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# Simulation Usage as a Partial Replacement of Traditional Clinical: A Study of Administrator and Faculty Perceptions in Practical Nursing Programs in Pennsylvania

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# SIMULATION USAGE AS A PARTIAL REPLACEMENT OF TRADITIONAL CLINICAL: A STUDY OF ADMINISTRATOR AND FACULTY PERCEPTIONS IN PRACTICAL NURSING PROGRAMS IN PENNSYLVANIA

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Title: Simulation Usage as a Partial Replacement of Traditional Clinical: A Study of Administrator and Faculty Perceptions in Practical Nursing Programs in Pennsylvania

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There has been a significant amount of research regarding simulation use in nursing education; however, there is limited research available regarding the replacement of traditional clinical with simulated clinical. This research included a mixed-method design formulated to determine Pennsylvania Practical Nursing Programs' current simulation usage and Pennsylvania Practical Nursing Directors', Assistant Administrators', and Faculty Members' perceptions regarding replacing a portion of traditional clinical with simulated clinical. An 18-item electronic questionnaire was delivered to 309 potential respondents via the Qualtrics electronic survey distribution system, with 191 responding.

Information regarding current simulation usage, possession of a functioning simulation laboratory, use of a Simulation Specialist/ Coordinator, number and type of mannequins used, and reasons for replacing a portion of traditional clinical with simulated clinical was obtained. Data were gained regarding the percentage of traditional clinical that is being replaced with simulated clinical in the average Pennsylvania Practical Nursing Program as well as administrators' and faculty members' suggestions regarding the maximum replacement of traditional clinical with simulated clinical in a 1,500 hour Practical Nursing Program with 900 hours of clinical.

A positive faculty attitude regarding teaching in a simulation laboratory was found. Simulation laboratory instructors indicated the types of training they received in order to operate

their programs' simulation equipment. Demographic data were analyzed with respondents' suggested hours of replacement of traditional clinical with simulated clinical to determine if certain school or participant characteristics related to a higher or lower replacement hour suggestion using the SPSS data analysis system. Respondents from certain types of Practical Nursing Programs ($p = 0.005$) and years that their program has had a functioning simulation laboratory ($p = 0.022$) were found to have significant correlations to the suggested amount of traditional clinical that could be replaced with simulated clinical. An open-ended item gathered respondent perceptions regarding replacing an amount of traditional clinical with simulated clinical. Open-ended responses were analyzed using the NVivo qualitative data analysis program revealing seven supportive simulation themes and four concern themes.

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# Chapter I

## INTRODUCTION

Nursing education delivery techniques have evolved over the years, but the importance of creating well-educated and caring nurses has not. Nurse educators must consider how to most effectively utilize the time that nursing students are within their grasp. The best and most useful practices must be employed to teach our future nurses how to empathetically, intelligently, and technically care for a diverse group of patients. In recent years, educational institutions have been asked to increase nursing student enrollment to help offset the nurse shortages across the nation. Clinical site congestion, limiting the amount of student nurses who can be trained at these institutions, impedes this worthwhile endeavor. Some educational institutions have chosen to utilize a simulation laboratory equipped with a mannequin and a trained faculty member as a replacement of a portion of clinical time, which would have been spent training on the traditional nursing units.

The use of a simulation in place of a portion of traditional clinical allows educational institutions to enroll a higher number of students without increasing clinical congestion. This study examined Pennsylvania's Practical Nursing Administrators' and Faculty members' current practices and professional opinions regarding the replacement of a portion of the required traditional clinical experience with a simulated clinical experience. Demographic and institutional data were analyzed with administrator and faculty responses in order to determine which type of institution, administrator, or faculty member is more or less likely to embrace simulation as a clinical replacement. The perceptions of nurse administrators and faculty members regarding whether nursing education will be improved by or suffer harm from utilizing an amount of simulated experiences in place of physical contact with patients was obtained.

These responses were analyzed to determine the suggested simulated clinical experience time allotments for use in Practical Nursing Programs.

## Statement of the Problem

The practice of utilizing nursing simulation laboratories has recently been incorporated into the world of nursing education. Research is available documenting positive student perceptions, elevated confidence, increased critical thinking, and improved content mastery with the use of simulation. However, there is limited guidance on the maximum percentage of time that should be designated for simulation. Specifically, guidance is needed regarding what hour allocation of clinical time in a 1,500 clock hour Practical Nursing Program in Pennsylvania could be used to incorporate nursing simulation into nursing education in place of traditional clinical time.

The nationwide nursing shortage has stimulated administrators in nursing programs to attempt to increase their enrollment. Although grant monies were made available (Pennsylvania Higher Education Foundation, 2008), many institutions found that they could not increase nursing student enrollment due to the lack of clinical site availability for training purposes (Giddens, Brady, Brown, Wright, Smith, & Harris, 2008). The use of simulation laboratories allows for increased student enrollment without increasing or being limited by clinical site congestion.

Positive student perceptions, improved content mastery, and an increased number of nurses in the workforce are worthwhile benefits, but how much of a good thing is too much? There is little evidence to guide what amount of simulation could be incorporated into a nursing program without altering quality of the baseline clinical experiences that a student must obtain. State and national organizations such as the Pennsylvania State Board of Nursing (PSBN) and

National Council of State Boards of Nursing (NCSBN) have not mandated the amount of patient contact that can be replaced with simulated experiences. Patient interaction is a necessary component of nursing education, and it is important to determine what amount of contact can be replaced with simulated learning experiences and still prepare nursing students effectively. The latest NCSBN position paper that addressed this situation was published in 2005. It states, "Pre-licensure nursing education programs shall include clinical experiences with actual patients; they might also include innovative teaching strategies that complement clinical experiences for entry into practice competency" (National Council of State Boards of Nursing, 2005, p.1). The value of simulation has been demonstrated by previous research studies; however, a determination needed to be made regarding the appropriate amount of simulated clinical that could replace traditional clinical. In this study, administrators and faculty members were asked for their opinions relating to this dilemma.

## Statement of Purpose

The purpose of this study was to survey the Administrators and Faculty of Practical Nursing Programs in Pennsylvania to determine whether they currently use a simulated clinical experience to replace a portion of required traditional clinical experience. This study also determined what percentage of clinical time that Practical Nursing Administrators and Faculty believe could be replaced with simulation while still maintaining the clinical objectives and clinical learning experiences in their respective Practical Nursing Programs. Administrators' and Faculty's rationales for their choices regarding the appropriate amount of time for simulated clinical experience for use in place of traditional clinical were acquired. Data were gathered regarding institution type and location. The program's current use of a Simulation Specialist or Simulation Coordinator as well as the number and type of simulation mannequins owned by the

program were obtained. The survey questions provided data that substantiated the level of simulation use in Practical Nursing Programs. The questions in this study were posed in hopes of gaining insight into administrators' and faculty members' perceptions of the efficacy of simulation use in nursing education, detailing simulation usage in Practical Nursing Programs, and determining a best practice guideline for the use of simulated clinical experiences as a partial replacement of a portion of traditional clinical experiences in practical nursing education.

## Significance of Study

To meet the demands of the nation-wide nursing shortage, an increased number of nurses must be trained in nursing education programs. Many schools of higher education are limited in increasing the number of students that they enroll by clinical space availability. One way to increase the enrollment of nursing students and to not cause further congestion at the clinical sites is to employ the use of a clinical simulation laboratory. Students rotating to a simulation laboratory would need less clinical time in a traditional clinical setting.

Because nursing administrators and faculty possess vast experience in nursing education, they were able to give valuable insights into the prospect of and replacement of traditional clinical experiences with simulated clinical experiences. Information was gathered regarding current simulation usage in Practical Nursing Programs in Pennsylvania. The Practical Nursing Administrators' and Faculty's responses and comments regarding the maximum allowable percentage of clinical time that could be replaced with simulated clinical experiences as well as their current simulation usage should be considered in future best practice guidelines for clinical simulation implementation.

## Theoretical Framework

Bonwell and Eison (1991) indicate that students must "read, write, discuss, or be engaged in solving problems. Most important, to be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation" (p. iii). They define active learning as "instructional activities involving students in doing things and thinking about what they are doing" (Bonwell & Eison, 1991, p. iii). Five characteristics of active learning strategies are mentioned: the students are active participants rather than listeners, a greater emphasis is placed on student skills than information transmission, students perform higher-order thinking skills such as analysis, synthesis, and evaluation in the classroom, activities are utilized, and emphasis is placed on exploration of personal attitudes and values (Bonwell & Eison, 1991).

Active learning is congruent with the learning that occurs in the simulation laboratory and will serve as the theoretical basis for this research. In a simulation laboratory, students are actively involved in problem solving related to the patient scenario that is presented. Students work in teams or independently to accomplish the tasks at hand by analyzing the problem, determining the appropriate actions, and completing the tasks. Debriefing frequently takes place following the scenario, where team members and observers discuss what has happened. Bonwell and Eison (1991) indicate that activities which include simulations, case studies, drama, and role playing allow for active involvement of the learners and qualify as active learning. All of these activities are easily incorporated into the educational techniques that are used by an experienced Simulation Specialist/Simulation Coordinator.

## Definition of Terms

Practical Nursing Administrator: A Registered Nurse responsible for the planning, organizing, supervising, and directing of the Practical Nursing department operations.

Practical Nursing Faculty: A Registered Nurse who teaches full-time or part-time in a Practical Nursing Program.

Simulated Clinical Experience: A learning experience where the nursing student utilizes knowledge of nursing care to interact with a mannequin that exhibits the signs and symptoms of a medical condition.

Simulation Laboratory: An area designated for the simulated clinical experience. It is equipped with the tools that a student would need to perform nursing interventions on a mannequin.

Traditional Clinical Experience: A learning experience where the nursing student utilizes knowledge of nursing care to interact with real patients in the healthcare setting.

## Research Questions

This study was designed to determine the perceptions of Practical Nursing Administrators and Faculty in Pennsylvania regarding the replacement of an amount of traditional clinical experiences with simulated clinical experiences. The questions addressed were:

1. What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator?
2. What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year?
3. What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively?

4. What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program?
5. What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience?

The null hypothesis for research question one is that Practical Nursing Programs do not have functioning simulation laboratories under the direction of a Simulation Specialist or Simulation Coordinator . The null hypothesis for question two is that Practical Nursing Programs are not currently replacing traditional clinical experiences with simulated clinical experiences in their programs. The null hypothesis for research question three is that Practical Nursing Administrators and Faculty do not believe that any amount of traditional clinical experiences should be replaced with simulated clinical experiences.

## Literature Review

The nationwide nursing shortage has caused many educational institutions to consider an increased number of student nurse admissions (Pennsylvania Higher Education Foundation, 2008). While enrolling an additional number of nursing students into nursing programs seems to be the obvious answer to the nursing shortage, the limited availability of clinical training sites restricts an increased enrollment of student nurses. With educational institutions increasing their enrollment to the highest degree allowable and filling the available clinical sites to their maximum capacity with student nurses, nurses on these units can feel overwhelmed (Campbell & Daley, 2009; Giddens et al., 2008). This clinical congestion dilemma has encouraged nurse educators to consider alternative ways to educate their student nurses. Some programs have

switched to evening or weekend training hours, when the healthcare facility does not usually have students from other educational institutions caring for the patients on the various units. Other nursing programs have switched from a 6 hour clinical day to a 12 hour clinical day (Tobar, Wall, Parsh, & Sampson, 2007). Some educational institutions have embraced technology and have incorporated an amount of a simulated clinical experience into their curriculum, replacing an amount of time that would previously have been spent in healthcare institutions.

A simulated clinical experience is a learning experience where the nursing student utilizes knowledge of nursing care to interact with a mannequin that exhibits the signs and symptoms of a medical condition. Simulation mannequins can range from low to high fidelity, which indicates their ability to accurately mimic patient symptoms. There is limited literature available regarding the preference or efficacy of low, mid, or high fidelity mannequins for use in Practical Nursing Programs. Low fidelity mannequins have a limited ability to imitate a live patient (Reeves, 2008). High fidelity simulation mannequins provide a realistic experience for nursing students:

> Some of the realistic features include having various palpable pulses, programmable vital signs, a chest that rises and falls with respirations, Korotkoff sounds when the blood pressure is taken, pupils that dilate or constrict, eyes that blink, a significant cough, retching noises, and the ability to have individualized speech when responding to nurses' questions. (Reeves, 2008, p. 219)

Trained nurse educators are able to program a simulation mannequin to exhibit symptoms of a certain disorder. This allows the educator to reinforce classroom content in the simulated

clinical setting. In the healthcare setting, there may not be a patient that exhibits the disease that is currently being covered in the classroom.

Likewise, on an obstetrical unit, the value of the learning experience is based on whether infant deliveries are available to be observed. At Ball State University, nurse educators devised a program to account for the limitations of an obstetrical clinical rotation by implementing a day-long simulation laboratory. The faculty members developed simulation stations such as: labor and delivery, neonatal assessment, Leopold maneuvers, postpartum fundal assessment, fetal heart monitoring, normal newborn care, infant feeding, and documentation (Bantz, Dancer, Hodson-Carlton, & Van Hove, 2007). Educators and students evaluated the simulation experience as beneficial to student learning. The faculty has maintained this simulation experience since its inception (Bantz et al., 2007). Other researchers have also attempted to help offset the lack of educational experiences available on the obstetrical unit such as Robertson (2006), who utilized a simulation experience to teach obstetrical complications.

Additionally, pediatric experiences are difficult to obtain due to the limited number of pediatric admissions as well as the increased number of schools requiring a pediatric experience in their clinical curriculum. Suplee and Solecki (2010) used simulation to help bridge this gap in pediatric nursing experiences. Simulation has also been instituted to train students for emergent conditions (Smith-Stoner, 2009), for trauma care (Henneman, Cunningham, Roche, & Cumin, 2007), and disaster preparedness (Hovancsek , Jeffries, Escudero, Foulds, Husebo, & Iwamoto, 2009).

With the sheer number of students on a nursing unit, the congestion can cause some confusion in care. The well-designed simulation unit can help alleviate the problem of congestion by allowing several student nurses to participate in the same simulation scenario. In

addition to the students performing in the role of a nurse during the scenario, other students can be involved in the learning experience in the role of observers. The students can monitor and determine the efficacy of the nursing interventions being taken as well as evaluate the performance of their peers (Reeves, 2008).

Content mastery, critical thinking, confidence, and nursing judgment are several simulation benefits that have been researched. Using a pretest/posttest design, Alinier, Hunt, Gordon, and Harwood (2006) conducted research to determine if simulation training enhanced learning. The control group received regular curriculum training, and the experimental group received the regular curriculum training plus simulation laboratory training. The experimental group generally achieved higher scores on the Objective Structured Clinical Examination than the control group. This study supported that learning is augmented with the addition of clinical simulation. Henrichs, Rule, Grady, and Ellis (2002) determined that advantages of including a clinical simulation scenario in education resulted in elevated critical thinking, decision-making, confidence, and clinical preparation.

Schoening, Sittner, and Todd (2006) indicated that clinical simulation scenarios may allow students to make clinical decisions that may positively or negatively impact the health of the mannequin. The student could see the consequences of their decisions without impacting the health of a living being.

Acquisition of cognitive learning during a simulation experience in a diploma level nursing program was supported by Lewis and Ciak (2011). Four semesters of data were obtained. The researchers administered The Nursing Care of Children and Maternal Newborn Test, a commercialized examination crafted by Assessment Technologies, Incorporated, after

students completed four pediatric and four maternal-newborn related simulation exercises. The pretest/posttest design revealed a statistically significant increase in knowledge ($p < 0.005$).

There are many studies that support a favorable student perception of learning with clinical simulation (Bearnson & Wiker, 2005; Childs & Sepples, 2006; Henrichs et al., 2002; Lewis & Ciak, 2011; Robertson, 2006). Bearnson and Wiker (2005) assessed student reaction to a simulation experience geared at medication administration. They analyzed student responses with a questionnaire and found that most students felt increased confidence about their nursing skills and patient assessment abilities. These students felt that simulation was valuable as an addition to, but not in place of, clinical. Bambini, Washburn, and Perkins (2009) conducted a study of 112 undergraduate nursing students. Using a pretest/posttest self-efficacy questionnaire, the researchers were able to determine that students' level of confidence increased significantly on several clinical skills. Qualitative data revealed themes of improved self-efficacy, communications, and clinical judgment.

Disadvantages to simulation included "the lack of reality, lack of knowledge on handling crisis events, possibility of fixation errors, and the presence of anxiety" (Henrichs et al., 2002, p. 219). Other limitations discussed by Bremner, Aduddell, Bennett, and VanGeest (2006) include:

> The complexity and time requirement for setup and learning this teaching method, the budgetary requirements for this type of technology ranging from $30,000 to $200,000 as well as physical space to house the equipment, the lack of incentives for the faculty to learn the technology and develop scenarios for the HPS [human patient simulator], and the need for small groups of students in simulation sessions to make learning effective. (Bremner et al., 2006, p. 171)

Reeves (2008) suggested that when the cost of a simulation laboratory is weighed against the cost of a clinical practice error, the price does not seem as significant. Reeves (2008) also reminded that student anxiety in the simulated clinical setting is a disadvantage. Henrichs et al. (2002) in their study of 12 nurse anesthesia students found that the students experienced "feelings of apprehension, uneasiness, or fear during the sessions" (p. 219). Moscaritolo (2009) indicated that traditional clinical is anxiety provoking. She also suggested that the elevated levels of anxiety may be detrimental to clinical performance. Research was not located that compared student anxiety levels in the traditional clinical setting to student anxiety levels in the simulation laboratory.

When implementing a clinical simulation experience, the advantages of content mastery, increased enrollment, positive student perception, improved critical thinking, and reported self-confidence must be weighed against the disadvantages of cost, space, faculty training, student apprehension, lack of reality, and increased time requirements. Research should be utilized to determine the best practices guidelines for simulation usage as a replacement for a portion of traditional clinical preparation in Practical Nursing Programs in Pennsylvania.

## Research Design and Statistical Analysis

In order to address the questions posed in this study, a survey was emailed asking Practical Nursing Administrators and Faculty in Pennsylvania for basic demographic data as well as information regarding the size, type, and location of their Practical Nursing Program. The survey contained questions regarding current simulation use, whether the program had a simulation laboratory, how long a functioning simulation laboratory had been in place, whether a specific individual was in charge of the simulation laboratory (a Simulation Specialist or Simulation Coordinator), and what type of training that individual had. Questions regarding

their current amount of simulation use and their perceptions regarding the ideal amount of simulation that can be used were posed. Additional informational questions were asked regarding the rationale for simulation use in place of clinical time, feelings regarding teaching in the simulation laboratory, and the type of simulation mannequins available at their school. There was also a free response item at the end of the survey designed to gather the administrators' and faculty members' perceptions regarding replacing some amount of traditional clinical with simulated clinical in a simulation laboratory.

Prior to survey administration, a panel of judges consisting of two nursing faculty members from a local university in Northwestern Pennsylvania were employed for survey review. Changes were made to the survey based on their recommendations. Two pilot surveys were administered to out of state administrators and faculty; however, due to the limited number of responses, the power was too small to make decisions regarding the reliability of the survey items.

