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Implementation of Best Practice of Simulation Design

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by

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Abstract

The use of simulation has increased in the academic setting. The placement for nursing students for clinical sites has become increasingly difficult. In order to meet the demands of clinical sites, State Boards of Nursing have created standards where simulation can replace clinical rotation. Most State Board of Nursing require the school of nursing to meet the International Association for Clinical Simulation and Learning (INACSL) Standards of Best Practice: Simulation[SM,] use a theory for debriefing, and show proof of current simulation education for the educators. The Simulation Design project implemented the National League for Nursing (NLN) Jeffries Simulation Theory, the INACSL Standards of Best Practice: Simulation Design, and Debriefing with Good Judgment to a cohort of 43 pre-licensure nursing students in a medical-surgical laboratory course. The project was implemented in a private university in the southeastern part of the United States. The Simulation Design project consisted of educational sessions for the facilitators, three pilot sessions, and three new and revised simulation-based experiences. The NLN Simulation Design Scale was a five point Likert-type design scale with one being strongly disagree with statement and five strongly agree with statement. The participants completed the survey after each simulation-based experience. The analysis revealed there were no significant differences between the simulations except in the category of fidelity (realism). The project administrator believed this was due to using participants as the client's parent, spouse or as a lab technician.

The Simulation Design project will continue to be implemented throughout all courses in the pre-licensure School of Nursing program in order to meet State Board of Nursing requirements and INACSL standards.

Acknowledgements

"Surely God is my salvation: I will trust and not be afraid. The Lord, the Lord is my strength and my song; he has become my salvation." Isaiah 12:2

Without my heavenly Father beside me every day I am unable to accomplish anything. He has sustained me, given me peace, wisdom, support, and surrounded me with people who have supported me as well. I delight in Him!

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SECTION I

Introduction

Simulation has been used to assist learning in the healthcare field for many years.
Some of the earliest usage of a mannequin was Resusci Anne by the Laerdal Company in
1960 for healthcare providers to practice cardiopulmonary resuscitation (CPR) (Cato,
2012). Today, there are low, medium, and high-fidelity mannequins for educators to use
in simulation. The military has been at the forefront at using high fidelity simulations to
train their medical providers. Anesthesiologists were one of the first healthcare fields to
incorporate simulations in education and encouraged other disciplines to use simulation
as well (Waxman, 2010). From 1999, using high fidelity simulation in nursing has
become significantly more popular. As the popularity of using high fidelity simulation in
nursing grew, several new organizations for simulation also developed. The International
Nursing Association for Clinical Simulation and Learning (INACSL) and The Society for
Simulation in Healthcare (SSH) are two of the main simulation only organizations. The
National League for Nursing (NLN) has developed an online site called Simulation
Innovation Resource Center (SIRC), providing education and support online. The NLN
has supported simulation research and a new simulation theory. In 2010, the Board of
Directors of INACSL began the task of developing standards of best practice for
simulation (Sittner et al., 2015). In 2011, the Board of Directors submitted the first
INACSL Standards of Best Practice: Simulation[SM]. There were seven standards and each
included a standard statement, rationale, outcomes, and criteria (Sittner et al., 2015). In
2013, INACSL added guidelines to the seven standards. In 2015, two new standards
were added. A third edition to the INACSL Standards of Best Practice: Simulation were
released in December 2016. The newest edition to the standards has a new format, no

numbers, and different titles (Sittner, 2016). INACSL has a task force to oversee the

revision and additional guidelines in the future (Sittner et al., 2015). The Society for

Simulation in Healthcare has created standards for certification of healthcare simulation

educators and the accreditation of simulation centers ("A vision for teaching", 2015).

The standard when using simulation in nursing education is to incorporate

evidence-based standards into the practice of simulation ("A vision for teaching", 2015).

The standards provide a base for tactical planning for a simulation program, research, and

educational opportunities to enrich faculty in simulation standards and abilities.

Implementing these in a simulation program provides reliability and consistent

simulations (Rutherford-Hemming, Lioce, & Durham, 2015).

Several large nursing studies have supported simulation as an effective means for

increasing knowledge, performance skills, critical thinking, clinical reasoning, and

patient safety (Alexander et al., 2015). The largest and most comprehensive study by the

National Council of State Boards of Nursing (NCSBN), provides confidence when

faculty are properly trained in simulation and simulation follows the standards of

INACSL, that up to 50% of simulation can be substituted for pre-licensure clinical

experiences and promotes outcomes similar to traditional clinical experiences (Hayden,

Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014).

INACSL Standards of Best Practice: Simulation: Simulation Design provides a

framework for developing effective simulation experiences. This standard incorporates

many of the other standards in the design in order for the simulation experience to meet

the outcomes for the simulation program to be reliable. INACSL Standards of Best

Practice: Simulation: Simulation Design includes adult learning methods, needs

assessment, education for the faculty, learning objectives, instructional design or

templates for the scenario, clinical standards of care, and evaluation of the simulation (INACSL Standards Committee, 2016, Dec.).

Simulation provides a learning environment replicating crucial practice situations for pre-licensure nursing students. Simulation is also a way to keep up with the increased difficulty in access to clinical sites, technological advances in health care delivery, and the increase in the complexity of patient care ("A vision for teaching", 2015). It is extremely important to have quality simulation experiences throughout the pre-licensure nursing program.

Problem Statement

There is inadequate compliance with INACSL Standards of Best Practice: Simulation: Simulation Design for scenario development and implementation. This capstone project addressed this problem by following the criteria of the INACSL Standards of Best Practice: Simulation: Simulation Design. There are 11 criteria in this standard (INACSL Standards Committee, 2016, Dec.). Implementing these criteria will lead to quality simulation experiences for both the educators and the pre-licensure nursing students.

Problem Recognition

Evaluating the current simulation design at the project location, using both INACSL Standards of Best Practice: Simulation: Simulation Design and the NLN Jeffries Simulation Theory, it was found that the simulations needed to be modified in order to have clarity in the learning objectives. Learning objectives need to be clear and concise in order to heighten the students' learning. Developing clear, concise learning objectives is the first step in the development of the simulation design (Waxman, 2010).

