USING HIGH FIDELITY SIMULATION TO ENHANCE UNDERSTANDING OF PEDIATRIC IMMUNIZATIONS AND PARENT EDUCATION IN BACCALAUREATE NURSING STUDENTS

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Abstract

The use of high fidelity simulation to educate health care professionals is becoming more common, especially in nursing education. This innovative teaching method bridges the knowledge gaps that are often present in nursing students related to limited clinical experiences and the transition of healthcare to the community setting. In addition, there are limited opportunities to practice in specialty clinical experiences such as pediatrics. This is particularly the case with pediatric immunizations. However, accrediting boards for colleges and future employers expect students to be able to function in these specialty roles despite the lack of clinical opportunities. Therefore, a pediatric immunization and parent education simulation was designed to address this knowledge gap and evaluate student anxiety, knowledge acquisition, satisfaction, and self-confidence with this innovative teaching method. The sample consisted of 21 senior nursing students enrolled in a community health nursing course in a rural baccalaureate nursing program in Illinois. The study design was a one-group, pre-test, post-test repeated measures design guided by Jeffries’ Nursing Education Simulation Framework. Participants completed a researcher designed demographic questionnaire, the State-Trait Anxiety Inventory Scale for Adults (STAI), a researcher-designed knowledge test, and the Student Satisfaction and Self-Confidence in Learning scale. Results were analyzed with SPSS, Version 20 using descriptive statistics, paired *t*-tests, and Pearson’s Correlation Coefficient. The study results demonstrated that high fidelity simulation was an effective teaching modality that decreased students’ anxiety, enhanced their knowledge, and increased their self-confidence with administering pediatric immunizations and providing parent education.
Dedication

This study is dedicated to my family. My parents, Bruce and Loretta Wort, have instilled the value of life-long learning in me and have laid the foundation for who I am today. My sisters, Lacey Petersen and Ashley Barnett, are my best friends and their support was essential to the creation of this study. Finally, this study is dedicated to my husband, Jordan Harris, who offered love, encouragement, and support throughout this journey.
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CHAPTER 1. INTRODUCTION

Background for the Study

Simulation in nursing education has been used to supplement traditional nursing education for decades (Gomez & Gomez, 1987). The use of static mannequins, task trainers, peer-to-peer learning, and role playing are all traditional methods of simulation that have been used in nursing education (Cant & Cooper, 2009). While these methods of simulation are appropriate and valuable depending on the course and learner goals, the use of high fidelity simulation is emerging in importance in nursing education. High fidelity simulation uses human patient simulators that are anatomically correct and can communicate and respond to nursing interventions (Gates, Parr, & Hughen, 2012). This creates a more life-like experience for nursing students over low fidelity simulation. Furthermore, simulation allows students to practice tasks repeatedly, fine tune critical thinking skills, and receive immediate feedback on performance (Cant & Cooper, 2009). However, nursing students may experience anxiety while using high fidelity simulation and anxiety has been shown to inhibit the learning process (Cant & Cooper, 2009). Therefore, student anxiety must be considered when engaging in simulation research. In addition, few simulation studies have looked at knowledge acquisition and those that have done so have utilized student self-report as opposed to a direct method such as an examination (Gates, Parr, & Hughen, 2012).

A recent article stated that the initial cost of creating a high fidelity simulation laboratory is $876,485. The cost of maintaining this laboratory each year is $361,245 (Gates, Parr, & Hughen, 2012). Because high fidelity simulators are very expensive, a
cost-benefit analysis and research must be conducted in order to persuade institutions to adopt the higher costs associated with this learning modality.

**Statement of the Problem**

Nursing students have limited opportunities to practice pediatric immunizations because of the lack of pediatric clinical placement sites nationwide. Unfortunately, students often end up in an observer role at these specialty clinical experiences due to restrictions placed upon what students are allowed to do and not do, especially in obstetrics and pediatrics (Smith & Roehrs, 2009). A recent study in Kansas was conducted because of new mandates that stated, “The expectation is that students will have a meaningful clinical experience that includes engagement as a student nurse with a pediatric population for which they can articulate and demonstrate specific clinical skills” (Rhodes, 2011, p. 10). Due to this mandate and the lack of pediatric clinical placements for nursing students, Rhodes (2011) implemented a pediatric asthmatic simulation scenario.

Unfortunately, there are few research studies that have measured the effectiveness of simulation for teaching pediatric content. Furthermore, Oermann and Lukomski (2001) found that nursing students identified their biggest fear in pediatric clinical to be the administration of medications to children. This fear was correlated with high stress and disappointment with the pediatric clinical experience (Oermann & Lukomski, 2001). Due to the limited opportunities for pediatric immunization experiences and students’ fear of administering medications to children, high fidelity simulation may be an effective tool for providing students the hands-on experience they need regarding pediatric
immunizations and parent education. A pediatric immunization and parent education simulation has not been cited in the literature or conducted at the cooperating institution to examine if it would decrease students’ anxiety, increase their self-confidence with this skill in the future, and provide long-term knowledge acquisition.

Significance of the Problem

Coupled with the challenges of providing nursing students with adequate clinical experiences, the expectations for new graduates are higher than ever. According to Leigh (2008), “…new graduates are apprehensive about expectations of their performance in the workplace and their ability to meet those expectations” (p. 1). Furthermore, graduates who believe they are well prepared are able to care for their patients better and make an easier transition into the workforce as registered nurses (Leigh, 2008). Because self-confidence is directly related to quality patient care, nurse satisfaction, and retention (Leigh, 2008), nurse educators must consider alternative approaches to learning that will develop self-confidence to perform skills that students have limited exposure to in the clinical setting.

To date, there has been little research conducted about the vaccination competence of student nurses. Furthermore, no research studies were found that evaluated the pediatric immunization competence of nursing students. Nikula, Nohynek, Puukka, and Leino-Kilpi (2011) conducted a study in Finland and evaluated the vaccination competence of graduating Finnish public health nurse students as a means to identify teaching needs in this area. The researchers concluded that “more vaccination
education in basic and continuing education is needed to maintain and develop vaccination competence” (Nikula et al., 2011, p. 361).

**Purpose of the Study**

The purpose of this study was to identify the impact of using high fidelity simulation on baccalaureate nursing students’ anxiety level and self-confidence when providing parent education and administering pediatric immunizations. The researcher also evaluated each individual student’s general anxiety level to determine if there was a relationship with the anxiety experienced while participating in the simulation. Knowledge acquisition from the simulation experience was also evaluated by administering a pre-test as well as two post-tests. The first post-test was given immediately after the simulation. The second post-test was given three months following the simulation to see if long-term knowledge acquisition was achieved from the simulation experience. A three month time period was used to determine long-term knowledge acquisition for this study using information from a systematic review of studies that evaluated long-term knowledge retention in medical students. These studies evaluated long-term knowledge that ranged from three months to eight years later (Custers, 2010). Based on these studies and time constraints for this study, it was decided to use three months as the minimum amount of time needed to evaluate long-term knowledge acquisition. Finally, student satisfaction with the simulation experience was evaluated.
Significance of the Study

This research study was significant for several reasons. The National Council of State Boards of Nursing (NCSBN) (2005) assumes the responsibility to ensure that new graduates are able to practice safely. The NCSBN (2005) states that pre-licensure nursing education experiences need to be across the lifespan. Furthermore, the NCSBN (2005) declares that pre-licensure nursing education programs should include clinical experiences with actual patients. However, the NCSBN (2005) states that innovative teaching strategies that provide clinical experiences to ensure entry into practice competency should also be used. Because of the lack of pediatric clinical placement sites and the limitations on what nursing students may and may not do, simulation could serve as an innovative teaching strategy to ensure new graduate competency in pediatric immunizations. Furthermore, no identified research studies were found that addressed the use of simulation for administering pediatric immunizations and providing parent education. This clearly suggests a gap in the literature. The results of this study can assist educators in designing effective simulations in the future that will allow nursing students to gain exposure to pediatric immunizations, experience with administration, and the provision of parent education. As a result, graduating nurses may be more competent and comfortable in this area as registered nurses. This study will also add to the research that is needed to determine the effectiveness of high fidelity simulation in nursing education.

Research Questions

Five research questions were developed for the research study and they are as follows:
1. Does the use of high fidelity simulation affect students’ state anxiety when administering pediatric immunizations and providing parent education?

2. Does a student’s trait anxiety impact the level of state anxiety that a student experiences when administering pediatric immunizations and providing parent education?

3. Does the use of high fidelity simulation result in long-term knowledge acquisition regarding aspects of pediatric immunizations?

4. What is the effect of the pediatric immunization simulation experience on students’ reported self-confidence with applying the skills learned to clinical practice?

5. What is the reported student satisfaction with the pediatric immunization simulation?

**Null Hypotheses**

The researcher’s null hypotheses for the research study were as follows:

1. There will be no relationship between engaging in the pediatric immunization simulation and students’ state anxiety.

2. There will be no relationship between students’ trait anxiety and the state anxiety they experience during the pediatric immunization simulation.

3. There will be no difference between the pre-test and two post-tests regarding knowledge acquisition from participating in the pediatric immunization simulation.

4. There will be no increase in student self-confidence with applying the skills learned to clinical practice after participating in the pediatric immunization simulation experience.
5. There will be a neutral reporting of student satisfaction from participating in the pediatric immunization simulation experience.
CHAPTER II. REVIEW OF RELEVANT LITERATURE

This chapter contains the review of the relevant literature, the conceptual framework that guided the study, and the definition of variables for the study. The chapter will begin with an explanation of the conceptual framework for the study followed by a literature review that includes previous related research in the area of the study. Finally, the independent and dependent variables for the study are identified and discussed at the conclusion of this chapter.

**Conceptual Framework**

The conceptual framework that guided this study was the Nursing Education Simulation Framework (NESF) that was developed by Pamela Jeffries. This framework has five components and is used to design, implement, and evaluate nursing education simulations (Jeffries, 2005).