Email addresses of administrators and faculty for survey distribution were gathered from the Pennsylvania Association of Practical Nurse Administrator's (PAPNA) website, by telephone calls, and through email correspondence with nursing programs. Surveys were distributed electronically via the Qualtrics survey distribution system.

Measures of central tendency were employed when reviewing the data. The Kruskal-Wallis Test and the Mann-Whitney Test were utilized to analyze whether demographic and program data correlated with a higher or lower suggestion of replacement of traditional clinical with simulated clinical hours. The free response item was evaluated for themes using NVivo software.

## Limitations of the Study

The following limitations were considered:

1. The sample did not include Administrator representation from every Practical Nursing Program in Pennsylvania.
2. This study only took into account the Practical Nursing Administrators' and Faculty Members' perceptions at that point in time.
3. The Practical Nursing Administrators in Pennsylvania come from different types of educational institutions. Responses may have been skewed based on the type of educational institution that they come from.
4. There were economic discrepancies in the different regions in which many of these schools were situated. There were both rural and urban schools. The schools' financial ability to invest in simulation equipment may vary.
5. There were differences in the length of the various Practical Nursing Programs across the state. The state mandated minimum is 1,500 clock hours, but there is not a maximum clock hour limitation.
6. There was a limited ability to generalize to Associate Degree and Bachelor Degree Nursing Programs due to different regulations from the state governing body related to program type.
7. This researcher had a bias toward the inclusion of simulated learning experiences in place of a small percentage of traditional clinical experiences.
8. This researcher previously served as the Vice-President of the Pennsylvania Association of Practical Nursing Administrators. This organization is composed of the nursing administrators who received this survey.

## Summary

The nation-wide nursing shortage is prompting nursing education programs to find ways to increase student nurse enrollment. Due to clinical site congestion, the ability to enroll additional nursing students is limited. Simulation has been proposed as a way to educate students in a simulation laboratory in place of a portion of the traditional clinical taught at healthcare facilities. Simulated clinical experiences allow for an increased student enrollment without the increased student nurse congestion at the healthcare facility.

Simulation's advantages and disadvantages have been comprehensively studied. Simulation's current use and anticipated use is significant for the education of tomorrow's nurses. This research attempted to develop a best practice guideline for the appropriate amount of simulated clinical experiences to replace a portion of traditional clinical experiences utilizing Bonwell and Eison's (1991) active learning theoretical framework. Current simulation practice and suggestions for future use from Practical Nursing Administrators and Faculty will help determine a best practice guideline for simulation usage in Practical Nursing Programs in Pennsylvania. Demographic and program data of respondents were analyzed to determine if any factors correlated with a higher or lower hour allotment suggestions from Administrators and Faculty.

# Chapter II

## REVIEW OF RELATED LITERATURE

Simulation has been used for centuries. In the past 15 years, simulation has been incorporated into nursing education. With the use of the technologically advanced simulation mannequins to teach nursing skills and decision making, nursing education has morphed from the traditional classroom and clinical model into a new hybrid of nursing education, which includes more time spent in clinical simulation laboratories.

With the push to increase nursing student enrollment as a result of the nursing shortage, coupled with the limited availability of clinical sites, simulation has been incorporated as a means to train nurses without increasing clinical site congestion. There is a scarcity of best practice evidence to guide Practical Nursing Programs that are deciding to incorporate a portion of simulated clinical in place of traditional clinical experience. There is limited specificity in the guidelines that the NCSBN has disseminated regarding simulated clinical adoption. This mixed-method study attempted to determine the average amount of time that Practical Nursing Administrators and Faculty in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year. Perceptions regarding the maximum percentage of simulated clinical experiences that can be substituted for traditional clinical experiences and still prepare nursing students effectively were gathered. Demographic data and perceptions regarding simulation were analyzed for relationships. An open-ended question allowed administrators and faculty to share their opinions regarding this practice.

### Background of Simulation

To determine what amount of simulation should be incorporated into the nursing education curriculum, one must first understand the history of its evolution. The historical uses

of simulation as well as the evolution of simulation as a nursing educational technique are discussed.

**History of Simulation**

The military has been the most consistent consumer of simulation throughout history. There is evidence of simulation being used to train soldiers in battle tactics dating back to 1000 B.C. Harris (2009) relates that some experts suspect that military training can be traced back to the Roman Empire. From the mentally-challenging board games that were used to depict army movements (Joyce, 2005) to a physically-challenging barrel with wooden sticks protruding that a swordsman could practice his skills upon (Harris, 2009), simulation has been used in a variety of historical training applications. Simulation became much more complex in 1929, when the first flight simulator was introduced for the preparation of marine and aviation pilots. This trainer was used during World War II, to instruct as many as 500,000 airmen (Ennis, 1981).

In 1965, Dalkey described an abstract war game that was designed to force participants to make choices regarding nuclear war. The model helped participants determine what damage level that they would be willing to incur and what destruction that they would be willing to inflict on another party. The simulation required the participants to utilize strategic planning to find an analytic solution using abstract nuclear models (Dalkey, 1965). This model was developed for the RAND Corporation, whose mission is to "improve policy and decisionmaking through research and analysis" (RAND Corporation, 2011, p. 1). Other uses of simulation in the military were designed to improve efficiency. A simulation was developed to determine the best procedure for building intercontinental ballistic missiles. Procedures involving people, spare parts, policies, and computer applications were used. This helped the Air Force determine a

cost-effective management system that promoted the thoughtful production of intercontinental ballistic missile weapons (Geisler, 1959).

As simulation continued to be used in the military, its applications became more varied. The previous aviation-oriented simulations were continued and supplemented with other weapon system simulations (Wilson, 1998). Wilson (1998) described the future fabrication of a simulator that will network different military positions so that each participant sees an identical simulation from their own vantage point. For instance, the helicopter pilot would view the same terrain as an infantry soldier at the exact same point in time.

As discussed here, many military applications are related to battle and strategy. However, the newest military simulations are related to saving lives rather than taking lives. Military surgeons, battlefield staff, and hospital personnel alike have the ability to use human training simulators to learn the complicated procedures involved in medical applications (Riddle, Chapman, Pike, & Norfleet, 2009). Previously, cadavers and animals were used for medical practice; however with ethical issues related to animal use and the lack of realism when using cadavers and animals, the use of simulation mannequins has come to the forefront of training (Riddle et al., 2009).

**Evolution of Simulation Use in Nursing Education**

The format of clinical nursing education has changed over the years. In Florence Nightingale's time, nurses were trained as apprentices. They worked in hospitals or on battlefields learning the trade as they cared for patients or injured soldiers. As education became more formalized, classroom nursing education was used as an adjunct to apprentice training. Task trainers came into use in the 1960s with the invention of Resusci Anne, a cardio-pulmonary resuscitation mannequin developed by Dr. Asmund S. Laerdal (Laerdal, 2007). In addition to

Resusci Anne, task trainers, or stationary models, have been available for students to learn certain nursing skills (Nagle, McHale, Alexander, & French, 2009). These models were beneficial to practice nursing skills such as venipuncture, urinary catheterization, and suctioning to name a few, but lacked realism as far as performing techniques on real patients. Soon, the next era of nursing education came about in the 1990s (Nagle et al., 2009). Simulation mannequins that could breathe, talk, and mimic patients in many ways became the newest educational delivery method in nursing education. Nagle et al. (2009) describe the simulator features as:

> A chest wall that rises and falls to simulate respiration, palpable pulses, and programmable heart, breath, and bowel sounds. Most mannequins can have artificial airways, intravenous catheters, chest tubes, urinary catheters, and nasogastric tubes inserted. They interface with a monitor for real-time numeric and waveform displays of blood pressure, heart rate, electrocardiogram, oxygen saturation, and central venous and pulmonary artery pressures. Faculty control mannequins with software stored on a laptop or desktop computer. (Nagle et al., 2009, p. 19)

In addition, most of the high fidelity mannequins also can speak using pre-recorded phrases. With the simulated patient being programmed with symptoms of a specific medical condition, the mannequin mimics a live patient. Applying nursing skills to a situation like this allows students to "demonstrate their ability to establish priorities, make decisions, take appropriate action, and work successfully as part of a team" (Jeffries, 2007, p. 4). Simulation mannequins replicate the human body for the purpose of training in nursing or medical education. Some mannequins are higher or lower fidelity, which indicates the degree that the mannequin

duplicates reality. There is limited literature available regarding fidelity level of mannequins and efficacy of simulation training specific to Practical Nursing Programs.

**Simulation as a Response to Clinical Limitations**

As the baby-boomers age and require more medical interventions, the already sparse nursing workforce cannot keep pace (American Association of Colleges of Nursing, 2009). "Dr. Peter Buerhaus and coauthors found that despite the current easing of the nursing shortage due to the recession, the U.S. nursing shortage is projected to grow to 260,000 registered nurses by 2025" (American Association of Colleges of Nursing, 2009, p. 2).

While Licensed Practical Nurses were not addressed in the prior study, there is another publication that specifically speaks to the potential Licensed Practical Nurse shortage. The Center for Workforce Information and Analysis specifically detailed the estimated shortage of Licensed Practical Nurses in Pennsylvania from 2008 to 2017 using a low estimate model and a high estimate model. For 2011, the low estimate model indicated that there was an 8% (3,100 nurses) shortage of nurses in Pennsylvania. The high estimate model suggested that the shortage was as much as 13% (5,300 nurses). Both the low and high estimate charts indicate a steadily increasing shortage for each year, with 2017 being the last year estimated. The 2017 low estimate model suggests a potential 19% (7,900 nurses) deficit in Licensed Practical Nurses, and the 2017 high estimate model suggests a potential 30% (12,600 nurses) deficit of Licensed Practical Nurses in Pennsylvania (Center for Workforce Information and Analysis, 2011).

The Registered Nurse (RN) and the Licensed Practical Nurse (LPN) have different functions according to the Pennsylvania Code. Per the code, the following general functions of a Registered Nurse include:

(a) The registered nurse assesses human responses and plans, implements and evaluates nursing care for individuals or families for whom the nurse is responsible. In carrying out this responsibility, the nurse performs all of the following functions:

(1) Collects complete and ongoing data to determine nursing care needs.

(2) Analyzes the health status of the individuals and families and compares the data with the norm when possible in determining nursing care needs.

(3) Identifies goals and plans for nursing care.

(4) Carries out nursing care actions which promote, maintain and restore the well-being of individuals.

(5) Involves individuals and their families in their health promotion, maintenance and restoration.

(6) Evaluates the effectiveness of the quality of nursing care provided.

(b) The registered nurse is fully responsible for all actions as a licensed nurse and is accountable to client for the quality of care delivered.

(c) The registered nurse may not engage in areas of highly specialized practice without adequate knowledge of and skills in the practice areas involved.

(d) The Board recognizes standards of practice and professional codes of behavior, as developed by appropriate nursing associations, as the criteria for assuring safe and effective practice. (Pennsylvania State Board of Nursing, 1976, p. 1)

The LPN includes a lower level of functions and often reports to the RN. The LPN may administer medications, therapeutic treatments, administer immunizing agents, perform skin testing, perform venipuncture, and give intravenous fluids after meeting certain conditions. The LPN cannot administer antineoplastic agents, blood, blood products, total parenteral nutrition,

intravenous push medications, and titrated medications (Pennsylvania State Board of Nursing, 2003). The function of the LPN is:

> (a) The LPN is prepared to function as a member of the health-care team by exercising sound nursing judgment based on preparation, knowledge, skills, understandings and past experiences in nursing situations. The LPN participates in the planning, implementations and evaluation of nursing care in settings where nursing takes place. (The Pennsylvania State Board of Nursing, 2003, p. 1)

Long-term care facilities are the primary employers of Licensed Practical Nurses in the nation. With the use of long-term care agencies by baby-boomers increasing, a commensurate need for Licensed Practical Nurses will become evident. Nursing education programs have been encouraged to admit more students and open additional sites through funding incentives offered through various government agencies (Pennsylvania Higher Education Foundation, 2008). Although financial support to increase enrollment was available (Pennsylvania Higher Education Foundation, 2008), many institutions found that they were limited by lack of clinical site availability. The hospital and community settings are overwhelmed by the large numbers of students on assigned clinical days (Campbell & Daley, 2009; Giddens et al., 2008). The excessive student numbers multiplied by the number of competing educational institutions for clinical placements increases the difficulty that educational institutions have in finding adequate clinical learning opportunities for their students (Campbell & Daley, 2009). Decreased length of stays of hospitalized patients and increasingly complex patient diseases coupled with nursing shortages further complicate this problem (Hovancsek et al., 2009). Pediatric inpatient stays have also decreased, which makes the pediatric nursing experience difficult to obtain. Suplee

and Solecki (2010) suggested using standardized patients and mannequins to help offset this decrease in learning opportunities.

Some hospitals do not permit student performance of invasive procedures on patients due to safety concerns (Hovancsek et al., 2009). Additionally, decreased length of hospital stays and increased clinical site congestion have created problems in securing a meaningful clinical experience for nursing students in nursing education. This has led nurse educators to be creative in their search for solid clinical educational opportunities for their students (Alinier, Hunt, Gordon, & Harwood, 2006). Tobar, Wall, Parsh, and Sampson (2007) described the implementation of 12-hour clinical days in their pediatric clinical course in an effort to combat these difficulties. One drawback noted with this alternative was that a student nurse would care for a smaller average number of patients due to being at the hospital a decreased number of days. Faculty had to be concerned with patient selection to ensure that students received diverse patient assignments throughout the rotation. Students, faculty, and staff reported positive perceptions of the longer clinical day. Students and faculty members indicated that the 12-hour shifts allowed more time for other work and responsibilities as well as promoted a better organization of the clinical experience. The staff expressed feelings that the continuity of care was improved with the students being on the floor six to seven more hours a day than previously (Tobar et al., 2007). Fatigue was reported by faculty at the end of the shift but not reported by students (Tobar et al., 2007). While this is an option to help combat clinical site unavailability and congestion, the drawbacks of decreased number of patients and faculty fatigue were noted.

Clinical learning opportunities are vastly affected by the needs of the patients on the unit (Larew, Lessans, Spunt, Foster, & Covington, 2006). As described by Tobar et al. (2007), diversity in patient assignments is critical for students to have a valuable clinical education. This

can be showcased on the medical-surgical floor where there may be an abundance of one type of post-operative patient to care for, but post-operative patients from other types of surgeries are not available. Likewise, the medical floor may have many individuals with the seasonal flu, but during an individual rotation there may be a limited number of patients with cardiovascular or urinary system ailments. This drawback is even more evident with an obstetrical rotation where the number of births directly relates to the quality of the educational experience.

Emergency experience is often difficult to obtain for student nurses. Emergent conditions are often prevented from occurring; so, students may not have the ability to care for patients with obstetrical complications, respiratory distress, arrhythmias, and other life-threatening conditions. Patient death is seldom experienced by student nurses and is difficult for many nurses to experience (Smith-Stoner, 2009), and pediatric experiences are limited (Suplee & Solecki, 2010). These conditions can be replicated and nursing skills can be refined in the simulation laboratory. For example, Smith-Stoner (2009) used high-fidelity simulation in an effort to increase the comfort and educational level of students learning end of life nursing care. Henneman, Cunningham, Roche, and Cumin (2007) taught trauma-related care for a simulated patient involved in a motor vehicle accident. Robertson (2006) implemented a simulation experience for junior and senior level students by teaching obstetric complications using Noelle, an obstetric simulation mannequin and baby. Also, disaster preparedness is an area that requires practice and collaboration with interdisciplinary teams prior to an actual event occurring (Hovancsek et al., 2009).

Nursing student enrollment has increased as a result of the need for nurses, and this increased enrollment has created a need for an increased number of nurse educators (Pennsylvania Higher Education Foundation, 2008). Several programs such as the Nurse

Educator Loan Forgiveness Program, Graduate Nurse Education Grant Program, and Nursing Faculty Development Grants were made available in an effort to provide more educators so that additional qualified nursing students could be enrolled in educational programs (Pennsylvania Higher Education Foundation, 2008). Taking a larger than average number of students to the healthcare facilities means that there is less time that the faculty member will have to spend with each student, thus limiting the faculty to student contact that can take place. Uppermost in each educator's mind is the safety and well-being of the patients that are receiving care. This means that students, at times, may miss out on procedures due to instructor unavailability.

Mistakes in healthcare are very costly, and death or medical complications can occur if a correct path of treatment is not followed. This not only is a detriment for the patient, it is financially costly to the healthcare institution that may have to house a patient longer or suffer financial loss as a result of a malpractice suit. There are approximately 98,000 American deaths each year as a result of medical errors with 1.5 million more individuals harmed. This preventable expense results in costs above $30 billion (Maxim Nurses, 2008).

Healthcare institutions provide orientations to new nurses in an effort to assist them to practice safely. N. Kuhrik, M. Kuhrik, Rimkus, Tecu, and Woodhouse (2008) described an oncology orientation program at the National Cancer Institute Designated Comprehensive Cancer Center. Novice and seasoned nurses new to the oncology unit were oriented using simulation. These nurses may not have previously witnessed the early clinical manifestations involved with oncologic emergencies. This simulation orientation allowed expert oncologic clinicians to "lead the process and manage the complexity of patient responses resulting from participant interventions to help novice and experienced nurses navigate through practice sessions and see the 'big picture' associated with acutely ill oncology patients" (Kuhrik et al.,

2008, p. 346). Participants completed pre-evaluation and post-evaluation questionnaires, and their responses were assessed to see if simulation positively or negatively influenced their perceptions. These 12 individuals rated items such as confidence, assessment skills, appropriate nursing care, prioritization of patient needs, critical thinking, decision-making, communication, and delegation on a Likert-scale. All items were rated higher after the training with the exception of communicating well with other team members during an oncologic crisis, which was rated the same before and after simulation training. All participants indicated that future training should include simulations (Kuhrik et al., 2008). Maintaining patient health and averting malpractice suits would outweigh the financial costs involved with mannequin purchase and training costs.

Simulation is being investigated as a solution for decreased clinical site availability and increased student enrollment. The lack of patient diversity and learning opportunities on the clinical units can be supplemented with simulation. Simulation can assist with orienting and training individuals, which may help to avoid costly mistakes. With these benefits and solutions to nursing program dilemmas, simulation seems to be a viable option; however, Practical Nursing Programs in Pennsylvania need guidance as to how much simulation can effectively be substituted for clinical experiences.

Katz, Peifer, and Armstrong (2010) studied simulation use in baccalaureate programs across the nation. Based on their survey results, 78.9% of the responding schools utilized simulation in their programs. Only 18 of the 60 responding schools replaced a degree of clinical with simulation. The authors indicated that the amount of time that simulation replaced clinical was noted in the open-ended question section of their survey form. The data obtained were

inadequate to reliably calculate the mean number of hours that programs are replacing clinical with simulation (Katz, Peifer, & Armstrong, 2010).

## Simulation Benefits and Disadvantages

As with any new educational methodology, one must determine the cost/benefit ratio to the students, the faculty members, and the educational institution. This section examines research regarding the purported benefits and disadvantages associated with simulation use.