Each simulation scenario needs to meet both the evidence-based standards, state board requirement, and theory-based standards. In order to ensure all of the standards are met, a tool needs to be used that incorporates all of these standards. As each scenario is developed, the tool will assist the developer to include all of the information. The tool will assist with accreditation visits to validate the simulation scenario meets the standards (Waxman, 2010).

The education of faculty in simulation methods is the most important part of the design of simulation scenarios. It is critical for those who will design, implement, and debrief to have adequate and theory-based knowledge and skills (Jeffries, Dreifuerst, Kardong-Edgren, & Hayden, 2015; Waxman, 2010).

Educators need to be skilled in a theory-based debriefing method. Debriefing after a simulation is a time where the students are able to self-reflect and learn how to critically think about the actions and interventions in the simulation. The educator needs to be skilled in directing the students to this level of reflection. This takes education, feedback, self-reflection, and mentoring from peers with more experience (Jeffries et al. 2015; Waxman, 2010)

briefing in a different manner. According to Simulation Design, criterion seven, briefing is to be planned and is to be consistent from one facilitator to another (INACSL Standards Committee, 2016, Dec.). During simulation, built in cues are to assist the student when they are experiencing difficulty. These are necessary to provide consistency for all simulated scenarios (INACSL Standards Committee, 2016, Dec.). The results of the faculty survey showed inconsistency on how the faculty member responds when facilitating simulations. Criterion 11 from Simulation Design states when developing scenarios, they need to be pilot tested so they meet the intended learning goals, objectives and are effective when implemented (INACSL Standards Committee, 2016, Dec.). In the faculty survey, 100% responded the simulations had not been pilot tested prior to being implemented. Design templates are used in the development of designing scenarios and to assist in standardizing the design process (INACSL Standards Committee, 2016, Dec.). The faculty survey revealed 60% did not use a template in developing a scenario. This also revealed there is not a standardized template used in the development of scenarios.

Pre-Licensure Nursing Students

Simulation has the potential to produce learning outcomes of critical thinking, prioritization skills, clinical judgment, increased patient safety, effective communication skills, leadership skills, and basic psychomotor skills (Bambini, Washburn, & Perkins 2009; Gore, Johnson, & Wang, 2015; Ironside & Jeffries, 2010; Shin, Ma, Park, Ji, & Kim, 2014; Wane & Lotz, 2013). Standardizing simulation and/or improving the implementation of simulation can enhance the outcomes of simulation (Rutherford-Hemming et al., 2015). The faculty identified the pre-licensure nursing students' greatest need is the ability to prioritize assessments and care of the patient during simulation. The need to develop simulations and standardize the simulation with this as a main objective

would help to meet this need.

Students' mid-term surveys and end-of-year surveys revealed the need of more experience with communication with the family members on patient education and with the provider of care on patient information. Communication on patient education should be a part of safety education in every simulation as well as communicating with the provider of care.

Students' survey revealed a lack of familiarity with the equipment and surroundings in the simulation room. This should be a part of an orientation or pre-lab briefing. This is part of Criterion seven: Briefing of Simulation Design. Pre-briefing should be planned and consistent for each simulation by each facilitator (INACSL Standards Committee, 2016, Dec.).

In a student survey regarding simulation, the amount of required interventions, skills, and tasks they were required to complete in a 15-20-minute simulation led them to not be able to focus on thinking. Instead they were focusing on getting through as many skills or tasks as possible. This is a result of having too many objectives for a simulation. Redesigning the simulations with a theory-based framework, for a specific purpose and measureable objectives, will lead the students to use critical thinking and clinical judgment skills rather than being task oriented (INACSL Standards Committee, 2016, Dec.).

In Simulation Design, part of the design process is to complete a needs assessment. Evaluating the pre-licensure student surveys, regulatory guidelines, data from evaluations, organizational analysis, and assessing all the course outcomes and the levels of learning is a part of the needs assessment (INACSL Standards Committee, 2016, Dec.). The pre-licensure students in the focus group survey expressed a desire to have

more experience with leadership skills. Adding opportunities for leadership skills when developing simulation scenarios will help meet the needs of the pre-licensure students and prepare them for post-graduation clinical experience as a registered nurse. Also in the focus group survey, the pre-licensure students noted the levels of learning are significantly higher from one semester to another. Evaluating the objectives from one course to another to ensure proper transition each semester is an important aspect of the design process.

Stakeholders

The stakeholders of this project are the faculty of the school of nursing, pre-licensure nursing students, the school of nursing, administrators of the university, investors in the university, State Board of Nursing, Accreditation Commission for Education in Nursing (ACEN), community hospitals, healthcare facilities, and people in the community. Each individual/group will be affected by this project in a different way. Each individual/group has a different interest in the outcome of the project as well.

The faculty of the school of nursing will be affected the most by this project. INACSL Standards of Best Practice: Simulation: Simulation Design has 11 different criteria to be implemented. Each of these will require the faculty to be involved in training, research, pilot testing, and evaluation (INACSL Standards Committee, 2016, Dec.). The success of the project relied on the faculty's positive involvement.

Pre-licensure nursing students were affected by the implementation of the project. High-quality simulation can produce improved critical thinking skills, performance in skills, knowledge of subject matter, and increased clinical reasoning (Alexander et al., 2015). Implementing the INACSL Standards of Best Practice: Simulation: Simulation Design incorporates several of the other standards of best practice. The current state of

simulation practice was improved by the project. The pre-licensure nursing students were evaluated throughout the change in the simulation design.

The school of nursing will be interested in the outcome of this project and hold a strong influence over this project. This project has the potential to positively affect the learning outcomes, National Council Licensure Examination (NCLEX) rates, and satisfaction rates of the pre-licensure nursing student. The nursing school has the ability to influence the faculty members to participate in this project, to assist with developing policies to support the project, and to financially support the education needed for the faculty members ("A vision for teaching with simulation", 2015).

The administrators of the university and the investors of the university will have a vested interested in this project's outcomes. The development of a high-quality simulation program leads to positive learning outcomes for the pre-licensure nursing students (Alexander et al., 2015). This leads to positive retention, positive marketing, and recruitment strategies. The recognition of a high-quality simulation program in the community area could bring recognition to the university.

