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Factors Influencing the Integration of High Fidelity Simulation in Associate Degree RN and LPN Nursing Programs

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by

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Dr. Rhonda Bishop, Committee Member — June 11, 2015 — Date

Dr. Steven Bishop, Committee Member — 6-11-15 — Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work at Lindenwood University and that I have not submitted it for any other college or university course or degree.

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Abstract

High fidelity human simulation (HFHS) has become a common feature in nursing education in recent years. This case study explored the practices and perceptions of nursing directors, faculty, and students regarding the integration of HFHS in associate degree RN and LPN programs. The course of study in these particular programs is two years or less in length, presenting added challenges for faculty to introduce new pedagogies into an abundantly full curriculum. Multiple data sources were used and included 41 participants through interviews with nursing directors and instructors, observation of instructors and students during HFHS scenarios and debriefing sessions, and student focus group interviews at four nursing schools in two Midwestern states. Data analysis resulted in the emergence of four major themes: time limitation, limited resources, instructional disconnect, and student perspectives. These findings were consistent with much of the current literature. Findings also demonstrate the negative effects of limited time, resources, and faculty practices on the ability of nursing students to suspend disbelief and fully engage in the learning scenarios. Given the financial investments in HFHS, achieving best use through supporting student participation in active learning and facilitating the development of clinical judgment are goals which should be considered.

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Chapter One: Introduction

Modern healthcare has been impacted by rapid expansions in knowledge and technological developments, resulting in very complex environments for the delivery of patient care (Nehring & Lashley, 2010). These advances have increased the demand for professionals who are comfortable with technology, have the ability to apply knowledge, and are "innovators, collaborators, and critical thinkers" (Mastrian, McGonigle, Mahan, & Bixler, 2011, p. 1). Nursing educators are challenged to prepare new nurses to practice safely and effectively in a variety of settings, where knowledge and innovation are constantly evolving (Benner, Sutphen, Leonard, & Day, 2010).

In recent years, high fidelity human simulation (HFHS) has emerged as an exceptional strategy to prepare students for the complexities of clinical practice (Halstead et al., 2011). Through the creation and manipulation of patient scenarios, HFHS permits the replication of clinical situations. The scenarios assist learners to develop an understanding of the situation and improve their ability to manage similar conditions in reality (Mastrian et al., 2011). Planned simulation activities allow students to safely work through realistic problems and reflect on their actions without the risk of harm to patients (Morris & Faulk, 2012). Simulation encourages students to take an active role in thinking and apply what has been learned, in context (Lewis & Ciak, 2011).

This chapter introduces the study and presents the background for conducting research on the integration of HFHS in nursing education. The theoretical framework is described and the research problem is identified along with an explanation of the study purpose. Questions guiding the research, definitions of key terms, and the study limitations and assumptions are also discussed.

Background of the Study

Simulation has played an important role in the education of health professionals for decades (Levine, Schwartz, Bryson, & DeMaria, 2010). Anesthesiology, surgery, dentistry, and nursing are examples of disciplines which use simulation in the education of personnel (Traynor, Gallagher, Martin, & Smyth, 2010). Task trainers, known as mechanical dummies, were referred to in nursing textbooks as far back as the late 1800s (Nehring & Lashley, 2010). In 1910, a full-body stationary task trainer known as Mrs. Chase was first introduced (Nickerson & Pollard, 2010). Mrs. Chase had arms equipped with needle injection sites and an internal apparatus which permitted nursing students to practice procedures involving the rectum, urethra, and vagina (Nehring & Lashley, 2010). Traditionally, students have developed technique and proficiency with the basic skills necessary for safe patient care by practicing with mannequins, models, and task trainers in the nursing skills laboratory (Nehring & Lashley, 2010).

Advances in technology have facilitated the development of computerized mannequins, known as human patient simulators, for use in healthcare education (Khan, Pattison, & Sherwood, 2011). As computer technology has progressed, fidelity in the simulators has also improved. Fidelity refers to the degree of realism in the simulator (Campbell & Daley, 2013). Low fidelity simulators are basic mannequins, such as Mrs. Chase, and are frequently used to teach fundamental patient care skills (Nehring & Lashley, 2010). Moderate fidelity simulators were developed in early 1960s for teaching cardio-pulmonary resuscitation techniques (Nickerson & Pollard, 2010). Some moderate fidelity simulators are equipped with computerized trainers which provide a variety of heart and breath sounds for teaching physical assessment skills including auscultation

(Nehring & Lashley, 2010). Using a stethoscope, students learn to distinguish between normal heart and lung sounds and those associated with an illness or disease process. Students also learn to identify anatomical landmarks where certain sounds can best be heard (Nehring & Lashley, 2010).