### Content Mastery

Content Mastery has been investigated as a benefit to simulation use. Alinier et al. (2006) investigated acquisition of clinical skills using a pre- and post-test study, which included a convenience sample of 99 second-year nursing diploma students. An Objective Structured Clinical Examination (OBSCE) pre-test was given. Students were separated into control and experimental groups. Both groups received the traditional curriculum; however, the experimental group was additionally given simulation-mediated training on two separate afternoons. At least five weeks later, the OBSCE post-test was given. "The control and experimental groups improved their performance on the second Objective Structured Clinical Examination. Mean test scores, respectively, increased by 7 to18 and 14 to18 percentage points. The difference between the means was statistically significant ($P < 0.001$)" (Alinier et al., 2006, p. 359) supporting that simulation has positive effects on content mastery.

Content mastery has been studied in other medical disciplines as well. A convenience sample of 20 first and second year family medicine residents was utilized to determine if lecture and simulated mannequin training could improve resident effectiveness at diagnosing cardiac murmurs. Participants were oriented to the normal sounds of the mannequin during a 15 minute teaching session and completed a pre-test "assessing their ability to describe and diagnose four

murmurs (aortic stenosis, benign flow murmur, aortic insufficiency, and chronic mitral regurgitation)" (Frost, Cavalcanti, & Toubassi, 2011, p. 279). This session took place within a three-week period prior to the actual session. Participants attended a one hour didactic session followed by a second hour of practical experience using "high-fidelity cardiopulmonary simulators (CPS)" (Frost, Cavalcanti, & Toubassi, 2011, p. 278). There were two types of simulation training: tutor-driven and learner-driven. The tutor-driven session included a more structured training, where settings were chosen and differences and similarities between the conditions were pointed out. The learner-driven session allowed the residents to determine which settings that they would like to examine. The differences and similarities between the valvular pathologies were not pointed out; however, the teacher provided answers to questions posed. These two types of sessions were utilized to determine whether future research based on this type of teaching techniques would be worthwhile. Due to a small sample size, a significant finding was not possible; however, a trend was evidenced indicating that the tutor-driven training was more effective than the learner-driven training. Correct murmur diagnosis increased significantly from 43.8% to 85.0% ($P = 0.0001$). Composite murmur characterization increased in 95% of the residents after the session ($P < 0.001$). Accurate murmur characterizations elevated from 0.613 correct to 0.831 correct ($P < 0.01$). These researchers suggested that the usage of a combination of didactic and simulated learning experiences may result in elevated clinical effectiveness when assessing cardiac pathology in family medicine residents (Frost, Cavalcanti, & Toubassi, 2011).

The replacement of traditional clinical with simulated clinical is increasingly being considered with the decreased availability of learning situations in the clinical agencies resulting from decreased lengths of stay, decreased hospital admissions, and clinical agency crowding as a

result of an increased number of nursing students and educational institutions. Meyer, Connors, Hou, and Gajewski (2011) were interested in determining the value of the simulation experience related to clinical performance. These researchers studied a convenience sample comprised of 116 junior level nursing students utilizing the staggered timing model. Students were assigned to attend the simulation laboratory for two weeks of an eight week clinical at varying times, which amounted to 25% of the clinical rotation. Four infant and four pediatric simulation scenarios were utilized during the clinical experience. Faculty rated these students every two weeks using a Likert-style evaluation tool. The faculty ratings indicated that students who attended the simulation laboratory scored 1.124 points higher than those who had not yet attended simulation training; however, this did not reach statistical significance. The third and fourth week ratings illustrated that simulation-trained students performed statistically higher ($P = 0.03$) than their peers who had not yet attended simulation training; however, the final evaluations were nearly equivalent between groups (Meyer et al., 2011). This study indicates that the use of simulation in place of a portion of clinical is not detrimental to clinical learning and may lead to a higher level of clinical performance.

Bux (2009) used a mixed qualitative and quantitative methodology to determine how useful clinical simulators were for training purposes on a convenience sample of 63 nurses working in a hospital. Quantitative data were evaluated using a 16-item pre-test and post-test one group design. Examination scores showed significant improvement. Bux (2009) concluded that learning was positively affected by simulation use. Qualitative data were gained through debriefing and focus group discussions. The qualitative evaluation of data revealed themes of confidence, knowledge, development of clinical skills, and interactive learning. These themes supported the usefulness of clinical simulators for training in the hospital environment.

Additionally, Linden (2008) conducted research supporting cognitive learning acquisition using a quasi-experimental study to compare the effects of a simulation experience added to a traditional course. The sample included 97 Associate Degree in Nursing (ADN) students enrolled in their first clinical course. The course utilized traditional preparation techniques and teaching strategies. Lecture was accompanied by a PowerPoint slideshow. The control group received lecture content followed by a 23 question multiple-choice post-test. The experimental group received the same lecture content and a simulation skills laboratory, followed by the 23 question multiple-choice post-test. There was a significant increase ($p < .000$) in cognitive learning acquisition between the control and experimental groups supporting that the addition of simulation training increased cognitive learning.

Lewis and Ciak (2011) confirmed acquisition of cognitive learning during the simulation experience implemented in their diploma level nursing program. Four semesters of data were obtained from four separate groups with a student number ranging from 9 to 28 in each group. Content information was provided to the students prior to the simulation experience via a simulation laboratory website. The Assessment Technologies Institute (ATI) commercial examination entitled, "The Nursing Care of Children and Maternal Newborn Test" was administered. Students completed four pediatric and four maternal-newborn related simulation experiences throughout the laboratory exercise. Then, students completed an identical post-test to determine the increase in acquisition of knowledge. The mean pre-test for 64 students was 0.664 and the mean post-test for 63 students was 0.823. A statistically significant knowledge increase was found utilizing the paired student t-test ($p < 0.005$). All semesters had statistically significant increases individually as well.

Another study confirming increased content mastery with simulation use was completed by Kuznar (2009). A sample of 84 students from two Wisconsin technical colleges participated in the survey. There were 54 students in the experimental group and 30 students in the control group. A mixed-method quasi-experimental design was used, and bivariate statistical procedures were utilized to analyze data. Pre-test analysis confirmed homogeneity between groups. Post-test results indicated a significant increase with the simulation group ($p < 0.05$ level) in fundamental nursing knowledge. Motivation was another component analyzed with this study. Both groups reflected an increased level of motivation and self-efficacy. Increased general self-efficacy was statistically significant for the simulation group; however, the comparison group showed a statistically significant increase in critical thinking (Kuznar, 2009).

Increased content mastery is very important to increasing nursing competence in students. While this is obviously beneficial, Cohen et al. (2010) were able to quantify the financial benefit of increased knowledge and experience utilizing simulation. The Medical Intensive Care Unit of an 897 bed urban teaching hospital was the setting of the research. All second and third year medical students were required to attend central venous catheter insertion training including lecture, ultrasound training, and practice using the central venous catheter simulator prior to rotating to the Medical Intensive Care Unit. Evidence-based guidelines pertaining to the prevention of catheter-related bloodstream infections were emphasized. Residents were evaluated using a checklist and had to achieve a passing score prior to rotating through the Medical Intensive Care Unit. The data from the year prior to the training and the data from the year after the training were compared. It was found that the average rate of infection decreased from 4.2/100 admissions to .42 /100 admissions, which lead to data computation of an estimated prevention of 9.95 catheter-related bloodstream infections per year. By utilizing this 9.95 result,

data computations were performed. The net annual amount saved was estimated between $704,034 and $711,248. The cost of the simulation training intervention was $111,916. The researchers indicated that this was a seven to one ratio of return between training costs and institutional savings (Cohen et al., 2010). This study underscores the costliness of mistakes that can be made in the hospital setting. Prevention of these errors promotes a decreased hospital stay for patients as well as a cost savings for the facility.

While gaining knowledge is necessary, being able to incorporate what is learned and put the knowledge into practice is essential. Daniels et al. (2010) researched knowledge retention and skill performance in a study of labor and delivery crisis management skills. A multiple choice questionnaire was administered to participants prior to the intervention. The experimental group received three hours of training on shoulder dystocia and eclampsia, which included a simulation scenario followed by a 40 minute debriefing. The control group attended 1.5 hours of lecture on shoulder dystocia and eclampsia, viewed a 26 minute video on shoulder dystocia, and practiced shoulder dystocia maneuvers on a stationary pelvic model. One month later, the two groups were retested using the same multiple choice questionnaire. There was not a significant difference in the scores on the multiple choice questionnaire from the pre-test to the test at the one month interval. Additionally at the one month interval, the two groups were videotaped while completing performance testing for shoulder dystocia and eclampsia to facilitate scoring of their technical skills. The simulation trained experimental group scored significantly higher on the shoulder dystocia drill ($P = 0.002$) and the eclampsia scenario ($P = 0.032$) than their lecture, video, and hands-on trained counterparts. It was reported that "Although both teams appeared to know the correct sequence of maneuvers, the simulation-trained teams consistently scored higher

due to their efficacy, team work, and correct execution of maneuvers" (Daniels et al., 2010, p. 43).

Many studies involving simulation support acquisition and retention of content. In addition to content mastery, some of these studies purport other benefits such as critical thinking, self-efficacy, confidence, improved clinical skills, and group interaction which are discussed throughout this section.

**Critical Thinking**

Decker (2007) studied a convenience sample of 114 senior-level students enrolled in a Bachelor of Science Degree in Nursing program. The students' reflective and critical thinking processes after a simulated learning experience were examined. The individual simulation groups consisted of four to five students. Demographic data were obtained at the onset of the study. Students participated in a simulation experience. Observational data and a semi-structured interview were employed to gather data, which were analyzed by axial, open, and selective coding. The study's findings indicated that learners were at different levels of reflective and critical thinking, which were influenced by their mind set, skills competencies, theoretical knowledge, and experiential knowledge (Decker, 2007). Based on this research, Decker (2007) suggests that thoughtful practice can translate into sound clinical judgment.

Another research study targeting critical thinking acquisition was completed by Ravert (2008). Ravert (2008) randomly assigned 28 baccalaureate nursing students into three groups. One group received the regular educational content with five one-hour enrichment sessions weekly on the assigned patient condition. The second group received the regular educational content along with five one-hour enrichment sessions per week on the assigned patient condition using a simulation mannequin. A third group was the control group, which received only

classroom content. The California Critical Thinking Disposition Inventory (CCTDI) was used to assess critical thinking. All groups displayed a moderate to large increase in critical thinking scores. The CCTDI scores were the most elevated for the control group. The California Critical Thinking Skills Test (CCTST) was also used. The experimental groups had a large effect size, while the control group had a moderate effect size. Statistical significance was not found between groups. Ravert (2008) hypothesized that the limited sample size may have lead to the lack of significance. This study does not support elevated critical thinking acquisition with the use of simulation.

Lewis and Ciak (2011) also studied critical thinking acquisition. In a diploma nursing program, students were required to take a course entitled "Growing Family." A control group consisting of a group of students who previously took the course over a summer term was utilized. The experimental group received the same classroom training but additionally had one day of obstetric and pediatric simulation scenarios in the laboratory. Students took the test entitled "The Nursing Care of Children and Maternal Newborn," an Assessment Technologies Institute (ATI) examination. The critical thinking questions were evaluated in this examination, and inconclusive results were found. There were increases on some critical thinking items in the experimental groups, and the opposite was true for other items indicating an increase in critical thinking in the control group. The researchers suggest that this evaluation may have been more sound if critical thinking was evaluated prior to and after the simulated laboratory experience.

**Confidence**

Bye (2008) conducted a study investigating the acquisition of knowledge, retention of knowledge, and confidence levels using a quasi-experimental research design. During the fall 2007 semester, 51 students participated in this study. Students were placed in three groups

consisting of 15 to 20 students each. A convenience sample based on the specific course that the student registered for was utilized with nonequivalent comparison groups. Students were primarily females ages 20 to 42. One group employed simulation with an actor. A second group utilized the VitalSim simulator. A third group used traditional methods.

Pre-tests of knowledge and confidence were given. Tests were administered at three measured intervals. The knowledge acquisition post-test one did not reveal significant differences between the VitalSim and traditional method, as well as the actor and the VitalSim. However significant differences were found (p value of .01) between the actor and the traditional method group. Bye (2008) indicated that this may have been a result of the actor not being prepared and realistic. In regards to knowledge retention, there were no significant differences between the three groups at the post-test one and post-test two intervals. Confidence was measured between the three groups. A significant difference at post-test two was noted. T-tests indicated that the VitalSim group demonstrated significant improvement between post-test one and post-test two. The mean confidence scores of the VitalSim group related to the items of history, assessment appraisal, and auscultations were found to be significantly higher than those in the actor group. Likewise, there were significant differences in the favor of VitalSim use between the VitalSim and traditional method group in the areas of evaluation of a patient's overall appearance as well as lung auscultation (Bye, 2008).

Lewis and Ciak (2011) studied confidence acquisition in a study conducted in the simulation laboratory at their diploma nursing program using the National League for Nursing's Student Satisfaction and Self-Confidence in Learning tool. This tool has eight questions aimed at quantifying student confidence regarding applying skills taught in the simulation setting to the clinical setting. Students completed four pediatric and four maternal-newborn related simulation

experiences throughout the laboratory exercise and then completed the Student Satisfaction and Self-Confidence in Learning tool. The student mean related to self-confidence in learning was 4.35, which indicated a positive response.

Another study researching student confidence level before and after simulation experience was conducted by Bambini, Washburn, and Perkins (2009). The sample consisted of 112 undergraduate nursing students, who voluntarily completed a pre-test and post-test with self-efficacy questions. Pre-test and post-test means were analyzed using a t-test, which indicated a significant increase ($p < .01$) in self-efficacy after a simulation experience. Confidence increases in vital sign assessment and breast examination were noted ($p < .01$). Elevated confidence levels in fundal and lochia assessment were also found ($p < .001$). Qualitative data relating to the simulation experience were reviewed for themes, which were identified as: improved "communication, confidence, and clinical judgment" (Bambini, Washburn, & Perkins, 2009, p. 81).

Confidence levels were studied in a convenience sample of 20 family medicine residents by Frost, Cavalcanti, and Toubassi (2011). A baseline qualitative assessment was given to determine the residents' subjective confidence levels in their cardiac examination skills prior to a teaching intervention. After a brief initial session that oriented the residents to the normal settings on the simulation mannequin, an experimental session was scheduled. The residents attended a one hour didactic session followed by a one hour practical session on murmurs utilizing the simulation mannequin. Following the intervention, subjective confidence levels related to their cardiac examination skills were assessed again. The residents' mean confidence scores from pre-intervention to post-intervention increased significantly related to the ability to

detect pathology (P = 0.0001) and differentiate between a pathologic and a physiologic murmur (P <0.0001) based on a Likert scale questionnaire (Frost, Cavalcanti, & Toubassi, 2011).

A quasi-experimental study was conducted by Ogilvie (2008) utilizing purposive sampling, based on participation in a previous research study. This study did not support critical thinking but did support elevated confidence levels related to simulation implementation. Of the 10 initial students recruited, 6 chose to participate. All students were third-year BSN students, who were asked to discuss their learning experiences in a four-day simulation laboratory. Ogilvie (2008) did not find a direct linkage between clinical reasoning and simulation use in response to her research questions; however, she did find a central theme of confidence. Ogilvie (2008) reported that student comments indicated that mannequins could not entirely replace real patients, but they did provide a safe practice environment. Facilitation, debriefing, knowledge, and skills acquisition were identified as factors that led to increased confidence levels.

Alinier et al. (2006) conducted a study involving 99 second-year nursing diploma students. Both experimental and control groups received the traditional curriculum. The experimental group received two afternoons of simulation training in addition to the regular curriculum. Pre-tests and post-tests were given, and a questionnaire was administered at the close of the experiment to both groups. According to Alinier et al. (2006):

> Students' perceptions of stress and confidence, measured on a 5-point Likert scale, was very similar between groups at 2.9 (1, not stressful; 5, very stressful) and 3.5 (1, very confident; 5, not confident) for the control group, and 3.0 and 3.4 for the experimental group. (p. 360)

So, Alinier et al. (2006) did not find a significant difference between student responses in the control and experimental groups regarding perceptions of stress and confidence.

Likewise, Li, Hicks, and Bosek (2008) conducted pre- and post-simulation/clinical training experiences research on senior nursing students which did not support confidence. Students in this study were randomly assigned to one of three groups, a simulation group, a clinical/ simulation group, or a clinical group. The sample included 25 students. There were no significant differences on written examination scores, knowledge retention, self-confidence, or overall clinical performance. Authors suggested a lack of significance due to small sample size (Li, et al., 2008).

As discussed, there are a few studies that do not support increased levels of student confidence. The majority of research indicates student confidence levels elevate with simulation mediated instruction.

## Simulation Perceptions

It is beneficial to determine the perceptions of stakeholders with any new educational modality. This section addresses student, faculty, administrative, and professional perceptions of simulation use.

### Student Perception of Simulation

Student perception is not a new measure of simulation's effectiveness as an educational tool. There are benefits and disadvantages regarding simulation, when viewed through the students' lens. These beliefs are discussed in this section.

A qualitative phenomenological study was completed by Partin, Payne, and Slemmons (2011) aimed at determining student perceptions of their maternal simulation laboratory experience. Of the 60 students in the study, 49 chose to participate. Students were asked to record their perceptions regarding their experiences and to include relevant information related to the simulated experience on an audiotape device. Researchers transcribed these recordings and

evaluated them for themes. Student responses were categorized into three themes: "nonthreatening environment, enhancement of learning, and feeling prepared for practice" (Partin, Payne, & Slemmons, 2011, p. 187). Student comments related to the non-threatening environment detailed that working on a mannequin is less intimidating because it allowed for practice, decreased the pressure of working on real patients, and decreased student concern of not knowing exactly what to do when working with real people (Partin et al., 2011). The enhancement of learning category contained comments from students related to increased ability to critically think, the scenarios were paced appropriately and allowed repetition as needed, and the faculty answered questions as needed. The third theme of feeling better prepared included student comments regarding enjoyment of the simulated hands-on interactive learning experience and decreased concern for future liability relating to their nursing practice (Partin et al., 2011). This study supports a positive student reaction to simulation laboratory learning experiences.

Childs and Sepples (2006) implemented a clinical laboratory as a senior-capstone event. Senior nursing students were asked to rotate through four stations. One station involved use of the simulation mannequin. The Educational Practice Scale for Simulation (EPSS) and Simulation Design Scale (SDS) were evaluated during this program and found to be reliable and valid. In addition to this goal, student perceptions on this simulation experience were solicited. Students rated this experience positively. The students rated the mock code scenario, with the simulation mannequin, the highest for enjoyment and learning that took place. Student feedback suggestions included making the voice coming from the mannequin the same gender of the mannequin and not using the primary simulation instructor's voice for the mannequin. Students indicated that more time was needed for simulations and debriefing, as only 25 minutes for the

simulation and 10 minutes for debriefing were originally allotted. In addition, the researchers found that they needed an additional instructor to make the experience successful.