Should there be a time when the university needs to use simulation to substitute for clinical hours, then the State Board of Nursing and ACEN would be interested in the process of implementation of this project and the continuation of the implementation of the standards of best practices. The State Board has specific requirements that must be met in order to substitute simulation for clinical hours. This project is a positive step in meeting those requirements.

The effects of the outcomes of this project on pre-licensure nursing students will indirectly affect community hospitals, healthcare facilities and people in the community. These are the areas and the communities where the pre-licensure nursing students will

practice when they graduate and become registered nurses (RNs). The outcomes from this project will better prepare the RNs to work in these facilities and to competently care for the people in the community (Kirkman, 2013).

Strengths, Weakness, Opportunities, and Threats

An analysis of strengths, weakness, opportunities and threats (SWOT analysis) was completed prior to the implementation of the project. There are several different strengths. According to the student's mid and end of year surveys, the faculty were very supportive of the students. This was mentioned multiple times about how faculty members supported students in their academic concerns but also in their everyday concerns as well. The school of nursing recently moved into a new facility and has adequate space and equipment for simulation and debriefing. Currently the university has two certified simulation experts in the nursing program that are available to mentor the nursing faculty. The nursing and administrative faculty are supportive for improvement in simulation design and in meeting the standards for simulation for the State Board of Nursing to use simulation for clinical replacement if needed. The university has Learning Space available for videoing simulations which is valuable for debriefing and self-reflection for both the students and faculty. Multiple electronic devices are in place to provide realism and fidelity for the simulations. The university has already invested in medium and high-fidelity mannequins for simulation.

There are a couple of weaknesses analyzed for the site and university. Intranet connectivity was reported as a problem from both faculty and student surveys. Decreased information technology (IT) support during simulation was considered a weakness from faculty per end of year survey. Lack of sufficient funding for educational needs was identified as a weakness from faculty in the end of year survey as well.

Potential opportunities identified in the analysis is the ability to provide a substitution of clinical hours with simulation. This project prepares the faculty and begins the process of meeting the board of nursing requirements for substitution. The faculty and administration are already vested in the nursing simulation program. A future potential is to provide on-site simulation educational opportunities.

Possible threats were evaluated that would hinder meeting the requirements of both the State Board of Nursing and evidence-based standards of simulation. The ongoing problems with technology could hinder video capabilities, high fidelity manikins, and fidelity. Another possible threat is faculty shortage and turnover rates. It takes several people to facilitate a simulation per standards. The time and preparation have to be considered in faculty work load. As new faculty are hired, there is an orientation process and learning phase before they would be ready to proceed with facilitating a simulation.

SECTION III

Purpose of Project

The purpose of the Simulation Design project was to provide a simulation-based experience of active learning to the participant in order for them to increase knowledge, skills, gain critical thinking skills, and improve in patient safety ("A vision for teaching with simulation", 2015; Alexander et al., 2015; Rutherford-Hemming et al., 2015). Simulation can best meet these outcomes when they have been built on a theoretical based framework and on INACSL Standards of Best Practice (Rutherford-Hemming et al., 2015). The Standards of Best Practice require a needs assessment prior to the development of simulation scenarios. This will help a nursing program to develop simulation scenarios throughout all courses to meet the needs of the participants for leadership skills, communication with providers of care and with the patients, learning how to show empathy, developing patient safety, critical thinking skills, prioritization skills, and gaining knowledge in the care of different medical conditions. Planning and developing simulation scenarios throughout a nursing program enhances the nursing organizational goals and outcomes and meets the needs of the pre-licensure nursing students. The standards for best practice in simulation design lead to increased quality, consistency, better outcomes, improved simulation programs and improved learning environment (Rutherford-Hemming et al., 2015).

Clinical site placement is becoming more difficult for schools of nursing across the United States. The length of stay of patients, high acuity levels, more schools competing for the same facility sites, faculty shortages, facilities limiting access to electronic medical records, or activity to observing care have decreased the high-quality clinical experience. Hayden et al. (2014) conducted a longitudinal study and concluded

high-quality simulation experiences could be substituted for up to half of traditional clinical hours. It is important for schools of nursing to prepare their simulation programs to meet the expectation of "high-quality" simulation. High-quality is defined as incorporating the INACSL Standards of Best Practice: Simulation (Hayden et al., 2014). In developing a high-quality program and incorporating the INACSL Standards of Best Practice: Simulation, it is recommended to begin slowly and steadily increase simulation design (Alexander et al., 2015). Not every program may be needing to supplement clinical time with simulation, but being prepared for the possibility is a very wise decision. The preparation, planning, development, education, and implementation of designing a high-quality simulation program takes more than a semester to implement.

The purpose of this project was to begin with one course to implement the INACSL Standards of Best Practice: Simulation: Simulation Design, a theory-based debriefing model, needed simulation education for the faculty, and the use of a design template to meet the required standards of best practice and the State Board of Nursing. This project is considered a pilot project for the school of nursing. At the conclusion of this project, it will be evaluated and analyzed and, if necessary, changes made so requirements can be implemented in the remaining courses and in the nursing program to meet standards of best practice and the requirements of the State Board of Nursing.

SECTION IV

Theoretical Framework

Nursing research and the development of evidence-based practice relies on the application of validated theories. The National League for Nursing (NLN) and Dr. Pamela Jeffries combined efforts to develop a theory for simulation. The simulation theory provides direction in designing a new simulation-based experience (SBE) (Jeffries, 2010). The start of the NLN Jeffries Simulation Theory began in 2003 with a simulation study "Designing and Implementing Model for the Innovative Use of Simulation to Teach Nursing Care of Ill Adults and Children: A National Multi-Site, Multi-Method Study"(Forneris & Fey, 2016). This study developed the NLN Jeffries Simulation framework (Forneris & Fey, 2016). The framework was revised three times before it was considered a theory. The NLN Jeffries Simulation Theory is the first theory specifically designed for simulation. Jeffries and the NLN knew the importance of having a theory for simulation in order to encourage and increase research in simulation. The NLN Jeffries Simulation Theory is extensively used in research and for simulation effectiveness both nationally and internationally (Forneris & Fey, 2016). The NLN Jeffries Simulation framework was used in multi-patient simulation research (Ironside & Jeffries, 2010), in preparing nurses in the graduate educator program (Young & Shellenbarger, 2012), and in the National Council of State Boards of Nursing National Simulation Study (Hayden et al., 2014).

