with instruc
	yes, more attention to details especially history before give Nitro to a patient
	yes, it gave me the chance to learn how to react as fast as possible
	yes, I learned to ask better focused questions
	yes, definitely, active listening and act fast
	yes, listen to patient and ask the most relevant question
	It did. I was informed of proper head to toe assessments as well as correct questions to ask
	yes, I learned a lot regarding assessment, vital signs and ECG changes
	before simulations I would not have been prepared of what to expect; with simulations I feel much more confident in assessing patients a
Q3 Improvement of Communication skills, explain (with patient and physician)	yes, practice different ways with patient going through different situation and help improve SBAR
	yes, learned open-ended questions and SBAR with physicians
	yes, more comfortable interacting with patients and other health care practitioners
	yes, was given advice on how to improve talking to patient and physician and help get better with communicating
	yes, able to play in front of our peers and instructor help build my confidence improved assessment and repeat practice makes it better
	yes, communication skills enhanced
	it made me to communicate with patients and physicians almost as the real world, I think I will be more considerate now
	yes, both patient and physician communication was improved. The importance of using SBAR during physician communication was grea
	yes, to be more understanding to the patient and collect all my information prior to calling a physician about my patient
	yes, know how to ask assessment questions and when to call doctor and what to say during SBAR
	yes, I improved my communication because I now know what to say and what not to say to patients and physicians, professional at all tin
	it improved my communication skills with patient but making more aware of treating the patient and not the machinery
	yes, I learned how to better communicate then SBAR to physician. Report every pertinent information. I also learned to ask or to do a goo in the process of diagnosis
	with patient yes though I might need to practice more, with the physician I know I need to gather all my necessary information before cal with SBAR
	yes, improved communication with patients, especially to explain procedures and interventions with right words for better understanding, I have learned to ask more questions and not just to assume what patient might have. More comfortable talking with doctor and providing organized and prepared when giving SBAR. It did, from repetitive simulation
	the experience improve my communication with patient, it makes ask the proper question during assessment
	yes, gave me the confidence to speak up about something even if I was unsure
	yes, it made me more confident in my communication by practicing what to ask, how to ask, and the appropriate interventions

	yes, because the SBAR is very effective method to use yes, talking in public is my biggest weakness. Now, I feel a bit more confident when communicate with others yes, increasingly because before it was a little intimidating approaching the physician but with the use of SBAR and read-back. I have mo and fellow colleagues yes, learned how to properly use SBAR during rap-up and how to better summarize information yes, knowing what to ask the patient and what to tell the doctor has improved the experience improve my communication skills with physicians because I was able to practice giving SBAR reports. It allowed me to p assessment questions to my patients yes, yes, specially with SBAR, what to do and what not to do yes, using the appropriate question styles as well as learning how to use a correct SBAR yes, having some knowledge helps me to know what questions to ask and recommendations to physician yes, active listening and act fast yes, Practicing SBAR, ask patient questions follow-up and reassess I don't think we can assess proper communication with patients becau in real life and are simulations yes, I also learned how to use SBAR correctly still working on communicating with patients, I do feel my SBAR has improved. Knowing what the pertinent information from both sul imperative in painting the picture of how the patient presents to the physician so that correct orders can be implemented
Q4 On post simulation feedback was it helpful confirming proper assessment and communication	yes, able to evaluate myself regarding assessment and communication with patients yes, feedback help me identify areas of further improvement and what further do or avoid in the future yes, place to learn and make mistakes, once you make mistake you learn from it and never make mistake again yes,during assessment and communication properly asking the right questions helps to know what to do next and help treat patients properly yes, able to see what improvements was needed practice makes it perfect yes, I had the opportunity to analyze my mistakes it was helpful confirming proper assessment and communication. It provided good feedback and areas for improvement I now can able to do an assessment in a timely manner yes, after training it was helpful yes, proper assessment helps you rule out probable causes and proper communication help build rapport with the patient yes, allowed me to refer to what was missing and a necessary tool to better intervene with patient treatment yes, whatever I have missed during my initial assessment, the instructors confirmed the proper way to do so. Also whatever I have forgo my instructors made sure I understand why is it important yes, some questions that we did not ask the patient that could make the diagnosis quicker and provide proper treatment yes, very helpful to go back and analyze what was done right or wrong It was very helpful just to look back and see what we have missed This helped me better remember on how to better take care of future patients I find very helpful it gives you opportunity to improve in your weak point yes, I was able to see how getting important assessing and getting initial information from a patient good and constructive opinion and criticism are great tools to proper growth and learning. I truly appreciate the feedback session yes, it help to recognize where my weakness are