Robertson (2006) described simulation implementation in a junior and senior level course entitled, "Developing Families." Obstetric complications were taught in this course using Noelle, an obstetric simulation mannequin with a simulation baby. Students completed a 17-item questionnaire at the end of this three-hour instruction period. The students responded that the simulation was realistic and improved their clinical confidence and knowledge levels. Some students related the enjoyment involved with thinking on their toes, the reinforcement of classroom material, prioritizing the nursing care, and the imitation of real life situations (Robertson, 2006). There were qualitative responses indicating that some students did not like not knowing what to expect. Students also rated not having previous simulation experiences as a negative factor (Robertson, 2006).

Maas and Flood (2010) also conducted research using a questionnaire administered to students who cared for an asthmatic simulated patient. Students produced favorable responses, with the majority (87%) responding that the "lifelike" aspect of the mannequin was what they liked best. This same majority related an increase in their confidence levels regarding their ability to care for an asthmatic patient. A large percentage (80%) felt that the skills acquired in the simulation laboratory would be transferrable to the skills required in clinical practice.

Another example of simulation being utilized for obstetrical content was given by Bantz et al. (2007). At Ball State University, faculty members utilized the simulation laboratory for aspects of an eight station obstetrical and neonatal learning experience. This laboratory was initiated because faculty indicated that students come to the hospital experience unprepared. This laboratory was a successful attempt at providing basic content as well as increasing student

confidence levels. All students responded favorably, indicating that they had gained knowledge from this offering. Course instructors indicated that the students were better prepared at the hospital. Students were more able to complete the required skills that were covered in the skills laboratory.

Lewis and Ciak (2011) administered the National League for Nursing's Student Satisfaction and Self-Confidence in Learning tool, which contained five Likert-style questions related to student satisfaction with simulation as an educational technique after an eight-station pediatric, maternity, and newborn simulated clinical laboratory experience. Positive responses were obtained, with all four semesters of students having an overall mean of 4.33. This study supports increased perceived student satisfaction levels following a simulated laboratory experience.

Schoulties (2009) questioned whether student perception of learning is elevated with simulation and whether there is a difference in student perception between traditional and simulated clinical education. Schoulties (2009) administered a 27-item Clinical Learning Environment Comparison Survey, which included demographic questions, to 40 BSN students. Traditional clinical scores were rated higher with items regarding caring for human patients, nursing process utilization, communication, providing patient support, and patient teaching. Traditional clinical also received higher ratings "for questions concerning discussion of psychosocial, developmental, and spiritual needs" (Schoulties, 2009, p. 22). Simulation had higher scores related to "critical thinking skills, identification of patient problems, anticipation of patient care needs in case of errors, reaction to patient status changes, as well as rationales related to treatment plans" (Schoulties, 2009, p. 22). Student confidence and security in their

decision-making abilities was perceived as higher with simulated learning experiences (Schoulties, 2009).

Another study by Fountain and Alfred (2009) questioned whether student learning styles impacted their preference for simulation. The researchers had a 75% response rate, which equated to 78 students for their survey. Researchers utilized the Pearson product-momentum correlation tool. Seventy-seven percent of respondents reported that they were social learners. "Two learning styles were significantly correlated with satisfaction: social learning ($r = .29$, $p = .01$) and solitary learning ($r = .23$, $p = .04$)" (Fountain & Alfred, 2009, p. 98). The researchers indicated that both of these learning styles can be met in the simulation laboratory, where students work together easily in small groups, watch others, and learn (Fountain & Alfred, 2009).

Bremner, Aduddell, Bennett, and VanGeest (2006) analyzed 41 baccalaureate students' perceptions following a simulation experience.

> Ninety-five percent (95%) of the students rated the session from good to excellent, whereas 68% indicated that the simulation should be a mandatory component of their nursing education. Sixty-one percent (61%) of the students felt that the experience gave them confidence with their physical assessment skills, whereas 42% found that this type of educational strategy relieves some of the stress associated with the first day of clinical for novice students. (Bremner et al., 2006, p. 172)

One individual in their study offered a comment related to the lack of realism of mannequins stated "Bottom line, he still is a dummy. You can't make dummies smile!" (Bremner et al., 2006, p. 172). Another limitation cited was a lack of time with the simulator.

Student perception of simulation use has been researched with first year nurse anesthesia students as well. These students indicated the advantages to simulation use included "the ability

to evaluate cognitive and psychomotor skills, the development of critical thinking and decision-making skills along with crisis management skills, and the management of rare or unusual anesthetic events, increased confidence, and the development of leadership skills" (Henrichs et al., 2002, p. 221-222). The disadvantages cited by the students were "lack of reality of the simulator, lack of knowledge in managing crisis events due to their inexperience, the potential for making fixation errors, and the anxiety that the sessions cause" (Henrichs et al., 2007, p. 222). There was disparity between the students' perceptions of how realistic the simulator is.

Elfrink, Nininger, Rohig, and Lee (2009) discussed other negative student perceptions related to simulation use, which included using videotaping for the debriefing session, being the student chosen to act out the scenario in front of their peers, repeating a simulated scenario, and not knowing where to begin when caring for the simulated patient. These researchers eliminated videotaping and repeating of scenarios from future simulation assisted training. They also allowed group interaction on the simulation rather than just one student being "on the spot" and provided an additional orientation to the simulation laboratory (Elfrink et al., 2009).

Jarzemsky and McGrath (2008) supported the value of low-fidelity mannequins. Students in the low fidelity group when compared with the control group, who did not have simulation, reported "significantly higher self-ratings for confidence, ability, stress, and critical thinking related to the skills of urinary catheterization, sterile dressing change, IV medication administration, and NG medication administration" (Jarzemsky & McGrath, 2008, p. 93). High-fidelity and low-fidelity simulator use has been shown to be effective. There is limited research comparing the mannequin fidelity level to the level of effectiveness in Practical Nursing education.

## Faculty Perception of Simulation

Similarities and differences between student and faculty perceptions regarding what characteristics make an effective simulation laboratory instructor were studied by Parsh (2009). The cognitive apprentice instructor model was utilized. There were 304 nursing students and 16 nursing faculty participating in the study using the Nursing Clinical Teaching Effectiveness Inventory (NCTEI). In addition, eight students and three instructors were interviewed. Technology and realism were the two areas identified as being different in the simulation laboratory than traditional clinical. The students and faculty rated the NCTEI similarly, with the students responding that effective simulation instructors possess strong communication skills, sound clinical judgment, good organization skills, the ability to articulate clearly, and the enjoyment of teaching. The instructors felt effective simulation instructors are encouraging, supportive, and respectful of students. The faculty indicated that simulation instructors must be good role models, and any criticism offered should be given in private (Parsh, 2009).

Tuoriniemi and Schott-Baer (2008) discussed the implementation of a simulation laboratory at their college. They indicated that there can be some degree of faculty reluctance to simulator usage. This hesitancy can be related to the increased amount of time required to formulate a simulation experience as compared to a traditional learning experience.

Farina (2008) conducted research in an attempt to determine current simulation use and knowledge by Associate Degree in Nursing faculty members. A convenience sample of six faculty members, who possessed at least a Master's Degree was utilized. Semi-structured interviews were conducted, transcribed, and analyzed for themes. Interview participants were asked which teaching strategies they commonly used in the classroom and at clinical. Simulation was reported as being used in the classroom, but there were no responses indicating

that it is being used at clinical. Farina (2008) indicated that although five individuals reported simulation use during classroom time, there was a disparity between reported use and actual use as observed by the researcher. Themes emerged from the data analysis indicating that faculty respondents believe that simulation is a non-threatening environment for students which provides a safe practice environment without the potential to harm clients.

Additionally, simulation was identified as a means of testing and determining skill attainment. Although faculty indicated these potential benefits of simulation use, they also voiced areas of concern relating to a knowledge deficit regarding simulation implementation. Respondents questioned what a simulation mannequin can do, what equipment and scenarios are required, and how to operate the mannequin (Farina, 2008). Farina (2008) stated that simulation has been used only for 25% of the clinical skills that are being taught in this nursing program. The mannequin has been available for three years. These faculty concerns are possible reasons for the limited simulation usage.

Other faculty members respond to simulation usage with excitement. Dillard, Sideras, Ryan, Carlton, Lasater, and Siktberg (2009) implemented a faculty training program on the use of the Lasater Clinical Judgment Rubric (LCJR). This tool was utilized to determine students' clinical judgment while engaged in simulation scenarios. The faculty received information regarding the tool and simulation use. At the end of the training, the faculty rated themselves as "competent" on a Likert scale. The researchers indicated that the instructors had a high level of motivation to continue to implement new teaching strategies (Dillard et al., 2009).

**Administrator Perceptions of Simulation Use**

Administrators, as well as faculty, are concerned about providing a meaningful education to their students. Administrators often are responsible for securing funding, space, and personnel

for new educational ventures such as simulation. Finding the resources for a project of this magnitude can be a burden for the administrator. Bremner et al. (2006) echoed these sentiments by writing:

> The complexity and time requirement for setup and learning this teaching method, the budgetary requirements for this type of technology ranging from $30,000 to $200,000 as well as physical space to house the equipment, the lack of incentives for the faculty to learn the technology and develop scenarios for the HPS [human patient simulator], and the need for small groups of students in simulation sessions to make learning effective . . . . (p. 171)

**Perception of Simulation by Professionals**

Bowen (2008) conducted a study to determine if human patient simulators are perceived by Certified Registered Nurse Anesthetists as being effective adjuncts to traditional anesthesia education and whether simulators are perceived to adequately help nurse anesthetists train to address emergency situations. Surveys were mailed to 200 randomly chosen Certified Registered Nurse Anesthetists in the United States of America, and 73 responses were received (36.5% response rate). Of the respondents to the survey, 81% indicated that they have never used a simulator and as a result could not give an answer on simulation use. Open-ended responses were evaluated for themes. Most respondents thought that patient simulators were effective in both anesthesia education and in preparation for critical events. The respondents identified “difficult airway, loss of airway, laryngospasm, bronchospasm, anaphylaxis, and malignant hyperthermia” (Bowen, 2008, p. 16-17) as worthwhile conditions for use with simulation. Participants also related the inability of simulation to take the place of real-life situations, but that they were beneficial to experience infrequent critical events (Bowen, 2008).

Simulation was used to teach Advanced Cardiac Life Support to "physicians, nurses, emergency medical technicians, respiratory therapists, and advanced health providers" in a study conducted by Hoadley (2009, p. 91). One group of participants used low fidelity mannequins, and one group used high-fidelity. There were not significant differences between the level of fidelity and content mastery, nor was there a significant difference of satisfaction between the two groups. The sample size was 53. The researcher indicated that although the difference was not significant between the experimental and control group, the data trended in the direction of the high-fidelity group. Both groups showed significant improvement from pre- to post-tests.

## Simulation Use

Simulation implementation as evidenced by research has demonstrated useful tendencies. Published examples of how simulation has been utilized will be discussed within this section.

### Replacement of Clinical with Simulation

Brigham Young University experienced a clinical site limitation during the last week of their six-week clinical rotation due to heightened security at the Salt Lake City hospitals as a result of the 2002 Winter Olympics. Faculty responded with innovation and created a simulation experience to replace one day of the clinical week. During the simulation, the faculty demonstrated on simulation mannequins how people could react differently to the same medication. Student responses were positive indicating increased comprehension regarding medication side effects and differing patients' responses to medication. Students also indicated increased confidence in medication administration skills and safe medication administration (Bearnson & Wiker, 2005).

Another example of replacing a portion of traditional clinical time with simulated clinical time is in the research of Schoening, Sittner, and Todd (2006). These researchers conducted a

non-experimental pilot study with baccalaureate nursing students. The sample, consisting of 60 students, was oriented, trained, and finally participated in simulation experiences related to pre-term labor. Session one dealt with the pre-term labor assessment and interventions. Session two required intervention with the unstable pre-term labor simulated patient. The clinical group was split in half. One-half of the group attended a morning simulation laboratory, while the other group cared for patients on the obstetrical unit. The roles were reversed in the afternoon. Session two took place one week after session one. A Likert-scale, with "1" being strongly disagree and "4" being strongly agree, was used to determine student perceptions of achievement of simulation outcomes. The mean response for the attainment of simulation objectives was 3.64. Overall mean of the students' perceptions of simulation was 3.75 (Schoening et al., 2006). The following categories were found when a content analysis of journal entries was performed: concepts and skills, effectiveness, empathy, critical thinking, decision making, consequences, cooperation, and competition (Schoening et al., 2006).

A triad of collaborative partners in Texas, including a liberal arts university's school of nursing, a nearby community college, and a regional medical center, were awarded a grant to develop a Regional Simulation Center (Sportsman, Schumacker, & Hamilton, 2011). The Texas Board of Nursing did not have regulations that placed a maximum on the amount of simulation that can replace traditional clinical experiences. Sportsman et al. (2011) reported that depending upon the clinical objectives, a certain amount of clinical time was designated to be completed in the Regional Simulation Center as follows: "health assessment (100 percent of CT [clinical time], fundamentals (50 percent of CT), two medical-surgical courses (each, 25 percent of CT), childbearing families (8 percent of CT), Pediatrics (13 percent of CT), and the final capstone course (20 percent of CT)" (p. 260). The use of simulation in this setting was used to increase

enrollment in these nursing programs by 39%. Clinical competence, grade point average (GPA), and standardized exit examinations were examined to determine the success of this new endeavor. There were no significant differences in the seniors' self perception of clinical competence, mean GPAs, or the results of the standardized exit examinations over the three year period. Therefore, Sportsman et al. (2011) suggest that the findings support that a portion of clinical can be replaced with simulation laboratory experiences without negatively affecting the success of the graduates.

**Simulation as an Evaluation Tool**

Careful planning, clear objectives, and precise outcome measures are essential if an evaluative method using simulation is desired (Suplee & Solecki, 2010). Decker, Sportsman, Puetz, and Billings (2008) caution against the use of simulation for learning and evaluation without strategic planning. These researchers indicated that simulation is valuable to determine competency or clinical judgment of nurses; however simulation cannot be used for competency testing until "educators and researchers acquire the knowledge and skills needed to use this education strategy, develop realistic case scenarios, and design and validate standardized and reliable testing methods" (Decker et al., 2008, p. 74). Smith and Roehrs (2009) asserted the importance of having a well-formulated simulation session. Their study indicated that the design of a simulation program can influence a student's satisfaction and self-confidence (Smith & Roehrs, 2009).

One of the many reasons that simulation is being integrated in nursing curriculum is the ability to replicate patient scenarios. With duplicate simulation scenarios, students can be measured against a standard. Larew, Lessans, Spunt, Foster, and Covington (2006) developed a theory-driven simulation protocol utilizing Benner's novice to expert theory. In this protocol,

increasing prompts were given until the student was able to identify and resolve the problem. Larew et al. (2006) indicated that this simulation protocol coupled with a performance evaluation tool would allow for clinical competency evaluations.

Wolf et al. (2011) suggested that there are barriers to simulation evaluation. The caring nature of nurse educators may soften the evaluation. When a student fails to perform satisfactorily, the nurse educator may wish to give the "benefit of the doubt" (Wolf et al., 2011, p.132). Secondly, the consumer driven model as it applies to nursing education can be a barrier. If one views the student as the consumer, they would be inclined to allow them to set the requirements and dictate the service terms. "Beneficiaries beyond the student" (Wolf et al., 2011, p. 133) need to be considered. The third barrier to simulation evaluation is that university standards can be lower than nursing program standards. With this in mind the authors suggested that instructors generate documentation of unsafe behaviors witnessed in the clinical area as well as the simulation laboratory.

## Authoritative Guidelines Related to Simulation Usage

Pennsylvania Practical Nursing Programs must secure program approval from the Pennsylvania State Board of Nursing. This Board of Nursing is part of a larger organization called the National Council of State Boards of Nursing. The input of this agency coupled with the guidelines for simulation from the primary nursing program accrediting body, the National League for Nursing Accrediting Commission (NLNAC), is useful to determine the degree of simulation implementation for each individual Practical Nursing Program.

### Licensing Agencies' Stances on Simulation Usage

The NCSBN is the coalition of the individual State Boards of Nursing across the United States of America. These Boards of Nursing are charged with the maintenance of public

protection. State Boards of Nursing determine "whether entry-level nurses have received effective, supervised clinical nursing education to ensure safe nursing practice" (National Council of State Boards of Nursing, 2006, p. 12). The NCSBN's Practice, Regulation, and Education (PR&E) Committee recommended, "Prelicensure nursing education programs shall include clinical experiences with actual patients; they might also include innovative teaching strategies that complement clinical experiences for entry into practice competency" (National Council of State Boards of Nursing, 2005). The NCSBN (2006) indicated that while there is limited research "addressing clinical experiences with actual patients, it is important to note that there are *no* studies of programs that have little or no clinical experiences" (National Council of State Boards of Nursing, 2006, p. 13). The NCSBN (2006) states that the role of a nurse is best learned by caring for actual patients while under the guidance of a qualified instructor. The NCSBN also indicates, "It was clear that simulation is an important complement to supervised clinical practice, but the simulation experts also stressed that simulation can never be used as a substitute for experiences with actual patients" (National Council of State Boards of Nursing, 2006, p. 14).

**National League for Nursing Accrediting Commission Guidelines Related to Simulation Use**

The NLNAC 2008 standards and criteria for Practical Nursing Programs indirectly address simulation use through the following criteria in Standard 4, Curriculum:

> 4.6 The curriculum and instructional processes reflect educational theory, interdisciplinary collaboration, research, and best practice standards while allowing for innovation, flexibility, and technological advances.

> 4.8 Practice learning environments are appropriate for student learning and support the achievement of student learning and program outcomes; current written agreements specify expectations for all parties and ensure the protection of students. (National League for Nursing, 2008, p. 96)

The simulation laboratory is a practice learning environment. As this dissertation indicates, much research has been conducted regarding simulation usage. Simulation mannequins are innovative and reflective of technological advances. Increased content mastery, critical thinking, and confidence acquisition are supported by many simulation-related research studies. As a result of the compatibility between simulation and clinical learning, one can apply these criteria to the simulated clinical experience as well as the traditional clinical setting.

## Theoretical Framework

### Active Learning

Traditionally, lecture has been used in the college classroom for a variety of reasons. Lecture typically requires less time, preparation, and materials and is more easily utilized for large classes (Bonwell & Eison, 1991). While the ease of using lecture is undisputed, Bonwell and Eison (1991) have questioned lecture's efficacy in promoting student comprehension and acquisition of content. They have suggested alternative teaching strategies for classroom use that may better prepare students, which fall under the umbrella title of active learning. Bonwell and Eison (1991) indicate that students must "read, write, discuss, or be engaged in solving problems. Most important, to be actively involved, students must engage in such higher-order thinking tasks as analysis, synthesis, and evaluation" (p. iii). They define active learning as "instructional activities involving students in doing things and thinking about what they are doing" (Bonwell & Eison, 1991, p. iii). Five characteristics of active learning strategies are described: students are

active participants rather than listeners, a greater emphasis is placed on student skills than information transmission, students perform higher-order thinking skills such as analysis, synthesis, and evaluation in the classroom, activities are utilized, and emphasis is placed on exploration of personal attitudes and values (Bonwell & Eison, 1991).