**Teacher Factors**

The role of the teacher during a simulation experience depends on the type of simulation being conducted. Simulations being utilized as learning experiences place the teacher in a facilitator role. As a result, the teacher assists the students, provides support, and engages in debriefing with the students at the conclusion of the simulation. If the simulation is being used for evaluative purposes, the role of the teacher becomes that of an observer. Although other teacher roles have been suggested for simulation experiences, further research is needed before these roles can be considered acceptable for teachers during simulation (Jeffries, 2005).
Student Factors

According to Jeffries’ (2005) research, students must be motivated in order for a simulation experience to be effective. Therefore, students must be prepared and responsible for some of their learning during the simulation. When students know what to expect prior to the simulation, they will be more motivated and self-directed (Jeffries, 2005). Furthermore, students’ anxiety and discomfort with engaging in the simulation can be decreased by ensuring that students have adequate knowledge and preparation prior to the simulation. Competition should be discouraged during simulation because it can increase anxiety and stress, which can be detrimental to learning (Jeffries, 2005).

Educational Practices

According to Jeffries (2005), “Research regarding good teaching has shown the importance of incorporating educational practices with certain pedagogical principles, that, when used consistently, result in student learning and satisfaction” (p. 98). These seven pedagogical principles are active learning, prompt feedback, student-faculty interaction, collaborative learning, high expectations, diverse learning styles, and time on task. These principles should be used to aid simulation design and guide implementation (Jeffries, 2005).

Active learning. Simulation allows students to be active participants in the learning process for both simple and complex learning activities. The use of human patient simulators encourages an interactive environment whereby students are given the opportunity to make connections among theoretical concepts. Students are then able to
apply those concepts in a safe environment and with clinical experiences that are often limited in everyday practice (Jeffries, 2005).

**Prompt feedback.** One advantage of simulation is that students are able to receive immediate feedback on their performance and critical thinking. This feedback is valued by students and they find it to be helpful and informative. Students also feel that prompt feedback encourages their self-confidence. Furthermore, immediate feedback from students allows faculty to identify students’ understanding of the concepts presented during the simulation (Jeffries, 2005). Feedback obtained from students about their perception of the simulation experience can also be used to make future changes to the simulation design if needed.

**Student-faculty interactions.** Students and faculty need to interact with one another during simulation experiences. Research has shown that students solved problems better when a faculty member was in the room and available to answer any questions (Jeffries, 2005).

**Collaborative learning.** Interdisciplinary care in the workforce is a common practice. Simulation offers a unique opportunity where students, faculty, and other healthcare professionals can work together to problem solve and promote a sense of teamwork (Jeffries, 2005). By working collaboratively through simulation, students are also able to see that there may be multiple correct approaches to the same clinical problem (Jeffries, 2005).

**High expectations.** High faculty expectations are needed for simulation in order for students to get the most out of the learning experience (Jeffries, 2005). Simulations
can have low expectations if the instructor’s expectations for the students would be more appropriate for students at a lower grade level. Unclear expectations also result in ineffective learning experiences for students.

Diverse learning. Both traditional and non-traditional students are present in today’s nursing programs. Increasing diversity places faculty in a unique position to accommodate several learning styles and to utilize different teaching methods to reach as many students as possible. Simulation can meet these needs and can be modified as needed for a diverse population (Jeffries, 2005).

Time on task. In order to achieve the learning outcomes of a simulation, it is imperative that a realistic time frame is maintained. Clear and focused objectives that meet the learning outcomes of the simulation need to be developed and should only focus on a few key concepts at a time. These objectives will keep the simulation within its scope and will prevent the simulation from becoming too long (Jeffries, 2005). Jeffries (2012) stated that the recommended time frame for a simulation scenario is 20 minutes. A debriefing session of at least 20 minutes or longer is needed to allow students to think deeper and engage in reflective critical analysis (Jeffries, 2012).

Simulation Design

When designing a simulation, the design must be appropriate to meet the learning outcomes. It is important to pay attention to objectives, planning, fidelity, complexity, cues, and debriefing (Jeffries, 2005).

Objectives. Objectives for the simulation must be clearly written and should match the students’ knowledge and experience. Students also need to be given the
learning objectives as well as specific information about the simulation, amount of time required, role expectations, and expected outcomes prior to the simulation (Jeffries, 2005).

**Fidelity.** Clinical simulations must be as realistic as possible to promote better learning outcomes (Jeffries, 2005). If the simulation is unrealistic, students will get less out of the learning opportunity. Therefore, fidelity must be carefully considered when designing a simulation experience (Jeffries, 2005).

**Complexity.** Simulations can range from simple to complex and must be appropriate for the knowledge and experience of the participants (Jeffries, 2005). A simulation that is too complex or too simple for the participants will result in an ineffective learning experience.

**Cues.** Cues are sometimes needed in simulation. In order to avoid students from becoming stuck, it is important to have a faculty member present that can provide cues. These cues enable the students to continue processing the situation and progressing with the simulation (Jeffries, 2005).

**Debriefing.** Debriefing is very important at the conclusion of simulations. Jeffries (2005) states, “A debriefing activity reinforces positive aspects of the experience and encourages reflective learning, which allows the participant to link theory to practice and research, think critically, and discuss how to intervene professionally in very complex situations” (p. 101). Furthermore, faculty and student feedback about the simulation experience is important for the designing of future simulations (Jeffries, 2005).
Outcomes

Depending on the simulation design, different outcomes can be expected from a simulation experience. Jeffries (2005) identifies five outcomes that are possible from simulation and they include increased knowledge, skill performance, learner satisfaction, critical thinking, and self-confidence. Research has shown that knowledge gained from simulations is retained longer than knowledge gained through the traditional teaching method of lecturing (Flood, Thompson, Lovell, Field, & Daub, 2011). Furthermore, simulations that focus on skill development have shown that students become competent in that skill quicker than traditional training methods (Ost, DeRosiers, Britt, Fein, Lesser, & Mehta, 2001). Learner satisfaction is the third simulation outcome that can be evaluated and can be done either quantitatively or qualitatively. Students’ self-confidence in their ability to apply the skills learned in the simulation to the clinical setting is the fourth identified simulation outcome that can also be evaluated. Finally, critical thinking by students engaging in a simulation experience can also be evaluated and is relevant to real world nursing (Jeffries, 2005).

Nursing Education Simulation Framework Conclusion

Jeffries’ NESF is an appropriate conceptual framework for the proposed research study. Research has shown that the simulation design characteristics of this simulation framework are relevant and serve as a guide for methodically conducting research on simulations (Jeffries & Rizzolo, 2006). According to Reese, Jeffries, and Engum (2010), “Well-designed simulations based on the Nursing Education Simulation Framework are effective learning tools to prepare competent nurses and can be integrated into the
curriculum to improve student problem solving. Simulations facilitate the application of theory into practice” (p. 37). This concept is particularly important for this research study because the students in this sample population are exposed to the material in theory but do not have the opportunity to practice the skill clinically.

**Review of Relevant Literature**

The literature review was conducted using EBSCO with CINAHL, the Cochrane Database, and OVID with the key words simulation, nursing students, immunization competence, and pediatric immunizations.

**Simulation and Student Anxiety**

Several studies have found that nursing students experience anxiety in nursing education, clinical experiences, and unfamiliar situations. According to Cant and Cooper (2009), nursing students may also experience anxiety while using high fidelity simulation which can inhibit the learning process. Leigh (2008) acknowledged that students can have an increase in anxiety during simulation because they anticipate that something is going to happen and feel like they are on the “hot seat.” Furthermore, Lasater (2007) stated that although there is no risk to a patient, this does not necessarily mean that students will not experience stress from the simulation. Cook (2005) similarly concluded that student learning and performance are affected by anxiety. However, Beischel (2011) found that anxiety did not affect cognitive learning in her study on simulation (p = .08) of undergraduate nursing students (N = 124) in a fundamentals course. However, 33% of the students qualitatively reported that the simulation increased their level of anxiety and affected their learning despite the quantitative results (Beischel, 2011).
An alternative study conducted by Khadivzadeh and Erfanian (2012) studied the effects of simulation-based training versus traditional training on nurse midwifery students’ (N = 56) anxiety when providing intrauterine device consultation and insertion. Students were randomly assigned to traditional training or simulation-based training. The researchers found that there was a significant decrease in state (p = .001) and trait (p = .024) anxiety along with an increase in comfort (p = .000) for students who participated in the simulation-based training (Khadivzadeh & Erfanian, 2012). Similar results were found by Bremner, Aduddell, Bennett, and VanGeest (2006) in their study with baccalaureate nursing students (N = 56). The researchers found that 42% of the students reported that high fidelity simulation relieved some of the stress associated with the first day of clinical for novice students. Bremner, Aduddell, and Amason (2008) used a convenience sample of sophomore baccalaureate nursing students (N = 149) and its purpose was to examine the effects of high fidelity simulation on the level of anxiety that these students experience on their first clinical experience. The researchers found that the group mean for anxiety in the intervention group was lower (M = 41.94) than the group mean for anxiety in the control group (M = 45.07); however, no p-values were given (Bremner, Aduddell, & Amason, 2008).

Simulation and Student Self-Confidence and Satisfaction

As a relatively new teaching modality in nursing education, high fidelity simulation must be evaluated in terms of student satisfaction and self-confidence with this innovative teaching method. Yuan, Williams, and Fang (2011) conducted a systematic review that evaluated nursing students’ confidence and competence with high
fidelity simulation. These researchers concluded that qualitative studies often presented positive results. However, more quantitative studies that use valid tools to measure confidence and competency are needed in this area (Yuan, Williams, & Fang, 2011).

Bremner et al. (2006) found that 61% of the participating students felt that the high fidelity simulation experience gave them increased confidence with their physical assessment skills. Another study conducted by Smith and Roehrs (2009) used junior students in a baccalaureate nursing program (N = 68). The students were enrolled in their first medical/surgical course and were required to complete a high fidelity simulation experience related to caring for a patient with a respiratory disorder. Smith and Roehrs (2009) used the Student Satisfaction and Self-Confidence in Learning Scale developed by the National League for Nursing to determine student satisfaction and their self-confidence with applying the skills to future patients with respiratory disorders. The researchers found that the overall mean score for the Satisfaction scale was 4.5 (SD = 0.5) on a 5-point Likert scale, indicating that students were satisfied with the high fidelity simulation as a teaching method. The researchers found that the overall mean score for the Self-Confidence scale was 4.2 (SD = 0.4) on a 5-point Likert scale, indicating that the students were confident in their ability to provide care to patients with respiratory conditions in the future (Smith & Roehrs, 2009).