The NLN Jeffries Simulation Theory is currently being used as a theoretical framework with the concepts leading education and practice when developing, implementing, revising, and assessing simulation (Beroz, 2017). The framework and the concepts of this theory were used in guiding and developing the new and revised SBE for

this project. The concepts of the NLN Jeffries Simulation Theory are context, background, design, simulation experiences, facilitator and educational strategies, participant, and outcomes. The concept of context impacts every part of the simulation. It includes the setting, the purpose (evaluation or instructional), and the circumstance of the simulation. Thus, the context of the simulation was an important starting point in designing a simulation and evaluating a simulation (Jeffries, Rodgers, & Adamson, 2016). In the project, the concept of context was incorporated in evaluating the new and revised simulations for their purpose and in the current curriculum setting of the course.

The definition of the concept of background pertains to goals of the simulation and specific expectations that drive the design of the simulation-based experience. Background includes how the simulation corresponds with the goals of the curriculum map. Background also includes equipment used in the simulation and the amount of time for the simulation-based experience (Jeffries et al., 2016). In the development of the project, the goals of the course, nursing program, accreditation institutions, and university were all considered as the project goals were written and reviewed. The pre-licensure nursing program did not have a current curriculum map. A time frame for each simulation and the equipment needed for each simulation were included in the simulation tool.

The concept of design includes learning objectives that will guide specific activities and/or problem-solving complexities according to the level of the student (context) in the simulation. The concept of design includes fidelity of the simulation from moulage, facilitator cues, and responses to participants' interventions, if the simulation will be videotaped, to briefing/debriefing strategies. The participant, observer, and standardized patient roles are all determined in the design concept as well (Jeffries et al.,

2016). During the project development phase learning outcomes were developed to meet

the learning level of the participant. The design of the SBE was then developed from the

learning outcomes. A participant observer was used as a family member and as a

laboratory collection personnel in several scenarios. Briefing and debriefing strategies

were planned and education was implemented for the facilitators.

The concept of simulation experience was an environment that includes

experiential, interactive, collaborative, and learner-centered. The simulation experience

was conducted in an environment of trust between the facilitator and the participant. It is

imperative for the participant to suspend disbelief. By suspending disbelief psychological

fidelity was created (Jeffries et al., 2016). In the development of the project, education on

briefing, stressing the importance of a fidelity contract, and creating and revising SBE to

ensure they were experiential, interactive, collaborative, and learner-centered were

implemented.

The concept of facilitator and educational strategies was strategic to the

successful implementation of the SBE. The relationship between the facilitator and the

participant during the SBE was very energetic. The facilitator needs to possess at least

these characteristics: skill, educational techniques, and preparation. The facilitator needs

to be able to adjust to the participants' learning needs during a simulation by providing

cues and giving them feedback and a time for reflection at the end of the simulation

through debriefing (Jeffries et al., 2016). The facilitators in the project completed five

different educational sessions on briefing, providing an environment of safety for the

participant, and on debriefing. Throughout the development of the SBE the facilitators

reviewed the cues for the participants as well as the overall learning objectives. Changes

were made to the scenarios after the pilot was completed to enhance the educational strategies of the SBE for both the facilitator and participant.

The participant was another concept. Learning by the participant was influenced by age, anxiety, self-confidence, and role assignment. The pre-briefing of the participant for the SBE can affect the learning during the SBE as well (Jeffries et al., 2016). Pre-briefing was a part of the education for the facilitators in the project. Pre-briefing assists with decreasing the participants' anxiety and assists with learning during the SBE (Chamberlain, 2015; Page-Cutrara, 2015).

The final concept was outcomes. Outcomes focused on three areas - participant, care recipients and organization/system. The participants' outcomes included the satisfaction, self-confidence, learning, and behavior throughout the SBE, including debriefing. Second was the health outcomes of the care recipients from the trained caregivers who used simulation. The last outcome was the organization/system outcomes which included cost-effectiveness and changes in practice from usage or changes in the SBE. In the project, data was gathered using the Simulation Design Scale (SDS) from NLN to determine if the new/revised scenarios made a difference in the SBE. The participants had the opportunity to complete a SDS on each scenario so a comparison could be analyzed.

Using both the NLN Jeffries Simulation Theory and the INACSL Standards of Best Practice: Simulation: Simulation Design in creating new and revising simulation scenarios in the project guided the researcher and facilitators to meet the current simulation standards and educational requirements for both the facilitators and participants.

SECTION V

Review of Literature

Databases and Keywords

A literature review was conducted by searching a variety of database search engines. These databases included Bulldog One Search, Cumulative Index to Nursing and Allied Health Literature (CINAHL), ProQuest Nursing and Allied Health Source. Websites of the International Nursing Association for Clinical Simulation and Learning (INACSL), Society for Simulation in Healthcare (SSH), and the National League for Nursing databases were used as well. A journal search included *Clinical Simulation in Nursing* and *Nurse Education Today*. Key terms for the search included nursing education, curriculum development, patient simulation, patient simulation standards, nursing skills, clinical judgment, nursing students, simulation, simulations- utilization, quality improvement, active learning, and computer simulation. Criteria used to determine inclusion of literature were peer-reviewed publication within the past 10 years.

Significance of Evidence-Based Simulation

Waxman (2010) analyzed six scholarly articles on scenario development and discussed the Bay Area Simulation Collaborative (BASC) of guidelines for scenario development. Each article stated the importance of having clear objectives when developing scenarios. One used the National League for Nursing and Pamela Jeffries Simulation Framework as a design. In one of Waxman's reviews, the nursing process was used to guide simulation scenario design. Overall, Waxman noted there were very few publish articles on scenario development.

BASC is a group of more than 100 schools and hospitals in the San Francisco Bay Area in California. Through a grant, the California Institute for Nursing and Healthcare

(CINHC) in Berkeley, California, who leads BASC, trained and educated both faculty and educators in the concepts of simulation. The grant also designed clinical simulation scenarios for BASC to use and implemented a research study to see if simulation made a difference in the critical thinking skills of nursing students. Waxman illustrated in detail how BASC used evidence-based guidelines for developing scenarios. BASC used the Nursing Education Simulation Framework by the National League for Nursing and Pamela Jeffries to guide them in developing their template and scenarios. Using a template creates structure in the designing of a scenario. BASC discovered having clear learning objectives and continuing research are both very important to the success of simulation. A clear simple design should be evidence-based, and written to predetermined learning objectives in order to achieve critical thinking, self-confidence, satisfaction by the learner, and the desired learning outcomes (Waxman, 2010).