While lecture is still commonly utilized in nursing education, other activities such as simulation have come to the forefront of accepted and promoted educational techniques. Simulation exercises are frequently initiated with a case study. Information regarding the simulated patient is given to the individuals participating in the role play or simulated learning experience. This is similar to the active learning techniques described by Bonwell and Eison (1991) as "case studies" (p. 38) and "role playing, simulations, and games" (p.47). Case studies are based on realistic problems. "Case studies that incorporate role playing allow students to vicariously experience situations in the classroom that they might face in the future and thus help bridge the gap between theory and practice" (Bonwell & Eison, 1991, p. 39).

Simulations are different from role plays in that simulations include "guiding principles, specific rules, and structured relationships" (Bonwell & Eison, 1991, p. 47) and role plays are often more spontaneous. Students are actively involved in the simulation, or case study as Bonwell and Eison (1991) describe, utilizing the higher order thinking skills to determine the simulated patient's medical issues, assessment data, and nursing actions required. Other students may be observers of the scenario or be actively involved in the role of the family members. When "groups of students [are] working together in a structured process to solve an academic task," the term cooperative learning can be applied (Bonwell & Eison, 1991, p.43). Bonwell and Eison (1991) indicate that there are two goals of cooperative learning, which are "to enhance

students' learning and to develop students' social skills like decision making, conflict management, and communication" (p. 43).

Simulated scenarios can be a collaborative effort where a group of students work together to assess and address the simulated scenario. Some students are observers, who watch as the simulation unfolds. This relates to Bonwell and Eison's (1991) description of drama. The active learning process entitled drama can increase enthusiasm for the topic, increase student interaction, and can promote an instructor's ability to determine student understanding of content. At the conclusion of the scenario, typically there is a discussion based on what occurred and how the student may have chosen alternative actions, called debriefing. Bonwell and Eison (1991) term this process "discussion" (p. 24). They indicate that there are many active learning techniques that can serve as triggers to a good discussion, some of which are: case studies, drama, simulations, and role playing. The use of simulation in nursing education relates to several active learning strategies suggested by Bonwell and Eison (1991).

## Conclusion

Simulation has been widely used in military training. Nursing education has incorporated simulation into their educational delivery over the past 15 years. Research has supported increased content mastery, critical thinking, confidence attainment, and positive student perceptions related to simulation usage. Suggested disadvantages to simulation use are faculty and student anxiety, extensive faculty training, faculty time, cost, space, and potential faculty and administrator reluctance. The NCSBN as well as the NLNAC support some amount of simulation use; however, currently there are no best practice guidelines available to determine what amount of simulated clinical can replace traditional clinical. Simulation, supported by Bonwell and Eison's (1991) theoretical framework as a worthwhile educational technique,

needed to be investigated more thoroughly as an adjunct to or replacement of a portion of clinical. This research indicated the current state of simulation usage in Practical Nursing Programs across Pennsylvania. Administrators and faculty at Practical Nursing Programs in Pennsylvania were surveyed to determine their perceptions regarding the amount of time that simulated clinical can replace traditional clinical without altering clinical objectives. It is hoped that this research would help determine a best practice guideline.

# Chapter III

# PROCEDURE

The military has consistently implemented simulation into soldier training for centuries. More recently, other disciplines have begun implementing simulation into their training. Within the last 15 years, simulation has been integrated into the nursing curriculum as a result of the availability of simulation mannequins that can mimic patient responses. This technological advancement has allowed nursing education institutions to use simulation as an adjunct to classroom learning, skills lab training, and traditional clinical preparation.

The use of simulation mannequins has been extensively researched. Simulation has been used for training medical students, nursing students, military personnel, emergency responders, and anesthetists. Researchers have found multiple positive benefits associated with simulation use including: content mastery, favorable student perception, increased clinical judgment skills, and elevated confidence. Drawbacks to simulation use include: student and faculty anxiety, high cost, faculty reluctance to change, and the limited number of students who can be in a simulation experience at one time.

## Statement of the Problem

This study explored current simulation usage in Practical Nursing Programs across Pennsylvania as well as gathered administrator and faculty suggestions regarding the optimal amount of time that simulated clinical could replace traditional clinical, while still preparing Practical Nursing Students effectively. Simulation has been integrated into many nursing programs as part of the educational process; however, there is limited guidance on the maximum hours or percentage of time that should be used. Specifically, it was essential to have guidance

regarding what percentage of clinical time in a 1,500 clock hour Practical Nursing Program could be allocated to nursing simulation in place of traditional clinical.

## Research Questions

The questions addressed in this study were:

1. What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator?
2. What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year?
3. What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively?
4. What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program?
5. What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience?

## Population

The population for this study included all Practical Nursing Administrators and Faculty across the state of Pennsylvania. The population will only include individuals working in

Pennsylvania programs due to variances in State Board of Nursing educational program requirements between states.

**Research Setting**

Survey participants included Practical Nursing Administrators and Faculty working in Pennsylvania based Practical Nursing Programs. These individuals worked in a variety of schools including, but not limited to, private, vocational-technical schools, and community colleges. The type of institution that survey respondents were affiliated with was determined in the survey.

**Research Procedures**

Email addresses were gathered for Practical Nursing Administrators and Faculty across the state of Pennsylvania using the Internet, telephone contact, and electronic correspondence. All eligible individuals were sent an electronic survey through Qualtrics, a survey administration program. Non-responders received a reminder email one week after the survey launch. Continued non-responders received a second reminder email two weeks after the survey launch. The survey remained open for a four week period. This researcher encouraged institutional participation via the Pennsylvania Association of Practical Nursing Administrators (PAPNA) list-serve as well as verbally at the PAPNA Conference.

**Data Collection Instrument**

A survey instrument containing demographic data, current use data, and perceptual items was given to each eligible participant. The survey contained 18 questions; however, each respondent had a varying number of questions based upon their responses. The administrators had a maximum of 17 questions, and the faculty respondents had a maximum of 13 questions.

The survey solicited the participant's position, years in nursing education, age, site enrollment, type of parent institution, and location of the institution. The respondent was questioned regarding whether their educational program had a functioning simulation laboratory, and if so, they were asked how long it has been in place.

The administrator respondents were questioned if their educational program utilizes simulated clinical in place of an amount of traditional clinical time. The administrators were also asked the number of hours of combined clinical and classroom time, total clinical time, and clinical time that takes place in the simulation laboratory. If the administrator indicated a functioning simulation laboratory was present, they were questioned regarding the rationale for replacing an amount of traditional clinical with simulated clinical and if there was a specific individual responsible for the simulation laboratory such as a Simulation Specialist or Simulation Coordinator.

Next, both administrator and faculty respondents were asked if they taught in the simulation laboratory. If the respondent confirmed that they do teach in the simulation laboratory, the type of training that they had to operate the simulation equipment was gathered. Faculty members were asked to choose whether they welcome the challenges of teaching in the simulation laboratory, were reluctant to teach in the simulation laboratory but would do it if they were required to, or are not interested at all in teaching in the simulation laboratory. Administrators were asked the number and type of simulation mannequins their program currently uses.

Both administrators and faculty were given an example scenario for a Pennsylvania program with the capabilities to provide a simulation experience with a competent nurse educator, well-equipped simulation laboratory, and well-developed simulation scenarios in place.

Related to this example scenario, participants' perceptions were gathered regarding what amount of 900 traditional clinical hours can be replaced with simulated clinical learning in a 1,500 hour Practical Nursing Program. Lastly, the participants had an opportunity to share any comments or perceptions that they have regarding the replacement of a portion of traditional clinical with simulated clinical in an open-ended comment box.

Validity of this survey instrument was determined. A panel of judges including two nursing faculty members from a local university in Northwestern Pennsylvania was utilized to determine content validity. These educational experts examined the survey and determined the degree to which the items measure what is intended. They also rated questions and made suggestions for item alterations. Two pilot surveys were administered to out of state administrators and faculty; however, due to the limited number of responses, the power was too small to make decisions regarding the reliability of the survey items.

A sample of the survey is found in Appendix A. The Table 1 indicates which questionnaire items correspond to which research question:

Table 1

*A Comparison of Research Questions to Survey Items*

| Research question | Related survey items |
|---|---|
| 1. What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator? | 7, 8, 12, 13, 14,15, 16 |
| 2. What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year? | 9,10, 11 |
| 3. What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively? | 17 |
| 4. What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program? | 18 |
| 5. What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience? | 1, 2, 3, 4, 5, 6 |

Kruskal-Wallis and Mann-Whitney Tests were utilized to determine linkages between the nominal items and suggested hours of replacement of traditional clinical with simulated clinical using the SPSS quantitative data analysis system. Measures of central tendency including the

mean, median, and mode were used. The free response item was evaluated for themes using the Qualtrics qualitative data analysis system.

## Summary

A mixed method research design was utilized to determine the perceptions of Practical Nursing Program Administrators and Faculty regarding current and perceived maximum simulated clinical use in place of a portion of traditional clinical. Nominal, current, and perceptual data were gathered through electronic survey distribution to each Practical Nursing Program Administrator and Faculty Member in Pennsylvania. Responses were evaluated using the Kruskal-Wallis and Mann-Whitney tests to determine linkages between data items and suggested hour replacement of traditional clinical with simulated clinical using the SPSS quantitative data analysis system. Open-ended responses were evaluated for themes using the Qualtrics qualitative data analysis system.

# Chapter IV

# DATA AND ANALYSIS

Simulation has been researched extensively as a supplement to classroom and clinical learning, but its use as a replacement for traditional clinical experiences has not been adequately studied or quantified. This study was developed to determine the current simulation usage in Practical Nursing Programs in Pennsylvania as well as to determine perceptions of how much simulation can be utilized in place of traditional clinical experience and still prepare Practical Nursing Students effectively. Bonwell and Eison's (1991) Active Learning Theory was utilized as the theoretical framework for this research.

## Procedure

A survey was developed to address deficits in literature related to the use of simulation in place of a portion of traditional clinical. Survey questions were developed to address the following five research questions:

1. What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator?
2. What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year?
3. What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively?

4. What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program?
5. What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience?

Face validity of the survey was achieved with the utilization of two nursing faculty members at a local university located in Northwestern Pennsylvania, who reviewed the survey questions and made recommendations. Survey questions were clarified based on their feedback. Two pilot surveys were administered; however, due to the limited number of responses, the power was too small to make decisions regarding the reliability of the survey items.

Practical Nursing Administrators' and Faculty Members' email address were obtained for this study. Participants representing all Practical Nursing Programs in Pennsylvania were invited to take part in this study. A total of 309 potential respondents received the survey invitation, and 191 individuals participated by responding, representing a 61.8% response rate. The percentages of Practical Nursing Program positions were represented in the sample, 21% (n = 40) Directors of the Practical Nursing Program, 5% (n = 10) Assistant Administrators of the Practical Nursing Program, 48% (n = 92) Full-time Practical Nursing Faculty, 22% (n = 42) Part-time Practical Nursing Faculty, and 3% (n = 6) Temporary Practical Nursing Faculty. Data were gathered for a four week period and analyzed using the SPSS quantitative data analysis program and the NVivo qualitative data analysis program.

## Results

Results of the survey are discussed throughout this section according to their relation to the five specific research questions.

### Research Question Number 1

Research question number one asked: What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator?

In order to address this question without duplication of program responses, only the Directors of the Practical Nursing Programs' responses were analyzed. Of the 40 Directors of the Practical Nursing Programs who responded to this survey, 30 Directors (75%) indicated that their Practical Nursing Program has a functioning simulation laboratory with active student participation, and 10 Directors (25%) responded that they did not have a functioning simulation laboratory. Directors of the Practical Nursing Program, who affirmed the presence of a functioning simulation laboratory, were asked additional questions regarding the number of years that the functioning simulation laboratory has been in place as well as if they have a dedicated individual responsible for the simulation laboratory. The majority of the Directors of the Practical Nursing Program who have a simulation laboratory (46%, n = 12) responded that their simulation laboratory has been in place one to two years. Three to 4 years was chosen by 19% (n = 5) of the Directors, 5 to 6 years was chosen by 31% (n = 8) of the Directors, and one Director (4%) indicated that their simulation laboratory has been in place for 7 to 10 years.

A variety of mannequins are utilized in Pennsylvania's Practical Nursing Programs. In order to avoid duplication of individual program data, only the Directors of the Practical Nursing Programs were asked to detail the specific mannequins that their program owns. Sixty-two

mannequins are owned by the 35 respondents' programs. The mean number of mannequins across all Practical Nursing Programs in Pennsylvania is 1.77. Table 2 depicts the specific mannequins used throughout the Practical Nursing Programs in Pennsylvania.

Table 2

*Simulation Mannequins Owned by Pennsylvania Practical Nursing Programs*

| Mannequin | Number |
|---|---|
| Laerdal: Sim Man 3G | 2 |
| Laerdal: Sim Man Essential | 4 |
| Laerdal: Sim Man (Retired) | 5 |
| Laerdal: Sim Jr. | 1 |
| Laerdal: Sim Mom | 1 |
| Laerdal: Sim Baby | 2 |
| Laerdal: Sim NewB | 1 |
| Laerdal: ALS Simulator | 1 |
| Laerdal: Nursing Anne | 5 |
| Laerdal: Nursing Kelly | 1 |
| Laerdal: Nursing Kid | 2 |
| Laerdal: Nursing Baby | 2 |
| Laerdal: Newborn Anne | 2 |
| Laerdal: Patient Kelly | 1 |
| Gaumard: Noelle S575 Maternal and Neonatal Birthing Simulator with Newborn Hal | 1 |
| Gaumard: Noelle S554, 100 MOES (Mobile Obstetric Emergencies with Newborn Hal) | 1 |
| Gaumard: Noelle S550, 100 Maternal and Neonatal Birthing Simulator | 1 |
| Gaumard: Noelle S550/S551 Maternal and Neonatal Birthing Simulator | 1 |
| Gaumard: Hal S3000 | 2 |
| Gaumard: Susie S2000 | 2 |
| Gaumard: Pediatric Hal S3004 | 1 |
| Gaumard: Five year PEDI Simulator (Mike and Michelle) | 1 |
| Gaumard: One year Pediatric Care Simulator (Mike and Michelle) | 1 |
| Gaumard: Newborn PEDI simulator (Susie and Simon) | 1 |
| Gaumard: Susie Simon Patient Care Simulator with Ostomy | 1 |
| Gaumard: Super Chloe Patient Care Simulator | 1 |
| METI: METIman | 1 |

Table 2 (continued)

*Simulation Mannequins Owned by Pennsylvania Practical Nursing Programs*

| Mannequin | Number |
|---|---|
| Nasco: Patient Care Manikin | 1 |
| Life/form: Complete Nursing Skills Geri | 1 |
| Life/form: Basic Keri | 1 |
| I don't know the company/names of the full body mannequins owned by my school | 9 |
| Other | 6 |
| Total | 62 |

*Note*. N = 35 Director of Nursing Program respondents.

In order to obtain this data, Directors of the Practical Nursing Programs were asked to "Indicate the number of the following mannequins that your program owns (please include all campuses)." One respondent wrote that their program shares the laboratory with another program, so they do not completely own all of the materials listed. Another respondent indicated that they lease their mannequins from another school that owns them. The data indicated that 62 mannequins are owned, but it must be considered that additional mannequins above this count are being utilized due to the leasing and sharing of mannequins.

Based on the Directors of the Practical Nursing Program responses, 62% of the Practical Nursing Programs have a primary individual, often called a Simulation Specialist or a Simulation Coordinator, who assumes responsibility for the educational experiences that take place in the simulation laboratory. Respondents were asked if they teach in the simulation laboratory. Of these individuals, 63% (n = 98) affirmed that they teach in the simulation laboratory, and the other 37% (n = 57) do not. Ninety-two percent (n = 136) of the assistant administrator and faculty respondents chose the response "I welcome the challenges associated with this type of

nursing education," when asked "Please indicate which statement most closely reflects your feelings about teaching in a simulation laboratory." The other choices were "I am reluctant to teach in the area, but I would do it if I was required," which was chosen 5% of the time and "I am not interested at all in this type of teaching," which was chosen 3% of the time.

Simulation laboratory instructors were asked to relate all types of training that they received so that they could operate the simulation equipment. "Sales representative provided training" was an option chosen by 59% (n = 58) of the instructors. Interestingly, 58% (n = 57) of simulation laboratory instructors disclosed that they taught themselves. Conferences (45%; n = 44), online modules and courses (35%, n = 34); and books and journals (31%; n = 34) were also listed as training options that were utilized. In addition to these survey options, the instructors had the ability to choose "other" and explain additional ways that they learned how to operate the simulation equipment. Three commonly listed training modalities included training with another faculty member, training with the individual in charge of the simulation laboratory, and visitation of other schools' simulation laboratories.

Based on the information gathered, it is evident that approximately 75% of the programs surveyed have a functioning simulation laboratory with approximately two simulation mannequins. The majority (62%) of Practical Nursing Programs with a functioning simulation laboratory employ a Simulation Specialist/Simulation Coordinator. Approximately half of the respondents are relatively new to having a functioning simulation laboratory, reporting that their laboratory has been in place for one to two years. Approximately one-third of the respondents have had a simulation laboratory in place for five to six years. Future research is warranted on the number of mannequins that are leased or shared, which may provide an even more complete picture of the number of mannequins that are currently being utilized by Practical Nursing

Programs in Pennsylvania. Based on these results which indicated that functioning simulation laboratories are in place that may contain a Simulation Specialist or Simulation Coordinator, the null hypothesis for research question one was rejected.

**Research Question Number 2**

Research question number two asked: What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year?

It was determined that 69% (n = 18) of the responding programs use simulation in place of traditional clinical as compared to 31% (n = 8) that do not. Only Directors of the Practical Nursing Programs were asked questions regarding hour allocation within their Practical Nursing Programs to avoid duplication of program information. The survey questions that were asked included:

1. What is the total amount of clock hours in your program (classroom and clinical combined)?
2. How many clinical hours does your program have?
3. How many of your program's clinical hours (reported in the blank above) take place in the simulation laboratory?

There were a variety of answers to these three questions. Combined classroom and clinical hours ranged from 1,500 to 2,025 hours, with a mean of 1,563 hours. The minimum number of clock hours allowable in Pennsylvania Practical Nursing Programs is 1,500, and the maximum is not specified (Pennsylvania State Board of Nursing, 2003). Clinical hours ranged from 628 to 1,170 hours, with a mean of 828 hours.

Since Practical Nursing Programs have varying hour allotments in total hours, clinical hours, and simulation hours, this study was specifically designed to gather the percentage of clinical hours that are replaced by simulation. The reported hours that programs are replacing traditional clinical with simulation ranged from 0 to 420 hours. Percentages ranged from 0% to 100%, with the majority of percentages falling into the 4% to 17% range. The replacement median was 10%, and the mode was10%. The weighted average of clinical hours being replaced with simulated clinical hours was 14.97%. Table 3 depicts this information.