Another study was conducted by Jeffries and Rizzolo (2006) that evaluated self-confidence in nursing students (N = 403) when providing care for a postoperative patient using three different teaching modalities: a paper/pencil case study, a hands-on simulation experience with a static mannequin, and a hands-on simulation experience
with a high fidelity patient simulator. The researchers found that the high fidelity patient simulator group reported significantly greater confidence in their ability to care for a postoperative patient than the other two groups (Jeffries & Rizzolo, 2006).

Hicks, Coke, and Li (2009) developed a randomized, controlled design study with senior baccalaureate nursing students (N = 92) enrolled in a critical care nursing course. Participants were divided into one of three groups for their practicum experiences: traditional clinical without simulation, simulation without traditional clinical, and both traditional clinical and simulation combined. One of the aims of this study was to determine self-confidence before and after the practicums. The researchers found that students in the simulation and combination groups had statistically significant increased self-confidence after their practicum experiences (p < .05) (Hicks et al., 2009).

Despite these positive results indicating increased self-confidence with high fidelity simulation, several studies have found conflicting results. Blum, Borglund, and Parcells (2010) conducted a study with junior level baccalaureate nursing students (N = 53). Students were assigned to either a traditional laboratory experience or a high fidelity simulation laboratory experience. No statistical differences were found between the two groups in terms of self-confidence and competence. However, a trend was evident that the traditional laboratory experience group reported higher self-confidence than the simulation group. Furthermore, faculty rated the traditional laboratory experience group’s competence higher than the simulation group (Blum et al., 2010). Feingold, Calaluce, and Kallen (2004) conducted a study on baccalaureate nursing students (N = 65) who were enrolled in an Advanced Acute Care of the Adult course. The researchers found that less
than half of the students felt that simulation increased their confidence and clinical competence (46.9%) (Feingold et al., 2004). Another study was conducted by Cardoza and Hood (2012) and examined senior baccalaureate nursing students’ (N = 52) self-efficacy for providing family-centered care on a pediatric patient. Before and after the simulation, participants completed the General Self-Efficacy (GSE) scale whereby higher scores reflected higher student confidence in caring for the pediatric patient. Surprisingly, there was a decrease in the GSE scores from pre-simulation to post-simulation, indicating that students had decreased self-confidence in caring for pediatric patients and providing family-centered care after the initial simulation (Cardoza & Hood, 2012). Cardoza and Hood (2012) concluded that these students may have had unrealistic self-awareness regarding their abilities to care for pediatric patients prior to the simulation.

Student satisfaction and self-confidence is paramount to every teaching modality that nursing instructors use. Because of these conflicting results regarding student satisfaction and self-confidence with high fidelity simulation, more research is needed in this area.

**Simulation and Knowledge Acquisition**

As the use of high fidelity simulation has gained acceptance in nursing education, studies have been conducted on knowledge acquisition as a result of simulation experiences. Leonard, ShuhaiBar, and Chen (2010) conducted a qualitative research study that explored undergraduate nursing students (N=48) perceptions of learning as a result of participating in one pediatric and one adult scenario using high fidelity simulation. This study was unique in that it incorporated nursing students from all levels for an
intraprofessional simulation. The researchers identified three key themes and member checked the themes with four participants. Based on the students’ perceptions, the researchers concluded that the high fidelity simulation scenario did reinforce students’ knowledge base. However, it did not determine if knowledge acquisition took place (Leonard et al., 2010).

Rhodes (2011) conducted a pediatric asthmatic simulation scenario utilizing a pre-test-post-test design to determine if knowledge acquisition occurred. The population consisted of students in a Practical Nursing Program (N = 21) who were finishing their first medical-surgical course. Rhodes (2011) concluded that there appeared to be a positive correlation between the simulation activity and an increase in student knowledge. However, Rhodes (2011) did not state if the results were statistically significant.

Gates, Parr, and Hughen (2012) conducted a research study that explored the effect of high fidelity simulation on knowledge acquisition in baccalaureate nursing students (N=104) who were in their second semester medical-surgical course. Students were randomly assigned to control and experimental groups. The researchers found that those who participated in the high fidelity simulation scenarios scored better on their post-test when compared with the in class examination on the same material. These findings were statistically significant (p < .01), indicating that there are knowledge acquisition benefits to participating in high fidelity simulation (Gates et al., 2012).

Aliner, Hunt, Gordon, and Harwood (2006) compared undergraduate nursing students (N = 99) clinical performance with a pre-test-post-test design using the Objective Structured Clinical Examination (OSCE). Students were randomly assigned to
either the control group or the experimental group. The control group received traditional clinical experience while the experimental group received both traditional clinical experiences along with simulation. Although both groups improved their clinical performance, the experimental group improved their clinical performance more as evidenced on the OSCE at a statistically significant level (p < .001). These results indicated that greater knowledge acquisition took place (Aliner et al., 2006).

A randomized controlled trial was conducted by Ellis et al. (2008). This study compared learning in a hospital setting versus a simulation for midwives and obstetricians (N = 132). Knowledge acquisition was determined using the pre-test-post-test design and found that post-test exam scores increased by 32% after training (p < .001). However, there was no difference in the post-test scores between those who had traditional hospital training and those that had simulation training (p = .46).

The Hicks, Coke, and Li (2009) study discussed earlier had another aim to the study regarding knowledge acquisition and retention. Participants were given a knowledge test after receiving two weeks of classroom instruction on critical care concepts. The participants then participated in one of three practicums for two weeks: traditional clinical without simulation, simulation without traditional clinical, and both traditional clinical and simulation combined. After the practicum was completed, participants’ clinical performance was assessed using patient actors and they received another written examination to test knowledge retention. The researchers found that students in all groups had statistically significant lower scores on their post-tests after their practicums (p < .000). Furthermore, the simulation group retained the least amount
of information (82.9%) and was consistently rated the lowest in terms of clinical performance by faculty when compared with the clinical and combination groups (Hicks et al., 2009).

Although several studies have been conducted on knowledge acquisition in simulation, many of the results are mixed. Furthermore, few studies have used direct methods of determining knowledge acquisition and have focused on students’ perceptions. Meanwhile, no studies were found that determined whether or not long-term knowledge acquisition is evident with the use of high fidelity simulation. As a result, there is clearly a gap in the literature and this study will help fill that gap because it uses a direct method for determining knowledge acquisition and it evaluates if long-term knowledge acquisition is gained from simulation experiences.

**Definition of Variables**

**Independent Variable**

The independent variable in the research study was the pediatric immunization and parent education high fidelity simulation. According to Jeffries (2005), “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 devises such as interactive videos or mannequins” (p. 97). Furthermore, high fidelity simulation “…is a teaching method that reproduces realistic clinical situations in a protected environment” (Leigh, 2008, p. 1).
Dependent Variables

The dependent variables for the study were the students’ state anxiety, self-confidence, satisfaction, and knowledge acquisition.

State anxiety. State anxiety is a term that denotes an individual’s anxiety level in response to a particular event or a perceived threat (Berlin & Sechrist, 2010).

Self-confidence. Self-confidence is essential for developing critical thinking skills and becoming an independent care provider. According to Leigh (2008), “Confidence can be defined as a judgment about one’s perception of ability” (p. 3).

Satisfaction. Student satisfaction with new learning modalities is crucial for effective learning. Satisfaction will be defined as the students’ fulfillment of expectations from the simulation experience.

Knowledge acquisition. According to the Merriam-Webster Online Dictionary (2012), knowledge is “the fact or condition of knowing something with familiarity gained through experience or association.” Billings and Halstead (2009) stated, “A learner constructs new knowledge by building on an internal representation of existing knowledge through a personal interpretation of experience” (p. 197). Based on this definition, this research study built on students’ existing knowledge of pediatric immunizations by offering a simulation experience that they can interpret, use critical thinking skills, and develop new knowledge that is experience based. Furthermore, this study defined knowledge acquisition as a gain in knowledge as evidenced by an improved score from the knowledge pre-test to the knowledge post-test.
CHAPTER III. RESEARCH METHODS AND PROCEDURES

This chapter includes information regarding the design of the study. The setting for the study and the study’s sample with inclusion and exclusion criteria are discussed. A power analysis table was used to determine the ideal number of participants. The study’s instruments are reviewed and the protocol and data analysis plans are discussed. Ethical considerations that guided the study are also discussed. Finally, the study limitations and plans for dissemination of results are discussed at the conclusion of this chapter.

Research Design

A one group, pre-test-post-test repeated measures design was used to conduct this study. According to Polit and Beck (2012), “Studies with multiple points of data collection are sometimes described as having a repeated measures design, which usually signifies a study in which data are collected three or more times” (p. 187). Data for this research study were collected before the simulation, immediately after the simulation, and three months following the simulation.

Setting

The study was conducted in a rural, Midwestern college of nursing. This college is a not-for-profit institution that prepares nursing students at the baccalaureate and masters levels. They have additional entry programs including an Advanced Placement program, an ADN to BSN track, ADN to MSN track, and a BSN to MSN track. The annual enrollment for the college is approximately 230 students. The institution is
accredited by the Higher Learning Commission as well as The Commission on Collegiate Nursing Education.

**Sample**

The sample consisted of a convenience sample of senior level baccalaureate nursing students who were currently enrolled in Nursing 401: Community Health Nursing. Inclusion criteria for the study included being 18 years or older, currently enrolled in Nursing 401: Community Health Nursing, and a current student of the college of nursing. Exclusion criteria included students who were less than 18 years old, students who were not currently enrolled in Nursing 401: Community Health Nursing, and students who did not provide informed consent to participate in the study. According to a power analysis table for a power of 0.80 and a moderate effect size of 0.30, 53 participants was considered the ideal number of students for the study (Cohen, 1988). However, there were only 21 students enrolled in Nursing 401: Community Health Nursing and this number was the sample size for the first two data collection points. When the second post-test knowledge test was completed, only 10 students remained in the study with 3 previous participants declining to participate and 8 previous participants not responding after their December graduation.