Shin, Sok, Hyun, and Kim (2015) implemented an active learning program, which consisted of simulation and standardized patients (SPs) in a nursing program. The active learning program was implemented in the didactic and lab portions of the program and began with the sophomore nursing students and continued until their graduation. The faculty attended training workshops on performance evaluation strategies, operation strategies of using simulation and SPs in class, and outcome-focused curriculum-building strategies. The faculty was trained on how to design a class using simulation and SPs, write scenarios and develop or apply performance evaluation methodologies. The goal of this study was to evaluate the effect of an active learning program on nursing competency in baccalaureate nursing education. A descriptive, cross-sectional comparative design was used to assess the effect of an active learning strategy on nursing competency. The scores for the active learning groups for nursing competency were significantly higher

than those for traditional learning groups. Critical thinking and human understanding, both subdomains of clinical competency, were both higher in the active learning groups. The students in the active learning group were more satisfied with their clinical practice and had higher learning achievement compared to the traditional learning group. There was no significant difference between the two groups with general self-confidence.

This study recognized the key to successful implementation of active learning was to have faculty training workshops and to include them in the participation and promote their understanding of active learning. The faculty needed to be involved to make the changes in the curriculum to include active learning in the didactic portion of the classroom.

Students initially expressed feeling burdened with having the task of active learning in every class. They later expressed the experience with simulation and SPs gave them confidence in clinical practicum and in communication with patients.

Brady (2011) created a course to incorporate Quality and Safety Education for Nurses (QSEN) competency definitions for a nurse. For each competency, the specific knowledge, skills, and attitudes (KSAs) have been created to include a multi-disciplinary approach in developing health care professionals with communication skills, emotional awareness, and value-based practice. Brady evaluated the best way to implement the QSEN competency skills was by programmable human patient simulators (HPS). Brady's literature review found HPS is a learning strategy helpful for developing communication skills, teamwork, and collaboration. When students are exposed to simulation, they are able to synthesize knowledge, perform skills, and express their interaction with the simulation patient and actors. The debriefing process gives direct feedback to the student and increases critical thinking and reflection. Brady reflected the

importance of a supportive environment during debriefing. The student needs to feel valued, respected, and free to ask questions, discuss mistakes, and reflect on how to improve practice. Brady included self-reflective assignments in the lab experience. Self-reflection increases the student's self-confidence in communication skills and promotes self-reflection as a practitioner. Brady covered teamwork and collaboration, safety, quality improvement, and informatics throughout the course. Brady used active learning strategies, technology experiences, and assignments incorporating multiple learning modalities throughout this course in order for students to gain an understanding of the QSEN competency skills.

Hayden et al. (2014) were part of a randomized, controlled, longitudinal, multisite research study beginning in the fall of 2011. The aim of the study was to determine if simulation could be substituted for traditional clinical hours in the pre-licensure nursing curriculum; to determine the education outcomes of undergraduate nursing students in the core clinical courses when simulation is integrated throughout the core nursing curriculum; and to determine whether varying levels of simulation in the undergraduate curriculum impact the practice of new graduate nurses in their first clinical positions. Nursing students from 10 pre-licensure programs across the United States were randomized into three different groups and were followed until six months post-graduation. Students were assessed on clinical competency and nursing knowledge, and how they rated how their learning needs were met both in the clinical and simulation environment. An important part of the procedure in this study was in training team members from each participating school. Each team member attended three mandatory training sessions on National League for Nursing (NLN) Jeffries Simulation Framework. They were taught the Debriefing for Meaningful Learning method. During these training

sessions, it was important for the teams to practice what they had learned, be evaluated, and receive feedback – debriefing. They practiced simulation scenarios with nursing students in order to refine the necessary skills of being a facilitator and knowing how to debrief.

Scenarios were given to each nursing program in order to ensure standardization. If a special scenario was needed for a specific course, an expert in nursing simulation reviewed the scenario to ensure it was consistent with NLN Jeffries Simulation Framework.

The results of this survey provided substantial evidence that substituting high-quality simulation experiences for up to half of traditional clinical hours produces comparable end-of-program educational outcomes and new graduates are ready for clinical practices. Using the INACSL Standards of Best Practice: Simulation, promotes high-quality simulation.

Outcomes of Evidence-Based Simulation

Bambini et al. (2009) completed a quasi-experimental, repeated-measures design to evaluate if simulation experiences increase the self-efficacy of nursing students preparing to enter the obstetrics clinical setting; the students' perceptions of the simulated clinical experience; and the effect that previous experience working with patients had on students' perceived level of confidence in their clinical skills. The quantitative results revealed significant increase in the students' confidence levels in performing postpartum exam after the simulation. Qualitative data results revealed the simulation learning experience to be valuable and increased their confidence level of what to expect and how to conduct themselves in a clinical practice area. Results revealed an improvement in psychomotor skills and patient interactions. Students shared comments on how the

simulation assisted them in learning how to work through assessments and problem solving. Students reported an increase in clinical judgment skills pertaining to prioritizing assessment skills, when and how to intervene, and how to be more aware of abnormal physical assessment findings. Bambini et al. (2009) were able to reveal with this study that effective simulation can improve nursing students' self-efficacy in clinical skills, confidence, communication, and clinical judgment.

Several research studies have been completed to evaluate students' clinical judgment, critical thinking, and/or clinical reasoning skills with simulation scenarios (Ironside & Jeffries, 2010; Shin et al., 2014; Wane & Lotz, 2013). Whether these simulation scenarios were multi-patient, scenarios developed by the students, or scenarios over a semester, the data from these research studies all came to similar conclusions. If the student created the scenario for the simulation, this teaching strategy promoted both critical thinking and clinical judgment. It increased the student's awareness of a patient's holistic interdisciplinary care (Wane & Lotz, 2013). In the research study by Shin et al., (2014) critical thinking scores overall increased significantly after simulation. In four of the seven critical thinking subcategories, there was an increase as well (prudence, systematicity, healthy skepticism, and intellectual eagerness). This study also revealed when nursing students participate in multiple simulations there is a significant increase in critical thinking.