Table 3

*Total Classroom and Clinical Hours, Clinical Hours, Simulation Hours, and Percentage of Replacement of Clinical Hours with Simulation*

| Classroom and Clinical Hours Combined | Clinical Hours | Simulation Hours that Replace the Clinical Hours (in the second column) | Percentage of Replacement of Clinical Hours with Simulation |
|---|---|---|---|
| 2025 | 630 | 0 | 0 |
| 1540 | 883 | 7 | 1 |
| 1500 | 628 | 10 | 2 |
| 1635 | 998 | 36 | 4 |
| 1500 | 750 | 30 | 4 |
| 1575 | 867 | 43 | 5 |
| 1506 | 900 | 60 | 7 |
| 1500 | 825 | 60 | 7 |
| 1603 | 791 | 64 | 8 |
| 1545 | 771 | 70 | 9 |
| 1506 | 678 | 60 | 9 |
| 1540 | 663 | 63 | 10 |
| 1610 | 834 | 84 | 10 |
| 1575 | 958 | 100 | 10 |

Table 3 (continued)

*Total Classroom and Clinical Hours, Clinical Hours, Simulation Hours, and Percentage of Replacement of Clinical Hours with Simulation*

| Classroom and Clinical Hours Combined | Clinical Hours | Simulation Hours that Replace the Clinical Hours (in the second column) | Percentage of Replacement of Clinical Hours with Simulation |
|---|---|---|---|
| 1581 | 898 | 100 | 11 |
| 1505 | 764 | 84 | 11 |
| 1500 | 830 | 96 | 12 |
| 1670 | 974 | 140 | 14 |
| 1575 | 800 | 118 | 15 |
| 1500 | 900 | 150 | 17 |
| 1554 | 862 | 150 | 17 |
| 1525 | 777 | 260 | 33 |
| 1510 | 1170 | 420 | 36 |
| 1560 | 780 | 780 | 100 |
| 1500 | 844 | * | * |
| 1500 | 750 | * | * |

*Note.* *Incomplete data.

It was found that 14.97% of traditional clinical hours in Pennsylvania Practical Nursing Programs are being replaced with simulated clinical. In relation to the scenario offered in this survey, with 900 hours of clinical in a sample Practical Nursing Program, 15% replacement would equate to 135 hours. Practical Nursing Programs in Pennsylvania have replaced a portion of traditional clinical with simulated clinical, thus the null hypothesis for research question two was rejected.

## Research Question Number 3

Research question number three asked: What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively?

In order to answer this research question, survey respondents were given a hypothetical scenario, which was written as:

> Scenario: you work in a 1,500 clock hour Practical Nursing Program with 900 hours (60%) of instruction designated as clinical time and 600 hours (40%) as classroom time. An ideal simulated learning experience is available with the proper equipment (including a high-fidelity mannequin) and space, a trained specialist, technical support, a well-developed plan of training and evaluation in place, as well as a variety of developed fundamental, medical-surgical, pediatric, obstetric, and psychiatric scenarios. Please indicate the number of hours (of the total 900 clinical hours) that you think your Practical Nursing Students could spend in the simulation laboratory in place of traditional clinical in the healthcare setting.

All respondents were asked to provide a response to this question. Answers ranged from 0 to 900 hours. The average response was 178.6 hours, indicating that the average participant suggested that 19.8% of the 900 clinical hours could be spent in the simulation laboratory in place of traditional clinical in the healthcare setting. These results indicated that Administrators and Faculty members believe that a portion of clinical can be replaced; therefore, the null hypothesis for research question three was rejected.

## Research Question Number 4

Research question number four asked: What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program?

In order to answer this research question, all survey participants were asked "Please share additional comments or concerns that you have regarding replacing traditional clinical (in a healthcare facility) with an amount of simulated clinical (in a simulation laboratory) in the space provided below." A variety of responses were obtained. Using the NVivo qualitative data analysis system, responses were analyzed for themes. Initially, responses were separated into positive perceptions of simulation and concerns related to simulation. These nodes were further dissected and revealed additional themes.

### Supportive Themes Related to Simulation Usage

There were seven support themes identified related to simulation usage. They are:

1. Simulation should be used as a replacement of a portion of a program's clinical hours.
2. Simulation is a viable option for enhancing learning when a portion of traditional clinical is replaced with simulated clinical.
3. The use of simulation is beneficial in compensating for clinical site unavailability, lack of specialty unit experiences, as well as limitation in the availability of certain patient conditions or diseases.
4. The simulation laboratory is a non-threatening environment that promotes student learning by allowing students to make mistakes and learn from them without negative consequences to human life.

5. The simulation laboratory is a valuable place for students to gain pre-clinical practice and to improve their nursing skills.

6. Our nursing program is actively using simulation.

7. Simulation provides for an equal learning opportunity by allowing for an exact replication of patient and learning conditions for all students.

**Support theme one: Simulation should be used as a replacement of a portion of a program's clinical hours**. Some respondents indicated that they feel that a larger use of simulation in their nursing programs is warranted. One individual wrote:

> I do not believe that we are using simulation to its best level. There is still much resistance in using simulation, especially when it is thought that we are "taking away clinical time" rather than teaching clinical experiences in a different way. (anonymous, personal communication, n.d.)

Another respondent stated that with using patient simulators students can have an even better learning experience than they might receive in the traditional clinical setting.

Additionally, the intensity of the simulation laboratory experience was discussed by one respondent, who suggested that one hour of traditional clinical equates to three hours of simulated clinical. Another individual wrote "If all the above were available [a perfect simulation setting] I think our time could easily and productively be doubled" (anonymous, personal communication, n.d.).

Simulation assists with providing scenarios or situations that may be limited by clinical site availability or location. A comment supporting this is:

> In our rural community, I feel that simulation is vital to the clinical learning experience. Unfortunately our students cannot experience everything during clinical, however by

> acting out scenarios in simulation, they are taught the necessary skills to handle a situation that they would otherwise experience without an instructor. (anonymous, personal communication, n.d.)

Low frequency patient disorders, diverse patient conditions, emergency situations, pediatric and obstetric situations can be examined in the simulation laboratory. Additional comments were related to the refinement of skills and nursing actions that can be gained in the simulation setting.

**Support theme two: Simulation is a viable option for enhancing learning when a portion of traditional clinical is replaced with simulated clinical**. The learning benefits that are associated with the type of learning that takes place in the simulation laboratory were detailed by respondents. Improved critical thinking, elevated decision-making, and appropriate problem-solving were end results that were listed. Respondents additionally indicated that skill performance can be enhanced through repetitive practice, and remediation can be provided. Many respondents lauded the positive student behavioral end products of increased confidence and decreased anxiety. Additionally, student enjoyment of the simulated clinical experience was reported.

**Support theme three: The use of simulation is beneficial in compensating for clinical site unavailability, lack of specialty unit experiences, as well as limitation in the availability of certain patient conditions or diseases**. Many respondents indicated a difficulty in obtaining pediatric and obstetric clinical experiences for their Practical Nursing Students. Some of this difficulty is related to rural location, and other difficulties are related to other programs utilizing these sites. Clinical congestion and lack of patient diversity were additional reasons that simulation use is in place. Respondents indicated that simulated clinical can help to offset some of these educational barriers.

**Support theme four: The simulation laboratory is a non-threatening environment that promotes student learning by allowing students to make mistakes and learn from them without negative consequences to human life.** The simulation laboratory is a controlled environment. Based on this, many respondents indicated that the non-threatening environment of the simulation laboratory is a good modality to enhance nursing skills without the anxiety associated with potentially harming patients. Others indicated that student confidence is increased in the laboratory and helps to promote ease at clinical.

**Support theme five: The simulation laboratory is a valuable place for students to gain pre-clinical practice and to improve their nursing skills.** Many respondents suggested skill attainment and improvement occur in the simulation laboratory. It was also suggested by many respondents that utilizing the simulation laboratory to enhance skills prior to going to clinical may decrease student anxiety and increase student confidence at clinical. Communication, teamwork, injections, and emergency nursing care were skills that were specifically mentioned. One individual wrote:

> I believe sim lab training is (an) essential part of the practicum and it is beneficial for students to know exactly what they are doing prior to going in to a live setting, especially with the acuity of care. Sim-lab helps clinical instructors get through procedures more effectively with the students, which helps increase productivity. (anonymous, personal communication, n.d.)

**Support theme six: Our nursing program is actively using simulation.** There were multiple reports of current simulation use throughout the open-ended responses. Specifics related to the total percentage, the number of days, and the number of hours of simulation use

were given. More complete data related to current simulation usage of Pennsylvania's Practical Nursing Programs can be found in the narrative of research question number two.

**Support theme seven: Simulation provides for an equal learning opportunity by allowing for an exact replication of patient and learning conditions for all students.** Simulation's ability to replicate student learning scenarios for all students is valued by several respondents. One individual wrote "Simulation can be helpful to provide experiences that either may not be available in clinical or critical situation that may not occur in clinical consistently. In addition, it guarantees that all participants will have the same opportunities" (anonymous, personal communication, n.d.). This duplication of learning is not available in the traditional clinical model.

**Concerns Related to Simulation Usage**

There were four major themes identified related to respondents' concerns with replacing a portion of traditional clinical with simulated clinical. They are:

1. Simulation cannot equate to traditional clinical in providing hands-on real life clinical experiences.
2. Simulation laboratory usage has a variety of difficulties associated with its appropriate functioning.
3. Traditional clinical is the preferred method for training nursing students; however, simulation is acceptable if traditional clinical is unavailable.
4. Faculty support and participation are important to the success of simulation use in a nursing program.

**Concern theme 1: Simulation cannot equate to traditional clinical in providing hands-on real life clinical experiences.** The most endorsed concern theme was that traditional clinical should not be replaced with simulated clinical because students need interaction with living patients as well as practice communicating with staff, healthcare professionals, and ancillary departments. Many respondents believe that simulation cannot adequately mimic the interaction that takes place at the healthcare facilities. One respondent aptly wrote:

> No matter how realistic the situation is, in the back of the student's mind they know it's pretend. Absolutely nothing can take the place of a human being with emotions. I still recall how I reacted when my first patient died, and how my instructor helped me cope through the event. Our upcoming nurses are already lacking in human relations because the bulk of their daily contact is with technology. Nursing is more than skills and science. Compassion has been one of the most essential components. Too much simulation will produce a lot of scarecrows like the one in the Wizard of Oz. They won't have a heart. I truly believe this with all my heart. You see, I have traveled down the yellow brick road. (anonymous, personal communication, n.d.)

There was discussion regarding the need for students to learn in a real clinical setting that is not controlled as simulation experiences are. One respondent wrote:

> Patient care is planned, but not thought out. The patient provides the student with experiences that force the student to decide what to do based on the patient preferences which cannot be utilized in scenarios. Additionally, caring for an individual provides the experience of working with the imperfect, which is never the case with mannequins. So, even though I feel the student nurse can learn from simulation, the true learning happens

at the bedside of an individual who does not know the proper behaviors and speech. (anonymous, personal communication, n.d.)

**Concern theme 2: Simulation laboratory usage has a variety of difficulties associated with its appropriate functioning.** Respondents indicated that simulation laboratory usage has a variety of difficulties associated with its appropriate functioning including limited resources, budgetary restrictions, lack of preparatory time, extensive planning required, student scheduling difficulties, laboratory scheduling difficulties, and group size limitations. Managing student down time, making students comfortable, and maintaining the appropriate student seriousness in the simulation laboratory environment were also areas of concern.

**Concern theme 3: Traditional clinical is the preferred method for training nursing students; however, simulation is acceptable if traditional clinical is unavailable.** Many respondents indicated their preference for traditional clinical, but stated that simulation is a viable option with educational value should traditional clinical be unavailable. One individual wrote, "Although I like the Sim lab and the hands-on, ask questions as you go, method etc., I believe the student gets far more actual experience with a live patient, who can show human emotion and response to the student's care" (anonymous, personal communication, n.d.). Others indicated that while traditional clinical is preferred, limited clinical experiences caused by clinical site unavailability or limited pediatric experiences may be offset with simulation.

**Concern theme 4: Faculty support and participation are important to the success of simulation use in a nursing program.** Concerns related to the faculty aspect of a simulation laboratory were noted. "Availability of other staff to assist with roles in [a] scenario" was a limitation discussed by one respondent, who indicated that she is the only individual who can set up and administer the scenarios (anonymous, personal communication, n.d.). Appropriate

training for faculty was noted by respondents to be important. One individual indicated the importance of properly conducting debriefing sessions. Another respondent wrote:

> I believe that debriefing is the most difficult part of simulation to teach faculty. Faculty must be trained extensively on the debriefing portion of simulation. Faculty should NEVER be punitive, demeaning, or degrading during these experiences. Faculty should be honest but supportive of students so they are not so stressed during these experiences that they cannot think straight. (anonymous, personal communication, n.d.)

Additional comments were noted regarding faculty members who do not support simulation. One comment suggested that it was hard to comprehend why some clinical faculty members do not appreciate simulation because "simulation is a wonderful opportunity to place students in situations where they have to think on their feet and take responsibility/accountability for their actions or inaction" (anonymous, personal communication, n.d.). Another respondent wrote: "Lastly, I believe faculty that do not support simulation should not be permitted to do simulation. Their negative demeanors are picked up immediately by students. Thus, the simulation experience is devalued" (anonymous, personal communication, n.d.).

## Research Question Number 5

Research question number five asked: What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience?

In order to determine whether respondent demographic data or their institutional characteristics were related to a higher or lower hour allotment suggestion, nonparametric statistics were utilized. The Kruskal-Wallis Test was employed when there were three or more choices, and the Mann-Whitney Test was used when there were only two choices.

**Position**

The data were analyzed to determine if hour allotment suggestions were influenced by a person's position within the Practical Nursing Program. Assistant administrators (n = 10) had the highest mean rank (91.70), followed by full-time faculty members (n = 87) with a mean rank of 91.32. Directors of the Practical Nursing Programs (n = 34) had a mean rank of 83.78. The two lowest mean ranks came from temporary Practical Nursing Faculty Members (n = 4) with a mean rank of 78.00 and part-time faculty members (n = 4) with a mean rank of 77.18. The comparison between position and the respondent's suggested hours of replacement of traditional clinical with simulated clinical was not significant ($H(2) = 2.465$, $p = 0.657$). This information is summarized in Table 4:

Table 4

*Current Position as Compared to the Suggested Number of Simulation Hours in a 1,500 Hour Practical Nursing Program with 900 Hours of Clinical*

| Reported Current Position | N | Mean Rank |
|---|---|---|
| Director of the Practical Nursing Program | 34 | 83.78 |
| Assistant Administrator of the Practical Nursing Program | 10 | 91.70 |
| Full-Time Practical Nursing Faculty | 87 | 91.32 |
| Part-Time Practical Nursing Faculty | 37 | 77.18 |
| Temporary Practical Nursing Faculty | 4 | 78.00 |
| Total | 172 | |

*Note.* Chi-Square 2.465, Significance 0.651.

**Years in Nursing Education**

Respondents were asked to indicate how many years that they have been in nursing education. Their responses were compared to the suggested number of hours that traditional

clinical could be replaced with simulated clinical in a 1,500 hour program with 900 hours of clinical time. Respondents with 6 to 10 years of nursing education background (n = 44) responded with the highest suggested simulation hour replacement with a mean rank of 93.82, followed by those with 11 or more years (n = 63) with a mean rank of 88.26, those with 0 to 2 years (n = 21) with a mean rank of 85.86, and those with 3 to 5 years (n = 44) with a mean rank of 76.97. While their data did indicate suggested simulation hour replacements at different levels, the differences between groups were not significant utilizing the Kruskal-Wallis Test ($H(2) = 2.673$, $p = 0.445$).

**Age**

Respondents were asked to report their age within 10 year increments. Their responses to this question were evaluated with their suggested number of 900 clinical hours that can be replaced with simulated clinical in order to determine if an individual's age was related to clinical hour replacement suggestions. Individuals in the 20-30 year age group had the highest mean rank (101.17) followed by the remaining age groups of 51-60 years (89.39), 31-40 years (86.07), 41-50 years (83.38), and 61 or more years (81.21) respectively. Utilizing the Kruskal-Wallis Test, there were not significant differences in the suggested clinical hour replacement with simulation between the different age groups ($H(2) = 0.995$; $p = 0.910$).

**Enrollment**

Program enrollment was gathered using 9 different ranges in groups that varied by 25 students in order to determine if there were differences between programs with a higher student enrollment and those with a lower student enrollment. There were 172 responses to this question, with at least 5 individual responses included in each section. There were not significant differences between the nine categories of enrollment ($H(2) = 10.830$; $p = 0.212$).

**Institution Type**

There were four categories of a nursing program's parent institution type that could be chosen including community college, private college, vocational-technical school, and other. Responses to "other" included the following types of schools: hospital (n = 4), university (n = 4), private (n = 4), business school (n = 1), union-supported training school (n = 1), non-profit organization (n = 1), career college (n = 1), and public high school (n = 1). The type of program was compared to the individual respondent's suggested amount of simulation hours that could replace the 900 clinical hours in a given scenario. Using the Kruskal Wallis Test, a significant difference was found ($H(2) = 12.957$; $p = .005$). Vocational-technical schools had the highest mean rank (94.09) followed by community college respondents (81.19), private college respondents (62.11), and "other" institution respondents (52.25) respectively.

Table 5

*Program's Parent Institution Type as Compared to the Suggested Number of Simulation Hours in a 1,500 Hour Practical Nursing Program with 900 Hours of Clinical*

| Program's Parent Institution Type | N | Mean Rank |
|---|---|---|
| Community College | 27 | 81.19 |
| Private College | 9 | 62.11 |
| Vocational – Technical School | 120 | 94.09 |
| Other – Please Specify | 16 | 52.25 |
| Total | 172 | |

*Note.* $H(2) = 12.957$, $p = .005$.

**Nursing Program Location**

The survey gathered data from the respondents regarding whether their school is located in a rural area, suburban area (surrounding the inner city), or urban (inner city) area. Of the

respondents, 73 were from a rural area, 81 were from a suburban area, and 18 were from an urban area. There were not any significant differences between the nursing program location and the suggested replacement of traditional clinical with simulated clinical hour suggestions using the Kruskal Wallis Test ($H(2) = .193$; $p= 0.908$).

**Functioning Simulation Laboratory**

Respondents were questioned if they have a functioning simulation laboratory. Of the total 172 respondents for this question, 145 affirmed that their program has a functioning simulation laboratory with active student participation, and 27 respondents' programs did not. Using the Mann-Whitney test, there was not a significant correlation present ($U = 1952.500$; $p = 0.983$) between the programs that currently use simulation and those that do not when compared to the suggested clinical hour replacement with simulation hours responses.

**Simulation Laboratory Years of Use**

It was questioned whether the number of years that a nursing program has been utilizing a simulation laboratory would correspond to higher or lower hour suggestions of replacing traditional clinical with simulated clinical. There was a significant difference found between the varying year ranges ($H(2) = 11.399$; $p = 0.022$). Those who have had a functioning simulation laboratory for 7 to 10 years ($n = 12$) had the highest mean rank of 102.13, followed by those with a functioning simulation laboratory for more than 10 years ($n = 6$) with a mean rank of 80.83. Additionally respondents who were in the five to six years response range ($n = 42$) had a mean rank of 80.69, those in the one to two years response range ($n = 35$) had a mean rank of 68.19, and those in the three to four years response range had a mean rank of 61.98.

