THE EFFECTIVENESS OF HUMAN PATIENT SIMULATION
ON BACCALAUREATE NURSING STUDENTS’
TRANSFER OF LEARNING

by

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ABSTRACT

Nursing faculty members are utilizing interactive teaching tools to improve nursing student’s critical decision-making skills; one method that has been found to be potentially effective is human patient simulation (HPS). The purpose of this time series design study was to determine whether undergraduate nursing students were able to transfer knowledge and skills learned from classroom lecture and a HPS clinical to the traditional clinical setting. Over the course of a semester, students were observed prior to a respiratory lecture, following the respiratory lecture, and following a simulation clinical.

The researcher collected quantitative data to assess participants during specific points of their instruction to determine if transfer of learning had taken place. Participants included were entry level nursing students. The findings indicated that students were able to transfer knowledge and skills learned from the HPS setting to the traditional clinical setting. An assessment rubric was also used to determine clinical competence in the traditional clinical setting. The results provided evidence that students’ perceived clinical competence and actual clinical competence was enhanced following HPS clinical. Results of the study also demonstrated that there was a positive correlation between students’ self-perception of clinical competence and their actual competence following HPS clinical.
DEDICATION

“I can do all things through Christ who strengthens me.”

Philippians 4:13

This dissertation is dedicated to my husband, Dr. Eric Kirkman. Thank you for being my mentor. I love you. This dissertation is also dedicated to my children Jalen and Justin Kirkman. You can do all things with self-discipline, tenacity, and faith in Christ. I wanted to complete this process because it is important for me to lead by example. I want the two of you to set your goals high and have the determination to reach for them. I love you with all my heart and hope that one day your aspirations will become reality. May the Lord grant you the desires of your heart and make all of your plans succeed (Psalms 20:4).
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>ASSIST</td>
<td>Approaches and Study Skills Inventory</td>
</tr>
<tr>
<td>CNA</td>
<td>Certified Nursing Assistant</td>
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<td>df</td>
<td>Degrees of freedom</td>
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<td>HPS</td>
<td>Human Patient Simulation</td>
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<tr>
<td>IRB</td>
<td>Institutional Review Board</td>
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<td>IVC</td>
<td>Interactive videoconferencing</td>
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<td>LCJR</td>
<td>Lasater Clinical Judgment Rubric</td>
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<tr>
<td>LTT</td>
<td>Learner Transfer Tool</td>
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<tr>
<td>MAR</td>
<td>Medication Administration Record</td>
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<tr>
<td>M</td>
<td>Mean</td>
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<tr>
<td>NA</td>
<td>Nursing Assistant</td>
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<td>N</td>
<td>number in population</td>
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<td>n</td>
<td>number in sample</td>
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<tr>
<td>OSATS</td>
<td>Objective Structured Assessment Technical Skill</td>
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<td>OSCE</td>
<td>Objective Structure Clinical Examination</td>
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<tr>
<td>p</td>
<td>Probability that observed data are consistent with null hypothesis</td>
</tr>
<tr>
<td>PI</td>
<td>Primary Investigator</td>
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<tr>
<td>PNCI</td>
<td>Program for Nursing Curriculum</td>
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<tr>
<td>r</td>
<td>Pearson’s product-moment correlation</td>
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<tr>
<td>Term</td>
<td>Definition</td>
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<tr>
<td>RM-ANOVA</td>
<td>Repeated Measures Analysis of Variance</td>
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<tr>
<td>$sd$</td>
<td>Standard Deviation</td>
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<tr>
<td>SPSS</td>
<td>Analytical software product originally standing for Statistical Package for the Social Sciences</td>
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First and foremost, I would like to thank my Lord and Savior Jesus Christ for giving me the strength and endurance to stay the course. The journey has been like footprints in the sand, when I looked back and felt that you were not there it was then that you carried me.

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CONTENTS

ABSTRACT .................................................................................................................................. ii
DEDICATION .................................................................................................................................. iii
LIST OF ABBREVIATIONS AND SYMBOLS ........................................................................ iv
ACKNOWLEDGMENTS ............................................................................................................. vi
LIST OF TABLES ......................................................................................................................... x
LIST OF FIGURES ...................................................................................................................... xi
CHAPTER I:  INTRODUCTION ................................................................................................. 1
  Problem Statement and Background .................................................................................. 1
  Significance of Problem ..................................................................................................... 2
  Human Patient Simulator ................................................................................................... 3
  Theoretical Framework ...................................................................................................... 5
  Definitions of Key Terms .................................................................................................. 6
  Research Questions ............................................................................................................ 7
  Summary ............................................................................................................................ 8
CHAPTER II:  REVIEW OF THE LITERATURE .................................................................... 9
  Attitudes and Simulation .................................................................................................... 9
  Benefits of Simulation ....................................................................................................... 11
  Use of Simulation in Nursing Education .......................................................................... 14
  Transfer of Learning ......................................................................................................... 17
LIST OF TABLES

1. Demographic Data ........................................................................................................... 40
2. Descriptive Statistics of Within-Subjects Factors................................................................. 41
3. Comparison of Transfer of Learning from the Human Patient Simulation Clinical Setting to the Traditional Clinical Setting over Time ........................................................................ 42
4. Comparison of Students’ Perceptions of Clinical Competence over Time ....................... 43
5. Descriptive Statistics of Within-Subjects Factors.................................................................. 45
6. Comparison of Student’s Clinical Competence over Time ................................................ 46
7. Regression Analysis of Student Perception of Clinical Competence and Performance Following Human Patient Simulation Clinical ................................................................. 47
8. Correlation between Student Perception of Clinical Competence and Performance Following Human Patient Simulation Clinical ........................................................................... 48
LIST OF FIGURES

1. Order of events with novice nursing students ......................................................... 26
2. Reliability and validity of instruments ....................................................................... 33
3. Research questions and analysis ................................................................................ 36
CHAPTER I

INTRODUCTION

Problem Statement and Background

Nursing programs throughout the country aim to produce graduates who are proficient in making critical decisions regarding the care of their patients. Critical decision-making is an important aspect of nursing care. Although nursing programs work diligently to ensure that nursing students are able to make critical decisions, health care administrators continue to emphasize that there is a need for improvement in this area (Tanner, 2006). One reason for the improvement is because some nurses are expected to care for five or more patients who have multiple complex illnesses during one shift. As a result, health care administrators have higher performance expectations for the novice nurse graduates (Feingold, Calaluoe, & Kallen, 2004; Jefferies, 2005). Health care administrators expect novice graduates to perform with a higher degree of clinical competence in the work setting. The ability of the novice graduate to make critical decisions impacts quality patient care, improves patient outcomes, and enhances self-confidence (Lasater, 2007; Nehring 2008). This level of proficiency validates the clinical competence of the novice graduate. In order to increase the ability for novice graduates to engage in critical decision making and to improve competency, many members of nursing faculty have integrated the use of human patient simulation (HPS) into nursing curriculum.

Members of nursing faculty have also been met with pressures from administrative agencies and accreditation bodies to incorporate simulation into their nursing curriculum because
of the potential effectiveness of the training approach. Madhavan (2006) stated that “simulation has emerged as the third leg in the stool of science and education” (p. 64). In a list of trends in registered nurse education, the National League for Nursing listed simulation first under the unit entitled teaching methods and approaches (National League for Nursing, 2004). The American Association of Colleges of Nursing (2005) publication, *Faculty Shortages in Baccalaureate and Graduate Nursing Programs* noted that nursing programs need to explore the use of simulated clinical experiences in supervised learning resource centers. The National Council Board of Nursing (2005) publication, *Clinical Instruction in Prelicense Nursing Programs*, stated that clinical experiences might also include innovative teaching strategies that complement clinical experiences for entry into practice competence. Nehring (2008) mailed a survey to the boards of nursing in all states, including the District of Columbia and Puerto Rico. The purpose of the study was to investigate the use of human patient simulation for clinical time and board regulations. Results revealed that 16 state boards of nursing permitted simulation as a substitution for health care clinical. Nehring noted that there was only one state that had clear guidelines that regulated the substitution of simulation clinical for health care clinical. These results suggest that simulation is a valued teaching tool in nursing education given that simulation may even be substituted for health care clinical.

**Significance of Problem**

This research study was significant because members of nursing faculty are relying heavily on HPS as a tool to improve the proficiency of student nurses; yet there is limited research that knowledge and skills learned in the HPS clinical setting is being transferred to the traditional clinical setting. There are nursing programs that have chosen to replace traditional health care clinical training for HPS clinical experiences (Nehring, 2008). Haskvitz and Koop
(2004) and Nehring (2008) reported conflicting views regarding this change in nursing curriculum. There are also no clear guidelines as to the amount of HPS clinical time that could be substituted for health care clinical time (Nehring, 2008). The lack of clear guidelines only intensifies the debate.

Preparation of nursing students to make critical decisions is important to health care administrators, practicing nurses, physicians, nursing faculty, nursing students, and the community at large. One reason a greater emphasis has been placed on the preparation of nursing students is because acuity levels of patients has increased over the years (Nehring, 2008; Schiavenato, 2009; Tanner, 2006). Furthermore, hospital orientation time dedicated to new employees has decreased because of financial constraints. As a result, health care administrators expect novice graduates to perform with a higher degree of clinical competence at the time of employment. In order to increase the ability for novice graduates to engage in critical decision making and to improve competency, members of nursing faculty have integrated the use of human patient simulation (HPS) into nursing curriculum. However, there is a gap in the research that supports the effectiveness of HPS on nursing students’ ability to transfer knowledge and skills to the traditional clinical setting. The purpose of this study was to examine whether baccalaureate nursing students were able to transfer knowledge and skills learned from classroom instruction and HPS clinical to the traditional clinical setting.

**Human Patient Simulator**

Use of the simulator was first initiated by the aviation industry to improve safety. In the early 1960s anesthesia professionals created their first HPS, named Sim One. According to Schiavenato (2009), Sim One was the first computer-controlled simulator. The goal for implementing this form of technology was to improve the students’ ability to master skills.
Human patient simulators provide realistic learning opportunities for students (Feingold et al., 2004). Nursing students can practice skills such as Foley catheter insertion, intravenous catheter insertion, and nasal gastric tube insertion. Simulators are also designed to communicate. The cost of HPS ranges from $70,000 to $200,000 (Bremner, Aduddell, Bennett, & VanGeest, 2006). The Program for Nursing Curriculum also known as PNCI created by Medical Education Technologies Incorporated costs approximately $30,000 for the purchase of over one hundred case studies (Schiavenato, 2009). The simulated clinical environment provides an opportunity for students to further develop deep learning and critical decision making as they care for patients with complex illnesses, as well as participate in crisis situations (Lasater, 2007). The goal is for students to transfer knowledge and skills learned from the simulated clinical environment into the traditional health care setting.

Previous studies have shown a gap in the research related to transfer of learning (Bearnson & Wiker, 2005; Feingold et al., 2004; Haskvitz & Koop, 2004; Lasater, 2007). Yet, Rich and Nugent (2009) reported that simulation is currently being used as an alternative or augmentation to the health care clinical experience. The researchers projected that clinical simulation would be an essential component of nursing curricula in the years to come. A study conducted by Feingold et al. (2004) revealed that half of the participants who utilized HPS did not believe that learning would transfer. Yet, 100% of faculty believed that the skills were transferable. Baxter, Akhtar-Danesh, Valaitis, Stanyon, and Sproul (2009) conducted a study using a mixed method approach exploring nursing students’ perspectives regarding their simulated learning experiences. Students commented that the simulators were only dolls and that they did not believe that simulation increased their skills for independent practice in the health care setting. Another study conducted by Wallin, Meurling, Hedman, Hedegard, and Fellander-
Tsai (2007) reported that knowledge gained by students during simulation training was transferable and their performance was improved.