**Research Instruments**

**Researcher Designed Demographic Questionnaire**

A self-designed demographic questionnaire was developed by the researcher to obtain information that described the sample (Appendix A). Information that was included on the demographic questionnaire included age, gender, race/ethnicity,
education level, previous experience with administering pediatric immunizations, and previous experience with providing parent education about pediatric immunizations. It took participants less than five minutes to complete the demographic questionnaire.

**State-Trait Anxiety Inventory for Adults**

The study also used the State-Trait Anxiety Inventory for Adults (STAI) that was developed by Charles Spielberger (Appendix B). The STAI was used to measure participants’ state and trait anxiety before the simulation. Participants’ state anxiety was measured again after the completion of the simulation.

The STAI consists of two scales, one for state anxiety and one for trait anxiety. State anxiety is a person’s current anxiety and is situational whereas trait anxiety is a person’s general tendency to become anxious. Each scale consists of 20 statements. Responses range from “not at all” to “very much so” on the State scale and from “almost never” to “always” on the Trait scale. All statements are scored based on a 4-point Likert scale where higher scores indicate higher anxiety. The STAI has been found to be very reliable. “In recent studies, coefficient alpha for S-Anxiety generally ranged from .90 to .97 and coefficient alpha for T-Anxiety ranged from .81 to .94” (Berlin & Sechrist, 2010, para. 8). Permission to use the STAI was received prior to the implementation of this study. It took participants less than 20 minutes to complete both scales of the STAI.

**Student Satisfaction and Self-Confidence in Learning**

The Student Satisfaction and Self-Confidence in Learning scale was developed by the National League for Nursing (Appendix C). This scale was used to determine participants’ satisfaction with the pediatric immunization and parent education
simulation. Furthermore, this scale was used to determine students’ self-confidence with applying the skills learned from the simulation to similar patients in the future. This scale consists of 13 statements based on a 5-point Likert scale with responses ranging from “strongly disagree” to “strongly agree.” The Student Satisfaction with Learning scale consists of five statements. Reliability testing has been completed on this scale using Cronbach’s alpha and was found to be 0.94 (Jeffries & Rizzolo, 2006). The Self-Confidence in Learning Using Simulations scale consists of eight statements and reliability testing using Cronbach’s alpha was found to be .87 (Jeffries & Rizzolo, 2006). Content validity of both instruments was established by nine experts (Jeffries & Rizzolo, 2006). It took participants less than 10 minutes to complete this tool.

**Knowledge Test**

A researcher designed knowledge test was developed regarding pediatric immunizations, administration, and parent education (Appendix D). The knowledge test consists of eleven fill in the blank, four true/false statements, five multiple response questions, and two short answer responses. This test was designed based on current NCLEX testing as well as the researcher’s goal to evaluate the students’ abilities to recall versus solely recognize information.

The knowledge test for this study was developed using several different resources. With permission from Nikula (2011), certain aspects of the Vaccination Knowledge Test (Appendix E) that she developed for a Finland study were incorporated into this research study’s knowledge test. The Cronbach alpha for Nikula’s knowledge test was found to be .78 overall (Nikula, Nohynek, Puukka, & Leino-Kilpi, 2011). In order to tailor the
knowledge test to focus specifically on pediatric immunization content and for nursing students in the United States, other resources were used as well. The Nursing Outcomes Classification (NOC) (Moorhead, Johnson, Maas, & Swanson, 2008) book was used and specific indicators from the NOC outcomes Immunization Behavior- 1900 and Knowledge: Treatment Procedure- 1814 were used. These indicators helped design and incorporate necessary content into the knowledge test. The current skills book used by the college of nursing (Berman & Snyder, 2012), recommendations by the Centers for Disease Control and Prevention (2012), and recommendations from the Immunization Action Coalition (2011) were also used to tailor the knowledge test to nursing students in the United States and specifically for content regarding pediatric immunizations. A Cronbach alpha was performed on the knowledge test for this study and was found to be .72. Two doctoral-prepared nursing faculty and one masters-prepared nurse who are experts in the field of immunization and community health reviewed the tool for content validity. It took participants less than 20 minutes to complete this tool.

**Modifications.** As stated, modifications were made to the original knowledge test that was developed by Nikula (2011) in order to meet the needs of this study. A brief description is being given for each of the questions that were modified along with a rationale.

**DT booster and influenza frequency.** The dT booster and influenza vaccination frequency questions were modified. Instead of using statements that the student identified as correct or incorrect as Nikula (2011) did, the researcher used fill in the blank questions for these two questions. The researcher chose this method in order to identify if students
knew with what frequency these vaccinations are to be given. Furthermore, the researcher was interested in evaluating students’ abilities to recall information versus solely recognizing it in a statement as this shows a higher level of thinking.

**Contraindications.** Another question regarding contraindications for receiving vaccines in children was modified. Statements 16a and 16f were based on Nikula’s (2011) original test. However, statement 16a was a modification that combined two separate statements form Nikula’s (2011) original test. Because the two statements had similar content, they were combined into one statement for the current knowledge test. Statement 16f has the same content as Nikula’s (2011) original test; however, the wording was changed to reflect the Centers for Disease Control and Prevention (2012) current terminology regarding missed or skipped doses of immunizations in children. Furthermore, Nikula’s (2011) original test consisted of statements that the participant would identify as either correct or incorrect. The author chose to modify the question to reflect a multiple response question to increase the similarity to RN-NCLEX testing in the United States.

**Injection areas and aseptic practice.** Another question regarding recommendations for injection areas and aseptic practice contained modifications from Nikula’s (2011) original test. In Nikula’s (2011) original test, injection areas and aseptic practice were separate questions and used statements that the student identified as either correct or incorrect. The study’s test combined these questions into one multiple response question to once again increase the similarity to RN-NCLEX testing in the United States. The wording in statements 18b, 18d, 18e, and 18f was slightly modified in order to reflect
this type of testing but the content remained the same as Nikula’s (2011) original test. Furthermore, the wording was changed in statements 18a and 18c to reflect the terminology that is used for locating the correct anatomical site for intramuscular injections in children by the Centers for Disease Control and Prevention (2012), the Immunization Action Coalition (2011), and the students’ current textbook (Berman & Snyder, 2012).

**Anaphylactic reaction.** A final question that was modified was based on content regarding the management of anaphylactic reactions. This question was only modified slightly and was very similar to Nikula’s (2011) original test. Once again, the question was modified to be a multiple response question to reflect current RN-NCLEX testing in the United States. Statements 19b and 19c are similar to Nikula’s (2011) original test; however, the author specifically wanted students to know that adrenalin is not given intramuscularly. Therefore, statement 19b was changed to subcutaneously and 19c removed the original wording that contained “intramuscular adrenalin” (Nikula, 2011).

**Research Protocol**

The researcher recruited participants because she had no influence on the students’ grades thereby preventing undue pressure on the students to participate in the study. The researcher was not the instructor for the community health course that ran the study’s simulation as part of course requirements. Although the simulation was a course requirement, students were not required to participate in the study if they did not wish to and volunteering for the study was emphasized. Students were given a packet of information that included two copies of the consent form, pre-simulation preparation...
requirement, and the study’s instruments (Appendices B, C, D, and E). Jeffries (2005) stated that it is very important to provide students with clear objectives for the simulation, the faculty member’s expectations, and to make students aware of the simulation’s focus so that the learning experience will stay on track. The researcher was available to answer any questions regarding the provided material. Students who wished to participate were asked to sign both copies of the consent form, one for the researcher and one for the student’s records. If students did not wish to participate, they were told to return their unsigned consent forms and blank tools in the provided envelopes. Each packet had a unique identifiable code affixed to it. As the packets were handed out, the researcher recorded the students’ names and the unique identifiable codes given to them. Only the researcher knew the identity of the students in relation to the unique identifiable codes. These codes were placed on all the study’s instruments that participants completed to avoid any personal identification of data during the study. All consent forms, completed instruments, and the unique identifiable codes were kept in a secure, locked location by the researcher.

Participants completed the demographic questionnaire (Appendix A), the STAI (Appendix B), and the knowledge pre-test (Appendix D) regarding pediatric immunizations and parent education before the simulation. These forms along with the participant’s informed consent were returned to the researcher in a sealed envelope and kept in a securely locked drawer in a locked office by the researcher. Participants were instructed to complete the pre-simulation preparation (Appendix F) to help them become motivated, self-directed, and active learners for the study. Jeffries (2005) identified active
learning and participation by student as important when considering student factors during simulation. Finally, students were given the date and time of the simulation.

The pediatric immunization and parent education simulation experience took place at the college of nursing’s high fidelity simulation center. The pediatric patient was a high fidelity simulator. The patient’s mother was played by a human actor. All supplies and immunization vials were available to the students in a medication room and students were asked to not “pretend” in order to increase the fidelity of the simulation. Jeffries (2005) emphasized the importance of making simulations as realistic as possible in order to promote learning outcomes. Jeffries (2005) also recognized the importance of student-faculty interactions during simulation in order to promote problem solving and provide cues if needed. Because this simulation was for learning purposes and was not evaluative, the teacher’s role in this simulation was that of a facilitator as identified by Jeffries (2005). Therefore, faculty members were present during the simulation experience to encourage student-faculty interactions and provide cues that promoted learning. The researcher was available during the debriefing.

Students were randomly assigned to roles. Jeffries (2005) emphasized the importance of collaborative learning during simulation amongst participants. Such a design is less threatening for students because they are able to work together to solve problems (Jeffries, 2005). In order to promote collaborative learning, a total of four students simultaneously participated in the simulation. All four of the students greeted the patient, took part in obtaining the patient history from the actor playing the 15 month old child’s mother, determined the child’s eligibility for immunizations based on
contraindications and precautions, and provided the parent education prior to the immunizations. The four students then went to a medication room to prepare the immunizations. Students were randomly assigned to administer the vaccinations and were paired into groups of two. The paired students drew up the immunizations from vials, labeled them appropriately, administered the immunizations simultaneously into the high fidelity simulator, and correctly documented each vaccine on the documentation sheet. Having two students administer the immunizations simultaneously to the pediatric patient increased the fidelity of the simulation because this is how this task is routinely completed in the clinical field (Centers for Disease Control and Prevention, 2012).