The research study by Ironside and Jeffries (2010) incorporated multiple-patient simulation experiences. Their findings were similar to the other research studies. As students were exposed to more multiple-patient simulations, their ability to make clinical judgment decisions increased. The multiple-patient scenarios were realistic to real-life clinical experience, which included distractions and frequent interruptions. The nursing

students requested more of these types of simulations to help assist them in preparation for becoming a "real" nurse.

Another outcome of simulation is preparing nursing students for leadership. Gore et al. (2015) completed a descriptive, correlational study in a leadership class over three semesters. The authors hypothesized there would be no difference in perceived learning between simulated and clinical environments. Multiple patient simulations were used to prepare the students to care for multiple patients, prioritize, improve critical thinking, delegation, and time management, and demonstrate leadership skills. The hypothesis was supported. The communication needs were better met in the clinical setting and the teaching-learning needs were better met in the simulation setting. Nursing students need to be exposed to situations which will prepare them for leadership. The decrease in clinical sites, the opportunities for multiple patient assignments in the clinical environment, or leadership preceptorship led to the need for simulated scenarios for these situations (Gore et al., 2015; Ironside & Jeffries, 2010).

Teaching nursing students clinical judgment and reflective thinking was crucial in the development of the nursing student. Teaching nursing students how to self-reflect, assist in learning from experience and applying theory to practice was vital to develop critical thinkers (Decker et al., 2010). There have been several research studies which have incorporated self-reflection after simulation (Bussard, 2014; Cato, Lasater, & Peeples, 2009; Decker et al., 2010; Shortridge, McPherson & Loving, 2014). Students have used a tool to complete either in debriefing or while reviewing a video of their simulation. In some of the studies, the students completed the reflective tool immediately and in other studies they are completed within 24 hours of the completed simulation. The instructors have been able to evaluate these tools to measure the student's clinical

judgment. The reflective tools and journals showed students feel a lot of anxiety during

simulation. For some students this anxiety hinders their ability to think critically

(Shortridge et al., 2014). Another finding from the self-reflective tools was students' lack

of understanding of pathophysiology hinders them from picking up information from the

cues during simulation (Decker et al., 2010; Shortridge et al., 2014). When students were

able to view a video of the simulation, they were able to reflect on what not to do in

future similar situations (Bussard, 2014; Decker et al., 2010). All of the studies reported

the more the student participated in self-reflection, the simulated patient encounters

became more in depth. Reflective thinking is a way of developing clinical judgment

(Bussard, 2014). Using reflective thinking with simulation expands the learning outcome

for the nursing student.

Strength and Weaknesses of Literature

The strengths of the literature were the vast information about simulation and how

it is an effective learning strategy and produces outcomes of critical thinking skills,

reflective thinking and clinical judgment. The importance of using evidence-based

standards and theory-based debriefing, providing education for the faculty, and using a

tool when designing simulation based scenarios were also strengths of the literature

(Bambini et al., 2009; Brady, 2011; Bussard, 2014; Cato et al., 2009; Decker et al., 2010;

Gore et al., 2015; Hayden et al., 2014; Ironside & Jeffries, 2010; Shin et al., 2014; Shin et

al., 2015; Wane & Lotz, 2013; Shortridge et al., 2014; Waxman, 2010). A weakness in

literature was many of the research studies utilized small sample sizes (Gore et al., 2015).

Another limitation was the tool used to measure competency was a self- assessment

completed by the student (Bambini et al., 2009; Bussard, 2014; Cato et al., 2009; Shin et

al, 2015; Shortridge et al., 2014). The type of the research study could limit how the results were interpreted (Ironside & Jeffries, 2010).

Summary of Literature

Literature revealed when evidence-based standards, theory-based debriefing, and education of faculty members are implemented, simulation-based scenarios can result in increased critical thinking, reflective thinking, and clinical judgement skills (Bambini et al., 2009; Bussard, 2014; Cato et al., 2009; Hayden et al., 2014; Shin et al., 2014; Shin et al., 2015; Waxman, 2010). Simulations can be designed to increase leadership skills and prepare the nursing student for entry into the workforce (Gore et al., 2015; Ironside & Jeffries, 2010). Simulation, when instituted using INACSL Standards of Best Practice: Simulation, can substitute for up to 50% of clinical time (Hayden et al., 2014).

SECTION VI

Project Design

The pre-licensure nursing program has specific time schedules to maximize the learning opportunities for the nursing students. The implementation of the Simulation Design project needed to be completed within the specified time schedule. The new and revised simulation scenarios were developed according to the NLN Jeffries Simulation Theory and INACSL Standards of Best Practice: Simulation: Simulation Design. Education for the facilitators was completed prior to the implementation of SBE.

Project Committee

The Simulation Design project was guided by a committee consisting of a chair and two committee members. The committee chair member was a graduate faculty member of the School of Nursing of the university. One committee member was a faculty member of the School of Nursing of the university and has served as the Simulation Lab Coordinator and has experience in simulation. The second committee member was a doctorally-prepared faculty member in a different university school of nursing who has extensive simulation experience.

Population

The population of participants in the Simulation Design project was a cohort of pre-licensure student nurses (n = 43) at a private university in the southeastern United States. The participants were enrolled in a pre-licensure nursing program that prepares student nurses to gain licensure as a Registered Nurse (RN). The student nurses were enrolled in the Adult Health I Experiential Lab Course.

Setting

The Simulation Design project was conducted as part of the pre-licensure curriculum in a school of nursing at a private university in southeastern United States of America. Participation in the collection of data regarding the Simulation Design project was voluntary and anonymous. The project was conducted in the simulation lab and debriefing classroom at the university setting where student nurses attend pre-licensure classes. The School of Nursing faculty assisted with the implementation.