The HFHS have more sophisticated anatomical structures and electronic components than low and moderate fidelity simulators. These simulators replicate the size, structure, and appearance of human patients and are available in adult, child, or infant sizes, and even obstetrical models (Farrar, & Suggs, 2010). The HFHS provides realistic heart, lung, and bowel sounds, vocalizations, working airway structures, vital signs including palpable pulses, and a venous network for simulating intravenous therapy (Parker & Myrick, 2010; Yuan, Williams, & Fang, 2011)). This level of simulator can be programmed to mimic the clinical signs of patients experiencing a range of health problems and can provide an interactive learning experience for students by responding to clinical interventions such as simulated medication administration. Depending on the model and options selected, one HFHS can range in cost from $100,000 to well over $125,000 for the simulator alone (Nehring & Lashley, 2010). Despite the cost of acquisition, maintenance, and facility renovation, more nursing programs are investing in this technology to enhance the curriculum (Brewer, 2011).

A number of advantages related to the use of HFHS in nursing education have been documented. One advantage for using HFHS is patient safety (Sears, Goldsworthy, & Goodman, 2010). The simulators are capable of creating authentic clinical situations to facilitate the application of theory to practice by presenting planned patient scenarios in a safe, controlled environment. These scenarios permit students to focus on the

clinical situation, practice patient care interventions, and learn from their mistakes without the risk of harm to real patients. According to Wane and Lotz (2013), HFHS can facilitate the development of technical skills and critical thinking skills based on analysis of physical assessment and other patient data. A study by Merrimam, Stayt, and Ricketts (2014) suggested HFHS was more effective than traditional classroom instruction for teaching nursing students the necessary assessment skills to recognize the deteriorating status of an acutely ill patient.

Another advantage to using HFHS is simulation assists with integrating theory into clinical practice, which is essential to confidence building and the development of critical thinking behaviors (Kaddoura, 2010). Simulation activities were found to engage students with a preference for social learning as well as those who were solitary learners in satisfactory learning experiences while supporting their individual learning styles (Fountain & Alfred, 2009).

Several concerns have also been raised associated with HFHS learning activities. Although these simulation activities are believed to facilitate the development of critical thinking skills, the results of some studies did not find a measureable correlation to support this conclusion (Fero et al., 2010; Lewis & Ciak, 2011). Student satisfaction with HFHS based learning was affected by the manner in which the activities were managed and debriefed, including issues such as video-recording, peer review, feeling singled out, and the ability to participate in peer group pre-planning sessions (Elfrink, Nininger, Rohig, & Lee, 2009). Other areas of concern for nurse educators included problems associated with evaluation of learner performance and measuring learning outcomes related to simulation lab activities (Foronda, Liu, & Bauman, 2013). There were also

challenges involved for instructors to effectively incorporate a new component into an existing curriculum (Brewer, 2011).

Faculty development is needed to improve expertise in instructional methods, curriculum integration, and learner evaluation related to HFHS (Halstead et al., 2011). Faculty support for implementing HFHS has also been recognized as an area of concern due to instructors being required to engage in time-consuming preparations in order to carry out effective simulation activities. Nehring and Lashley (2010) described these challenges:

> Given the demands on nursing faculty, unless they were allotted time for this activity as part of their workload assignments, scenario development just did not happen. As a consequence, often the simulators sat unused or were turned on simply for patient assessment. The real potential of using the simulators was, for the most part, unrealized. (p. 391)

Underutilization of simulators in nursing education has been recognized as a problem, rendering the equipment as very "expensive bed weights" (Schiavenato, 2009, p. 388).

Theoretical Framework

The Theory of Transformative Learning was the overarching framework used to describe student experiences and learning processes related to HFHS activities within the field of nursing. Transformative Learning Theory is based on the assumption adults have perspectives which are acquired through experiences. These perspectives include assumptions, values, feelings, and conditioned responses which shape the individual's frames of reference which he or she uses to understand and engage the world (Morris & Faulk, 2012). Learning is seen as "the process of using a prior interpretation to construe

a new or revised interpretation of the meaning of one's experience as a guide to future action" (Mezirow, 2000, p. 5).

Amid the concepts central to Transformative Learning Theory, Mezirow (2000) specifically discussed knowledge development for the adult learner in relationship to three central themes: the role of the experience, rational discourse, and critical reflection. The processes associated with these themes can facilitate changes in an individual's perspectives when he or she encounters new situations and attempt to integrate learned material into existing frames of reference (Parker & Myrick, 2010). The central themes of Transformative Learning Theory (Mezirow, 2000) are supported in the basic concepts associated with Adult Learning Theory (Knowles, 1984).