The simulation took approximately 20 minutes to complete. Following the simulation, students were asked to attend a debriefing session. The researcher guided the students to discuss how they felt about the simulation and providing care to a family unit as opposed to a single patient. Students commented on their experience with the simulation and unclear concepts were addressed. Prompt feedback through debriefing was cited by Jeffries (2005) as very important for identifying participants’ feelings and evaluating their understanding of the concepts presented during the simulation. Furthermore, debriefing allows the participants to think critically following a simulation, one of the learning outcomes expected after a simulation (Jeffries, 2005).

Following debriefing, students completed the State Anxiety scale (Appendix B), the Student Satisfaction and Self-Confidence in Learning scale (Appendix C), and the knowledge post-test (Appendix D) regarding pediatric immunizations and parent
education. All completed forms were collected in sealed envelopes and kept in a securely locked location by the researcher.

Three months after the simulation experience, participants were given a final knowledge post-test (Appendix D) to determine if long-term knowledge acquisition was achieved as a result of the high fidelity simulation. The knowledge post-test was administered by the researcher at the end of the participants’ professionalism course. Administering the post-test randomly at the end of a class helped to keep students from reviewing the information prior to the test. Furthermore, students were not able to use resources to find the answers to the knowledge test and they did not receive any additional content regarding pediatric immunizations after their community course that could have affected the outcomes of the study. The completed forms were given to the researcher in sealed envelopes and were kept in a securely locked location by the researcher. Students who had graduated after the simulation experience were contacted and asked to complete the knowledge test via Survey Monkey. None of these participants responded to the survey.

This research study addressed all of the learning outcomes that were expected from a simulation as identified by Jeffries (2005), including increased knowledge, skill performance, learner satisfaction, critical thinking, and self-confidence. The researcher was the only one who inputted data SPSS and a password protected file was used.

**Data Analysis Plans**

Data were analyzed using SPSS, Version 20. All study instruments were reviewed carefully to ensure that they were completed in their entirety prior to entering data.
Descriptive statistics were used to describe the sample and to evaluate the results of the Student Satisfaction and Self-Confidence in Learning scale. Paired *t-tests* were used to compare the pre-test and post-test state anxiety scores to determine if any changes in state anxiety occurred from before to after the simulation experience. Because there was a normal distribution of the sample, Pearson’s Correlation Coefficient was used to determine if there was a correlation between participants’ trait and state anxiety. A paired *t-test* was also used to compare the knowledge pre-test and the second knowledge post-test three months later to determine if long-term knowledge acquisition was achieved as a result of the simulation experience.

**Risks and Benefits to Participants**

**Risks**

Minimal risks were anticipated with this study. Students may have felt that they were doing extra work by having to complete the study’s instruments as opposed to solely attending the simulation for the experience. Furthermore, administering medications to children has been documented as an identified fear in nursing students (Oermann & Lukomski, 2001). Therefore, students had access to five free Behavioral Medicine Counseling Services if needed following participation in the simulation experience.

**Benefits**

The opportunity to administer pediatric immunizations is often limited in the clinical setting for nursing students. As a result, this simulation gave students the opportunity to practice this skill prior to graduation. Furthermore, participating in a
research study that adds to the knowledge base for effective nursing education could be personally satisfying for the participants and also counted as a professional service activity for the semester. Finally, increased experience with high fidelity simulators may be beneficial to participants in the future because it is becoming more common in nursing education and at the college of nursing.

**Ethical Considerations**

Several ethical considerations were addressed when the protocol of the study was previously discussed. As stated, IRB approval was sought and obtained before implementation of the study. Permission to use the STAI and the Student Satisfaction and Self-Confidence in Learning scale was received prior to the start of the study. Informed consent was obtained only after thoroughly reviewing potential risks and benefits of the study with prospective participants. Participants were assured that either participation in the study or lack of participation would impact their grades within the college and they were informed that they could withdraw from the study at any time without penalty. Furthermore, confidentiality of participants was protected in several ways. First, no identifying information was requested on the questionnaires that participants were completing and returning. The questionnaires were kept in a locked drawer in a securely locked office at all times. When data was decoded and saved, information was stored in a password protected file on a secure network. Raw data collected during the study will be kept secure for no more than five years and will then be destroyed by shredding.
Limitations of the Study Design

Participants took the State Anxiety scale twice and the knowledge test three times. Increasing familiarity with these tools over time could have altered how the participants responded to the statements and questions. In order to minimize familiarity, the knowledge test questions were randomized in a different order each time it was administered. In addition, some of the data collected were based on participants’ subjective opinions that could not be scientifically validated. Furthermore, some students in the proposed sample graduated in December, resulting in missing data at the conclusion of the study. Finally, it was assumed that students answered all questions and statements honestly without purposefully swaying the results of the study.

Summary

In conclusion, this chapter addressed the research design and methodology that was used to implement this study. Study limitations were identified and discussed. The results of this study were disseminated via a poster presentation at the Midwest Nursing Research Society conference in Chicago in March of 2013.
CHAPTER IV. RESULTS

The purpose of this study was to identify the impact of using high fidelity simulation on baccalaureate nursing students’ anxiety level, knowledge acquisition, satisfaction, and self-confidence when providing parent education and administering pediatric immunizations. This study also evaluated each student’s general anxiety level to determine if there was a relationship between general anxiety and the anxiety experienced while participating in the simulation.

This study used a convenience sample of 21 senior community health nursing students in a BSN program located in a rural area using a one group, pre-test-post-test repeated measures design that answered five research questions. This chapter will describe the sample as well as discuss the results of the study.

Sample Description

The sample size consisted of 21 senior community health students enrolled in a rural, Midwest, baccalaureate nursing program. The sample consisted of 19 (90.5%) females and two (9.5%) males. The majority of the sample was White (90.5%). However, one student reported being Black/African American (4.8%) and one student (4.8%) did not specify ethnicity. The age range of the sample was 21 to 44 years with the majority of students being 21 to 25 years old (66.7%). The majority of the sample reported current education level as being enrolled in a BSN program (85.7%). A much smaller percentage of the sample reported currently being enrolled in a BSN program while also having a previous associate’s degree (9.5%) or a previous bachelor’s degree (4.8%). Of the 21 participants, 17 (81%) reported having no experience with administering pediatric
immunizations, three (14.3%) reported administering one to two injections to a child, and one (4.8%) reported administering three to five injections to a child. Furthermore, 20 participants (95.2%) reported having no experience with providing parental education regarding pediatric immunizations, while one participant (4.8%) reported providing parental education on pediatric immunizations three to five times. The sample’s demographic data are summarized in Table 1.

Table 1

*Sample’s Demographic Data (N = 21)*

<table>
<thead>
<tr>
<th>Demographics</th>
<th>Participants</th>
<th>Percent of Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>19</td>
<td>90.9</td>
</tr>
<tr>
<td>Male</td>
<td>2</td>
<td>9.3</td>
</tr>
<tr>
<td><strong>Age Group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21-25</td>
<td>14</td>
<td>66.7</td>
</tr>
<tr>
<td>26-35</td>
<td>4</td>
<td>19.0</td>
</tr>
<tr>
<td>36-45</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>19</td>
<td>90.5</td>
</tr>
<tr>
<td>Black/African American</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td>Did not Specify</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Previous Degree</td>
<td>18</td>
<td>85.7</td>
</tr>
<tr>
<td>Previous Associate Degree</td>
<td>2</td>
<td>9.5</td>
</tr>
<tr>
<td>Previous Bachelor Degree</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Pediatric Immunization Experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Experience</td>
<td>17</td>
<td>81.0</td>
</tr>
<tr>
<td>Administered 1-2 Injections to a Child</td>
<td>3</td>
<td>14.3</td>
</tr>
<tr>
<td>Administered 3-5 Injections to a Child</td>
<td>1</td>
<td>4.8</td>
</tr>
<tr>
<td><strong>Parent Education Experience</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Experience</td>
<td>20</td>
<td>95.2</td>
</tr>
<tr>
<td>Provided Parent Education 3-5 Times</td>
<td>1</td>
<td>4.8</td>
</tr>
</tbody>
</table>
Data Analysis

Data were analyzed using SPSS, Version 20. Paired *t-tests* were used to compare the pre-test and post-test state anxiety scores to determine if any changes in state anxiety occurred from before to after the simulation experience. Because there was a normal distribution of the sample, Pearson’s Correlation Coefficient was used to determine if there was a correlation between the participants’ trait and state anxiety. A paired *t-test* was also used to determine long-term knowledge acquisition from the pre-test to the second post-test. Descriptive statistics were also used to further analyze knowledge acquisition and to evaluate the results of the Student Satisfaction and Self-Confidence in Learning scale.

Research Question 1

The first research question for the study was stated as: Does the use of high fidelity simulation affect students’ state anxiety when administering pediatric immunizations and providing parent education? Data were collected using the State Trait Anxiety Inventory. The State Anxiety scale was administered before the simulation and after the simulation experience. Data were analyzed using paired *t-tests* to determine if there was a statistically significant difference in participants’ state scores before participating in the simulation and after participating in the simulation. Results indicated that participants experienced significantly greater anxiety about administering pediatric immunizations and providing parent education before the simulation (M = 44.33, SE = 2.63) than after the simulation (M = 32.57, SE = 2.43), *t*(20) = 4.4, *p* = .000. These results are summarized in Table 2.
Table 2

Participants’ Pre and Post-test State Anxiety Scale Mean Scores and Results (N = 21)

<table>
<thead>
<tr>
<th></th>
<th>Mean S-Anxiety Scale Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-test Mean Score</td>
<td>44.3333</td>
</tr>
<tr>
<td>Post-test Mean Score</td>
<td>32.5714</td>
</tr>
<tr>
<td>( t )</td>
<td>4.403</td>
</tr>
<tr>
<td>( df )</td>
<td>2</td>
</tr>
<tr>
<td>( p )</td>
<td>.000</td>
</tr>
</tbody>
</table>

Research Question 2

The second research question for the study was stated as: Does a student’s trait anxiety impact the level of state anxiety that a student experiences when administering pediatric immunizations and providing parent education? Data were collected using the State Trait Anxiety Inventory. The Trait Anxiety scale and the State Anxiety scale were administered prior to the simulation. After the simulation, only the State Anxiety scale was administered to participants. Because there was a normal distribution of the sample, Pearson’s Correlation Coefficient was used to determine if there was a correlation between participants’ trait anxiety and state anxiety that they experienced regarding administering pediatric immunizations and providing parent education. Results showed there was a significant relationship between participants’ trait anxiety and state anxiety that they experienced while administering pediatric immunizations and providing parent education both before the simulation, \( r = .522, \ p \ (\text{two-tailed}) < .05 \), and after the simulation, \( r = .655, \ p \ (\text{two-tailed}) = < .01 \). Therefore, students who experienced higher trait anxiety experienced higher state anxiety before and after the simulation. Likewise,
students who experienced lower trait anxiety experienced lower state anxiety before and after the simulation. These results are summarized in Table 3.