Table 6

*Number of Years Program has had a Functioning Simulation Laboratory*

| How Many Years has Your Program had a Functioning Simulation Laboratory | N | Mean Rank |
|---|---|---|
| 1 – 2 Years | 35 | 68.19 |
| 3 – 4 Years | 50 | 61.98 |
| 5 – 6 Years | 42 | 80.69 |
| 7 – 10 Years | 12 | 102.13 |
| More then 10 Years | 6 | 80.83 |
| Total | 145 | |

*Note.* H(2) = 11.399, P = 0.022.

**Use of Simulation in Place of Traditional Clinical**

Individuals who responded that they were the Director of their Practical Nursing Program were questioned whether their nursing program currently uses simulation in place of traditional clinical. Of those respondents who answered this question (n = 24), 17 individuals answered affirmatively that their program currently uses simulation in place of traditional clinical, and 7 individuals indicated that their program currently does not. There was not a significance between these two groups (U = 46.000; p = .390) in the suggested replacement of traditional clinical hours with simulated clinical hours.

**Simulation Educators**

It was questioned whether educators who teach in the simulation laboratory would have a higher hour replacement suggestion of replacing traditional clinical with simulation than those who do not teach simulation. One hundred forty-five faculty members responded to this questions, and of those, 93 responded that they teach in the simulation laboratory, and 52 responded that they do not. Using the Mann-Whitney Test, it was determined that there was not

a significant difference (U = 2149.500; p = 0.266) between whether the faculty member teaches in the simulation laboratory and their suggested replacement of traditional clinical hours with simulated clinical hours.

**Rationale for Simulation Use in Practical Nursing Programs**

As discussed in Chapter II, there are multiple reasons that programs have utilized simulation within their nursing programs. These reasons were summarized and placed in a question format on the survey that directors of Practical Nursing Programs received. Eighteen directors responded to this question. The most commonly chosen reason for simulation use is "Simulation use in nursing education has been supported as a valuable learning tool." The second most commonly chosen response was "Simulation increases student exposure to a variety of medical/surgical conditions." Additionally, "Simulation provides student experience in caring for patients with complex diseases" and "Practical Nursing Students can care for emergency situations that are often prevented in the clinical setting," were chosen with a higher percentage. See Table 7 for additional information.

Table 7

*Director of Practical Nursing Program's Rationales for Simulation Use*

| Responses | Number | Percentage |
|---|---|---|
| Other educational institutions are using the clinical sites that we previously used. | 7 | 39 |
| Simulation use in nursing education has been supported as a valuable learning tool. | 17 | 94 |
| Simulation decreases the size of our clinical groups. | 11 | 61 |
| Simulation offsets the decreased length of hospital stays. | 4 | 22 |
| Simulation provides student experience in caring for patients with complex diseases. | 12 | 67 |
| There are a decreased number of pediatric admissions at the local healthcare facilities. | 8 | 44 |
| Practical nursing students are not allowed to complete certain invasive procedures at the healthcare facilities that they can complete in the simulation laboratory. | 9 | 50 |
| Simulation increases student exposure to a variety of medical/surgical conditions. | 13 | 72 |
| Practical nursing students can care for emergency situations that are often prevented in the clinical setting. | 12 | 67 |
| There are a limited number of births at the local healthcare facilities. | 5 | 28 |
| Disaster preparedness can be taught. | 1 | 6 |
| Other (please explain) | 3 | 17 |

*Note.* N = 18 respondents.

## Summary

There has been a significant amount of research regarding simulation; however, there is limited research available regarding the replacement of traditional clinical with simulated clinical. This study was designed to help bridge this gap in the literature and determine the current use of simulation as well as the suggested use of simulation from administrators and faculty members in Practical Nursing Programs in Pennsylvania. Bonwell and Eison's (1991) Active Learning Theory was utilized as the theoretical framework for this study.

This study included an 18-item questionnaire that was distributed to 309 representatives from all of the Practical Nursing Programs in Pennsylvania. Display and Skip Logic were used to display questions for appropriate populations. Websites, email correspondence, and telephone calls were utilized to gain the contact information of the respondents. Pennsylvania's Practical Nursing Administrators and Faculty were included in the electronic survey distribution. The survey was distributed for a four-week period via the Qualtrics Survey Distribution system. Results were analyzed using the SPSS quantitative analysis system and the NVivo qualitative analysis system.

The amount of simulation use within Pennsylvania's Practical Nursing Programs was previously unknown. The data gathered through this survey have provided insight on current and potential simulation use. The research findings indicate that 75% of the programs surveyed have a functioning simulation laboratory with approximately two simulation mannequins. The majority (62%) of Practical Nursing Programs with a functioning simulation laboratory employ a Simulation Specialist/Simulation Coordinator. Approximately half of the respondents are relatively new to having a functioning simulation laboratory, reporting that their laboratory has been in place for one to two years. Approximately one-third of the respondents have had a simulation laboratory in place for five to six years. The data indicated that 69% of Pennsylvania's Practical Nursing Programs, who responded to this survey, replace a portion of traditional clinical with simulation. There are extensive variations between programs regarding the total program hours, number of clinical hours, and the number simulation hours that replace clinical. Based on the weighted average of the Directors of Pennsylvania's Practical Nursing Programs' survey responses, 14.97% of traditional clinical is being replaced with simulated

clinical. Administrator and faculty responses to a hypothetical scenario in this study suggest that an average of 19.8% of the traditional hours can be replaced with simulation.

There were 98 individuals who indicated that they teach in the simulation laboratory. They were asked to choose the modalities of training that they received so that they could operate the simulation equipment. Sales representatives and self-teaching were the most commonly chosen responses. Conferences, online modules and courses; and books and journals were also listed as training options that were utilized. In addition, the instructors had the ability to choose "other" and explain additional ways that they learned how to operate the simulation equipment. As a result of this, three commonly listed training modalities were noted including training with another faculty member, training with the individual in charge of the simulation laboratory, and visitation of other schools' simulation laboratories.

Respondents had the ability to relate comments and concerns regarding simulation. Seven supportive themes were identified, which included the concepts of supporting the use of simulation, learning with simulation as a viable option, assisting with clinical site unavailability, alleviating a lack of patient experiences or complex medical conditions on the clinical units, promoting a non-threatening environment where mistakes can be made, procuring student preparation for clinical and the practicing of skills, and allowing for the duplication of learning opportunities for all students. An additional theme included comments related to the survey respondents' current simulation use.

Four concern themes related to the replacement of traditional clinical with simulated clinical were identified. One group of responses indicated that there are a portion of administrators and faculty members, who feel that traditional clinical should never be replaced with simulated clinical. There are others who feel that the traditional clinical learning method is

preferred over simulated clinical; however simulated clinical is a viable option if the need arises due to the lack of clinical site unavailability or congestion. Other responses indicated that the respondents feel that faculty support and participation are critical to the success of the simulation laboratory. Additionally, a variety of logistical difficulties related to the scheduling, allocating of resources, and functioning of the simulation laboratory were discussed.

Demographic information was gained from respondents in order to determine if these variables were related to a higher or lower suggestion of traditional clinical hours that could be replaced with simulation hours. The variables of position, years in nursing education, age, enrollment, and nursing program location were not significant when compared with the respondents' suggested simulation hours. The program type variable did reveal a significant difference ($p = .005$) in simulation hour suggestions.

Simulation information was gained from respondents. The variables including whether the respondents' program had a functioning simulation laboratory, whether they currently utilized simulation in place of an amount of traditional clinical, and whether they were a simulation instructor did not have significant correlations with their suggested number of simulation hours that could replace traditional clinical. The number of years that the respondents' simulation laboratory has been in place did significantly ($p = 0.022$) correlate to the suggested hour allotment of simulation hours that could replace traditional clinical hours.

# Chapter V

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

Mannequins that could breathe, talk, and mimic patients had their birth into nursing education in the 1990s (Nagle et al., 2009). Since then, simulation has increasingly been researched and incorporated into nursing education. The benefits of content mastery (Alinier et al., 2006; Frost, Cavalcanti, & Toubassi, 2011), critical thinking (Decker, 2009; Kuznar, 2009), confidence (Bambini, Washburn, & Perkins, 2009; Bye, 2008; Frost, Cavalcanti, & Toubassi, 2011), and positive student perception (Childs & Sepples, 2006; Lewis & Ciak, 2011; Mass & Flood, 2010; Partin, Payne, & Slemmons, 2011) have been supported with research.

While the benefits of simulation have been well documented, there is a scarcity of data regarding what the best amount of simulation to use is. The National Council of State Boards of Nursing as well as the National League for Nursing Accrediting Commission do not have specifications on the maximum allowable amount of simulation that can replace traditional clinical; therefore, it was important to develop a guideline for Practical Nursing Programs to use. It was the intent of this research to gather information regarding current simulation use and perceived maximum suggested simulation use so that Pennsylvania Practical Nursing Programs can make optimal decisions regarding the substitution of traditional clinical with an appropriate amount of simulated clinical based on administrator and faculty recommendations.

## Sample

The sample included the directors, assistant administrators, and faculty members of Practical Nursing Programs in Pennsylvania. A maximum effort was made to locate the names and email addresses of all directors, assistant administrators, and faculty members representing Pennsylvania's Practical Nursing Programs. The survey was emailed to 347 individuals. There

were 38 surveys that were undeliverable; therefore, 309 individuals had the ability to participate in the survey. There were 191 respondents to the survey, which equated to a 61.4% response rate.

### Validity

Face validity of the survey was accomplished with the utilization of two nursing faculty members at a local university in Northwestern Pennsylvania. These faculty members reviewed the survey and made suggestions. Survey questions were modified based on their recommendations.

### Pilot Reliability

Two pilot survey administrations were launched. One pilot survey was emailed to Practical Nursing Program Administrators and Faculty in New York, and the other was emailed to Practical Nursing Program Administrators and Faculty in Ohio. Both pilots were unsuccessful due to poor response. The power was too small to draw conclusions from.

### Data Collection

An 18-item survey was distributed to survey recipients. The amount of questions that each individual received varied based on Skip and Display Logic. Directors of Practical Nursing Programs were targeted for specific questions as were faculty members. The survey was emailed through the Qualtrics survey distribution system. The SPSS data analysis system and the NVivo qualitative data analysis systems were used to interpret the data. Measures of central tendency and non-parametric statistics were utilized. Narrative data were analyzed for themes.

## Research Questions

The survey was developed to address the following research questions:

1. What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator?
2. What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year?
3. What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively?
4. What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program?
5. What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience?

**Analysis of Data**

Research Question 1: What is the percentage of Practical Nursing Programs in Pennsylvania that have a functioning simulation laboratory which includes simulation mannequins and may include a trained Simulation Specialist/Simulation Coordinator?

Findings: The examination of data revealed that 75% of Practical Nursing Programs in Pennsylvania have a functioning simulation laboratory in place. Many of these programs (62%) utilize a Simulation Specialist/Simulation Coordinator to orchestrate activities within the simulation laboratory. Director of Practical Nursing Program responses revealed the mean

number of mannequins in the average Practical Nursing Program in Pennsylvania to be 1.77. The majority of simulation laboratories in Pennsylvania's Practical Nursing Programs have been in place for one to two years (46%, n = 12). Other simulation laboratories have been in place for 3 to 4 years (19%, n = 5), 5 to 6 years (31%, n = 8), and 7 to 10 years (4%, n = 1).

There were 98 individuals who indicated that they instruct in the simulation laboratory. These individuals were asked to relate all types of training that they received so that they could operate the simulation equipment. The option "Sales representative provided training" was chosen by 59% (n = 58) of the instructors, and 58% (n = 57) of instructors disclosed that they taught themselves. Conferences (45%; n = 44), online modules and courses (35%, n = 34); and books and journals (31%; n = 34) were listed as training options that were utilized. In addition, the instructors had the ability to choose "other" and explain additional ways that they learned how to operate the simulation equipment. Three commonly listed training modalities included training with another faculty member, training with the individual in charge of the simulation laboratory, and visitation of other schools' simulation laboratories.

Research Question 2: What is the average amount of time that Practical Nursing Programs in Pennsylvania currently dedicate to simulated clinical experiences in place of traditional clinical experiences per program year?

Findings: Utilizing the Directors of the Practical Nursing Programs' responses, 69% (n = 18) of the Practical Nursing Programs in Pennsylvania are using simulation in place of traditional clinical as compared to 31% (n = 8) that do not. There are extensive variations between the total number of hours, number of clinical hours, and the amount of simulation that is used in place of traditional clinical in Pennsylvania's Practical Nursing Programs. Total program hours ranged from 1,500 hours to 2,205 hours, with a mean of 1,563 hours. Clinical hours ranged from 628

hours to 1,170 hours, with a mean of 828 hours. Simulation hours that are employed in place of clinical hours ranged from 0 to 428 hours. Due to the varying differences between Pennsylvania programs' total and clinical hours, a percentage of replacement was formulated. The most commonly reported replacement percentages fell between 4% and 17%; however, the percentages ranged from 0% to 100%. The weighted average of traditional clinical that is currently being replaced with simulated clinical was found to be 14.97%.

Research Question 3: What is the maximum amount of simulated clinical experiences that Practical Nursing Administrators and Faculty in Pennsylvania believe could be substituted for traditional clinical experiences and still prepare nursing students effectively?

Findings: A hypothetical scenario was posed to the respondents, which was written as:

> Scenario: you work in a 1,500 clock hour Practical Nursing Program with 900 hours (60%) of instruction designated as clinical time and 600 hours (40%) as classroom time. An ideal simulated learning experience is available with the proper equipment (including a high-fidelity mannequin) and space, a trained specialist, technical support, a well-developed plan of training and evaluation in place, as well as a variety of developed fundamental, medical-surgical, pediatric, obstetric, and psychiatric scenarios. Please indicate the number of hours (of the total 900 clinical hours) that you think your Practical Nursing Students could spend in the simulation laboratory in place of traditional clinical in the healthcare setting.

Answers ranged from 0 to 900 hours, with an average response of 178.6 hours. The calculated percentage suggests that the average respondent believes that 19.8% of the 900 clinical hours could be spent in the simulation laboratory in place of traditional clinical in the healthcare setting.

Research Question 4: What are the Practical Nursing Administrators' and Faculty's perceptions regarding the use of simulated clinical experiences in place of an amount of traditional clinical experiences in a Practical Nursing Program?

Findings: Survey respondents were given at opportunity to share any comments or concerns regarding the substitution of a portion of traditional clinical with simulated clinical. Responses were analyzed using the NVivo qualitative data analysis system. The comments were separated into supportive and concern themes.

**Supportive Themes Related to Simulation Usage**

There were seven support themes identified related to simulation usage. They are:

1. Simulation should be used as a replacement of a portion of a program's clinical hours.
2. Simulation is a viable option for enhancing learning when a portion of traditional clinical is replaced with simulated clinical.
3. The use of simulation is beneficial in compensating for clinical site unavailability, lack of specialty unit experiences, as well as limitation in the availability of certain patient conditions or diseases.
4. The simulation laboratory is a non-threatening environment that promotes student learning by allowing students to make mistakes and learn from them without negative consequences to human life.
5. The simulation laboratory is a valuable place for students to gain pre-clinical practice and to improve their nursing skills.
6. Our nursing program is actively using simulation.
7. Simulation provides for an equal learning opportunity by allowing for an exact replication of patient and learning conditions for all students.

**Concern Themes Related to Simulation Usage**

There were four major themes identified related to respondents' concerns with replacing a portion of traditional clinical with simulated clinical. They are as follows:

1. Simulation cannot equate to traditional clinical in providing hands-on real life clinical experiences.
2. Simulation laboratory usage has a variety of difficulties associated with its appropriate functioning.
3. Traditional clinical is the preferred method for training nursing students; however, simulation is acceptable if traditional clinical is unavailable.
4. Faculty support and participation are important to the success of simulation use in a nursing program.

Research Question 5: What demographic characteristics of the respondents or institutional characteristics are related to higher or lower hour allotment suggestions of simulated clinical use in place of an amount of traditional clinical experience?

Findings: It was thought that certain individuals might suggest higher or lower hour traditional clinical replacement based on their age, position, years in nursing education, program enrollment, program type or nursing program location. Demographic information was gained from respondents in order to determine if these variables were in fact related to a higher or lower suggestion of traditional clinical hours that could be replaced with simulation hours. The variables of position, years in nursing education, age, enrollment, and nursing program location were not significant when compared with the respondents suggested simulation hours.

The program type variable revealed a significant difference ($p = .005$) in replacement of traditional clinical with simulation clinical hour suggestions. Vocational-technical schools had

the highest mean rank (94.09) followed by community college respondents (81.19), private college respondents (62.11), and "other" institution respondents (52.25) respectively. Responses to "other" included the following types of schools: hospital (n = 4), university (n = 4), private (n = 4), business school (n = 1), union-supported training school (n = 1), non-profit organization (n = 1), career college (n = 1), and public high school (n = 1).

Table 8

*Demographic Variables as Related to the Suggested Number of Hours that Traditional Clinical can be Replaced with Simulated Clinical in a 1,500 Hour Program with 900 Clinical Hours*

| Variable | Significance Level | Significant/Not Significant |
|---|---|---|
| Position | P = 0.657 | Not Significant |
| Years in Nursing Education | P = 0.445 | Not Significant |
| Age | P = 0.910 | Not Significant |
| Enrollment | P = 0.212 | Not Significant |
| Program Type | P = 0.005 | Significant |
| Nursing Program Location | P = 0.908 | Not Significant |

Simulation information was also requested from respondents. The variables including whether the respondents' program had a functioning simulation laboratory, whether they currently utilized simulation in place of an amount of traditional clinical, and whether they were a simulation instructor did not have significant correlations with their suggested number of simulation hours that could replace traditional clinical.

The number of years that the respondent's simulation laboratory has been in place significantly correlated (p = 0.022) to the suggested hour allotment of simulation hours that could replace traditional clinical hours. The respondents with a functioning simulation laboratory for 7 to 10 years (n = 12) had a mean rank of 102.13, followed by those with a functioning

simulation laboratory for more than 10 years (n = 6) with a mean rank of 80.83. Additionally respondents who were in the five to six years response range (n = 42) had a mean rank of 80.69, those in the one to two years response range (n = 35) had a mean rank of 68.19, and those in the three to four years response range had a mean rank of 61.98.

Table 9

*Program Simulation Variables as Related to the Suggested Number of Hours that Traditional Clinical can be Replaced with Simulated Clinical in a 1,500 Hour Program with 900 Clinical Hours*

| Variable | Significance Level | Significant/Not Significant |
|---|---|---|
| Functioning Simulation Laboratory | P = 0.983 | Not Significant |
| Simulation Laboratory's Years of Use | P = 0.022 | Significant |
| Current Use of Simulation in Place of Traditional Clinical | P = 0.390 | Not Significant |
| Whether the Respondent is a Simulation Instructor | P = 0.266 | Not Significant |

## Discussion

Administrators, assistant administrators, and faculty members of Pennsylvania's Practical Nursing Programs have provided valuable information regarding their current and suggested amount of simulation use. Seventy-five percent of Practical Nursing Programs have a functioning simulation laboratory, and 62% of these programs have a Simulation Laboratory Coordinator or Specialist. Katz, Peifer, and Armstrong (2010), similarly found that 78.9% of the baccalaureate nursing programs that they surveyed used simulation in their programs.