The work of Mezirow (2000) with Transformative Learning Theory complements the work of Knowles (1984) involving Adult Learning Theory. Knowles (1984) identified significant differences between adults and children in the way they learn and found adults require certain conditions to learn more effectively (1984). Adult Learning Theory, also known as Andragogy, is premised on the following key assumptions regarding learner characteristics, emphasizing adults: (a) need to understand the importance of what they are expected to learn, (b) learn by doing, (c) are problem-solvers, (d) learn best when the content is of immediate value, and (e) are internally motivated to learn (Knowles, 1984). Several fundamental consistencies exist between Transformative Learning Theory and Andragogy including the importance of the experience. The processes associated with critical reflection are utilized when adults are engaged in problem-solving (Mezirow, 2000). Knowles' (1984) concept of adults being internally motivated to learn supports the assertion by Mezirow (2000) that autonomous

thinking is developed through transformative learning. Knowles (1984) further suggested adults learn more effectively what they are able to discover for themselves. Although Knowles (1984) provided reference to dialogue in learning situations, Mezirow (2000) emphasized the crucial significance of dialogue in perspective transformation.

Perspective transformation takes place when adult learners encounter a disorienting dilemma, or a situation which does not fit into their current frames of reference (Mezirow, 2000). The learner will then reflect on recognized thought patterns and the assumptions upon which they are based, and use these to assimilate the new information (Mezirow, 2000). Reflection helps the learner adapt a frame of reference and restores balance in the learner's thinking. Transformation occurs when individuals critically appraise the manner in which they interpret and engage a situation (Parker & Myrick, 2010). Rational discourse is essential to interpret and validate the meaning of experiences. Discourse involves expressing observations and beliefs in extensive discussion with others and filtering the exchange through one's frames of reference. The purpose of this dialogue is to arrive at agreement and insights into the disorienting dilemma (Parker & Myrick, 2010).

Transformative Learning Theory is uniquely suited to adult learners (Mezirow, 2000). It integrates fundamental concepts of Andragogy and promotes empowering adults as autonomous thinkers (Parker & Myrick, 2010). In addition, this theory emphasizes the role of social discourse with testing of new concepts, an essential component associated with perspective transformation. Although research is limited relating Transformative Learning to nursing, the theory provides a sound framework to describe how adults re-learn. Transformative Learning Theory can be applied to all

levels of nursing education and can be the basis for nurse educators to prepare learning activities to facilitate the development of new perspectives (Morris & Faulk, 2012).

The concepts of Transformative Learning Theory pertain to instructional approaches used by faculty when incorporating HFHS in the nursing and allied health curricula. Understanding and applying these concepts can facilitate the success of adult students. High fidelity simulation-based learning activities present opportunities to expose students to disorientating experiences from which critical reflection occurs (Parker & Myrick, 2010).

A vital component associated with simulation experience is the debriefing process immediately following an active learning scenario (Decker et al., 2013). Debriefing provides a forum to encourage critical reflection, social discourse, and further learning which supports transformation (Parker & Myrick, 2010). The approaches involved with critical reflection also contribute to the development of critical thinking skills. The process of students learning to adapt and expand their frame of reference is not static; the ability is carried to each new problem-solving experience (Parker & Myrick, 2010). The critical thinking skills gained translate beyond a particular situation into the whole of nursing practice (Dreifuerst, 2012).

Professional healthcare practice is expected to undergo continued growth in complexity. Nurses must be prepared to engage in reflective practice and develop a personal commitment for lifelong learning. Transformative Learning Theory provides a problem-solving model appropriate for the type of learning desired in nursing education and embraced in nursing practice (Morris & Faulk, 2012).

Statement of the Problem

High fidelity simulation equipment and learning activities have become more commonplace in nursing education (Brewer, 2011), and numerous studies have been conducted with a focus on student learning outcomes. Studies related to curriculum integration of HFHS are sparse and have not produced recommendations for best practices. In addition, available nursing research is limited to registered nursing (RN) education programs and no studies have been identified involving practical nursing (LPN) programs. The concerns surrounding HFHS related to faculty support and acceptance, curriculum integration, and evaluating learning outcomes have been documented (Brewer, 2011; Dowie, 2011; Foronda et al., 2013). These concerns may be more pronounced when faculty are tasked with integrating HFHS into nursing curricula of shorter duration, specifically, curricula which are two years or less in length as compared with four-year nursing programs. This current research study was intended to provide insight into how HFHS activities were being used, particularly in practical nursing and associate degree registered nursing programs.