Table 3

Relationship between Participants’ Trait Anxiety and Pre and Post-State Anxiety (N = 21)

<table>
<thead>
<tr>
<th>Anxiety Relationships</th>
<th>Pearson Correlation (r)</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trait and Pre-State Scores</td>
<td>.522</td>
<td>&lt; .05</td>
</tr>
<tr>
<td>Trait and Post-State Scores</td>
<td>.655</td>
<td>&lt; .01</td>
</tr>
</tbody>
</table>

Research Question 3

The third research question for the study was stated as: Does the use of high fidelity simulation result in long-term knowledge acquisition regarding aspects of pediatric immunizations? As previously stated, data were collected using a knowledge test developed by the researcher using several different resources. With permission from Nikula (2011) (Appendix E), certain aspects of the Vaccination Knowledge Test that she developed for a Finland study were incorporated and modified into this research study’s knowledge test. In order to tailor the knowledge test to focus specifically on pediatric immunization content and for nursing students in the United States, other resources were used as well. Nursing Outcomes Classifications (NOC) (Moorhead et al., 2008), the current skills book used by the cooperating facility (Berman & Snyder, 2012), recommendations by the Centers for Disease Control and Prevention (2012), and recommendations from the Immunization Action Coalition (2011) were all used to tailor the knowledge test to nursing students in the United States and specifically for content
regarding pediatric immunizations (Appendix D). Pre-determined criteria for correct answers to the knowledge test were identified prior to the students taking the test and were used to determine correct versus incorrect answers during scoring. Cronbach’s alpha for the knowledge test was computed using SPSS, Version 20, and was found to be $\alpha = .72$. According to Field (2009), “…a value of .7 to .8 is an acceptable value for Cronbach’s $\alpha$” (p. 675).

All 21 participants completed the pre-test and the first post-test. Descriptive statistics showed that the mean pre-test percent on the knowledge test was 43.6 (SD = 11.78) and the mean percent on the first post-test was 84.5 (SD = 9.16). These results indicate that immediate knowledge acquisition did take place after participating in the high fidelity simulation.

Ten participants completed the second post-test three months after the simulation experience. Eight of the original participants graduated and did not respond to complete the post-test via Survey Monkey. Three more participants declined further participation in the study. Results showed that the mean post-test two percent decreased by 23.59% from post-test one. However, there was still a statistically significant difference in knowledge from baseline ($M = 43.6, SE = 3.72$) to three months later ($M = 60.9, SE = 4.4$), $t(9) = -6.06$, $p = .000$, indicating that long-term knowledge acquisition was present from participating in the high fidelity simulation scenario. These results are summarized in Table 4.
Table 4

*Participants’ Pre and Post-test Two Knowledge Test Mean Percent Scores and Results (n = 10)*

<table>
<thead>
<tr>
<th>Knowledge Test Mean Scores and Results</th>
<th>Pre-test Mean</th>
<th>Post-test Two Mean</th>
<th>t</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>43.6</td>
<td>60.9</td>
<td>-6.056</td>
<td>9</td>
<td>.000</td>
</tr>
</tbody>
</table>

**Research Question 4**

The fourth research question for the study was stated as: What is the effect of the pediatric immunization simulation experience on students’ reported self-confidence with applying the skills learned to clinical practice? Data were collected using the National League for Nursing’s Self-confidence scale in the Student Satisfaction and Self-Confidence in Learning scale. The Self-confidence scale consists of eight statements that participants rated on a 5 point Likert scale with responses ranging from “strongly disagree” to “strongly agree.” Based on a mean score of 4.45, students appeared to feel self-confident in their ability to administer pediatric immunizations and provide parent education in the clinical setting. The results from the Self-confidence scale are summarized in Table 5.
Table 5

Descriptive Statistics for Self-confidence Scale (N = 21)

<table>
<thead>
<tr>
<th>Scale Item</th>
<th>Range of Scores for Item</th>
<th>Mean Score for Item</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confident mastering content presented.</td>
<td>4.00-5.00</td>
<td>4.3810</td>
<td>0.49761</td>
</tr>
<tr>
<td>Simulation covered critical content.</td>
<td>4.00-5.00</td>
<td>4.5714</td>
<td>0.50709</td>
</tr>
<tr>
<td>Increased performance in clinical practice.</td>
<td>3.00-5.00</td>
<td>4.5238</td>
<td>0.60159</td>
</tr>
<tr>
<td>Helpful resources used teaching the simulation.</td>
<td>4.00-5.00</td>
<td>4.6190</td>
<td>0.49761</td>
</tr>
<tr>
<td>Student responsibility to learn necessary information from the simulation.</td>
<td>4.00-5.00</td>
<td>4.6667</td>
<td>0.48305</td>
</tr>
<tr>
<td>Know how to get help with unclear concepts.</td>
<td>4.00-5.00</td>
<td>4.7143</td>
<td>0.46291</td>
</tr>
<tr>
<td>Know how to use simulation to learn critical aspects of skills.</td>
<td>4.00-5.00</td>
<td>4.7143</td>
<td>0.46291</td>
</tr>
<tr>
<td>Instructor’s responsibility to tell me what I need to learn from simulation.</td>
<td>1.00-5.00</td>
<td>3.4286</td>
<td>1.43427</td>
</tr>
</tbody>
</table>

Research Question 5

The fifth research question for the study was stated as: What is the reported student satisfaction with the pediatric immunization simulation? Data were collected using the National League for Nursing’s Satisfaction scale in the Student Satisfaction and Self-Confidence in Learning scale. The Satisfaction scale consists of five statements that participants rated on a 5 point Likert scale with responses ranging from “strongly disagree” to “strongly agree.” Based on a mean score of 4.68, students appeared to be
very satisfied with the pediatric immunization and parent education simulation. The results from the Satisfaction scale are summarized in Table 6.

Table 6

*Descriptive Statistics for Satisfaction Scale (N = 21)*

<table>
<thead>
<tr>
<th>Scale Item</th>
<th>Range of Scores for Item</th>
<th>Mean Score for Item</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching methods helpful and effective.</td>
<td>3.00-5.00</td>
<td>4.6667</td>
<td>0.57735</td>
</tr>
<tr>
<td>Variety in activities to promote learning.</td>
<td>3.00-5.00</td>
<td>4.7143</td>
<td>0.56061</td>
</tr>
<tr>
<td>Enjoyed instructor teaching.</td>
<td>2.00-5.00</td>
<td>4.6190</td>
<td>0.74001</td>
</tr>
<tr>
<td>Teaching materials motivating and helped learning.</td>
<td>3.00-5.00</td>
<td>4.6667</td>
<td>0.57735</td>
</tr>
<tr>
<td>Teaching methods suitable to my learning.</td>
<td>4.00-5.00</td>
<td>4.7143</td>
<td>0.46291</td>
</tr>
</tbody>
</table>
CHAPTER V. DISCUSSION

The purpose of this study was to determine the influence of high fidelity simulation on students’ anxiety, knowledge acquisition, satisfaction, and self-confidence when administering pediatric immunizations and providing parent education. The study’s conceptual framework was Jeffries’ (2005) Nursing Education Simulation Framework. The research design was a one-group, pre-test-post-test repeated measures design.

This chapter will present a discussion of the study’s results. The findings related to the research questions will be reviewed followed by the study’s limitations and implications for research and nursing education.

Summary and Implications of Findings

Research Question 1

The first research question compared participants’ anxiety with administering pediatric immunizations and parent education before the simulation and after the simulation. Results indicated that students experienced statistically significant less anxiety after participating in the simulation.

In debriefing, some participants reported that they felt they may have “over-rated” their confidence with administering pediatric immunizations and providing parent education. Therefore, these individuals felt that they may have underreported their anxiety prior to the simulation. Participants qualitatively reported that their anxiety during the simulation was higher than they anticipated and they felt it may have impacted their performance at times. However, participants brought to light that anxiety can be high during a simulation experience which could impact their learning. Therefore, measures to reduce anxiety as much
as possible should be implemented during simulation experiences. Nikula et al. (2011) similarly found that their participants overestimated their vaccination knowledge as well.

In order to limit student anxiety during this study, participants were given clear objectives and preparation material, unclear concepts were clarified prior to the simulation, and there were no observers in order to avoid making the students feel like they were on the “hot seat.” Overall, participants reported in debriefing that these anxiety reducing measures were very helpful. However, an additional anxiety limiting option may be to have students assigned to certain roles within the simulation. This study had all participants participate in every aspect of the simulation so they could be exposed to the whole process. However, delineating roles may be beneficial by allowing students to focus on performing in their role while observing alternative roles.

**Research Question 2**

The second research question compared participants’ trait and state anxiety to determine if an individual’s trait anxiety affected the state anxiety that he or she experienced during the simulation. Results indicated that there was a statistically significant relationship between participants’ trait anxiety and the anxiety (state anxiety) they experienced administering pediatric immunizations and providing parent education both before and after the simulation.