	yes, it give you the opportunity to see what your weakness are and what you can improve in before you work with live patients
	yes, during feedback session we were able to go over weak points and find areas of improvement to better ourselves
	yes, seeing where I can improve has helped
	the post simulation feedback sessions allowed me to improve my performance in the simulations
	yes, I realized how important little things can be for example proper physical assessment can help RN mistreat sepsis due to a lack of phy
	yes, it did allow me to collect all my information and put all the puzzles together in order to come up with an accurate diagnosis
	yes, we learn from our mistakes
	makes me aware of what my jobs will be once on the floor
	yes, valuable
	I agree with confirming proper assessments after the simulation. If proper assessment was done it provided clues to manage the case prop
	yes, I found it very helpful to go over the correct rationale and I learned from my mistakes
	helpful because it provides new nurses both with constructive criticism and proper ways to deal with a patient in a given scenario. It also
Q5 Areas that require improvement	sim mannequin is excellent as it is
	None
	None
	all was quite thorough
	None
	it was perfect
	I appreciate the feedback but I wish it would be more detailed, but I understand there not so much time for detailed expectation of each m
	simulations are run pretty well, there isn't much areas I saw that need improvement to hear lung sounds sometimes can be difficult if spen
	none, it was all great
	simulation mannequin was functioning great times but sometimes difficult to hear lung and bowel sounds at times
	some of the mannequins were not working correctly
	none really, I just think sometimes it is hard to listen to bowel sounds on the mannequin
	some of the mannequins are easier to access and also perform CPR on. Some of the chest felt like a brick wall
	in my opinion, simulation covers well area of knowledge. It’s very organized session and have good scenario representation Everything s
	It was difficult to think of mannequin as a person and not a doll
	No
	interventionist, I need to know which supplies to gather when hanging bags or putting an IV so that I'm not going back and forth
	I need to improve my SBAR communication and also my reaction time to patients change of status
	None
	IV insertion
	nothing, I feel the simulation lab has the most innovating technology and real life situation possible for us to do at this time
	Nothing

	identifying correct heart and lung sounds from the mannequin noises simulations might be improved with better communication among t
	Lung and cardiac sounds not easy to listen and recognize them on them
	none. I think it was very helpful and simple. I don't think it needed improvement
	no suggestions
	make the person behind the mannequin less dramatic
	no improvement
	the respiratory and abdominal sounds were not the clearest, maybe a class on respiratory sounds would have been helpful
	None
	At times, the mannequins malfunctioned, other than that, simulation was very good and informative
Q6 At any time did you felt lost during simulation	yes felt lost but as started working more, felt more comfortable
	in the beginning felt lost because do not know what to expect and how to use the equipment
	yes, knowing what appropriate interventions to use and communicate effectively with physicians
	sometimes, tried to learn how to understand scenario better post case wise and learn from it in the future
	No
	yes, some of them simple complains, and if you do good assessment you can't diagnose the patient
	yes, especially during the first 2 days, I was not able to keep up with the very fast report, it was so fast for my English language skills
	the only time I felt lost was playing the role of interventionist getting in the IV takes concentration and by the time you look up so much l
	no, I was able to follow
	no, all was explained well, they were so very helpful
	it would be great to know what diseases we would be doing prior to sim just to review a little bit and be prepared
	yes, there were times when different instructions advised conflicting interventions
	yes, there were times we were lost but because we focus on one thing instead of the whole scenario
	in the beginning when I did not know the treatment for the rhythms
	no, never, they always were organized
	At time I did feel lost because everything was happening. For example when I was the interventionist by the time I had put the IV in the p
	I felt lost every day because we were never aware of what diseases we would be doing on that day. If we were provided that and were abl would not have been clueless in simulations.
	Overall it was a good experience
	No
	no, unless the team wasn't communicating
	At the beginning I did feel lost because I didn't know what was expected. I didn't know if we were supposed to actually perform the skills
	No
	yes, sometimes under stress when too many people are talking at the same time can be disruptive