Purpose of the Study

The purpose of this qualitative study was to examine current practices for integrating HFHS learning activities in nursing programs whose course of study may be completed in two years or less. Using a qualitative approach to research afforded an opportunity to examine faculty attitudes, perceptions, and practices related to the use of HFHS as an instructional tool. In addition, student perceptions of the pedagogical advantages of HFHS and their reaction to learning experiences in the simulation lab were also explored.

Information generated from this study adds to the field of research concerning HFHS in nursing. Insights gained from the research data may inform faculty in similar nursing programs regarding their instructional practices and the learning outcomes associated with HFHS activities. An understanding of students' responses to HFHS may also be useful in planning learning experiences which maximize acceptance, engagement, and improved learning.

Research Questions

In an effort to gain insight into the practices for implementing HFHS in the nursing curriculum, and the perceptions of faculty and students regarding HFHS as a teaching and learning strategy, the following research questions guided this study:

1. What key factors do nursing program directors report influence the use of HFHS as part of the nursing school curriculum?

2. According to nursing school personnel, what changes to the program curriculum have taken place to promote the integration of HFHS learning activities?

3. What are the perceptions of nursing faculty regarding HFHS as an instructional resource and influence on student learning outcomes?

4. What are the perceptions of nursing students regarding HFHS as a pedagogical strategy and the implementation practices experienced?

Definitions of Key Terms

For the purposes of this study, the following terms are defined:

Clinical education/clinical experience. Clinical experience refers to the hands-on component of nursing education, permitting practical application of didactic and skills

aspects of the curriculum with human patients in various healthcare settings (Cannon & Boswell, 2012).

Critical thinking. Critical thinking is a learned thought process; the ability to analyze and process information in context to make appropriate decisions and act accordingly (Nehring & Lashley, 2010).

High fidelity human patient simulator (HFHS). An HFHS is a computerized mannequin which functions in such a manner as to provide realistic physiological and pharmacological parameters of patients with different health conditions and respond to interventions of students and faculty (Nehring & Lashley, 2010).

High fidelity human simulator lab coordinator. The lab coordinator is a person who manages the resources and technical aspects of the simulation lab and may act as a faculty resource or a lab preceptor (Adamson, 2010).

LPN to RN bridge programs. Nursing programs designed to provide learners educational mobility within the profession. This is accomplished through articulation agreements, credit transfers, advanced placement, and validation of previous learning (Billings & Halstead, 2012). Associate degree nursing programs may offer LPN to RN bridge programs, traditional nursing education programs, or both.

Suspension of disbelief. The mindset adopted by participants to willingly accept the authenticity of a situation and engage in the learning scenario. The degree of realism, also known as fidelity, in environment and equipment facilitates participants to perceive HFHS as a realistic substitute for a clinical episode (Gantt & Webb-Corbett, 2010; Mastrian et al., 2011).

Undergraduate nursing programs. The three common types of undergraduate nursing programs include the two-year associate degree program, three-year diploma program, and four-year baccalaureate degree program. All three prepare students to become registered nurses (Billings & Halstead, 2012). In addition, practical nursing programs exist where programs are 12 to 18 months in length and prepare students for licensure as practical or vocational nurses.

Limitations and Assumptions

This study was known to have certain limitations due to its location, scope, and nature. The limitations which were identified are discussed.

Researcher bias. The researcher for this study comes from the field of nursing and had an understanding of the role and issues related to HFHS in nursing education. Because of this background, the researcher recognized the existence of predetermined ideas regarding HFHS (Yin, 2014). Research design, triangulation of data, inclusion of contrary findings, and reviewing preliminary findings with a critical colleague facilitated attempts to limit bias in the final report (Stake, 2010).

Sample demographics. The researcher used purposeful sampling (Creswell, 2013) to select four typical nursing education programs for the study. To accomplish its stated purpose, the sample included both LPN and associate degree RN programs which utilized HFHS learning activities. The population of the geographic area where the study was conducted is disproportionately white Caucasian. Study participants reflected the regional population resulting in limitations in terms of racial and ethnic diversity, which may have influenced attitudes and perspectives.

Instrument. Interviews and observations are essential sources of data in case study research (Yin, 2014). The researcher conducted interviews in each nursing program and observed students during HFHS learning situations to record field notes of critical activities. The researcher's presence may have influenced the responses of interview participants and may have been perceived as intrusive during simulation activities (Creswell, 2014). In addition, the possibility exists for events to have proceeded differently as a result of being observed (Yin, 2014).