Overstreet (2008) reported that “there are no studies that demonstrate if nursing simulation practice transfers to nursing clinical practice” (p. 601). Overstreet further stated that transfer of learning should be a research topic investigated for future use of simulation. Nursing school administrators are investing thousands of dollars in the purchase of human patient simulators and accessories in an effort to improve the critical decision making skills of students. Members of nursing faculty are spending numerous hours working to integrate simulation into their nursing curriculum. While the literature suggests that students generally perceive that they will be able to transfer knowledge from a simulation clinical to the traditional clinical setting, little data support the actual outcomes of student success in a health care setting, or how much the simulation clinical attributes to the students’ ability to transfer learning (Curtin & Dupuis, 2008; Feingold et al., 2004).

**Theoretical Framework**

This study was based on the theoretical framework of transfer of learning. According to Simons (1999), transfer of learning theory addresses three types of learning which include:

1. Transfer from prior knowledge to learning
2. Transfer from learning to new learning (learning now preparing for later learning)
3. Transfer from learning to application (learning for practice)

Simons (1999) states that “transfer of learning occurs whenever previously learned knowledge and skills affect the way in which new knowledge and skills are learned and performed” (p.577). Lauder, Reynolds, and Angus (1999) defines transfer of learning as the “ability to apply knowledge gained in one situation to bear in another similar situation or to use
metacognitive strategies to act in a new or novel situation” (p. 480). This study focuses on the third type of learning transfer which is the transfer from learning (classroom instruction and simulation setting) to application (traditional clinical). Members of nursing faculty use a lecture or problem based learning format in class to deliver content related to assessment and disease processes. Content is covered with the expectations that students will encounter similar scenarios in the traditional clinical setting. To further prepare students for such encounters, members of nursing faculty have required students to participate in simulation clinicals that address content covered in the classroom setting. The simulation clinical environment is designed to provide a high degree of realism in order to prepare students to transfer knowledge and skills learned from the simulation clinical to the health care clinical setting. The simulator has the capability to mimic what happens when the human body experiences complications. Bruckman (2006) states that “learning sciences researchers have found that when learning is situated in real-world settings, and focused on authentic problems that have meaning for students, then students develop a much deeper understanding of the material” (p.466). In simulation clinicals, students are learning to prepare for practice as they increase their clinical competence.

**Definitions of Key Terms**

**Human Patient Simulation.** In this study, the term human patient simulation (HPS) will be used synonymously with the term high fidelity simulator. The outward appearance of the human patient simulator is very similar to the appearance of a human. Radhakrishman, Roche, and Cunningham (2007) define HPS as “a computerized full-body mannequin that can provide an interactive teaching and learning environment” (p. 1). The simulator can be dressed to resemble the appearance of a male or a female. It has pulses, a heartbeat, and breath sounds that can be palpated and auscultated by the practicing nurse. Human patient simulators are controlled
by computer technology and respond physiologically to symptoms of disease conditions like a human being. While caring for the simulator, students are able to witness the improvement or deterioration in the simulator’s condition (Lasater, 2007).

**Transfer of Learning.** Transfer of learning is defined as “learning that occurs when learning in one context or with one set of materials impacts on the performance in another context or with another set of materials” (James, 2007, p. 96). In this quantitative study, students demonstrated transfer of learning as they transferred knowledge and skills learned during a respiratory lecture and simulation clinical to human patients. This determination was evidenced by expert observers using objective scoring by way of a performance evaluation tool.

**Clinical Competence.** Clinical competence is defined as “the habitual capability and judicious use of communication, knowledge, technical skills, clinical reasoning, emotions, values, and reflection in daily practice for the benefit of the individual and community being served” (Epstein & Hundert, 2002, p. 226). For the purpose of this study, the clinical competence of student participants was rated by nurse observers as they used numeric values from the students’ performance while conducting respiratory assessments. The numeric value from the students’ performance was then used to categorize participants into a beginning, developing, accomplished, or exemplary level of competence.

**Research Questions**

1. Are students able to transfer knowledge and skills learned from the human patient simulation clinical setting to the traditional clinical setting over time?
2. Do students’ perceptions of their clinical competence change over time?
3. Does the use of human patient simulation improve clinical competence?
4. Is there a relationship between student perception of clinical competence and performance following human patient simulation clinical?

**Summary**

Health care administrators are requiring nursing students to function at a higher performance level due to the increase in patient acuity level and the number of patients admitted with multiple chronic illnesses. In response, nursing programs have incorporated HPS into their curricula in order to produce graduates who are proficient at the time of employment. There are programs that substitute simulation clinical training for health care clinical experiences. Yet, there is minimal research that validates the students’ ability to transfer knowledge learned from the human patient simulation clinical setting to the traditional clinical setting. This quantitative study examined whether baccalaureate nursing students were able to transfer knowledge and skills learned from classroom instruction and HPS clinical to the traditional clinical setting.
CHAPTER II

REVIEW OF LITERATURE

Nursing programs are beginning to use human patient simulation (HPS) more often to ensure that graduates are prepared to care for patients with chronic complex illnesses. This review of literature will address the varying attitudes that nursing faculty and students have about simulation. There are also several benefits discussed in the literature that support the use of HPS in nursing education. This review of literature will address benefits of simulation as well as the use of simulation in nursing education. HPS is used in numerous ways in the education of nursing students. However, there is minimal research that supports the ability of nursing students to transfer what they learn from the simulation setting to the traditional clinical setting. This review of literature will examine various types of methodologies used in medical and non-medical disciplines that have investigated transfer of learning.

Attitudes and Simulation

Attitudes regarding the integration of simulation have been explored by many researchers (Bray, Schwartz, Weeks, & Kardong-Edgren, 2009; Jansen, Johnson, Larson, Berry & Brenner, 2009; McCallum, 2007; McCaughey & Traynor, 2010). The general consensus is that HPS is a valuable tool for training future practitioners. However, researchers agree that additional research is needed in the area of HPS. For example, Kardong-Edgren, Starkweather, and Ward (2008) conducted a non-experimental pilot project to assess faculty and student perceptions concerning the use of simulation. The pilot project was conducted by faculty who taught a
clinical foundations of nursing course. Students (n= 100) participated in three simulation scenarios in groups of ten. Scenario one consisted of infection control and isolation measures. Scenario two included wound care, surgical asepsis, body mechanics, bed making, and mobility and range of motion. Scenario three focused on various assessment and performance of psychomotor skills. Faculty (n=8) used the National League for Nursing tool to evaluate educational practices, simulation design, student satisfaction, and self-confidence. Findings revealed that there were mixed feelings regarding the use of simulation amongst faculty. However, student participants found simulation to be satisfying and stated that it increased their self-confidence. Researchers noted that for the first time in history, all students enrolled in the course passed the final exam.

Researchers conducted a study investigating the use of high-fidelity simulation and traditional lecture and its effect on the knowledge and attitude of nursing students related to the nursing process (Burns, O’Donnell, & Artman, 2009). Participants in this pre-post test design study were first year undergraduate nursing students enrolled in an Introduction to Nursing course. Participants were given a multiple choice survey designed to assess their understanding of the nursing process. A 14-item attitudinal survey was also completed by participants. Prior to simulation, participants completed a 2-hour lecture on the nursing process. A week later an unannounced pre-test was conducted followed by a 3-hour simulation session. Participants were divided into groups of six and completed one of twelve simulation scenarios. A week later participants completed an unannounced post-test. The hypothesis was supported. Research indicated that high-fidelity simulation and traditional lecture were effective methods for increasing student knowledge of the nursing process.
McCallum (2007) noted that the level of fidelity (realism) of the simulation environment contributes to the degree of student learning. Yet, there have been concerns that students do not take simulation clinical scenarios seriously because simulators are not real patients. Davis (2005) disputed this argument by reporting that students often cry if the human patient simulator dies. McCaughey and Traynor (2010) noted that there is an increased level of realism when using human patient simulation because of the simulators cosmetic appearance and functional capacity.

**Benefits of Simulation**

Researchers have found that by using human patient simulation (HPS) as a teaching tool, students have the opportunity to engage in deep learning and critical decision-making (Feingold et al., 2004; Garside, 2009; Lasater, 2007; Wallin et al., 2007). Educators verbalize this belief because HPS allows them to create an authentic clinical experience where students are given the opportunity to respond like they would in the traditional clinical setting. When using HPS, students are often exposed to high risk scenarios that they are not routinely exposed to in the traditional clinical setting (Rourke, Schmidt, & Garga, 2010). For example, Garside (2009) used a mixed method approach to evaluate simulation strategies used by second-year diploma nursing students. Thirty-two of the 73 students had never taken part in a simulation clinical before. Participants completed a pre-test/post-test pertaining to students’ knowledge level, understanding, skills, and confidence. Garside (2009) noted that prior to simulation participants felt that they had a strong knowledge base but lacked confidence. After simulation, students noted that they felt more competent and confident in their skill level. One participant wrote that simulation was believed to be more beneficial than lecture. Fifty-one students agreed that they felt better prepared after simulation, and 22 students strongly agreed that they felt better prepared.
Kneebone et al., (2005) conducted a qualitative study to examine whether the use of a realistic simulation clinical setting would be beneficial in the acquisition of technical skills (wound closure and urinary catheterization) by undergraduate medical students. The researchers also evaluated whether the use of video recording supported learning. All participants (n=22 medical students) attended a wound closure and urinary catheterization training course as well as a communication course. All students participated in at least six simulation experiences where they performed wound closure or urinary catheterization training. Findings from structured interviews revealed most students believed that simulated clinical was realistic and improved communication and technical skills. Human patient simulation clinical can be conducted to emulate the traditional clinical setting giving students the opportunity to improve their ability to engage in deep thinking and decision making.

Although the use of HPS has begun to escalate as a tool to educate nursing students in the last few years, there are several nursing, medical, and anesthesia programs where students have been trained using HPS for many years (McCallum, 2007; Radhakrishnan et al., 2007; Schiavenato, 2009). Good (2003) conducted a study that supported the benefits of HPS. The findings of the study revealed that simulation helped beginning medical students acquire basic skills and residents to refine and rehearse advanced skills. A mixed method study involving fourth-year baccalaureate nursing students and third-year medical students was implemented by Dillion, Noble, and Kaplan (2009) using HPS. The study was initiated to examine the interdisciplinary collaborative relationship between nursing and medical students. Simulation was used as a tool to study student perceptions of interdisciplinary collaboration. Nursing and medical student participants completed a 15-item Likert-type pre-posttest survey describing their perceptions of the nurse-physician relationship. The simulation experience was a mock code
scenario. Nursing students’ perceptions of the need for nurse-physician collaboration was higher than that of the medical students on both the pretest and posttest. Medical students scored higher on the posttest when asked about the need for nurse-physician collaboration than they did on the pretest. Results noted that after completing the scenario, medical students understood the importance of collaboration and nursing autonomy. Both nursing and medical students gained a greater appreciation for interdisciplinary collaborative relationships after completing the HPS experience. The researchers noted that this was another benefit of the HPS clinical.