Project Description

The Simulation Design project was developed using both the NLN Jeffries Simulation Theory and the INACSL Standards of Best Practice: Simulation: Simulation Design. The INACSL Standard for Simulation Design has 11 different criteria. As the project was developed each criterion was met. The facilitators were educated on the theory of Debriefing with Good Judgement. During the piloting of the SBE the facilitators were recorded and used the DASH tool to evaluate themselves along with the project administrator on their effectiveness in briefing and debriefing. The NLN Simulation Design Scale survey was used with permission from NLN. The NLN Simulation Design Scale is a Likert scale survey used to evaluate the effectiveness of the SBE by the participant. There were no identifying marks on the Simulation Design Scale survey. A new design template was used to format the scenario and to use as a communication tool between the facilitators and Simulation Lab Coordinator.

Project Content

Education of the facilitators including information on briefing and debriefing. The education was delivered through evidence-based articles, videos, face to face education,

and role play. Following the pilot sessions, the facilitators were able to debrief and self-reflect on their abilities with briefing and debriefing along with the project administrator.

Three scenarios were used for the Simulation Design project. One scenario was new and two were revised to meet the nursing students' educational needs and INACSL design standards. Each scenario was piloted and revisions were made after the conclusion of the pilot. Cues for the facilitator were incorporated in the scenario. Clear learning objectives were created for each scenario and drove the activities of the SBE. Briefing and debriefing information were included in each scenario. Two of the scenarios incorporated the students as the client's spouse or parent and a lab technician.

After each debriefing session, the students were asked to complete the Simulation Design Scale survey. Prior to the beginning of the SBE the students were informed regarding the Simulation Design project and their rights to participate in completing the survey. There were no identifying marks on the survey. A different color of paper was used for those who participated in the SBE and those who were observers.

Timeline

The pilots of the SBEs were completed from November 2016 to January 2017. The education of the facilitators was completed from the end of September to the end of October 2016. The implementation of SBEs was from March to the end of April 2017.

Instrument

The Simulation Design Scale (SDS) was used to collect data. The project administrator is a member of the NLN and was given permission to use the SDS. The survey gathers information on five topics using a Likert scale from one to five and not applicable. The five topics are objectives and information, support, problem solving, feedback/guided reflection, and fidelity (realism). Content validity was established by ten

content experts in simulation development and testing. Reliability was testing using Cronbach's alpha which was found to be 0.92 for the presence of features (NLN, 2017).

Cost/Benefit Analysis

The cost for the Simulation Design project was minimal. The costs included:

- Colored paper for surveys ($25.00)

- Colored paper for facilitator notebooks ($75.00)

- Notebooks for facilitator and project administrators ($45.00)

- Printing of copies for surveys ($30.00)

- Printing of scenarios ($20.00)

Outcome exchange of cost to benefit was favorable as there is minimal cost involved and opportunity for ongoing benefit. The School of Nursing has a moderate simulation lab and debriefing area where pre-licensure education occurs, thereby incurring no additional cost. School of Nursing faculty volunteered to assist with the implementation of the Simulation Design project. The availability of simulation lab and faculty volunteering to assist with the implementation of the Simulation Design project resulted in no additional cost. A beneficial result of the Simulation Design project was to meet the standards of the State Board of Nursing. It is important to meet the standards of the state board of nursing in case simulation is needed to take the place of clinical hours. Another beneficial result of the Simulation Design project was the education provided to the facilitators. Increasing the facilitators' knowledge in briefing and debriefing affects the learning environment for the participant. Increased quality, consistency, better outcomes, improvement in the simulation program and improved learning environment are all benefits of the Simulation Design project.

Ethical Considerations

The School of Nursing Institutional Review Board (IRB) at the university site where the Simulation Design project was presented approved the Simulation Design project prior to implementation. The project committee chair and members also approved the Simulation Design project proposal.

An explanation regarding the Simulation Design project and data collection was provided to all student nurses attending the simulation orientation. Attendees were instructed to read the informed consent that was provided to each of them and they were given the opportunity to ask clarifying questions. The informed consent explained the data collection process. The informed consent instructed participants that completion of data collection served as the consent to participate and if participants did not wish to participate they could either return a blank survey or simply not complete a survey. Student nurses were informed that participation in the collection of data was voluntary and no negative repercussion would occur due to declining participation in data collection. Anonymity of participants was maintained since there were no identifying features on the survey. Participants in the simulation had white surveys and observers had green surveys. At the completion of filling out the surveys the participants placed the surveys in a box. The facilitator returned the box to the project administrator. Surveys were then maintained in a secure file area in the project administrator's private locked office.

SECTION VII

Project Implementation

Education on briefing and debriefing was implemented with two facilitators. Education was provided through evidence-based articles, videos, education with the project administrator, and role play.

A new design template was implemented to ensure all the standards were met and the template was used as a communication tool between the facilitators, the Simulation Lab Coordinator, and anyone who would be assisting with the SBE. The design template was modified from EM Sim Cases. Permission was obtained from EM Sim Cases to use the design template as long as their footer information was maintained at the bottom of each page (EM Sim Cases, 2017).

The simulation scenarios were each piloted using volunteer nursing students and the facilitators. The project administrator oversaw the pilots and videoed the debriefing sessions. Following the pilot sessions, the facilitators were able to debrief and self-reflect on their abilities with briefing and debriefing along with the project administrator using the DASH tool. The simulation scenarios were revised as needed.

The Simulation Design project was presented to a cohort of Associate of Science pre-licensure nursing students in the middle of the spring semester. The first two SBE were not part of the Simulation Design project. At completion of these two simulations the SDS survey was administered. The following three SBE were either a new scenario or revised to meet both the NLN Jeffries Simulation Theory and the INACSL Standards of Best Practice: Simulation: Simulation Design. The SDS survey was collected at the completion of each SBE. The revised scenarios were on the topics of diabetes and the musculoskeletal system. The new scenario topic was on a post-surgical total

laryngectomy client. In the scenarios for the diabetes and total laryngectomy clients, the nursing students played the role of the client's wife, parent, and lab technician. Each student was provided a script and wore a lanyard to identify. The facilitator briefed the students on their roles prior to the beginning of the SBE.

Debriefing followed every simulation except the last simulation. For the SBE in the Simulation Design project the facilitators used Debriefing with Good Judgement theory to debrief. The last simulation was a formative simulation and there was no debriefing as a group.