Based on the directors' of the Practical Nursing Programs responses, 69% of Practical Nursing Programs in Pennsylvania replace a portion of traditional clinical with simulated clinical. This is a much higher percentage than the 30% that baccalaureate respondents in Katz et al.'s (2010) survey reported. The average Pennsylvania Practical Nursing Program is replacing 14.97% of their clinical hours with simulation. Katz et al. (2010) indicated that the amount of time that simulation replaced clinical was noted in the open-ended question section of their survey form. The data they obtained were inadequate to reliably calculate the mean number of hours that baccalaureate programs are replacing clinical with simulation. There were no other studies located that analyzed the portion of traditional clinical time that can be replaced with simulated clinical. Qualitative administrator and faculty responses indicated that several individuals think the amount of simulation that is currently used in their particular program could easily be increased.

Multiple learning benefits related to simulation use were included in the Practical Nursing Administrators' and Faculty Members' qualitative comments of this research. Content mastery has been supported by many researchers (Alinier, Hunt, Gordon, & Harwood, 2006; Bux, 2009; Frost, Cavalcanti, & Toubassi, 2011; Lewis & Ciak, 2011; Linden, 2008). The qualitative comments in this survey concurred that Practical Nursing Program Administrators and Faculty perceive simulation to enhance learning. Critical thinking has been suggested as a benefit by researchers; however research often does not reach statistical significance to support its acquisition (Decker, 2007; Lewis & Ciak, 2011). Critical thinking was suggested as an end result of simulation by Pennsylvania Practical Nursing Program Administrators and Faculty. Partin, Payne, and Slemmons (2011) found the themes from student responses in their research included "nonthreatening environment, enhancement of learning, and feeling prepared to

practice" (p.187). These themes were congruent with the themes gained from Pennsylvania Practical Nursing Administrator and Faculty responses in this study. The acquisition of confidence in simulation experiences has been researched extensively with mostly favorable results (Bambini, Washburn, & Perkins, 2009; Frost, Cavalcanti, & Toubassi, 2011; Lewis & Ciak, 2011); however there were some data available that did not support increased confidence (Alinier et al., 2006; Li, Hicks, & Bosek, 2008). Practical Nursing Administrators, Assistant Administrators, and Faculty respondents in this study indicated that they believe that student confidence was elevated by having educational experiences in the simulation laboratory. Jarzemky and McGrath (2008) indicated that students who had simulation experiences using a low-fidelity mannequin had significantly higher self-assessments of skill performance than those without simulation. Farina's (2008) research detailed positive faculty perceptions of simulation as a non-threatening environment that provides safe practice for students without the potential to harm clients. Skill attainment was a qualitative theme associated with simulation use in this study as well. Respondents to this survey also indicated that simulation provides the ability to duplicate patient scenarios and provided for student practice in a safe environment that allows for student mistakes.

The average respondent supported that 19.8% of clinical time can be replaced with simulation. Based on these responses, there is an indication that an average program with 14.97% replacement of traditional clinical with simulated clinical, could increase the amount of time that their Practical Nursing students spend in the simulation laboratory. No other research was available indicating a percentage of traditional clinical that could be replaced with simulated clinical.

While the quantitative and qualitative data suggested increasing the amount of time that the average Practical Nursing Program spends in the simulation laboratory might be warranted, other qualitative themes revealed that many respondents do not believe that traditional clinical should be replaced with simulation. Some respondents believe that it is acceptable to replace a portion of traditional clinical with simulation provided that there is a deficit of clinical sites or patients with complex diseases. This is congruent with prior research indicating that hospital and community settings are overwhelmed with large numbers of nursing students on assigned clinical days (Campbell & Daley, 2009; Giddens et al., 2008). Pediatric inpatient stays have decreased, which makes the pediatric nursing experience difficult to obtain (Suplee & Solecki, 2010). Obstetric experiences have also been supplemented with simulation (Bantz et al., 2007; Robertson, 2006).

It was questioned whether specific respondent demographic data would correlate with higher or lower suggested hour allocations for replacement of traditional clinical with simulated clinical. It was found that only the Practical Nursing Program type and the number of years that a simulation laboratory has been functioning significantly correlated with suggested hours. Position, years in nursing education, age, enrollment, nursing program location did not significantly correlate. Surprisingly, there was not a correlation between the respondents from programs with functioning simulation laboratories versus those respondents from programs without functioning simulation laboratories when contrasting suggested hours of replacement of traditional clinical replacement hours with simulation. It was thought that respondents from programs that already possess a functioning simulation laboratory would suggest higher hours of replacement of traditional clinical with simulated clinical; however, that hypothesis was not supported. Additionally, there was not a significant correlation between the programs that

already replace a portion of their clinical time with simulation and those that do not with their suggested replacement hours. Simulation educators did not correlate with a significantly higher number of suggested hours than their counterparts, who do not teach in the simulation laboratory. No previous research was available linking administrator and faculty demographic data to perception of simulation use.

An average of 1.77 mannequins per Pennsylvania Practical Nursing Program are owned. Acquisition of the high cost items, such as mannequins, was suggested as being difficult for programs in the qualitative comments gathered by this research. This economic hardship was collaborated by prior research by Bremner, Aduddell, Bennett, and VanGeest (2006). Additionally, scheduling difficulties, group size, preparatory time, and faculty support and participation are also listed as simulation coordination concerns in this study. This sentiment was echoed in Bremner et al.'s (2006) research. Even with these concerns at hand, many respondents extolled the learning that can be enhanced with simulation usage, the non-threatening environment of the simulation laboratory, the ability to provide pre-clinical experience, the ability to practice skills, and the opportunity to provide learners with duplicate learning scenarios.

Survey respondents overwhelmingly welcomed the challenges associated with teaching using the simulation modality. Dillard, Sideras, Ryan, Carlton, Lasater, and Siktberg (2009) also found faculty excitement with simulation. Additionally, there is research available that indicates faculty reluctance with using simulation (Farina, 2008;Tuoriniemi & Schott-Baer, 2008). The data gathered through this survey indicated that only 5% of respondents were reluctant to teach in the simulation laboratory and 3% of respondents were not interested at all in teaching in the

simulation laboratory. This data is incongruent with the prior research by Farina (2008) and Tuoriniemi and Schott-Baier (2008).

## Practice Recommendations

Based on data gathered through this research, some recommendations can be made. It is suggested that Practical Nursing Programs formulate and utilize a functioning simulation laboratory that contains at least two simulation mannequins. It is advisable to have a faculty member trained to utilize the simulation equipment and employed as the Simulation Specialist or Simulation Coordinator. This individual can manage the operation of the simulation laboratory as well as assist other faculty members to learn how to effectively use the simulation mannequins. Faculty members using the simulation equipment need to have support and sufficient training. Faculty support of simulation, budgetary assistance, and simulation training are essential to an effective simulation laboratory experience.

This researcher suggests that simulation can be used as a partial replacement of between 15% and 20% of the total amount of traditional clinical in a 1,500 hour Practical Nursing Program with 900 hours of clinical. Based on respondents' feedback, it is suggested that the amount of replacement of traditional clinical not exceed 20% due to the value of hands-on patient care, real-life patient conditions, and healthcare team interactions. Simulation can be beneficially used to offset limited pediatric and maternity experiences as well as decrease clinical site congestion and combat clinical site unavailability. Additionally, simulation can assist with providing a standardized simulated patient with diverse medical-surgical conditions in order to provide duplicated learning experiences for all nursing students.

## Limitations

Due to the variances between nursing program educational and clinical requirements, the results of this study may not extend to Registered Nurse Programs or Practical Nursing Programs with vastly different hour requirements in other states. Additionally, while all Practical Nursing Program Administrators and Faculty were invited to participate, only 62% of invited individuals chose to participate. Likewise, 40 of the 57 Directors of Nursing Programs participated in the survey resulting in incomplete data. It is unknown if the individuals who did not participate in this study chose not to due to negative perceptions of simulation, which might have skewed the responses toward simulation differently.

## Suggestions for Further Research

### Replication Possibilities

This study could be replicated in other states with similar clock hour requirements. Additionally, this study could be administered in different states and in different types of nursing programs with minor survey modifications.

### Extension Possibilities

This study was geared toward the Practical Nursing Program hour requirements as determined by the Pennsylvania State Board of Nursing. With minor changes, this survey could be distributed to a variety of nursing programs such as Associate Degree Programs, Baccalaureate Degree Programs, Master Degree in Nursing Programs, as well as Doctoral Nursing Programs. Each level of nursing has different clinical requirements, which may lead administrators and educators to find the suggested amount of simulation that could replace traditional clinical for their specific program type.

Director of Nursing respondents were asked to identify which mannequins were currently being used by their nursing program. For this study, the mannequins needed to be listed by specific company and mannequin name due to a lack of published research that specifies a clear distinction between a "low-fidelity," "mid-fidelity," and "high-fidelity" mannequins. It would be interesting to categorize the mannequins currently being utilized in Practical Nursing Programs according to fidelity and gather educator perceptions regarding which fidelity level of mannequin is most effective in training Practical Nursing Students.

Concern theme one indicated that respondents believe that simulation cannot adequately mimic the interaction that takes place at the healthcare facilities. One respondent wrote, "Our upcoming nurses are already lacking in human relations because the bulk of the daily contact is with technology" (anonymous, personal communication, n.d.). Future research may be warranted to determine if communication is positively or negatively impacted in Practical Nursing Students and Graduates whose program utilized simulation as a training modality replacing a portion of traditional clinical.

It would be valuable to research whether simulation usage in place of a portion of traditional clinical correlates with a higher or lower National Council Licensure Examination for Practical Nurses (NCLEX-PN) pass rate. It would also be interesting to determine whether employers rate recent Practical Nursing Graduates' clinical skills higher or lower based on whether they graduated from a Practical Nursing Program that incorporates simulation in its training.

**Potential Survey Modifications**

Based on respondent comments, this survey could be modified for future administrations to include the number of mannequins that are leased or shared by educational institutions in

addition to those that are owned. This additional information may provide a more complete picture of the number of mannequins that are truly being utilized by Practical Nursing Programs in Pennsylvania.

## Summary

There is a strong use of simulation in Pennsylvania's Practical Nursing Programs. By quantifying the current use of simulation, it was determined the average Pennsylvania Practical Nursing Program replaces 14.97% of their traditional clinical with simulated clinical. Additionally, based on respondents' data, the average maximum suggested percentage of replacement of traditional clinical with simulation is 19.8% of the total clinical hours. This provides a best practice guideline for Pennsylvania Practical Nursing Programs who currently use or are considering using simulation as a partial replacement of traditional clinical.

The quantitative data are suggestive for the inclusion of simulation in the total amount of clinical hours. There were qualitative support themes extolling the learning benefits associated with simulation. Acquisition of clinical skills, elevation of confidence levels, duplication of learning opportunities, non-threatening environment, and pre-clinical practice were all listed as positive components of simulation. There were concern themes identified related to the replacement of traditional clinical with simulated clinical. Some respondents indicated simulation cannot replace real life interactions with patients and healthcare facility team members and that simulated clinical should be only used as a replacement of traditional when there is a lack of site availability or clinical site congestion.

Simulation has been supported as a valuable learning tool in nursing education. Some respondents indicated that they are currently using simulation, and others indicated that they are considering increasing the amount of simulation in their program. It is hoped that this research

will serve as a guide to help administrators and faculty members in Practical Nursing Programs in Pennsylvania determine the optimal amount of simulation to use in their programs.

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# APPENDICES

# APPENDIX A

Replacement of Traditional Clinical with Simulated Clinical Survey

Q1 Please select the choice below that describes your current position most closely.

- ❍ Director of the Practical Nursing Program
- ❍ Assistant Administrator of the Practical Nursing Program
- ❍ Full-time Practical Nursing Faculty
- ❍ Part-time Practical Nursing Faculty
- ❍ Temporary Practical Nursing Faculty

Q2 Please indicate how many years that you have been in nursing education.

- ❍ 0 - 2 years
- ❍ 3 - 5 years
- ❍ 6 - 10 years
- ❍ 11 or more years

Q3 Please indicate your age in the following ranges.

- ❍ 20 - 30 years of age
- ❍ 31 - 40 years of age
- ❍ 41 - 50 years of age
- ❍ 51 - 60 years of age
- ❍ 61 or more years of age

Q4 Please select the practical nursing program ENROLLMENT for your campus per calendar year from the following ranges. (If you are an Administrator - please include the total enrollment from all sites that you oversee).

- ❍ 0 - 25 students
- ❍ 26- 50 students
- ❍ 51 - 75 students
- ❍ 76 - 100 students
- ❍ 101 - 125 students
- ❍ 126 - 150 students
- ❍ 151 - 175 students
- ❍ 176 - 200 students
- ❍ More than 200 students

Q5 Please select your program's parent institution type.

- ❍ Community College
- ❍ Private College
- ❍ Vocational - Technical School
- ❍ Other - please specify _____

Q6 Which of the following choices most closely describes where your practical nursing program is located.

- ❍ Rural
- ❍ Suburbs (surrounding the inner city)
- ❍ Urban (inner city)

Q7 Do you have a functioning simulation laboratory with active student participation?

- ❍ Yes
- ❍ No

Q8 How many years has your program had a functioning simulation laboratory?

- ❍ 1 - 2 years
- ❍ 3 - 4 years
- ❍ 5 - 6 years
- ❍ 7 - 10 years
- ❍ More than 10 years

Q9 Please complete the following:

| | Clock hour amount |
|---|---|
| What is the total amount of clock hours in your program (classroom and clinical combined)? | |
| How many clinical hours does your program have? | |
| How many of your program's clinical hours (reported in the blank above) take place in the simulation laboratory? | |

Q10 Does your Practical Nursing Program currently train students in a simulation laboratory in place of a portion of traditional clinical time (training time spent in a healthcare facility)?

- ❍ Yes
- ❍ No

Q11 Select the reasons that your educational institution is replacing a portion of traditional clinical time (at the clinical facilities) with simulated clinical (in the simulation laboratory). Please mark all that apply.

- ❑ Other educational institutions are using the clinical sites that we previously used.
- ❑ Simulation use in nursing education has been supported as a valuable learning tool.
- ❑ Simulation decreases the size of our clinical groups.
- ❑ Simulation offsets the decreased length of hospital stays.
- ❑ Simulation provides student experience in caring for patients with complex diseases.
- ❑ There are a decreased number of pediatric admissions at the local healthcare facilities.
- ❑ Practical Nursing Students are not allowed to complete certain invasive procedures at the healthcare facilities that they can complete in the simulation laboratory.
- ❑ Simulation increases student exposure to a variety of medical/ surgical conditions.
- ❑ Practical Nursing Students can care for emergency situations that are often prevented in the clinical setting.
- ❑ There are a limited number of births at the local healthcare facilities.
- ❑ Disaster preparedness can be taught.
- ❑ Other (please explain) _____

Q12 Do you have a faculty member (ie. simulation specialist or simulation coordinator) who is primarily responsible for educational experiences that take place in the simulation laboratory?

- ❍ Yes
- ❍ No

Q13 Do you teach in the simulation laboratory?

- ❍ Yes
- ❍ No

Q14 What type of training did you receive to operate the simulation equipment (select all that apply)?

- ❑ Sales representative provided training
- ❑ Online modules/ courses
- ❑ Conferences
- ❑ Taught myself
- ❑ Books/ Journals
- ❑ Other (please explain) _____

Q15 Please indicate which statement most closely reflects your feelings about teaching in a simulation laboratory:

- ❍ I welcome the challenges associated with this type of nursing education.
- ❍ I am reluctant to teach in this area, but I would do it if I was required.
- ❍ I am not interested at all in this type of teaching.

Q16 Indicate the number of the following mannequins that your program owns (please include all campuses).

_____ Laerdal: Sim Man 3G
_____ Laerdal: Sim Man Essential
_____ Laerdal: Sim Man (Retired)
_____ Laerdal: Sim Jr
_____ Laerdal: Sim Mom
_____ Laerdal: Sim Baby
_____ Laerdal: Sim NewB
_____ Laerdal: ALS Simulator
_____ Laerdal: Nursing Anne
_____ Laerdal: Nursing Kelly
_____ Laerdal: Nursing Kid
_____ Laerdal: Nursing Baby
_____ Laerdal: Newborn Anne
_____ Laerdal: Patient Kelly
_____ Laerdal: Convalescent Kelly
_____ Vital Sim Unit
_____ Sim Pad Unit
_____ Gaumard: Noelle S575 Maternal & Neonatal Birthing Simulator with Newborn Hal
_____ Gaumard: Noelle S555.100 MOES (Mobile Obstetric Emergencies with Newborn Hal
_____ Gaumard: Noelle S554.100 Maternal and Neonatal Birthing Simulator
_____ Gaumard: Noelle S550.100 Maternal and Neonatal Birthing Simulator
_____ Gaumard: Noelle S550/S551 Maternal and Neonatal Birthing Simulator
_____ Gaumard: Hal S3000
_____ Gaumard: Susie S2000
_____ Gaumard: Pediatric Hal S3005
_____ Gaumard: Pediatric Hal S3004
_____ Gaumard: Newborn Hal S3004
_____ Gaumard: Premie Hal S3009
_____ Gaumard: Hal S1000
_____ Gaumard: Hal S1020
_____ Gaumard: Five year PEDI Simulator (Mike and Michelle)
_____ Gaumard: One year Pediatric Care Simulator (Mike and Michelle)
_____ Gaumard: Newborn PEDI simulator (Susie and Simon)
_____ Gaumard: Susie S1010 - For Prehospital and Nursing Care
_____ Gaumard: Susie Simon Patient Care Simulator with Ostomy
_____ Gaumard: Super Chloe Patient Care Simulator
_____ METI: METIman

_____ METI: iStan
_____ METI: Human Patient Simulator (HPS)
_____ METI: Emergency Care Simulator (ECS)
_____ METI: PediaSIM
_____ METI: BabySIM
_____ Nasco: Patient Care Manikin
_____ Life/form: Basic Geri
_____ Life/form: Advanced Geri
_____ Life/form: Complete Nursing Skills Geri
_____ Life/form: Basic Keri
_____ Life/form: Advanced Keri
_____ Life/form Complete Nursing Skills Keri
_____ Life/form Micro-premie simulator
_____ I don't know the company/names of the full body mannequins owned by my school (please indicate the number owned)
_____ Other, please describe

Q17 Scenario: You work in a 1,500 clock hour Practical Nursing Program with 900 hours (60%) of instruction designated as clinical time and 600 hours (40%) as classroom time. An ideal simulated learning experience is available with the proper equipment (including a high-fidelity mannequin) and space, a trained specialist, technical support, a well-developed plan of training and evaluation in place, as well as a variety of developed fundamental, medical-surgical, pediatric, obstetric and psychiatric scenarios. Please indicate the number of hours (of the total 900 clinical hours) that you think your Practical Nursing Students could spend in the simulation laboratory in place of traditional clinical in the healthcare setting.

| | Hours of Simulation (1) |
|---|---|
| Simulation hours (of the total 900 traditional clinical hours) | |

Q18 Please share additional comments or concerns that you have regarding replacing traditional clinical (in a healthcare facility) with an amount of simulated clinical (in a simulation laboratory) in the space provided below.