In addition to the benefits of improved skill acquisition and the increased awareness of the importance of interdisciplinary collaborative relationships, an additional benefit of HPS is transfer of learning. Thomas (2007) defined transfer of learning as the ability to apply knowledge and skill used in one setting to another similar setting. Miller (1990) shared that it was important for students to comprehend content taught in traditional lecture, followed by knowing how to perform the content being taught. Then the student should demonstrate what they have learned by doing. HPS gives students the opportunity to demonstrate the first three learning practices but the last element must be performed in the clinical setting. Murphy and Tyler (2005) noted that transfer of learning is a concept that has gotten limited attention in the area of research. However, it is fundamental to the pedagogy of educators. Educators work hard to ensure that adult learners are prepared to enter the workforce. Thomas (2007) stated that transfer of learning is “a cornerstone for the success of the total learning experience” (p. 5). Educators strive to bridge the gap between theory and practice. The research conducted in the area of transfer of learning examines whether students are able to make the transition.
Use of Simulation in Nursing Education

The use of HPS in undergraduate nursing programs has increased over the years (Lasater, 2007; McCallum, 2007; Radhakrishman et al., 2007). Research indicates that students do not encounter many critical decision-making experiences in the traditional clinical setting (Lasater, 2007). Therefore, nursing faculty members are seeking interactive teaching tools such as HPS to increase the number of opportunities the students have to engage in critical decision-making (King, Hindenlang, Moseley & Kuritz., 2008). Heightened security for the Winter Olympics in Salt Lake City, Utah, prompted nursing faculty at Brigham Young University to use an alternative clinical experience in which they conducted a study exploring the benefits and limitations of using human patient simulation (HPS) as a substitute for one day of clinical experience (Bearnson & Wiker, 2005). Using a mixed method approach and an exploratory descriptive design, first year baccalaureate nursing students completed a Likert scale type survey. Participants also completed three open-ended questions. Two groups of students completed 2-hour HPS sessions that involved the care of three post-op patients. Participants verbalized increased knowledge, heightened medication administration skills, heightened confidence, and increased ability to recognize abnormal breath and heart sounds.

McCallum (2007) presented a literature review that discussed the debate regarding the use of simulation in nursing education. This exploration stemmed from a concern by UK nurses that they were strong in theory but lacked confidence in clinical skills. The purpose of the literature review was to debate the effectiveness of human patient simulation (HPS). McCallum (2007) noted that simulation is thought to reduce the theory-practice gap, this statement emphasizes transferability. Simons (1999) noted that transfer of learning takes place when students are able to apply knowledge to practice. Simulation usage is also viewed as decreasing
risk of litigation related to errors. This view stems from students having more opportunities to engage in high risk situations that they are not routinely exposed to in the traditional setting. This exposure is believed to increase the clinical decision making and competence of students thus reducing errors and creating a safer patient care environment. Students have the opportunity to practice their skills on patients that have human characteristics. In simulation clinical, students make mistakes without causing harm.

In a qualitative study conducted by Lasater (2007), students were able to tie theory to clinical practice; students witnessed outcomes after interventions were implemented, and anticipate situations that could occur in clinical practice, thus showing the benefit of transfer of learning. Lasater (2007) examined the high fidelity simulation experience of junior level nursing students enrolled in an Acutely Ill Adult course (n=15). The investigation focused on the correlation of high fidelity simulation on students’ development of clinical judgment. The study involved students’ self-report of high fidelity simulation effects on confidence and clinical judgment skills. However, the investigator noted that there was a need for additional research that links performance in simulation to real clinical practice. In this study, Lasater identifies a need for additional research that examines transfer of learning.

McCaughey and Traynor (2010) initiated a longitudinal study that examined the role HPS played in preparing senior level nursing students for clinical practice. During the simulated clinicals, the students’ performance was videotaped and also observed through a one way mirror. Researchers collected both quantitative and qualitative data over a six month period. A Likert-type questionnaire containing 32 items and a section for comments was administered on the day of the final course meeting. Results supported the belief that HPS was an effective teaching tool in the undergraduate nursing curricula. Students commented on their belief that HPS was helpful
in their ability to grasp concepts. One student wrote that simulation “helped me to become more aware of my practice and how I assess patients, deliver care, and deal with situations” (p. 4). Seventy-two percent of participants (n=67) believed that the use of HPS was beneficial in their transition from student to staff nurse. There were 17.2% of participants (n=16) that believed the use of HPS was not beneficial.

Carter and Gaskins (2010), community health faculty, implemented a project using community health nursing students and patient simulation to prepare students for bioterrorism disaster management. Participants cared for a patient exposed to smallpox. During the simulation experience, a group of students were assigned to observe while the other group participated in the scenario. Shift report was given midpoint during the scenario, which allowed time for role change. Observers assessed students’ ability to identify signs and symptoms of smallpox, exposure, route of transmission, room assignment, and knowledge of isolation precautions. Further teaching was conducted in the debriefing session. Students viewed other biological agents like anthrax and mustard gas through the use of moulage. Students also viewed a Strategic National Stockpile video and a PowerPoint presentation entitled Planned Response to Pandemic Influenza. Qualitative comments from the students described the experience as beneficial to their learning. However, students were not able to test their knowledge and skills by participating in a disaster scenario with real patients; therefore, the students’ ability to transfer learning was left unknown. Additional research is needed to identify whether participants were able to transfer knowledge to a real or mock disaster event.

Nursing programs have increased their usage of HPS to improve the clinical competence of nursing students as they enter the workforce. The cost of HPS ranges from $70,000 to $200,000 (Bremner et al., 2006). Yet, there is minimal research that validates the use of HPS in
the area of transfer of learning. The ability of nursing students to demonstrate transfer of learning is critical to the field of nursing education (Lauder et al., 1999). Researchers note the gap in the literature in the area of transfer of learning (Alinier, Hunt, Gordon & Harwood, 2006; Kuduvalli, Parker, Leuwer & Guha, 2009; Domuracki, Moule, Owen, Kostandoff & Plummer, 2009).

**Transfer of Learning**

Most research has focused on training anesthesia and medical students. Minimal research has been conducted in the discipline of nursing to validate whether students that complete HPS training are able to transfer knowledge and skills learned to the traditional clinical setting (Alinier et al., 2006; Kuduvalli et al., 2009; Domuracki et al., 2009). Kuduvalli et al. (2009) conducted a study to provide evidence that the implementation of a high-fidelity simulation-based course for anesthesia students improved the long-term retention and transfer of skills to clinical practice. Second year juniors in an anesthesia program participated in a one day simulation course that focused on clinical management of anesthesia emergencies and team resource management. Students worked in pairs as they participated in real time simulated clinical scenarios. A debriefing session was held after each scenario, followed by a presentation of the approved guidelines for emergency management and a viewing of the group’s performance. The evaluation was followed up by a longitudinal cohort study. Researchers sent an electronic open-ended questionnaire to 73 participants who completed the simulation-based course, after having 12 months of clinical practice. Researchers wrote that knowledge and skills acquired in the simulation course were transferred into clinical practice (i.e., communication, confidence, and situational awareness).
Domuracki et al. (2009) investigated whether simulation training improved the health care professionals’ ability to apply cricoid pressure in the clinical setting. Resuscitation guidelines from Europe and North America recommend that cricoid pressure be held when the health care provider bag and mask ventilates a patient to prevent gastric insufflation and aspiration. Researchers found that health care providers were not applying the appropriate amount of pressure. One-hundred-and-one subjects were randomly placed in experimental (53 subjects) and control groups (48 subjects). Both groups participated in personal demonstration of technique, three successful cricoid pressure attempts on a model, and once on a human patient. The experimental group was the only group to participate in simulator training. Results revealed that the experimental group was able to apply the appropriate amount of cricoid pressure 38% of the time. The control group was able to apply the appropriate amount of cricoid pressure 19% of the time. Simulation training improved the health professionals’ ability to apply cricoid pressure to human patients and, thus, affirming the transfer of learning theory (Domuracki et al., 2009).

Transfer of learning theory has also been examined when conducting research to educate non-medical professionals. Kent, Andrea, and Simpson (2010), university professors, conducted a transfer of learning study with a group of 48 teachers who were enrolled in a master’s program. The study was conducted over three semesters. Researchers used traditional lecture and interactive videoconferencing (IVC) to determine if student teachers could close the gap between theory and practice by improving reading instruction. One motivation behind conducting the study was to better prepare future teachers for practice. Nurse educators share this same rationale for training nursing students for practice when using HPS. In this study, faculty experts covered the theory portion of the lesson with student teachers. Afterwards, student teachers used IVC to observe the lecture content and lecture strategies being delivered to a group of fifth graders. A
debriefing session was held after both interventions were completed. Data from the education study revealed that transfer of learning took place. In a survey, student teachers commented that they had an increased confidence and competence in their ability to effectively deliver reading instruction.

Murphy and Tyler (2005) investigated the correlation between learning approaches and transfer of learning to the workplace. This longitudinal study explored the students’ ability to apply what they learned in theory to the practice setting. Part-time students, enrolled in a year-long managerial vocational course and who worked full-time jobs, were participants in the study. The investigators used student self-report and the Approaches and Study Skills Inventory for Students (ASSIST) as instruments for data collection. Participants completed a questionnaire regarding their knowledge and ability to transfer learning to the workplace after they completed the managerial course. The ASSIST Inventory was also completed at the end of the course. The ASSIST inventory has three main scales for learning approaches. The scales include deep, strategic, and apathetic approaches. The scale assisted in determining student approach to learning. Researchers went further to question whether students’ course grades increased their ability to transfer knowledge and skill to the workplace. Researchers found that students who engaged in deep learning were able to transfer knowledge and skills to the workplace. Results also revealed that academic grades were not significant predictors of the student’s ability to transfer what they learned to the workplace. Researchers concluded from their findings that more information about transfer of learning could have taken place by observing the students in the workplace. The primary investigator of the HPS transfer of learning study will collect data by observing students in the traditional clinical setting. This study supports the need for this method of data collection.
Lucas et al. (2008) conducted a transfer of learning study. The purpose of the study was to investigate whether the use of a virtual reality laparoscopy simulator would improve the medical students’ performance of virtual laparoscopic procedures. Thirty-two novice medical students were randomized into either the experimental (n=16) or control group (n=16). The study was conducted using a pretest-posttest design. The baseline performance of all participants was evaluated using an Objective Structured Assessment Technical Skill (OSATS) instrument. Data from the pre-test revealed that there was not a significant difference in performance between the experimental and control groups. The experimental group completed six unsupervised training sessions with the simulator in addition to the traditional training method. The control group participated in the traditional training method with no simulation. At the end of the training period, both groups performed a laparoscopic cholecystectomy on the simulator model under observation (using the OSATS instrument). Observers reported that the experimental group performed significantly better than the control group.

Hatala et al. (2008) conducted a clinical competence quantitative study comparing the ability of medical students (n=28) to perform an accurate cardiac physical examination on simulator patients with audio-video technology, cardiac patient simulators, and real patients. Real patients were recruited by mail using a list of specific cardiac requirements. Two physician investigators used an objective structured clinical examination tool (OSCE) for data collection. The tool was used to evaluate the students’ ability to accurately diagnose four cardiac findings (normal heart sounds, aortic stenosis, mitral regurgitation, and mitral stenosis). Investigators reported that participants performed a more accurate assessment on the two simulated models (Hatala et al., 2008). Conversely, faculty members tested the effectiveness of the simulation clinical by asking four nursing students from the advanced medical-surgical course to participate
in two simulation experiences. Students were evaluated on their ability to prioritize patient care and recognize rapid changes in their patients’ conditions. Students verbalized that the simulation clinical assisted with learning. Students stated that during nursing orientation they were asked to participate in a mock code and felt that they performed better than their peers because of their HPS experience. Students also shared that they were better able to recognize changes in their patients’ condition (Curtin & Dupuis, 2008).

Researchers implemented a study to investigate whether the time to complete simulation activity led to the clinical competency of performing fibreoptic intubation procedure (Crabtree, Chandra, Weiss, Joo & Naik, 2008). Thirty respiratory therapists participated in the study. All participants attended a lecture where they were given oral and written instructions addressing how to manipulate a fibreoptic scope. The participants were divided into two groups (low fidelity and high fidelity) where they were given the opportunity to practice on their assigned simulator for up to one hour with informal feedback. After participating in the training exercise both groups were tested on how long it took them to perform the intubation. The following week, participants performed the fibreoptic manipulation procedure on a human patient while being observed by two anesthesiologists, who were not members of the research team. The researchers measured the time it took for the participants to perform the procedure. Results revealed that there was no correlation between times to complete the procedure on either type of simulator. The researchers concluded that time measurements were not good indicators for clinical competency.