The following assumptions were accepted:

1. The responses of the participants were offered honestly and without bias.

2. Observation of students was based on criteria established with faculty participants and reflected student activity without bias.

Summary

An introduction to the study was presented in this chapter beginning with a discussion of the history and some of the major issues related to the use of simulation in the education of healthcare professionals. The theoretical basis for this study was identified as Transformative Learning, which reflects the concepts of Andragogy and Experiential Learning Theories. Transformative Learning Theory was described in comparison to accepted practices of simulation scenario followed by the debriefing process, which are commonly used with HFHS. Problems associated with integration of HFHS were identified, and the purpose of the study was described in terms of examining current practices and faculty and student perceptions related to HFHS in the nursing curriculum. The research questions, definitions of the key terms associated with this

study, limitations, and assumptions were explained. The results of this study may offer support and insight for nursing faculty and program directors in the use of HFHS.

In Chapter Two, a review of literature appropriate to the study was presented to provide deeper insight into the issues associated with HFHS in the education of healthcare professionals generally, and nursing specifically. The literature was summarized related to the practical and theoretical aspects of the subject matter. The methodology was detailed in Chapter Three, an analysis of the data was provided in Chapter Four, and the findings and conclusions were revealed in Chapter Five.

Chapter Two: Review of Literature

Although simulation has been used as an educational strategy for decades, the advent of HFHS, for nursing education in particular, is still relatively new (Nehring & Lashley, 2010). The escalation of HFHS labs has been the result of advances in technology, funding available to invest in this resource, a decline in the availability of clinical resources, and the demand for nurses prepared to function in an increasingly complex healthcare environment (Campbell & Daley, 2013; Morris & Faulk, 2012). However, instructors often grapple with finding ways to integrate HFHS in the curriculum and the time necessary to develop quality simulation experiences for their students. In the absence of needed resources and support, these expensive simulators have been underutilized or even remain in the box for extended periods (Nehring & Lashley, 2010).

This study was conducted to explore current practices for implementing HFHS in associate degree RN and LPN education programs. In addition, faculty attitudes, practices, and perspectives regarding the use of HFHS in the curriculum were examined. Nursing student perceptions related to their experiences with HFHS were also studied. Results may inform nursing faculty in similar programs regarding instructional practices and also facilitate making the case for additional support where needed. Insight into student perspectives related to HFHS may be useful in planning learning and debriefing activities for better learning.

This chapter began with a definition of simulation and a description of simulators in terms of type and fidelity. A summary of the relevant literature regarding the history of simulation in adult education generally, healthcare professionals more specifically, and

the proliferation of HFHS in nursing education were also provided. In addition, various learning theories used as the framework for studying the implementation and outcomes related to HFHS were discussed. The chapter concluded with experiences pertaining to HFHS in nursing education.

Rosen, Hunt, Pronovost, Federowicz, and Weaver (2012) differentiated simulation in terms of technique, technology, and strategy. Simulation refers to techniques used to replicate the essential aspects of a real situation. The simulator is the technology, a device used to imitate part or all of the human body with which the learner interacts. Simulation-based training refers to the strategy of designing instruction which combines "information, demonstration, and practice-based learning activities" (Rosen et al., p. 244).

Simulators may be simply a molded replica of a body part or a full-bodied mannequin (Mastrian et al., 2011). Mannequins are categorized according the level of fidelity, which refers to the degree of realism and complexity they are capable of providing (Kilmon, Brown, Ghosh, & Mikitiuk, 2010). Low fidelity simulators include static mannequins frequently used for teaching psychomotor skills like those used in giving a bed bath or inserting a Foley catheter (Cannon & Boswell, 2012; Kilmon et al., 2010). Moderate or intermediate fidelity simulators provide a higher level of sophistication, such as computerized heart and lung sounds for teaching auscultation with a stethoscope (Nehring & Lashley, 2010). Moderate fidelity simulators are useful for teaching anatomical landmarks and discernment of sounds even though the chest may not rise with inhalation (Nehring & Lashley, 2010). High fidelity simulators are full-bodied, computerized mannequins also capable of providing realistic heart, lung, and abdominal

sounds. However, in addition to the chest moving with respirations, the simulators are able to blink, sweat, urinate, and have pulses (Nehring & Lashley, 2010). They can be intubated and programmed to respond in real time to interventions such as the administration of oxygen or medications (Nehring & Lashley, 2010).

High fidelity simulators are available in adult, child, and obstetric models which simulate the birth process (Nehring & Lashley, 2010). Greater authenticity assists the learner to suspend disbelief and fully engage in the learning scenario (Mastrian et al., 2011). Static mannequins have been used as patient simulators since 1911. However, in recent years, HFHS has become an increasingly common element in the education of health care professionals (Nickerson & Pollard, 2010).