	During the first weeks learning ACLS and understanding rhythms and what critical interventions needed to be done quickly. Over the tim can now identify basic rhythms and what steps I need to take immediately yes, sometimes dialogue was not clear and information was vague In the beginning, more than anything was not sure exactly what to do in certain cases on how much we are allowed to do when calling re sometimes it was challenging to decide on the appropriate interventions for a particular case Of course, things happen too fast, I was unsure of what to do as a priority. But over all I learned a lot No No Oh yes! Especially when you do not know what to do. On the cardio week, I didn't know what to do next, when to call MD, etc… No there were times which I and the group felt lost even when we were providing the proper treatment but the patient would die anyway No yes, I felt lost a lot of times especially when I did not understand EKG's after learning EKG's and ACLS, I feel more confident in how to work in teams to carry out CPR and advance life support in crisis
Q7 Have you gained knowledge and skills in meeting the objectives (cardiovascular assessment and SBAR communication)	yes, improved in knowledge,skills (cardiovascular assessment and SBAR communication) yes, improved in knowledge,skills (cardiovascular assessment and SBAR communication) yes, improved in knowledge,skills (cardiovascular assessment and SBAR communication) absolutely, felt evrything learned simulate the real thing was very helpful Yes Yes Yes yes, I would love to do more sim cardiovascular assessments were definitely improved along with CPR and ACLS skills yes, I am more proficient or somewhat on SBAR communication and with physician yes yes simulation has given me more confidence in initiating an appropriate cardiovascular assessment and SBAR communication to the physici yes, thorough assessment is crucial in the diagnosis of patient condition, focusing in the whole picture, not just one thing, all objectives w I learned to properly communicate with physician,patient and family Yes yes, I have gained knowledge and have met my expectations from this course, I have improve in general assessment tools and interventio I have definitely improved my skills when dealing with patients with cardiovascular problems, providing SBAR and communicating with and patients

	Yes Yes Yes Definitely gained more knowledge, this program helped me reinforce what I knew and helped me learn and gain more confidence Yes there always be place for improvement but over all I have gained knowledge yes, the protocols and usage of SBAR was very helpful and I feel more competent in what is expected from me when I get on the unit Yes more knowledge on cardiovascular head to toe assessment and SBAR I gained a vast amount of knowledge and skills from the simulation that helped me meet the objectives yes, assessment, proper intervention (treatment) and for sure SBAR Yes Yes Yes yes I am very happy to have been prepared even though it puts you in an uncomfortable situation. It is better to be put in this situation her Yes I have gained knowledge by working in teams, listening to instructors and watching the scenarios and critiquing myself during the simula ways to improve on assessments and communicating with patients and families
Q8 Any missing elements that could have made the simulation more effective in meeting the objectives	yes, covered important areas that improvement is needed more equipments, procedures and skills No seemed to have been researched and analyzed by the staff well enough No No I believe simulations met all my expectations detailed explanation of each mistake No No No just reviewing symptoms prior to sim would have helped us understand the scenario much better maybe focusing explaining possible interventions prior to the cases No yes, just time being new nurses even though we learn the treatments we want to make sure that were treating the right symptoms. The ma have enough time to process no, all areas were met