Blum, Borglund, and Parcells (2010) also conducted a clinical competence study using high-fidelity nursing simulation. The clinical competence of 43 entry-level baccalaureate nursing students was measured by using the Lasater Clinical Judgment Rubric (LCJR). Students were
randomly placed into either the control or experimental group to master skill acquisition. The control group used the traditional training method of using a task trainer and lecture. The experimental group was trained by using a high fidelity simulator and lecture. The two groups met in their assigned group for seven hours a week. On the day of check off, nursing faculty completed the LCJR to rate the clinical competence of students in the areas of recognizing deviations from expected patterns, information seeking, prioritizing data, and clear communication. Data revealed that the clinical competence of the students increased over the semester. However, simulation was not determined to be the main factor contributing to the increase in clinical competence because competency level increased for both the control and experimental group. The researchers noted the need for more research in the area of transfer of learning.

May and Kahnweiler (2000) conducted a mixed method study, using a pretest-posttest design and semi-structured interviews to explore the effect of a mastery practice design on learning and transfer in behavior modeling training. Participants included 38 supervisors and managers who participated in a 12-week training program that included active listening and role playing. Participants were separated into a conventional workshop group where they participated in role playing and active listening skills practice, followed by a feedback session delivered by a coach. The mastery practice lab group was videotaped as they participated in role play activities, and then given an opportunity to view the video as the coach provided feedback. Participants completed a behavioral and listening skills survey four weeks following their training session. Researchers noted that the mastery group showed a greater retention of knowledge and behavioral demonstration (i.e., interpersonal communication and negotiation.
skills). However, there were not significant findings in learner transfer when comparing the mastery group to the conventional group.

Summary

Human patient simulation has been integrated into nursing, anesthesia, and medical programs for many years. It has also been studied using a variety of methodologies largely with the same affirmation. Most faculty and students believe that HPS is a beneficial learning modality. Thus, the use of HPS in nursing curriculum has escalated over the last few years. The benefits of HPS have been demonstrated in the students’ ability to improve skill acquisition (Kneebone et al., 2005), increase clinical competency (Garside, 2009), and collaborate across disciplines (Dillion, Noble & Kaplan, 2009). Although attitudes toward the integration of HPS and its benefits have been thoroughly examined, HPS has not been rigorously examined with regards to transfer of learning in the field of nursing education.

This study used a quantitative approach to examine whether students are able to demonstrate transfer of learning from a classroom and simulation setting to the traditional clinical setting. The current study hypothesizes that nursing students participating in classroom lecture and HPS clinical will be able to transfer knowledge and skills learned to the traditional clinical setting. As mentioned previously, this study will use transfer of learning theory as a theoretical framework. The primary investigator plans to examine whether entry level nursing students are able to transfer knowledge and skill to practice. Simons (1999) refers to this theory of transferability as application. However, because transfer of learning theory has not been used as a theoretical framework in nursing, the theory has been imported from the field of psychology and education.
CHAPTER III
RESEARCH METHODOLOGY

The use of HPS in nursing education has been researched in numerous ways. However, there is a gap in the literature in the area of transfer of learning (Alinier et al., 2006; Domuracki, et al., 2009; Kuduvalli et al., 2009; & Lasater 2007). The purpose of this study was to examine whether baccalaureate nursing students were able to transfer knowledge and skills learned from classroom instruction and HPS clinical to the traditional clinical setting. Simons (1999) transfer of learning theory states that one type of transfer is the transfer from learning to application. The current study examined this type of transfer. In this study, the researcher examined whether nursing students were able to transfer knowledge and skills learned from the simulation clinical to the traditional clinical setting. It is important to nurse educators to produce graduates that are capable of managing the care of multiple complex clients. As a result, HPS has been integrated into nursing curricula (Bearnson & Wiker, 2005; King et al., 2008). Therefore, it is important to determine whether students are able to transfer what they learned while caring for the HPS to human patients. This chapter includes participant involvement, how participants were recruited, the types of instruments used, the data collected, procedure for data collection, and how the data were analyzed.

This quantitative study was conducted using a time series-repeated measures (RM) design to evaluate students’ ability to transfer knowledge and skills learned during the semester. The study was based on Simons’ (1999) transfer of learning theoretical framework. The primary investigator examined whether student participants were able to transfer previously
learned knowledge and skills to practice. The primary investigator implemented two interventions within the study that were conducted between observations. Intervention one, was the respiratory assessment lecture which was conducted before intervention two, the simulation clinical (Figure 1). The traditional clinical took place throughout the semester (O₁ X₁ O₂ X₂ O₃). The observations were used to assess students’ ability to transfer knowledge and skills learned from the simulation clinical to the traditional clinical setting.
Figure 1. Order of events with novice nursing students
Participants

First semester undergraduate nursing students from a local university were recruited to participate in the study. One exclusion criterion for the study was students who were repeating the fundamentals in nursing, community health nursing, or adult assessment course. However, all students met study requirements. Therefore, there were no participants excluded from the study. This was tracked by the students completing a question on the demographic survey that asked if they ever made a D or an F in a nursing course (Appendix E). The population of the study was 48 first level nursing students. The Raosoft sample size website (2009) was used to perform the power analysis. Calculations were based on a population size of 48 students with a 5% margin of error and a 90% confidence level. In order to have an adequate sample size the primary investigator (PI) concluded that, based on the power analysis, 41 students would participate in the study.

Recruitment

The primary investigator (PI) received permission from the Dean of the College of Nursing and Allied Health and course professors at the University of North Alabama to recruit first semester undergraduate nursing students for the study. The PI completed the electronic research review process and was granted research implementation approval from the Institutional Review Boards (IRB) at the University of Alabama and the University of North Alabama. The PI recruited students using face-to-face communication while they were in their Adult Health Assessment class. Two weeks prior to the students completing their first clinical experience in the traditional clinical setting, the PI met with all first semester undergraduate nursing students to inform them of study details (purpose, time involvement, level of participation, potential risks and benefits) and to invite them to participate in the study. The informed consent form was
distributed and the PI answered questions proposed by perspective participants (Appendix A). After all questions were answered, the PI exited the room and a research assistant collected the informed consent forms. The PI is an instructor at the university where the study was being conducted, and the students would be enrolled in the PI’s course during their last semester of nursing school. To prevent the students from feeling pressured because of the role of the PI and to protect the anonymity of the students, the PI excused herself from the room during the collection of the informed consent forms. A second meeting was scheduled to meet with students who were absent during the time of the initial meeting. Students from the initial meeting were invited to attend the second meeting if they had additional questions. This meeting was conducted in the same format as the initial meeting.

**Instrumentation**

**Nurse Observers/Raters**

This study used nurses with pulmonary assessment experience as nurse observers/raters to collect student performance data. Refer to Figure 1 to link questions and assessments with instruments used by nurse observers/raters. Prior to beginning the study, the nurse observers/raters and alternate observers/raters were required to attend a training session that included an orientation of tools and performance measurements. The observers/raters were given an opportunity to ask questions about content contained on each tool. The primary investigator answered questions about the study by email, telephone, and face-to-face discussion. Observers/raters, who were unable to attend the training session, were required to view a video recording of the original training session. Trained nurse observers/raters were used in the traditional clinical setting to observe the performance of students. Observers/raters completed a 7-item paper-and-pencil performance evaluation tool on each student in their assigned group.
during each observation period (Appendix B). Observers/raters evaluated the student’s ability to accurately locate lung fields, distinguish breath sounds (clear, crackles, and/or wheezes), verbalize correct breath sounds, and properly document findings on three patients during each observation session. Performance data were collected by trained nurse observers/raters at three points in time. The nurse observers completed the performance evaluation tool and the LCJR.

According to Simons (1999), a form of transfer is the transfer from learning to application. It is important for students to take what they have learned in one environment and then transfer those concepts to the practice setting. There were four instruments used for data collection: a performance evaluation tool (Appendix B), a clinical judgment rubric (Appendix C), a transfer of learning tool (Appendix D), and a tool to collect demographic information (Appendix E).

**Performance Evaluation Tool**

The performance evaluation tool (Appendix B) answered the question of whether students were able to transfer knowledge and skills learned from the human patient simulation clinical setting to the traditional clinical setting over time. The performance evaluation tool has been structured to reflect the Objective Structure Clinical Examination (OSCE). Hardin, Stevenson, Downie, and Wilson (1975) were the first researchers to recommend use of this format. Hardin et al. (1975) rated the performance of medical students by using a combination of the OSCE and multiple choice tests. The OSCE and multiple choice tests yielded a .63 validity correlation. However, multiple choice tests were not used in this study. Content used in the performance evaluation tool to rate participants has been taken from assessment textbooks that contain recommendations for the use of evaluation of similar content (Dillion, 2003; Estes, 2006; Jarvis, 2008; Potter, 2009; Seidel, Ball, Dains, & Benedict, 2003; Weber & Kelley, 2003).
Three members of the nursing faculty with at least five years of teaching experience and experience teaching entry level nursing students were chosen to review the performance evaluation tool to establish content validity. All expert reviewers agreed that all content in the performance evaluation tool was appropriate for a respiratory assessment. A content validity score of 1.0 was achieved.

The performance evaluation tool was used to collect data to examine whether previously learned knowledge and skills affect performance. According to Simons’ (1999) transfer of learning theory, this is one way students demonstrate transfer of learning. Examples of performance measures that were included in the performance evaluation tool are “demonstrate proper respiratory assessment technique,” “identify breath sounds accurately,” and “listen to breath sounds in the anterior and posterior thorax”. The use of a performance evaluation tool allowed observers/raters to collect performance data on their assigned students. The observers/raters conducted an initial assessment (one of three), at the beginning of the students’ clinical experience, to establish a baseline comparison using the components listed below.

- The student’s ability to locate lung fields
- The student’s ability to distinguish breath sounds
- The student’s ability to verbalize correct breath sounds

A pilot test was conducted by the nurse observers/raters for interrater reliability testing. Three nursing students volunteered to participate. Using the performance evaluation tool the nurse observers/raters evaluated each student while they performed a respiratory assessment on three different patients. The nurse observers/raters met with the primary investigator to compare result totals and to discuss any deviations in scoring. The performance evaluation tool yielded an interrater reliability testing score of 1.00.
Lasater’s Clinical Judgment Rubric

The nurse observers/raters measured performance by using the performance evaluation tool and the “being skillful” dimension of Lasater’s Clinical Judgment Rubric (LCJR). These tools were used to answer the question of whether human patient simulation improves health care clinical competence. The LCJR (Appendix C) was developed based on Tanner’s Clinical Judgment Model. Tanner’s Clinical Judgment Model was used to assess stages in which students developed clinical judgment. The LCJR contains 11 dimensions. The dimensions are segregated into four developmental levels to include effective noticing, effective interpreting, effective responding, and effective reflecting. The “being skillful” dimension is listed under the effective responding developmental level. Dillard et al. (2009) reported that the Clinical Judgment Rubric had a Cronbach’s alpha of .94. The primary investigator used the “being skillful” dimension of Lasater’s Clinical Judgment Rubric for this study to determine clinical competence. The LCJR “being skillful” dimension is aligned with the study’s theoretical framework which addresses transfer from learning to application. The Clinical Judgment Rubric categorizes measurement options that range from exemplary, accomplished, developed and beginning. Three members of the nursing faculty with at least five years of teaching experience and experience teaching entry level nursing students were chosen to review the LCJR to establish content validity. All expert reviewers agreed that the “being skillful” dimension of the LCJR addressed performance and clinical competence. A content validity score of 1.0 was achieved. The three expert reviewers also determined the numeric value from the “being skillful” dimension to quantify the categories of measurement: exemplary (10-12), accomplished (7-9), developed (4-6) and beginning (1-3).
Learning Transfer Tool