Brief History of Simulation in Adult Education

The concept of simulation in education is not a recent innovation. The first ground-based flight simulator was invented for pilot training in 1929, and simulation has been used as a military training strategy throughout recorded history (Nickerson & Pollard, 2010). As far back as the Roman Empire military training involved practicing sword strikes on wooden beams to prepare for the battlefield (Rhodes, 2011). Modern military training includes the use of battlefield simulation, planned drills, and computer programs to prepare soldiers to react in conditions they are likely to encounter in real-world situations (Nickerson & Pollard, 2010).

Transportation simulators are widely used by the military, commercial pilots, commercial truck drivers, and the automobile industry to provide opportunities to respond to dangerous situations without the fear of real-life consequences (Nickerson & Pollard, 2010). As reported by Bashir (2010), the learning curve is experience “in a safe

environment where the consequences of mistakes do not result in injury or loss of life" (p. 558). The computerized environments mimic reality and can be adapted to facilitate preparing for situations which may rarely be encountered, but where safety demands the ability to respond appropriately (Nickerson & Pollard, 2010). Simulation also plays a major training role in the United States space program, the nuclear power industry, and in health care as well. These diverse industries share one important similarity in that protecting and saving lives depends on responding appropriately in an emergency. Incorporating simulated reality into training environments helps teams and individuals prepare for such emergency situations (Nickerson & Pollard, 2010).

Simulation in health care education. The role of simulation in the education of health care professionals has evolved in recent decades (Levine et al., 2012). Apart from the task trainers used in nursing education a century ago, the first simulators are reported to have been developed in the 1960s by anesthesiologists to teach airway and resuscitation skills (Levine et al., 2012). Until the 1980s, simulation was not widely considered for medical education because of firmly established apprenticeship training models and the prohibitive cost of technology (Bewley & O'Neil, 2013; Shah, Carter, Kuwani, & Sharpe, 013). A number of concerns have promoted the increased use of high fidelity and virtual reality simulation in medical training. Among these issues are concerns for patient safety, advances in technology, accreditation and licensing organizations, and the need for teaching and validating critical skills (Levine et al., 2012; Shah et al., 2013).

Historically, medical education has followed the apprenticeship model where students study the basic sciences and apply these principles to patients in the clinical

setting under the supervision of an attending physician (Khan et al., 2011). The traditional processes involved in preparing new doctors to become skilled physicians and surgeons sometimes resulted in unfortunate and unintentional harm to patients (Zorn, 2011). Tavabie and Baker (2012) described recent concerns regarding young doctors being inadequately prepared for their new roles and apprehension regarding their ability to manage acutely ill patients. These issues with new physician preparation are the result of changes in health care delivery, the limited exposure to acutely ill patients as medical students, and restrictions imposed on working hours for postgraduate physicians (Shah, et al., 2013; Tavabie & Baker, 2012). The importance for clinicians in training to have exposure to real patients is acknowledged, however, this training must be accomplished while avoiding compromises to patient safety (Tavabie & Baker, 2012).

National attention has prompted changes to the health care environment related to patient safety. Liability insurers, regulatory agencies, and educators no longer accept compromises to patient safety in the interest of medical training (Khan et al., 2011). In addition, learning in actual patient care environments tends to exist as opportunities are presented, making it difficult to plan teaching experiences for medical students and resident physicians (Levine et al., 2012; Paskins & Peile, 2010). Simulation can provide exposure to planned cases ensuring important material and skills are sufficiently addressed. The use of simulation permits novice and experienced users to practice difficult elements of a procedure until it is mastered without the risk of harm to patients (Bewley & O'Neil, 2013; Khan et al., 2011). Because the learning activities can be predictable, safe, reproducible, and standardized, simulation affords a cost-effective and

capable educational environment (Bewley & O'Neil, 2013) as well as an emerging tool for assessment, remediation, and skill validation (Levine et al., 2012).

In addition to improvements in simulation equipment, technological advances have also facilitated improvements in patient treatment and interventions for which simulation is needed to validate practitioner skills (Bewley & O'Neil, 2013; Khan et al., 2011; Levine et al., 2012). Refined surgical procedures and vascular stent procedures are two examples which require physicians to demonstrate competency on simulators before being allowed to perform them on real patients (Levine et al., 2012). Simulation is also considered as a method to screen and select candidates for surgery resident positions and to provide long-term follow-up and validation of acquired skills (Levine et al., 2012; Scott et al., 2011).