	I believe simulations were effective when meeting objectives handouts describing the cases so that we could review them at home while v a simulation schedule so that we could review the topics covered for the simulation day
	no, everything just perfect, wish I can spend more time in simulation, great experience if the mannequins did not work properly it made certain things difficult and if we could actually do more interventions instead of simulate them it would be great
	Not applicable
	No
	I feel that the simulation were effective enough
	yes, more time working in real time doing head to toe assessment, charting, medication administration, re-demonstration, the real world s
	no that I know of
	More time to give SBAR
	No
	not knowing proper treatment for some situations such as alcohol withdrawal
	No
	No
	None
	No
	Can't think of anything at the moment
	everything was great
	simulations were very effective as stated in question 5, sometime the mannequins would malfunction but we all improvised to carry out th
Q9 Was Simulation session relevant as it show usefulness of what I was learning	yes, it covers important areas in which improvement is needed
	yes, everything learned can be used in real life setting in the hospital
	yes, scenarios were based on what they learned
	yes, it was taught how the real thing will be and to prepare us
	yes, learning how to apply ACLS, rapid response and codes
	after every session, teaching us how to treat, assess, diagnose the patient was very effective teaching
	absolutely, it followed everything we learned during lecture, each simulation case was never a typical case, therefore I always had to criti
	Yes
	definitely useful it gave hands on real world approach to many issues discussed in class
	yes, it puts me more comfortable to care for my patient
	yes, we had modules, classroom lecture and they gave us the simulation session it all came together, it was great!

	yes, it was relevant in learning what to do in different scenarios
	yes, it was relevant in showing what real life cases can be like with the aid of mannequins
	yes, very useful to what I was learning. It made some stuff easier to retain. Practice make for better knowledge
	I know how to treat certain symptoms and also what not to do
	yes, scenarios were excellent, as well as presenting the symptoms. Also equipment utilized were very helpful
	simulation were very useful, I have learned to put into practice my knowledge. I feel more prepared to start my clinical
	the simulations and lectures were not in sync
	when I work in simulation though I know it all, but I was surprise how much that I don't know
	yes, simulation targeted all the common diseases we will see in the hospital
	yes, we had modules that were supposed to do at home and study
	Yes
	yes, the simulation reflect to me at a certain point what I believe I will face at the hospital settings
	yes, MI, stroke, CHF are very relevant condition we will face in the hospital setting and getting our hands wet will help with how we now
	yes, helped go over Acute Care scenarios in a safe setting
	yes, scenarios will be seen in the hospital setting
	yes, the simulation often correspond to the material we were learning in lecture
	for sure impact me as a RN on how to assess and treat situations that requires quick interventions
	I definitely learned how to use my learning skills throughout simulation session. Knowing how to treat different diseases (intervene as a r
	yes, doing the different algorithm will help improved my skills during emergency situations
	Yes
	yes, repetition
	very much so as those are the most likely situations that will be seen in the hospital
	Yes
	yes, every case scenario during simulation was well thought out. Simulation was the missing piece to what I did not experience in nursing
Q10 Any comments	greatly benefit nursing students and new graduates
	None
	None
	thank you for all the help
	none
	None
	loved it, Sim's is an ideal environment to groom and equip new nurses for the real world
	thank you for everything I really appreciate the opportunity to be here and learn so much

	No I had a great time took away lots of doubt and fear that I may have or had I feel the first couple of weeks I will be ready No None None I feel very grateful with simulations, I think it has definitely giving me on step ahead in my career I enjoyed participating in the simulations. I'm thankful that I'm more prepared to start the clinicals in the hospital Not applicable great simulation experience over all I would like to truly thank you every single person who took time to teach and to share their knowledge with me during this program. I tr minute of your time. Thanks to help me prepare to be the best nurse that I can be No No Thank you for having me and I am truly thankful for everyone's efforts to making me a better nurse No great experience the sim lab is a great environment for health professionals to practice their critical thinking skills and learn not applicable not applicable No I am not expected to be the same, on the hospital floor, but I love simulation No everyone in the lab was great and friendly. I truly enjoyed being here simulations as well as the taping of simulations is a great way for new nurses to learn through mistakes and learning from others