The Learning Transfer Tool (Appendix D), developed by Victoria Elfrink, Associate Professor at the Ohio State University, was used to answer the question, do students’ perceptions of their clinical competence change over time. The tool was developed based on Anderson and Kratwohl’s framework (Elfrink & Lee, 2010). The framework measures learning outcomes using the cognitive process (remember, understand, apply, analyze, evaluate, and create) and knowledge dimensions (factual, conceptual, procedural, and meta-cognition). The Anderson and Kratwohl framework examines learning outcomes. The Learning Transfer Tool (LTT) was first piloted using a pre-licensure nursing program at Ohio State University (n=125). A Cronbach’s alpha score of 0.84 was achieved during the pilot study. In spring 2009, the LTT was used in a multisite study. A Cronbach’s alpha score of 0.96 (n=685) was achieved (Elfrink & Lee, 2010). Three members of the nursing faculty with at least five years of teaching experience and experience teaching entry level nursing students were chosen to review the Learning Transfer Tool to establish content validity. All expert reviewers agreed that all questions in the Learning Transfer Tool addressed clinical competence. A content validity score of 1.0 was achieved. The primary investigator used the LTT to further examine the study’s transfer of learning framework. Questions incorporated in the LTT measure the following: student’s ability to deliver nursing care, prioritize patient care needs, delegate patient care, and identify and communicate data that are needed for patient care decisions. This study utilized the LTT to assess students’ self-perceptions of their clinical competence. Participants used the LTT to evaluate their self-perception of their performance three times during the study. Time 1 of the self-assessment was completed one week after consenting to participate in the study. Time 2 was completed
Research Questions | Analysis
---|---
Are students able to transfer knowledge and skills learned from the human patient simulation clinical setting to the traditional clinical setting over time? | Repeated ANOVA
Do students' perceptions of their clinical competence change over time? | Repeated ANOVA
Does the use of human patient simulation improve clinical competence? | Repeated ANOVA
Is there a relationship between students' perception of clinical competence and performance following human patient simulation clinical? | Regression Analysis

Figure 3. Research questions and analysis

Summary

Patients in today’s health care environment are older and have multiple complex illnesses. Professional nurses are required to make critical decisions regarding the care of these patients. Some nurses are caring for more than five patients at a time. Therefore, the nurse’s ability to make critical decisions in patient care is essential. The increased medical complexity of patients over the years has also led to a need for graduate nurses to work at a higher skill level. As a result, nurse educators are exploring interactive teaching tools to improve the nursing students’ ability to make critical decisions. Members of nursing faculty are using HPS as one innovative teaching tool to improve critical decision making among nursing students. The increased attention and rapid emergence of HPS has led some nurse educators to question
All participants were informed of the purpose of the study and received a statement of informed consent notifying the students of their rights before the study began. The statement included a right to withdraw. Participants were informed that if they discontinue participation in this study, they would continue to be treated in the usual and customary fashion. Students were also informed that participation in the study would not affect their grades and that participation in the study would be entirely voluntary. The research assistant witnessed the signing of the consent form and storage process. This information is indicated on the informed consent form (Appendix A). The consent form will be kept for four years in case the university wants to check to see if consent was given to be in the study.

There was minimal risk and no cost to participants. All data collected were locked in a fireproof filing cabinet in the primary investigator’s office at the University of North Alabama. The primary investigator is the only one who has a key to the filing cabinet. Institutional Review Board (IRB) approval has been obtained from the University of North Alabama (Appendix F) and the University of Alabama (Appendix G).

**Procedure**

Students experienced a one day traditional classroom lecture on the topic of respiratory assessment. Students completed both traditional clinical training and one day in a simulation clinical setting. The setting for the HPS clinical took place in the on-campus lab at the local university. The setting of the traditional clinical was in an acute care community hospital.

As previously shown in Figure 1, students were observed in the traditional clinical setting after the initial assessment but prior to the respiratory assessment lecture in the classroom setting. This initial observation took place one week after participants consented to participate in
the study. The week following the respiratory assessment, content was covered in the classroom setting. Observers/raters conducted the second observation in the traditional clinical setting. The final observation took place the week after the simulation clinical. The simulated patient scenario required students to care for a patient with a diagnosis of asthma. In order to create a realistic setting, students were given information regarding the patient’s medical history, medication administration record (MAR), and laboratory values. During the scenario, the patient experienced an anaphylactic reaction. Following the completion of the asthma patient scenario, the students were given the opportunity to listen to various breath sounds on the human simulator (crackles, wheezes, and normal breath sounds). To assess for transfer of learning to the traditional clinical setting and clinical competence, students were assigned human patients.

**Data Analysis**

Information collected from the four instruments was the source of data investigated. To maintain uniformity, data were collected from all students. Information collected related to sample characteristics are included in the study.

Both descriptive and inferential statistical methods were used to analyze data collected for the study. The most appropriate level of measurement is interval because the observers/raters completed performance evaluations at three points in time to assess for transfer of learning. Repeated measures analysis of variance (RM-ANOVA) was used to indicate whether transfer of learning varied and clinical competence increased over time. Pearson’s r was used in the analysis of whether there was a relationship between student perceptions of clinical competence (Figure 3). An alpha level of .05 was used for all statistical tests comparing responses.
<table>
<thead>
<tr>
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<th>Analysis</th>
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<tr>
<td>Are students able to transfer knowledge and skills learned from the human patient simulation clinical setting to the traditional clinical setting over time?</td>
<td>Repeated ANOVA</td>
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<tr>
<td>Do students' perceptions of their clinical competence change over time?</td>
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<td>Does the use of human patient simulation improve clinical competence?</td>
<td>Repeated ANOVA</td>
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<tr>
<td>Is there a relationship between students' perception of clinical competence and performance following human patient simulation clinical?</td>
<td>Regression Analysis</td>
</tr>
</tbody>
</table>

Figure 3. Research questions and analysis

Summary

Patients in today’s health care environment are older and have multiple complex illnesses. Professional nurses are required to make critical decisions regarding the care of these patients. Some nurses are caring for more than five patients at a time. Therefore, the nurse’s ability to make critical decisions in patient care is essential. The increased medical complexity of patients over the years has also led to a need for graduate nurses to work at a higher skill level. As a result, nurse educators are exploring interactive teaching tools to improve the nursing students’ ability to make critical decisions. Members of nursing faculty are using HPS as one innovative teaching tool to improve critical decision making among nursing students. The increased attention and rapid emergence of HPS has led some nurse educators to question
whether students will be able to transfer knowledge and skills gained from the classroom and HPS clinical setting to the traditional health care setting. Many nurse educators believe that knowledge and skill transfer will take place. However, it is essential for nursing scholars to provide evidence that validates this belief. This study used a time series-repeated measures design to further expand the research in the area of HPS and transfer of learning.
CHAPTER IV

RESULTS

The purpose of this study was to determine whether baccalaureate nursing students were able to transfer knowledge and skills learned from classroom instruction and human patient simulation (HPS) clinical to the traditional clinical setting. Simons (1999) states that transfer of learning takes place when students are able to apply what they have learned from one setting and later apply it to the practice setting. This study focuses on the ability of nursing students to execute this type of transfer. The researcher examined students’ perceptions of their clinical competence. Members of nursing faculty have been challenged by health care administrators to produce nurse graduates that are competent in meeting the health care needs of today’s complex patient population (Elfrink, Kirkpatrick, Nininger, Schubert, 2010). The researcher also sought to determine if the use of human patient simulation actually improved the clinical competence of entry level nursing students. Furthermore, the researcher investigated whether there was a correlation between student perception of clinical competence and performance. This chapter presents the results and the analysis of data obtained.

Demographic Data

The population for this study was first semester undergraduate nursing students enrolled in a baccalaureate nursing program. Forty-eight participants were enrolled in an assessment course, community health nursing, and fundamentals in nursing course. At the beginning of the semester students consented to participate in the study. Some students (n=6) that began the
The study chose not to continue participation, leaving (n=42) to complete the study. Attrition took place due to one student withdrawing from the nursing program. Two students withdrew due to medical reasons. One student did not wish to be observed, and two students were not available on one of the observation days.

The participants (n=42) completed a demographic survey (Appendix E) to collect demographic information. Demographic data are presented in Table 1. The sample consisted of 37 white students (88%), four African American students (10%), and one Asian American student (2%). There were 34 females (81%) and eight males (19%). Twenty-eight students (67%) were between the ages of 18-21, six students (14%) were between the ages of 22-25, five students (12%) were between the ages of 26-30, two students (5%) between the ages of 31-40, and one student (2%) was between the ages of 41-50. There were eight students (19%) who responded “yes” to having previous work experience as a health care provider. There were four students who worked as a certified nursing assistant (CNA), two who worked as a nursing assistant (NA), and two who worked as other. There were six students (14%) that held one previous degree and two students (5%) who participated in HPS training prior to entering nursing school.
Table 1  

Demographic Data (n=42)

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</tbody>
</table>

Note. There were six students that held one previous degree. There were two students who participated in HPS training before.

Data Analysis

Research Question 1: Are students able to transfer knowledge and skills learned from the human patient simulation clinical (HPS) setting to the traditional clinical setting over time?

To address Research Question 1, participants were observed by nurse observers/raters while completing respiratory assessments. The observers/raters completed a performance evaluation tool (Appendix B). Participants were observed performing the respiratory assessments at three separate time intervals over the course of the semester to determine if
students were able to transfer knowledge and skills learned from the HPS clinical setting to the traditional clinical setting over time. Observations took place at the beginning of the semester, the week following the respiratory assessment lecture, and the week following simulation clinical. Participants could score a maximum of 12 points during all three observations depending on their performance. Participants were rated based on their ability to locate lung fields, distinguish breath sounds, verbalize correct breath sounds, obtain an accurate history, and accurately document assessment findings. The average of the three scores for each student was used to establish whether transfer of learning took place (Table 2).

Table 2

Descriptive Statistics of Within-Subjects Factors

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>3.2619</td>
<td>1.64038</td>
<td>42</td>
</tr>
<tr>
<td>Time 2</td>
<td>4.8333</td>
<td>1.81879</td>
<td>42</td>
</tr>
<tr>
<td>Time 3</td>
<td>6.5794</td>
<td>2.04882</td>
<td>42</td>
</tr>
</tbody>
</table>

An ANOVA using a repeated-measures design was used to analyze the data for this question. The data indicated that the mean score for Time 1 was 3.2619. The mean score for Time 2 was 4.8333. The mean score for Time 3 was 6.5794. The (n=42) represents the 42 scores for participants who each performed respiratory assessments on three separate patients at three separate times. Findings indicated there was a significant difference (p = .000) in transfer of learning demonstrated by participants over time (Table 3).
A post hoc analysis was run to compare performance between groups. The difference in mean score between Time 1 and Time 2 was (-1.571). The difference in mean score was greater between Time 2 and Time 3 (-1.746) than Times 1 and 2 (-1.571). The data indicated that the mean difference was greater following HPS clinical than following the respiratory assessment lecture.

**Research Question 2: Do students’ perceptions of their clinical competence change over time?**

To address Research Question 2, participants completed the Learning Transfer Tool (LTT). Participants completed the LTT at three separate times over the course of the semester to determine if students’ perceptions of their clinical competence changed over time. The LTT was completed at the beginning of the semester, on the same day following the respiratory
assessment lecture, and on the same day following HPS clinical. The LTT had a Chronbach alpha of .96 for this sample. Data from the LTT responses were entered into SPSS statistical software. Results of repeated-measures ANOVA are presented in Table 4.

Table 4

Comparison of Students’ Perceptions of Clinical Competence over Time

<table>
<thead>
<tr>
<th>(I) Time</th>
<th>(J) Time</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>-1.429</td>
<td>1.504</td>
<td>0.348</td>
<td>-4.466 -1.608</td>
</tr>
<tr>
<td>1</td>
<td>3</td>
<td>-7.762*</td>
<td>1.138</td>
<td>0.000</td>
<td>-10.061 -5.463</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>1.429</td>
<td>1.504</td>
<td>0.348</td>
<td>-1.608 4.466</td>
</tr>
<tr>
<td>2</td>
<td>3</td>
<td>-6.333*</td>
<td>0.969</td>
<td>0.000</td>
<td>-8.291 -4.376</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>7.762*</td>
<td>1.138</td>
<td>0.000</td>
<td>5.463 10.061</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
<td>6.333*</td>
<td>0.969</td>
<td>0.000</td>
<td>4.376 8.291</td>
</tr>
</tbody>
</table>

*The mean difference is significant at the p < .05 level.