Based on these results, instructors who are having students participate in simulation need to understand the relationship between students’ general anxiety and the anxiety they may experience during a simulation for that experience to be positive. As a result, nurse educators will be better able to identify and assist students who generally
have higher anxiety. It may also prove to be beneficial if instructors avoided pairing higher trait anxiety students. Instead, a combination of higher and lower trait anxiety students may result in a more relaxed environment and enhanced learning. However, more research is needed in this area to determine if this would be an appropriate alternative.

Research Question 3

The third research question evaluated whether or not participants demonstrated long-term knowledge acquisition three months after participating in the simulation. Results showed that there was a statistically significant difference in the mean percent scores from baseline to three months later, indicating that long-term knowledge acquisition was evident. However, on average students scored 23.59% lower on the three month post-test when compared with the post-test immediately after the simulation.

Based on these results, instructors must understand that it is not feasible to expect students to retain all of the information they are presented with during a simulation long-term. The possibility also exists that anxiety experienced during a simulation may inhibit students from retaining all of the information. Therefore, repetition and revisiting the important concepts over time may result in more long-term knowledge acquisition than a single simulation experience. As a result, instructors could incorporate the material from the simulation into classroom lectures throughout the semester so the material is retained.

However, participants did have statistically significant knowledge acquisition from baseline to three months later as stated. Based on these results, instructors can incorporate simulation experiences into their clinical time knowing that it does result in
long-term knowledge acquisition for their students. Furthermore, simulation will be especially important for instructors to use for clinical experiences that are often limited in the clinical setting. By using simulation, instructors can give their students exposure to rare clinical opportunities.

**Research Questions 4 and 5**

The fourth and fifth research questions focused on participants’ satisfaction with the simulation experience and their self-confidence with applying the skills learned to the clinical setting. Overall, participants reported very high satisfaction and self-confidence after participating in the simulation.

These results indicate that Jeffries’ (2005) NESF was effective and resulted in a well-designed simulation that participants were satisfied with and promoted their self-confidence. Therefore, instructors designing simulations as learning opportunities can be confident that using Jeffries’ (2005) NESF will result in a well-designed simulation that will meet learning outcomes.

One area that is worth discussing is participants’ responses to item number eight of the Self-confidence scale. This item addresses students’ perceptions that it is the instructor’s responsibility to tell them what they need to learn from the simulation. Based on the 5-point Likert scale ranging from “strongly disagree” to “strongly agree,” the minimum score was a 1, the maximum score was a 5, and the mean was 3.4. Based on Jeffries’ (2005) NESF, students must be motivated in order for a simulation experience to be effective and they must be prepared and responsible for their learning during a simulation. Therefore, providing students with clear objectives and a thorough
preparation assignment is not enough. The imperative is that instructors must communicate with students that it is their responsibility to take initiative for their learning by being prepared and motivated so they will be self-directed during the simulation and get the most out of the learning experience.

**Additional Findings**

After analyzing the data, additional findings became evident that warranted discussion. Using descriptive statistics for the knowledge test, it was found that test question items that were part of the preparation material but not incorporated into the simulation scenario resulted in poor recall of the information. An example of this finding involved the participants’ poor recall of the intramuscular site that is not used until a child has been walking for at least six months to one year. Results showed that 76.2% of participants answered this question incorrectly on the pre-test, 28.6% of participants answered this question incorrectly on the post-test immediately after the simulation, and 60% of participants answered this question incorrectly on the post-test three months later. Another example of this finding involved the participants’ poor recall of information regarding the appropriate actions to take if a patient experiences an anaphylactic reaction after administering an immunization. Results showed that 76.2% of participants answered this question incorrectly on the pre-test, 90.5% of participants answered this question incorrectly on the post-test immediately after the simulation, and 100% of participants answered this question incorrectly on the post-test three months after the simulation.

These results indicate that students are likely to have poor recall of knowledge or skills that they did not apply during the simulation experience and these findings are very
significant for nurse educators. When designing simulations, nurse educators must make sure they are incorporating the most important concepts they want their students to remember into the simulation scenario. Otherwise, students are likely to forget concepts although they thoroughly reviewed them and prepared for the simulation. Furthermore, these findings showed that more attention must be paid in nursing education to teaching students how to manage anaphylactic reactions. Because anaphylactic reactions can result in sudden death, nurse educators must be preparing future nurses as to how to respond quickly and intervene appropriately when a patient experiences an anaphylactic reaction. From a safety perspective, these results were very alarming and necessitate the need for increased education and a well-designed simulation regarding anaphylaxis for nursing students. Nikula et al. (2011) found similar results with one-sixth of their participants failing to give the correct response to managing anaphylactic reactions after vaccine administration.

Limitations of the Study

Sample

This study used a convenience sample of senior level nursing students in a rural, Midwest, nursing program and thereby might not represent the general population of nursing students. Furthermore, the sample size of this study was relatively small with only 21 participants in the first two phases of data collection and only 10 participants in the final phase of data collection. To increase the generalizability of this study, a larger sample size that is more representative of the nursing student population would be beneficial.
Repeat Tools

Both the State Anxiety scale and the knowledge test were administered more than once during data collection. The State Anxiety scale was administered before the simulation and one week after the simulation. The knowledge test was administered one week before the simulation, immediately after the simulation, and three months after the simulation. As a result, students could have become familiar with these tools and remembered how they previously responded. As a result, they may have inadvertently responded differently than they otherwise would have due to their repeated exposure to these tools. In order to decrease participants’ familiarity with the knowledge test, the questions were randomized differently each time.

Subjective Data

Some data collected for this research study were based on subjective opinions of the participants that cannot be scientifically validated. Therefore, future studies that are able to use scientifically validated methods of data collection for anxiety, satisfaction, and self-confidence would be beneficial.

Simulation Timing

Due to scheduling conflicts and available simulation lab time, the research study was conducted at the end of the semester and during the second half of the participants’ clinical day. As a result, the participants may have been busy preparing for their normal clinical experience, resulting in less time for them to prepare for the simulation experience. Furthermore, participants may have been stressed about upcoming responsibilities such as final exams that could have impacted how well they prepared for
the simulation. Therefore, scheduling the simulation during a less stressful time in the semester and as a full clinical day so the simulation preparation is their only responsibility may result in enhanced learning for the students.

**Implications for Research**

**Generalizability**

This study examined the effects of a high fidelity simulation scenario on students’ anxiety, knowledge acquisition, self-confidence, and satisfaction. Because of the limitations in this research study, an area of future research would be conducting this study with a larger sample that is more culturally diverse in order to increase generalizability. Furthermore, this study could be conducted with students who are at different levels of the curriculum in order to make the findings more generalizable to the undergraduate nursing population.

**Anaphylaxis**

As previously mentioned, this study brought to light the huge knowledge gap that participants had with intervening appropriately for clients who experience an anaphylactic reaction. Therefore, conducting a similar scenario in which a child actually experiences an anaphylactic reaction after receiving an immunization may be beneficial for nursing students, increasing their knowledge regarding this serious safety concern. Such a research study could go one step further whereby nurses are followed long-term to identify if they ever provided care to a patient who experienced an anaphylactic reaction. If so, a qualitative portion could be included in the research study to identify if
participants felt that the simulation helped them be better prepared for such an emergent situation.

**Implications for Nursing Education**

This research study revealed important implications for nursing education. First, nurse educators must realize that simulation can be anxiety provoking for students. As a result, well designed simulations that have clear objectives and an adequate preparatory assignment are necessary in order to maximize students’ learning during a simulation experience. Another important implication of this research is that students have poor recall with skills and knowledge that are not emphasized during a simulation. Therefore, important concepts must be highlighted within the simulation scenario in order to enhance students’ recall of this information long-term. Finally, incorporating pediatric immunization content and skills is a necessity in undergraduate nursing curricula. Students have limited opportunities to perform in this role in the clinical setting so the use of simulation can help future nurses learn the appropriate nursing actions, skills, and communication techniques that are necessary when performing in this role.

**Conclusion**

In conclusion, this research study identified that performing in the nursing role when administering pediatric immunizations and providing parent education is anxiety producing for students. Furthermore, the study found that simulation is an effective teaching modality to decrease the anxiety associated with this process and to promote long-term knowledge acquisition. Finally, students were satisfied with simulation as a learning tool and reported an increase in their self-confidence with applying the skills
learned to their clinical practice. Based on these findings, a recommendation for nursing education is to incorporate a pediatric immunization and parent education simulation into the nursing curriculum.
References


Hicks, F.D., Coke, L., & Li, S. The effects of high-fidelity simulation on nursing students’ knowledge and performance: A pilot study. *NCSBN Research Brief, 40.*

National Council of State Boards of Nursing, Inc.: Chicago, IL.


APPENDIX A
DEMOGRAPHIC QUESTIONNAIRE

Unique Identifiable Code: ________________

Age (Please Specify): __________

Ethnicity/Race (Please Specify): ________________________________

Please give an email you check regularly that is NOT your BRCN email:

__________________________

Gender (Please Circle)
- Male
- Female

Education Level (Please Circle All That Apply)
- Currently Enrolled in BSN program
- Previous Associate’s Degree
- Previous Bachelor’s Degree
- Previous Master’s Degree

Please indicate your previous experience administering pediatric immunizations (Please Circle)
- 0-No experience
- 1-Given 1 to 2 injections to a child
- 2-Given 3 to 5 injections to a child
- 3-Given 6 or more injections to a child

Please indicate your previous experience providing parent education about pediatric immunizations (Please Circle)
- 0-No experience
- 1-Given parent education about pediatric immunizations 1 to 2 times
- 2-Given parent education about pediatric immunizations 3 to 5 times
- 3-Given parent education about pediatric immunizations 6 or more times
APPENDIX B
EXAMPLES FROM STATE-TRAIT ANXIETY INVENTORY

State Anxiety Scale

Read each statement and then circle the appropriate number to the right of the statement to indicate how you feel right now, that is, at this moment.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Not at all</th>
<th>Somewhat</th>
<th>Moderately so</th>
<th>Very much so</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel calm</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel tense</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel steady</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Trait Anxiety Scale

Read each statement and then circle the appropriate number to the right of the statement to indicate how you generally feel.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Almost never</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>I feel pleasant</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel satisfied with myself</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I feel inadequate</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix C
Examples from Student Satisfaction and Self-confidence in Learning Scale

Please indicate your own personal feelings about each statement below by marking the numbers that best describe your attitude or beliefs.