Advances in computer technology along with the evolution of educational methods which incorporate complex interactions and crisis management have brought HFHS to a more central role in medical education (Khan et al., 2011). The expanded use of HFHS in medical training is replicated across other health disciplines as well. What began as an initiative by anesthesiologists to teach airway and resuscitation skills (Levine et al., 2012) has become an integral component in the education of physicians, nurses, and other allied health professionals (Khan et al., 2011).

Proliferation of HFHS in nursing education. Nursing practice has experienced tremendous changes related to science and technology in recent decades. In 2010, findings of a Carnegie Foundation study led by Dr. Patricia Benner reported the existence of a significant gap between current nursing practice and preparation of nursing students to enter professional practice (Shinnick, Woo, & Mentes, 2011). The study also found

classroom and clinical instruction to be deeply divided and recommended better integration between the two. Shinnick et al. (2011) suggested HFHS may be a useful tool to help bridge the gap.

The popularity and acquisition of HFHS by nursing programs has become increasingly widespread over the last decade. Improvements in simulation technology, reductions in cost, and the availability of funds to purchase the equipment have contributed to this escalation (Campbell & Daley, 2013). While these conditions have made the expansion of HFHS possible, the need for this technology can be attributed to a number of other factors (Nehring & Lashley, 2010). Some of the primary influencing factors include: (a) increasing demands for patient safety, (b) nursing shortages and the need to increase enrollments, (c) limited availability of appropriate clinical experiences and low patient census in clinical areas, (d) the need to improve teaching strategies for health professionals, (e) technological advances in patient care, and (f) the ability of simulation to enhance clinical practice (Nehring & Lashley, 2010).

Patient safety. Nursing practice involves a number of psychomotor skills which must be successfully acquired (Ross, 2012). Issues regarding quality and safety in patient care have become the focus of nationwide societal and regulatory attention (Campbell & Daley, 2013). The traditional nursing skills laboratory encourages students to pretend certain aspects of performing a procedure on a patient (Gantt & Webb-Corbett, 2010). Although mastery of skills is extremely important, concerns related to safety encompass much more than learning procedure skills to become a competent practitioner. Competency involves the ability to use knowledge, skills, and critical thinking as the

basis of sound clinical judgment in the delivery of care (Nehring & Lashley, 2010). Gantt & Webb-Corbett (2010) offered the following insights:

> Today's simulation laboratories are built to allow the student to suspend disbelief. The goal is to have the environment be authentic enough for the student to incorporate real nursing practices into their learning. The nursing student who has to continue to imagine aspects of patient care in the laboratory will not be in a position to know what to do in the genuine clinical environment. (p. 48)

High fidelity simulation offers a safe and interactive environment for nursing students to develop awareness and skill in patient safety, delegation, communication, and critical thinking (Campbell & Daley, 2013).

Nursing enrollment and limited clinical sites. Soon after entering nursing school, students begin working in clinical settings to learn about caring for patients through experience with real situations in a variety of settings. Benner et al. (2010) stated, "both experiential learning and situated learning are central to nursing education" (p. 41). Students begin the clinical learning process with stable patients guided by feedback from instructors and practicing nurses. Eventually, learners progress to situations requiring more knowledge, skill, critical thinking, and independence. With time, experience, and coaching, the learner develops the ability to recognize, prioritize, and respond to patient concerns in a competent manner (Benner et al., 2010). In addition to increased competence, students also develop the self-confidence to confront challenges, seek new learning opportunities, and recover from obstacles (Cannon & Boswell, 2012).

One of the challenges faced by nurse educators is the ability to secure adequate clinical experiences for their students (Yuan et al., 2011). This difficulty is likely to be made worse as the number of nursing programs and students increase to meet workforce demands (Traynor et al., 2010). Factors including shortened length of hospital stay and rapid patient turnover, higher acuity, patient safety issues, nursing staff shortages, and competition for clinical sites among nursing programs have impacted the ability to provide quality clinical learning experiences (McNelis, Fonacier, McDonald, & Ironside, 2011; Traynor et al., 2010; Yuan et al., 2011).

The National League for Nursing (NLN) commissioned a national survey in 2009 to study clinical education in prelicensure RN programs. Participants were asked to identify the top five barriers they faced in providing optimal clinical learning experiences, and strategies used to overcome the barriers. For the 2,386 survey respondents, the barrier most frequently cited was the lack of quality clinical sites to meet learning objectives and accommodate the number of students (McNelis et al., 2011). Common strategies identified by participants to overcome clinical site barriers included scheduling clinical activities during the evenings, overnights, and weekends, providing more observational experiences, and substituting simulation for clinical hours (McNelis et al., 2011). Addressing the growing need for quality clinical experience, Jeffries (2009) suggested HFHS will continue to be a component in nursing and health care education, with some states now permitting HFHS to substitute up to 25% of real clinical time (Gates, Parr, & Hughen, 2012).