The data indicated that a significant difference existed between Times 1 and 3 (p=.000) and Times 2 and 3 (p=.000). Time 2 and Time 3 took place after the respiratory assessment lecture and following HPS clinical. There was no significant difference between student perceptions at Times 1 and 2 (p=.348). The results revealed that students’ perception of their clinical competence was statistically significant following the respiratory assessment lecture and HPS clinical combined. There was also a statistically significant difference in perceptions following simulation. However, there was not a significant difference in perceptions following the respiratory assessment lecture alone (Time 1).
Research Question 3: Does the use of human patient simulation improve clinical competence?

To address Research Question 3, data from the total points scored on the Performance Evaluation Tool (Appendix B) were used to evaluate the participants using Lasater’s Clinical Judgment Rubric (LCJR). The nurse observers/raters used the “being skillful” dimension of Lasater’s Clinical Judgment Rubric (Appendix C) to categorize student performance into one of the four categories: beginning, developing, accomplished, and exemplary. Nurse observers/raters used numeric values from the Performance Evaluation Tool to categorize participants using the LCJR as beginning (0-3), developing (4-6), accomplished (7-9), and exemplary (10-12). Data collected at three separate times over the course of the semester were used to determine if HPS improved clinical competence. As previously stated, measurements took place at the beginning of the semester (Time 1), the week following the respiratory assessment lecture (Time 2), and the week following HPS clinical (Time 3). The LCJR had a Cronbach’s alpha of .72 for this sample.

Data were analyzed by using repeated-measures ANOVA design. The data revealed that there was a significant difference at all three intervals (Table 5). Participants’ competence scores yielded a mean score of 1.6032 at Time 2, which was after the respiratory lecture. The mean score after Time 3, the HPS clinical, was reported at 2.1825. The mean score was greater after Time 3 than Time 2. The mean score shown for Time 2 was 1.6032 which indicated that the students qualified for the beginning category for clinical competence. The mean score for Time 3 was 2.1825 which indicated that students remained in the beginning category for clinical competence but at a level closer to the top of the range.
Table 5

*Descriptive Statistics of Within-Subjects Factors*

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time 1</td>
<td>1.2302</td>
<td>0.45892</td>
<td>42</td>
</tr>
<tr>
<td>Time 2</td>
<td>1.6032</td>
<td>0.70517</td>
<td>42</td>
</tr>
<tr>
<td>Time 3</td>
<td>2.1825</td>
<td>0.80400</td>
<td>42</td>
</tr>
</tbody>
</table>

The results of a comparison of the participants’ level of competence over time are displayed in Table 6. There was a significant difference across the comparison groups. The mean difference from Time 1 to Time 2 was -.373. The mean difference from Time 2 to Time 3 was -.579. There was a greater mean difference between Times 2 and 3 than Times 1 and 2. The data indicated that the mean difference was significantly greater following HPS clinical than following the respiratory assessment lecture. The data also indicated that HPS clinical increased the clinical competence of the entry level nursing students by -.579.
Table 6
Comparison of Student’s Clinical Competence over Time

<table>
<thead>
<tr>
<th>(I) Time</th>
<th>(J) Time</th>
<th>Mean Difference (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
<th>95% Confidence Interval for Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Lower Bound</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>-.373*</td>
<td>0.068</td>
<td>0.000</td>
<td>-0.508</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-.952*</td>
<td>0.071</td>
<td>0.000</td>
<td>-1.093</td>
</tr>
<tr>
<td>2</td>
<td>1</td>
<td>.373*</td>
<td>0.068</td>
<td>0.000</td>
<td>0.238</td>
</tr>
<tr>
<td></td>
<td>3</td>
<td>-.579*</td>
<td>0.084</td>
<td>0.000</td>
<td>-0.745</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>.952*</td>
<td>0.071</td>
<td>0.000</td>
<td>0.812</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>.579*</td>
<td>0.084</td>
<td>0.000</td>
<td>0.413</td>
</tr>
</tbody>
</table>

*The mean difference is significant at the $p < .05$ level

**Research Question 4: Is there a relationship between students’ perception of clinical competence and performance following human patient simulation clinical?**

To address Research Question 4, students’ perception of clinical competence scores were used from the LTT (Appendix D) and the total points scored on the performance evaluation tool (Appendix B) from Time 3, following HPS clinical. On the same day following HPS clinical, students completed the LTT rating their perceptions of their clinical competence. The following week, students were observed by nurse observers/raters who rated the students’ performance using the performance evaluation tool. This information was used to determine if there was a relationship between student perceptions of clinical competence and performance following HPS clinical.
Regression analysis was the statistical test used to determine if there was a relationship between student perception of clinical competence and performance following HPS clinical.

The regression analysis (Table 7) found that a significant difference did exist (F= 4.281, p = .045).

Table 7

Regression Analysis of Student Perception of Clinical Competence and Performance Following Human Patient Simulation Clinical

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>92.768</td>
<td>1</td>
<td>92.768</td>
<td>4.281</td>
<td>.045*</td>
</tr>
<tr>
<td>Residual</td>
<td>845.183</td>
<td>39</td>
<td>21.671</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>937.951</td>
<td>40</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*The mean difference is significant at the p < .05 level

Data entered into SPSS statistical software and Pearson correlation were run for a perception score and performance score (Table 8). As mentioned previously, there was a significant effect (.045), thus yielding a positive correlation (r = .314) between students’ perceptions of clinical competence and performance following HPS clinical. The data indicated that there is a positive correlation between student perception of clinical competence and performance following HPS clinical.
Table 8

Correlation between Student Perception of Clinical Competence and Performance Following Human Patient Simulation Clinical

<table>
<thead>
<tr>
<th>Perception Score</th>
<th>Performance Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Perception Score</td>
</tr>
<tr>
<td></td>
<td>Spearman correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
<tr>
<td></td>
<td>Performance Score</td>
</tr>
<tr>
<td></td>
<td>Spearman correlation</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
</tr>
<tr>
<td></td>
<td>N</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.05 level (2-tailed).

Summary

The researcher attempted to answer four research questions. An ANOVA using a repeated measures design was used to analyze Research Question 1. Data from Question 1 examined students’ ability to transfer knowledge and skills learned from HPS clinical. There was a statistically significant difference in transfer of learning between the three measurement times. To answer Research Question 2, a repeated-measures ANOVA was used to determine whether students’ perceptions of their clinical competence changed over time. The results revealed that there was not a significant difference between Time 1 and Time 2. However, there was a significant difference in students’ perceptions of their clinical competence between Time 2 and Time 3 (following HPS clinical). Research Question 3 was also analyzed using repeated-measures ANOVA. Results from this analysis attempted to answer Research Question 3 as to whether the use of HPS improved clinical competence. The data indicated that there was a significant difference in clinical competence at all three times. The use of HPS improved the
clinical competence of students. In Research Question 4 the researcher sought to determine if there was a relationship between HPS and clinical competence. Regression analysis was used to analyze this question. The results yielded a positive correlation between students’ perceptions of clinical competence and performance following HPS clinical. The data analyzed and reported in this chapter indicate a significant effect on student performance as it relates to transfer of learning and clinical competence over time. These results, in addition to findings, implications, limitations, and recommendations for future studies, will be discussed in Chapter V.
Members of nursing faculty aim to produce nursing graduates who are proficient in delivering safe nursing care. Accomplishing this goal has become more complex as the patients of today present with multiple complex illnesses (Tanner, 2006). Health care administrators are pressuring members of nursing faculty to produce nursing graduates that are capable of caring for multiple clients with complex illnesses following completion of the nursing program (Feingold et al., 2004; Jefferies, 2005). To respond to this pressure, members of nursing faculty are integrating the use of human patient simulation (HPS) into their curricula. The human patient simulators are computerized mannequins capable of mimicking the physiology of human patients. These human patient simulators have pulses, heartbeats, and breath sounds that can be palpated and auscultated by a practicing nurse (Radhakrishman et al., 2007). Rourke et al. (2010) noted that one advantage to HPS clinical is that students are exposed to high risk scenarios that they are not routinely exposed to in the traditional clinical setting. As a result, there are nursing programs that have replaced traditional health care clinical time with HPS clinical (Nehring, 2008). The purpose of this study was to examine whether baccalaureate nursing students were able to transfer knowledge and skills learned from classroom instruction and HPS clinical to the traditional clinical setting.
Significant Findings

Research Question 1: Are students able to transfer knowledge and skills learned from the human patient simulation clinical (HPS) setting to the traditional clinical setting over time?

A pairwise comparison was conducted to evaluate the mean difference over the three time periods. The results showed that the mean difference was greater following HPS clinical than following the respiratory assessment lecture. These results indicate that students were able to transfer knowledge and skills from HPS clinical to the traditional clinical setting. These findings support the research conducted by Domuracki et al. (2009) who reported that anesthesia students are able to transfer knowledge and skills from the HPS clinical setting to the traditional clinical setting. Research in the discipline of medicine and anesthesia indicates that students are able to transfer knowledge and skills learned, after caring for a human patient simulator, to human patients (Alinier et al., 2006; Kuduvalli et al., 2009; Domuracki et al., 2009). In Simons’ (1999) transfer of learning theory, this action was referred to as the transfer from learning to application.

Nurse observers/raters evaluated participants as they conducted respiratory assessments during three points in time. Observations took place at the beginning of the semester, the week following the respiratory assessment lecture, and the week following simulation clinical. During each point in time, the participants conducted a respiratory assessment on three different patients. The evaluations were conducted to determine if students were able to transfer knowledge and skills learned from the HPS clinical to the traditional clinical setting. The results revealed a significant increase in mean score over the three points in time. Participants were able to transfer
knowledge and skills learned from the didactic and HPS clinical setting to the traditional clinical setting.

**Research Question 2: Do students’ perceptions of their clinical competence change over time?**

Participants completed the Learning Transfer Tool (LTT) to rate their perception of their clinical competence at three points in time. As previously stated, the three points in time were at the beginning of the semester, on the same day following the respiratory assessment lecture, and on the same day following HPS clinical. Participants responded to the survey by indicating whether they did not agree, somewhat agreed, or strongly agreed that they were competent to perform a specific skill.

In this research study, the data revealed that there was a significant difference in the students’ perception of their clinical competence between the respiratory lecture and HPS clinical. The data also indicated that HPS clinical is an important factor in increasing students’ perception of their clinical competence. Therefore, it is important that members of nursing faculty take the data into consideration when engaging in curricula development. Members of nursing faculty should encourage the use of HPS in conjunction with traditional pedagogical practice when making curricular changes.

Blum et al. (2010) conducted a study that examined students’ self-perception of their clinical competence. The results showed that the students believed that their competence increased. In this study, there was a significant difference between the students’ self-perception at the beginning of the semester and their perception following HPS clinical indicating that students perceived that they were more competent to care for a respiratory patient after they completed the HPS clinical. These findings are consistent with the findings of Beyea, Slattery,
and Reyn (2010). The authors stated that a simulation-based nurse residency program increased the perception of competency of the nurse residents. The nurse residents were asked to rate their level of competence each week after course content was covered. Beyea et al. (2010) reported that the nurses’ perception of their competence increased throughout the program. HPS was noted by students as a factor that contributed to the increase in the nurses’ perception of clinical competence.