The information from the SDS survey was entered into an excel spreadsheet on the project administrator's MacBook Air computer. This information was later entered into the IBM® Statistical Package for the Social Sciences ®, Version 24 for analysis.

SECTION VIII

Project Evaluation

Statistical Analysis

The IBM® Statistical Package for the Social Sciences ®, Version 24, was utilized to analyze the data obtained from Simulation Design Scale. A Mann-Whitney U Test (also called the Wilcoxon-Mann-Whitney test) which is a rank-based nonparametric test was conducted to evaluate whether there was a difference in the SBE that were changed to meet the INACSL Standards of Best Practice: Simulation: Simulation Design versus those that were not changed. There were five dependent variables from the SDS survey that were measured (Laerd Statistics, 2015).

A Mann-Whitney U test was run to determine if there were differences in SBE score between objectives, support, problem solving, feedback, and fidelity. Distributions of the SBE scores for fidelity were similar, as assessed by visual inspection. Simulation Based Experience score was statistically significantly lower in fidelity (Mdn = 10.0), $p =$ .019, than objectives (Mdn = 25.0), $p = .214$, problem solving (Mdn = 25.0), p= .244, support (Mdn = 20.0), $p = .199$, and feedback (Mdn = 20.0), $p = .747$, U =1,941.500, z = 1.243.

The results of the Mann - Whitney U test supported the claim of improved SBE when they are structured by INACSL standards in the area of fidelity but not in the areas of objectives, support, problem solving and feedback. Several factors may have influenced the results. The first was the facilitators were educated prior to the beginning of all SBE and may have unintentionally used the increased knowledge in the non - INACSL standardized SBE. Another factor was both of the facilitators have extensive backgrounds in communication. One facilitator was certified as a simulation expert and

the other facilitator has 30 plus years as a psychiatric nurse. The non-INACSL

standardized SBEs are well-written and do follow most of the INACSL standards.

Comparison to Literature and Theoretical Framework

Based on the statistical analysis of the SDS it can be concluded the participants in

all of the SBE felt supported or very supported by the facilitators, the learning outcomes,

and goals of the simulation design. The participants deemed the objectives were clear and

the facilitators communicated in a timely and productive manner to assist them in

problem solving. The participants felt supported by the facilitators throughout the SBE.

The participants thought the SBE were designed for their specific knowledge level and

they were able to independently problem solve, set goals, and prioritize assessment and

interventions. The participants believed the briefing and debriefing were beneficial,

constructive, and assisted them with self-reflection. The fidelity (realism) of the SBE was

the only difference between the SBE that were designed to meet the INACSL Standards

of Best Practice: Simulation: Simulation Design and those that were not. Fidelity assists

the participants in learning. Fidelity is part of the theoretical framework of design.

Each of these different areas are important to the participant in being able to learn,

critically think, practice self-reflection, utilize clinical judgement, and prioritize care of

the client (Bambini et al., 2009; Bussard, 2014; Ironside & Jeffries, 2010; Shin et al.,

2014; Wane & Lotz, 2013). Each of these areas are measured on the SDS survey and are

a part of the NLN Jeffries Simulation Theory.

SECTION IX

Interpretation of Process

The following are ways the Simulation Design project achieved its goals and areas for improvement for future sustainability.

Achievements

The Simulation Design project did achieve statistical significance in fidelity (realism) for the new and revised SBE. The main difference in the new and revised SBE was the use of participants as the client's spouse, parent or as a lab technician. This required the participants to interact, communicate and/or educate the client's family member or the lab technician. Many of the participants and observers verbalized how much they liked having to interact with a "real" person during the SBE. The participants stated, "It helped me with my teaching and communication skills". Another participant stated, "I had to acknowledge the family member like I would in clinical and couldn't just go through simulation like a routine".

Limitations

Generalization for the use of the Simulation Design survey/project was weak due to the small sample size, it was a convenience sample, and it was only implemented one time. Further use of the Simulation Design survey/project with improvements would increase the generalization.

Recommendations for Improvements

The education for the facilitators was completed prior to the beginning of all of the SBE. This may have influenced the facilitators' response to briefing, debriefing, and responding to the participants during the simulation for the SBE that were not changed. To gain a better outcome in the study, using two different courses and changing the SBE

to meet the standards in only one course would be recommended. Another recommendation would be to survey the facilitators.

Plan for Sustainability

The Simulation Design project is serving as a pilot to meet the requirements the State Board of Nursing, INACSL Standards of Best Practice: Simulation, and NLN Jeffries Simulation Theory. Since the cost of implementation was minimal and the benefits to both the participants and the School of Nursing are crucial, the Simulation Design project will continue through the School of Nursing's Simulation Council. Following the Simulation Design project and other changes will lead to meeting the requirements of the State Board of Nursing and the Standards of INACSL. The barriers of continuing the Simulation Design project are the amount of time involved in making the changes to each course, continuing to keep up with the current practices of simulation, on-going monitoring of SBE, financial support for educational competency by administration, and resistance to change on behalf of the faculty. The Standards of INACSL for simulation are not just for nursing programs, they are for any programs using simulation. Implementing these same standards and practices into other programs within the university that are using simulation creates an environment of excellence.

Conclusion

The use of simulation has greatly increased in the academic setting. Preparing the pre-licensure nursing students for practice by using simulation has been found to be as good of a learning environment as clinical rotations (Hayden et al., 2014). The Simulation Design project used the NLN Jeffries Simulation Theory and the INACSL Standards of Best Practice: Simulation: Design in creating new and revised SBE in a medical-surgical course for pre-licensure nursing students. Meeting these standards in the

creation of the SBE provides a rich supportive learning environment for the students. The nursing students are able to learn how to critically think, prioritize assessments and interventions, make critical judgments, self-reflect, and assist with goal orientation (Bambini et al., 2009; Bussard, 2014; Ironside & Jeffries, 2010; Shin et al., 2014; Wane & Lotz, 2013).

The Simulation Design project meets the standards of the State Board of Nursing for replacing simulation for clinical rotation. The Simulation Design project was a pilot project for the School of Nursing and would require a full implementation throughout all simulation courses and facilitators to completely meet the State Board of Nursing standards. This would increase our learning outcomes for our students and if needed the ability to replace clinical rotation with simulation.

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