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

Satisfaction with Current Learning

1. The teaching methods used in this simulation were helpful and effective
2. I enjoyed how my instructor taught the simulation
3. The way my instructor(s) taught the simulation was suitable to the way I learn

Self-confidence in Learning

4. I am confident that I am mastering the content of the simulation activity that my instructors presented to me
5. I am confident that this simulation covered critical content necessary for the mastery of medical surgical curriculum
6. My instructors used helpful resources to teach the simulation
Unique Identifiable Code: _____________

Fill in the Blank with the correct response.

1) The _________________ muscle should not be used in children until they have been walking for at least 6 months to one year. ***

2) If the muscle mass is adequate, the _________________ muscle may also be used for intramuscular injections in children ages 12 months through 2 years. ***

3) The _________________ muscle is the preferred site for intramuscular injections in children ages 12 months through 2 years. ***

4) The influenza vaccine is given every _________________ year(s). **

5) A child with an anaphylactic reaction to _________________ would be a contraindication for receiving the flu vaccine. ***

6) The dT booster is given every _________________ year(s). **

7) Hib is given to prevent _________________ _________________ _________________. **

8) The DTaP is given to prevent _________________, _________________, and _________________ in children. ***

9) The varicella vaccine is administered to prevent _________________ in children. ***

10) The MMR is given to prevent _________________, _________________, and _________________ in children. ***

11) The IPV is given to prevent _________________ in children. ***

True/False—Circle “True” or “False” for the following statements.

12) **True / False** The MMR vaccine has been linked with autism in previous research studies. ***

13) **True / False** Children between the ages of 6 months and 8 years old who are receiving a flu vaccine for the first time need two doses of the influenza vaccine at least eight weeks apart from one another. ***

14) **True / False** Aspiration is necessary when giving vaccines to children due to their small muscle mass and the increased risk for puncturing large blood vessels. ***
15) **True / False** No more than one vaccine should ever be given in each anatomical site in children. ***

16) The mother of a 15 month old child calls the health department that you work at and asks what she can do for “reactions” her child is experiencing after receiving his vaccines. After further inquiry, the mother tells you that the child is experiencing a temperature of 100˚ F along with redness, soreness, itching, and swelling at the injection site. You would be correct to tell the mother to do the following (Select all that apply) ***

   a. Get the child to the emergency department as soon as possible as he may be in the beginning stages of a severe reaction
   b. Administer Aspirin according to the over the counter guidelines in order to help with the pain
   c. Apply a cool compress to the injection site
   d. Apply a warm compress to the injection site
   e. Administer Benadryl as needed according to the over the counter guidelines
   f. Administer Tylenol as needed according to the over the counter guidelines

17) Managing an anaphylactic reaction includes *

   a. A client should be monitored at least for 15 minutes after the vaccination in case of an anaphylactic reaction *
   b. Administering adrenalin subcutaneously **
   c. The strength of adrenalin to be used is 1:10,000 **
   d. A client’s age determines the dose of adrenalin *
   e. A client’s weight determines the dose of adrenalin *
   f. Adrenalin dosage can be given to a client 3-4 times every 5 minutes *
   g. A client having an anaphylactic reaction must be referred to a hospital *

18) The following recommendations are followed with regard to the injection area of vaccinations and aseptic practice. **

   a. Infants’ (<1-year-olds) intramuscular vaccinations are administered to the anterolateral aspect of the thigh muscle **
   b. A dry needle should be used when injecting vaccines **
   c. Toddlers’ (1-6 years) intramuscular vaccinations are administered to the shoulder muscle of the upper arm or the anterolateral aspect of the thigh muscle **
   d. Disinfecting the skin should always occur before injecting the vaccine **
   e. The healthcare provider should always disinfect his/her hands before administering a vaccine **
   f. The healthcare provider should always disinfect his/her hands after administering a vaccine **
19) Select all that apply for maintaining safety measures during vaccine administration for children. ***
   a. Use an alcohol swab and rub vigorously back and forth to clean the site prior to injection
   b. Insert the needle at a 45° angle due to the smaller muscle mass in infants and children
   c. Recap the needle following vaccine administration
   d. Use the same needle to draw up the medicine from the vial that you use to administer the vaccine to the child
   e. Activate the safety device on the needle and dispose the syringe and needle into a non-permeable safety device

20) The following are contraindications to receiving vaccines in children **
   a. Previous severe reaction (anaphylaxis) to a vaccine or a vaccine component that is scheduled to be administered again **
   b. An elevated temperature of 99° F along with congestion and a cold ***
   c. Concurrent use of long-term/high dose steroids ***
   d. A history of redness, soreness, itching, and swelling at the injection site from a previous vaccine that is scheduled to be administered again ***
   e. Serious immunodeficiency *
   f. A history of a “missed dose” for the regular vaccine schedule **
   g. A history of severe muscle weakness and persistent screaming (> 3 hours) following administration of a vaccine that is scheduled to be administered again ***

**Short Answer**

21) You are reviewing the vaccines a child is scheduled to receive with his mother. During the conversation, the mother states, “I’m not sure if I want him to get the flu vaccine. I really don’t want him to get sick.” In short answer form, explain how you would educate this mother on this topic. ***

22) The mother of a 15 month old child inquires about giving her child the LAIV (Live attenuated influenza vaccine) as opposed to the inactivated influenza vaccine in order to avoid giving her child another shot. Briefly explain whether the use of this vaccine would or would not be appropriate for this child. ***

* Original Items, Nikula, 2008
** Original Items, Nikula, 2008, Modified by Harris, 2012
*** Original Items, Harris, 2012
APPENDIX E
PERMISSION FOR USE OF KNOWLEDGE TEST

Permission to use and modify the Knowledge Test /Instrument of Vaccination Competence

Permission is granted for Josey Harris, BSN, RN to use and modify the Knowledge Test/Instrument of “Vaccination Competence” (developed by and copyrighted to Anne Nikula) in the “Using High Fidelity Simulation to Enhance Understanding of Pediatric Immunizations and parent Education in Baccalaureate Nursing Students” (Instrument: Knowledge Test). Modifications to the original items of the Knowledge Test/Instrument of “Vaccination Competence” are requested to be indicated in the footnote of the instrument (Knowledge Test) using the format indicated below.

1 aa *
2 bb *
3 cc*
4 dd **
5 ee **

Clarifications in the footnote:
* original items, Nikula 2008
** original items, Nikula 2008, modified by Josey Harris 2012

It is also requested that a rationale of the reasons for modifications should be given of the items that were modified (for example, different recommendations for injection sites).

No fee is required. This permission to use and modify this instrument cannot be transferred, nor can it be used in studies other than “Using High Fidelity Simulation to Enhance Understanding of Pediatric Immunizations and parent Education in Baccalaureate Nursing Students”.

I would also like to know where and when the study will be published. I am also very interested to read the final version of your thesis.

Askola 5.11.2012.
Anne Nikula
PhD, MNSc, PHN, RN
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FINLAND
(EUROPE)
SBAR

Joey is a 15 month old child who presents to the local health department for his routine vaccinations. He is accompanied by his mother, Jenny.

Simulation Objectives:

1) Provide parent education for pediatric immunizations according to current recommendations and evidence-based research.
2) Identify the disease processes that are being prevented by administering varying pediatric immunizations to properly educate parents.
3) Describe contraindications and precautions for administering immunizations to pediatric patients to promote safe, quality care.
4) Correctly prepare and label immunizations needed for a 15 month old pediatric patient to promote safe, quality care.
5) Administer immunizations to the pediatric patient using correct administration technique.
6) Identify best care for pediatric patients experiencing an anaphylactic reaction from an immunization using current recommendations.
7) Respond to the psychosocial needs of pediatric patients receiving immunizations using therapeutic communication.

Simulation Plan:

1) The simulation will take approximately 20 minutes and will consist of groups of four students at one time.
   a. All four participants will greet the patient, obtain the patient history from the human actor playing the 15 month old child’s mother, determine the child’s eligibility for immunizations based on contraindications and precautions, and will provide the parent education prior to the immunizations.
   b. The four participants will be divided into groups of two. All students will draw up the immunizations in a separate medication room, will label them appropriately, will administer the immunizations simultaneously into the high fidelity simulator with their partner, will correctly document each
vaccine on the provided documentation sheet, and will provide the mother with the appropriate vaccine information sheet (VIS).

2) A debriefing will take place immediately following the simulation and will take approximately 20 minutes.

**Pre-Simulation Preparation:**

1) Review the 2012 Recommended Immunizations for Children from Birth Through 6 Years Old by the Centers for Disease Control and Prevention
   a. Identify the vaccines and the diseases they prevent
   b. Be familiar with the vaccines that would need to be administered to a 15 month old pediatric patient
   c. Identify the recommendations for a child between the ages of 6 months and 8 years who is receiving the influenza vaccine for the first time
2) Go to 
   a. Review the sections entitled:
      i. Comfort Measures
      ii. Dual administrators
      iii. Routes of administration
      iv. Infection Control
      v. Route and Site—Subcutaneous Route and Intramuscular Route
      vi. Special Situations—Multiple Vaccinations and Managing Acute Vaccine Reactions
      vii. Documentation
4) Research the relationship (if any) between autism and the MMR vaccine.
5) Identify the appropriate age for a child to receive the live attenuated influenza vaccine as opposed to the inactivated influenza vaccine.
6) Research the relationship between the inactivated flu vaccine and the belief that it causes illness.
7) Review correct sites and the correct administration technique for intramuscular and subcutaneous injections for pediatric patients, especially a 15 month old.
8) Research contraindications for immunizations in general and specifically for the flu vaccine.
9) Research how often the flu vaccine and dT booster needs to be given.
Simulation Outcomes

1) Student will provide safe, quality, patient-centered care to the pediatric patient receiving immunizations.

2) Student will provide accurate parental education regarding pediatric immunizations based on current recommendations and evidence-based research.