**Research Question 3: Does the use of human patient simulation improve clinical competence?**

The researcher investigated whether HPS improved clinical competence over time. The researcher sought to answer this question by using the participants’ performance scores to categorize participants using the Lasater’s Clinical Judgment Rubric (LCJR) as beginning (0-3), developing (4-6), accomplished (7-9), and exemplary (10-12). The results indicated that there was a significant difference in performance scores at each time period. However, participants’ performance scores remained in the beginning category over time. The data further indicated that at Time 3, participants were at a higher level within the beginning category than at Time 2. These findings are similar to a study conducted by Beyea et al. (2010). In that study the researchers examined whether students’ clinical competence improved while completing a simulation-based nurse residency program. Researchers found that there was a significant effect regarding the students’ improved clinical competence over time. Beyea et al. (2010) credited the improved clinical competence to the use of HPS.

Participants in the current study were entry level nursing students. Therefore, it was not expected that they would reach the exemplary category over the three month period in which the study was conducted. It would typically take students four semesters or longer to reach the
exemplary category to perform respiratory assessments. Nonetheless, the data indicated that by using HPS the clinical competency of participants improved over time. The participants transitioned from a low level within the beginning category at Time 1 and Time 2, to a higher level in the beginning category at Time 3, after HPS clinical. The findings were consistent with Beyea et al. (2010) that the use of HPS improved the clinical competency of students over time.

Research Question 4: Is there a relationship between students’ perception of clinical competence and performance following human patient simulation clinical?

The researcher used the participants’ perception of clinical competence scores from the LTT and the total points scored on the performance evaluation tool, following HPS clinical to measure the relationship between perception of competence and actual clinical performance. Regression analysis was the statistical test used to determine if a relationship existed between the two variables. The data revealed that there was a relationship between student perception of clinical competence and performance following HPS clinical. The Pearson correlation results from this study indicated that as students participate in HPS clinical both their perception of clinical competence and performance improves. These findings are consistent with the findings of Bjorshol, Lindner, Soreide, Moen, and Sunde (2009). In that study the researchers found that students’ confidence in their clinical competence increased as their performance improved after participating in HPS clinical.

Simons’ (1999) transfer of learning theory noted that it is the goal of educators for students to perform competently in their discipline. One way of accomplishing this goal was to be able to transfer learning to practice. Epstein and Hundert (2002) described clinical competence as the ability to habitually perform skills on a daily basis for the benefit of the patients. As Bruckman (2006) suggests, students are able to achieve a higher level of
competency when a deeper level of understanding takes place. The results of the current study found that participants were able to gain a deeper understanding as the data revealed that a relationship existed between student perception of clinical competence and performance following HPS clinical.

**Discussion**

The researcher examined whether participants were able to transfer knowledge and skills learned from the HPS clinical setting to the traditional clinical setting. Findings concluded that participants were able to transfer knowledge and skills learned in the classroom to caring for human patients. The evidence also demonstrated that participants were more competent caring for human patients after completing HPS training. Research indicates that members of nursing faculty are integrating HPS into their curricula to ensure that graduates are proficient to practice in the workplace shortly after graduating from nursing school (Elfrink et al., 2010; Lasater, 2007; McCallum, 2007; Radhakrishman et al., 2007). There is a higher performance expectation placed on graduating nurses in today’s health care environment. Thus, health care administrators are seeking graduating nurses who can perform safe patient centered care (Feingold et al., 2004). Findings from this study support the belief of members of nursing faculty. HPS training is an effective learning and teaching method. The results indicate that by using HPS in clinical learning, novice graduates would be more proficient to practice in the workplace.

This research study was conducted by observing students in the traditional clinical setting following a respiratory assessment lecture and HPS clinical. The participants’ performance scores were higher after participating in HPS clinical. Nursing students typically complete didactic and clinical rotations as part of their preparation to transition from student
nurse to staff nurse. There is minimal research in nursing that validates students’ ability to
transfer knowledge and skills learned from the HPS clinical setting to the traditional clinical
setting (Murphy & Tyler, 2005; Alinier et al., 2006; Kuduvalli et al., 2009; Domuracki et al.,
2009). However, results from this study can be used to add to the body of knowledge that
supports students’ ability to transfer knowledge from the HPS clinical setting to the traditional
clinical setting. Further research might reveal that transfer of learning takes place because HPS
gives students the opportunity to engage in deep learning and critical decision making. The
findings from this study are important to the body of research because not only do students
believe they perform more competently but their beliefs are affirmed by their performance
scores after participating in HPS clinical.

In this study, transfer of learning was assessed by observing participants conducting a
respiratory assessment on three patients over three time periods in the traditional health care
setting. Nurse observers/raters evaluated participants using a performance evaluation tool.
Lucas et al. (2008) conducted a similar transfer of learning study on a group of medical students.

The findings of Lucas et al. (2008) were comparable to those found in this research
study, i.e., there was a significant positive effect of HPS clinical on participants’ ability to
transfer knowledge and skills to the traditional clinical setting. The congruence in findings may
have resulted because both studies used a combination of didactic, HPS clinical, and traditional
clinical. Students completed HPS clinical shortly after being introduced to content in the
didactic setting. The findings from this study revealed that the use of HPS increased the
knowledge acquired from the didactic setting.

Performance scores collected by nurse observers/raters revealed that participants were
able to transfer knowledge and skills learned in the HPS clinical setting to the traditional clinical
setting. This information is important to the nurse educators because other transfer of learning studies (Kuduvalli et al., 2009; Curtin & Dupuis, 2008) examined only students’ perceptions of their ability to transfer knowledge and skills, instead of examining their actual performance. The studies that examined perception scores (Kuduvalli et al., 2009; Curtin & Dupuis, 2008) reported that students believe that they have the ability to transfer what they have learned. However, a study conducted by Feingold (2004) reported that 50% of students participants (n=47) did not believe transfer of learning would take place. Students may have arrived at this conclusion because they did not feel comfortable making this assumption regarding their clinical ability.

The study conducted by this researcher offers more definitive assessment by using nurse observers/raters to evaluate actual performance. The use of performance scores in this research study further reinforces the effectiveness of HPS in facilitating learning transfer.

The researcher examined students’ perceptions of their clinical competence. Participants completed the LTT at the beginning of the semester, on the same day following the respiratory assessment lecture, and on the same day following HPS clinical. Participants completed the LTT by answering whether they perceived that they could perform a specific skill competently. Garside (2009) also conducted a study to explore students’ perceptions of their clinical competence. Students in Garside’s study noted that they felt more competent in their skill level after participating in HPS clinical. The results of the two studies were consistent. After completing HPS clinical, the results revealed that students’ perceptions of clinical competence increased over time. Beyea et al. (2010) conducted a similar study examining students’ perceptions of their clinical competency. The data showed that students perceived an increase in their competence after being exposed to HPS clinical. One might infer that students felt more confident because they were able to practice their skills in a safe nonpunitive environment such
as the HPS clinical setting. Elfrink et al. (2010) described the HPS clinical setting as an environment where patient safety is not affected and clinical learning is promoted.

The researcher also examined whether the use of HPS clinical improved the actual clinical competence of students. Data were collected by using the participants’ performance scores and categorizing the students’ level of competency by using the “being skillful” dimension of the LCJR. Data from this study indicated that there was a significant effect in the participants’ actual clinical competence to perform respiratory assessments on human patients following HPS clinical. A study conducted by Blum et al. (2010) examined the clinical competence of students using the LCJR. Members of nursing faculty evaluated students using the LCJR. The data revealed that the clinical competence of the students increased over the semester. The results of the two studies are congruent. In a study conducted by Haskvitz and Koop (2004) researchers also found similar results. Their study investigated the use of HPS to remediate struggling nursing students. The researchers found that students were more competent after attending HPS clinical. The results reported by Haskvitz and Koop (2004) and Blum, et al. (2010) are consistent with the findings of the current study which revealed that students are more competent after completing HPS clinical. This information is important because members of nursing faculty should consider using HPS to not only improve the clinical competence of nursing students but to also remediate those students who need additional clinical experience.

The researcher sought to examine whether there was a relationship between student perception of clinical competence and performance following HPS clinical. The researcher used the participants’ perception score and the performance score to determine if there was a significant relationship between the two variables. The Pearson correlation results indicated that there was a positive relationship between student perception of clinical competence and
Few studies have focused on the relationship between students’ perception of clinical competence and performance. Brown and Chronister (2009) conducted a study that examined students’ confidence in their ability to read ECG telemetry. Findings from confidence scores were compared to the students’ actual performance on the ECG Sim Test. Data revealed that there was a significant positive correlation in students’ perceived competence and their actual performance on the ECG Sim Test. Data from this study complement the findings from the current study that also discovered a significant positive correlation between perception ratings and performance scores. Arnold et al. (2009) found that when using simulation, students’ confidence in their performances correlated with the students’ average knowledge scores. These findings are similar to those found in the current study. The consistency in the results may have been attributed to the realism that a simulated environment offers. Students are able to practice their skills in an environment that is comparable to the actual patient care setting.

**Implications**

The findings from this study indicated that it is important for members of nursing faculty to identify HPS as an effective learning and teaching method. The integration of HPS into nursing curricula will give students the opportunity to practice newly learned skills and reinforce prior knowledge in a safe patient care environment. The findings from this study provided evidence that students are able to transfer knowledge and skills learned from the HPS clinical setting to the traditional clinical setting. By using HPS, students have the opportunity to refine skills in an environment that is similar to the traditional clinical setting. The exposure to HPS clinical increases students’ perceptions of their clinical competence, as found in this study. Members of nursing faculty should be supported in their effort to use HPS to teach nursing
students. Simulation and simulation equipment can be financially straining on an institution; however, the use of HPS has shown to produce positive results. These findings provide support to nursing faculty members and program administrators as they work to offer evidence that the financial investment of HPS is worth the dividend of competent practicing nurses.

Members of nursing faculty desire to produce graduates that are proficient in providing safe patient care after graduation. Health care administrators seek to employ graduating nurses that are qualified to care for patients in today’s complex health care environment. The findings provided evidence that the use of HPS is one way to better prepare nursing graduates for the workplace. Based on the findings of this study, it is not suggested that HPS clinical be used to totally replace traditional clinical training. It is suggested that HPS clinical be used in conjunction with learning gained from traditional clinical training and didactic instruction. Findings from this study showed a mean difference in performance following HPS clinical. Transfer of learning also took place after students participated in didactic learning. One can conclude that both didactic and HPS impacted student learning. Therefore, a combination of didactic, HPS clinical, and traditional clinical is recommended.

Members of nursing faculty and health care administrators should work collaboratively to ensure that the integration of HPS into nursing curricula continues to improve the clinical competence of students. It is also imperative that members of nursing faculty and health care administrators assess students’ ability to transfer knowledge and skills to the workplace after using HPS. Findings from this study could be used to begin this discussion.

**Limitations**

There are limitations to the study that are important to reveal and consider for future studies. One limitation is that the study only used one group of students from a single university.
that participated in one simulation scenario. The use of more than one scenario and nursing procedure may reveal different results. Secondly, convenience sampling was used for this study because the participants were enrolled in the course and the course was a prerequisite for graduation. Because participants were not selected randomly, bias was a possible threat to the study.

The study was conducted using a time series design which included three specific times at which data were collected. The use of a time series design method may have affected attrition because of the extended time intervals and multiple observations. In addition, students were asked to participate in the study while managing a full-time course load. The additional workload may have contributed to attrition over the course of the study. Participants in this study were entry level nursing students. These students were observed for the purpose of this study on their first day in the traditional health care setting. Students may have experienced added stress due to being observed on their first day. The stress may have affected their performance. Another limitation was the assumption that all participants have had the same amount of exposure and comfort level with working with HPS. This study assumes that all students began the experience with the same level of understanding regarding respiratory assessment. Findings revealed that transfer of learning may have been influenced by extraneous variables such as the course load of students and outside employment.

**Recommendations for Future Research**

After reviewing and discussing the results of this study, the researcher has identified areas for future research studies. The recommendations for future research are as follows:

- The sample for the study consisted of 42 entry level nursing students from one local university. The researcher suggests using a larger population to generate a more
diverse subject pool. A larger population will also make the findings more
generalizable to nursing students across the country.

- The 42 students that participated in the study were from a local baccalaureate nursing
  program. Nursing students from associate degree programs were not represented. A
  recommendation for future research is to include participants from both associate and
  baccalaureate degree nursing programs. This design will provide a better
  representation of the student nursing population.

- Observation in the study was conducted at three points in time. The times included the
  beginning of the semester, one week following the respiratory assessment lecture, and
  the week following HPS clinical. The researcher suggests using an additional point in
  time. Future researchers may want to follow up four weeks after Time 3 to determine
  if knowledge and skill transfer is stable over time.

- Demographic data indicated that there were eight students that had prior work
  experience as a health care provider. There were also two students who participated in
  HPS training prior to entering nursing school. Future researchers may want to
  examine whether past experience influences students’ ability to transfer knowledge
  and skills.

- This study examined participants’ performance and their self-perception of their
  performance after a respiratory assessment lecture and an asthma scenario using HPS.
  Future researchers may want to explore different combinations of didactic and HPS
  training.
Conclusions

The use of HPS continues to emerge in nursing education curricula. Members of nursing faculty believe that HPS is an effective learning and teaching method. However, researchers have questioned whether students are able to transfer what they learned from HPS clinical to the traditional clinical setting. This study showed a significant difference in students’ ability to transfer what they learned from HPS clinical to the traditional clinical setting. Students were able to transfer respiratory assessment knowledge gained from HPS clinical to human patients. The findings from this study also showed a significant effect on student’s clinical competence over time. Students’ perceptions regarding their ability to conduct respiratory assessments increased after being exposed to didactic, traditional clinical learning, and HPS clinical. A positive relationship between students’ perception of clinical competence and clinical performance was found following HPS clinical. The findings showed that there was an increase in the students’ performance as well as their self-perception of clinical competence following HPS clinical.
REFERENCES


Dillard, N., Sideras, S., Ryan, M., Carlton, K.H., Lasater, K., & Siktberg, L. (2009). A collaborative project to apply and evaluate the clinical judgment model through simulation. Nursing Education Perspectives, 30(2), 99-104.


The University of Alabama
Informed Consent to Participate in Research

You are being asked to be in a research study.
The study is called “The Effectiveness of Human Patient Simulation on Baccalaureate Nursing Students’ Transfer of Learning”. It is being studied by Mrs. Tera Kirkman. She is a doctoral student in the Instructional Leadership for Nurse Educator’s program at the University of Alabama.

What is this study about?

I want to study baccalaureate nursing students’ ability to transfer knowledge and skills learned from classroom instruction and human patient simulation clinical to the traditional clinical setting.

Why is this study important- What good will the results do?

The findings will help nurse educators improve nursing education. It will increase the amount of research in the area of transfer of learning, clinical competence, and human patient simulation. It will also provide information to nurse educators when they are deciding if they should replace hospital clinical with simulation clinical.

Why have I been asked to take part in this study?

You are being asked to be in this study because you are a first semester undergraduate nursing student at a four year university. You are in the position to help nurse educators and future nursing students understand the value of human patient simulation training.

How many other people will be in this study?

The target is 43 first semester undergraduate nursing students from the University of North Alabama will be in the study.

What will I be asked to do in this study?

If you agree to be in this study, you will be observed by trained nurses while doing a respiratory assessment on human patients. The study will take place in a traditional clinical setting. Observations will take place three times over three months. The observation sessions will take about 20-30 minutes. You will also answer a computerized survey that will check how you rate your skill level. This will take place at three different times over three months. The survey will take about 10 minutes. You will also be asked to share personal information like age, gender, and education.
Will being in this study cost me anything?

The only cost to you from this study is your time.

Will I be compensated for being in this study?

There will be no monetary compensation for being in this study. You will not receive a grade for being in the study. Grades will not be affected by participation or non-participation in the study. Grades will not be affected by study survey results or study observations.

What are the risks (problems or dangers) from being in this study?

There are minimal risks to those taking part in this study. You may feel stressed when performing the respiratory assessment because you will be watched by a nurse observer, and this will be no different than other experiences in your academic training. Your being in the study is voluntary.

What are the benefits of being in this study?

No benefits can be promised to you. However, the information gained from the study may help you or other students who take part in simulation clinical in the future. The study will also improve how nursing students are educated.

How will my privacy be protected?

Your privacy will be protected by only asking you questions that relate to the study and your thoughts about your skill level. Information about your age, gender, and work experience will be asked as they are needed.

How will my confidentiality be protected?

Your confidentiality will be protected by not asking you to use your name during the study. The only place your name will be used is on the informed consent form. You will be asked to use a unique identification number during the study. A trained research assistant will collect the informed consent forms, place the forms in a sealed envelope, and lock them in a file cabinet in Mrs. Tera Kirkman’s office. The consent form will be kept for four years in case the university wants to check to see if consent was given to be in the study. The results of this study will be published in a professional journal (magazine), but no names will be used.

What are the alternatives to being in this study?

The only other option is not to take part in the study.
What are my rights as a participant?

To be in the study is totally voluntary. It is your free choice. You may choose not to be in it at all. If you start the study, you can stop at any time. Not being in or stopping participation will have no influence on your relationship with the University of Alabama or the University of North Alabama.

The University of Alabama and the University of North Alabama both have an Institutional Review Board committee that looks out for the fair and safe treatment of people in research studies. They may review the study records if they wish. This is to be sure that people in research studies are being treated fairly and that the study is being carried out as planned.

Who do I call if I have questions or problems?

If you have questions about this study right now, please ask them. If you have questions later on, please call Mrs. Tera Kirkman at 256-648-9530. If you have questions or concerns about your rights as a person in the study, call Ms. Tanta Myles, the Research Compliance Officer of the University of Alabama at 205-348-8461 or 1-800-933-2262.

You may also ask questions, make a suggestion, or file concerns through the IRB Outreach Website at http://osp.ua.edu/site/PRCO_Welcome.html. After the study is finished, you are encouraged to complete a survey for those who were in the study located on the same website, or you may ask Mrs. Tera Kirkman for a copy of it. You may also send an e-mail to participantoutreach@bama.ua.edu.

I have read this consent form. I have had a chance to ask questions.

---

Signature of Research Participant

Date

Email Address of Research Participant

Signature of Research Assistant/Witness

Date
## APPENDIX B

### Performance Evaluation Sheet

**Respiratory Assessment**

<table>
<thead>
<tr>
<th>Step</th>
<th>Criterion</th>
<th>Achieved (1 point each)</th>
<th>Not Achieved (0 point each)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Student inspect shape, symmetry, and rhythm of respirations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Student determines rate of respirations within 2 breaths per minute of observer's reading</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 3    | Student performs respiratory assessment to check for potential influencing factors by asking the following questions:  
   1) History of shortness of breath  
   2) Cough, Cough production, sputum  
   3) Chest pain  
   4) History of lung problems  
   5) Smoking history  
   6) Use nebulizer treatment of breathing aid or oxygen | (1 point each = total 6 points) |                             |
| 4    | Positions stethoscope at client's anterior level                         |                         |                             |
| 5    | Positions stethoscope at client's posterior level                        |                         |                             |
| 6    | Student accurately describes normal or adventitious sounds heard from patient  
   1) Clear  
   2) Crackles  
   3) Wheezes |                         |                             |
| 7    | Accurately documents assessment findings                                 |                         |                             |

**Location:** Hospital: ______________________           Nursing Home _____________________________

**Total Score:** __________ Observer Signature: __________________________________

---

**Observer Name:** ________________________ **Participant ID Number:** __________

**Observation Phase:** ______________________ **Patient Number _______ of _________**
APPENDIX C
Observer Final Evaluation of Student Performance

Observer Name: _______________________  Participant ID Number: ________
Observation Phase: _____________  Patient Number _______ of _________

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Exemplary</th>
<th>Accomplished</th>
<th>Developing</th>
<th>Beginning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Being skillful</td>
<td>4) Shows mastery of necessary nursing skills</td>
<td>3) Displays proficiency in the use of most nursing skills; could improve speed or accuracy</td>
<td>2) Is hesitant or ineffective in using nursing skills</td>
<td>1) Is unable to select and/or perform nursing skills</td>
</tr>
<tr>
<td></td>
<td>*Scores 10-12 out of 12 points</td>
<td>* Scores 7-9 out of 12 points</td>
<td>* Scores 4-6 out of 12 points</td>
<td>* Scores 1-3 out of 12 points</td>
</tr>
</tbody>
</table>

Total Score: _________________
Category: _________________
<table>
<thead>
<tr>
<th></th>
<th>Do Not Agree</th>
<th>Somewhat Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify the building blocks for delivering nursing care e.g.</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>equipment needed or contributing pathophysiology (FU)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deliver nursing care (PAP)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Evaluate the nursing care that I deliver (PE)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Recognize the existing needs of a patient (PAP)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Anticipate emerging needs of patients (CA)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Prioritize existing needs of patients (PA)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Prioritize emerging needs of patients (CA)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Understand the roles of the health care team (CU)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Perform care as part of the health care team (PAP)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Delegate care to members of the health care team (PA)</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Identify relevant patient care data to communicate with a</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>supervisor or health care practitioner (PA)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communicate relevant patient care data with a supervisor or</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>other health care practitioner (PAP)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anticipate the data needed for future communication with a</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>supervisor or other health care practitioner (PA)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX E

Demographic Data

1. Are you Male or Female?
   - Male
   - Female

2. What is your age?
   - 18-21
   - 22-25
   - 26-30
   - 31-40
   - 41-50
   - 51-60
   - 60 or over

3. What is your race?
   - White
   - White, non-Hispanic
   - African American
   - Hispanic
   - Native American
   - Asian American
4. How many previous degrees do you hold at present?
   - 0
   - 1
   - 2
   - 3

5. Have you ever worked as a healthcare provider?
   - Yes
   - No

6. If you answered yes to #5, what was your role?
   - Certified nursing assistant
   - Nursing assistant
   - Patient care tech
   - Multi-skilled assistant
   - Unit Secretary
   - Licensed Practical Nurse
   - Other

7. How many semesters have you been enrolled in nursing school?
   - 1 semester
   - 2 semesters
   - 3 semesters
   - 4 semesters
8. Have you ever made a D or F in a nursing course?
   - Yes
   - No

9. Have you ever participated in human patient simulation?
   - Yes
   - No
APPENDIX F

University of North Alabama IRB Approval

Date to Committee:  October 28, 2010

Principal Investigator(s):  Tera Kirkman

Title of Research Proposal:  The Effectiveness of Human Patient Simulation On Baccalaureate Nursing Students’ Transfer of Learning

Date Approval Ends:  One Year from Date Approved

IRB Action:  This proposal complies with University and Federal Regulations for the protection of human subjects (45 CFR46). Approval is effective for a period of one year from the date of this notification.

Victoria Hulsey, Chair
Human Subjects Committee

Date Approved:  11-1-10
APPENDIX G

University of Alabama IRB Approval

January 14, 2011

Tera Kirkman
ELPTS
College of Education
The University of Alabama

Re: IRB # 11-OR-012 “The Effectiveness of Human Patient Simulation on Baccalaureate Nursing Students’ Transfer of Learning”

Dear Mrs. Kirkman:

The University of Alabama Institutional Review Board has granted approval for your proposed research.

Your application has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on January 13, 2012. If your research will continue beyond this date, complete the relevant portions of Continuing Review and Closure From. If you wish to modify the application, complete the Modification of an Approved Protocol Form. When the study closes, complete the appropriate portions of FORM: Continuing Review and Closure.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

Carpentato T. Myles, MSN, CRNP
Director & Research Compliance Officer
Office for Research Compliance
The University of Alabama