Technological advances. Advances in technology and knowledge are increasing rapidly and significantly influence the practice of health care delivery (Nehring &

Lashley, 2010). Although it is imperative for nurse educators to prepare students for the type of clinical environments they will encounter (Traynor et al., 2010), there are difficulties in meeting this challenge. Mastrian et al. (2011) offered the following:

> While we cannot expose our students to every possible type of technology they might encounter in future practice, we can help them to become proficient users of various technologies that currently support the delivery of quality, safe, and effective health care. (p. 12)

A report published in 2008 by the American Association of Colleges of Nursing identified essential outcomes for baccalaureate nursing graduates. The technology-related outcomes in the report suggested students be exposed to patient care technologies such as pumps, monitors, computer assisted devices, and patient information systems (Mastrian et al., 2011). High fidelity human simulation can provide educators with the tools to demonstrate the use of technology as recommended by the American Association of Colleges of Nursing and assist students in their transition to the demands of contemporary nursing practice (Traynor et al., 2010).

Clinical enhancement. High fidelity simulation provides a means to engage students in situations they may not encounter with real patients. For example, HFHS scenarios can begin with very basic objectives to promote student success and self-confidence and gradually build in complexity exposing the learner to an interactive experience with many variables (Garrett, MacPhee, & Jackson, 2010; Mastrian et al., 2011). Engaging and guiding students in this manner is supported by Transformative Learning Theory. As students reflect on how they interpret and problem-solve challenging situations, perspective transformation is facilitated (Parker & Myrick, 2010).

Using HFHS also permits faculty to present patient diagnoses and problems which may be unavailable in the clinical setting. The scenarios can be adapted to teach specific competencies and interventions which students may not otherwise have the opportunity to encounter. Examples of these situations may include the effects of altered fluid volume on elderly, pediatric, and pregnant patients, or the effects of significant blood loss and what happens when correct and incorrect types of replacement fluids are administered (Nehring & Lashley, 2010). High fidelity simulators can be programmed to respond to errors in judgment, skill, and medication administration, allowing students to see the consequences of such errors (Gates et al., 2012). In addition, social and cultural diversity may be introduced into the scenarios helping students learn to consider these important aspects in patient care, patient education, and home care follow-up (Campbell & Daley, 2013).

In a review of recent literature comparing the effectiveness of HFHS to clinical rotations, Richardson and Claman (2014) found no significant differences in student learning outcomes related to clinical nursing skills and critical thinking competency. Jeffries (2009) posed the following question which remains unanswered: "what do students need in real-world clinical practice that educators cannot simulate in an authentic, simulated environment using high fidelity simulators, standardized patients, and other types of simulations experiences?" (p. 71). With the increasing integration of HFHS in the nursing curriculum, "nursing educators have begun to use theoretical frameworks to organize the teaching and learning experiences" (Nehring & Lashley, 2010, p. 27).

Learning Theories as the Framework for HFHS in Nursing

Educators have expressed concerns regarding how well HFHS helps prelicensure students acquire and integrate the knowledge, skills, and critical thinking to prepare them for professional practice (National Council of State Boards of Nursing [NCSBN], 2009). A number of studies have been conducted using learning theories believed to be a suitable basis for implementing HFHS. Some of the major learning theories used by educators to support the practice of HFHS in the nursing curriculum are discussed here.

Novice to expert. One theory frequently used in nursing applications is Benner's (1984) Novice to Expert Theory which described the stages of knowledge growth and clinical competence experienced by nurses (Dumchin, 2010). Benner (1984) identified five levels of proficiency for nurses: novice, advanced beginner, competent, proficient, and expert. Moving from novice to expert involves the transition from rule-governed behavior to intuitive, contextually determined behavior, based on experience (Dumchin, 2010). Along the continuum of expertise, nursing students should reach the level of advanced beginner by the time they graduate. The nurse continues to acquire mastery and experience after graduation, progressing toward becoming an expert professional (Benner, 1984). High fidelity simulation is a useful tool to facilitate the process by which nursing students learn to reflect on clinical experience and classroom learning in order to achieve higher levels of expertise in nursing practice (Kilmon et al., 2010).

Self-efficacy. Self-efficacy is described as a person's perception regarding how well they are prepared to succeed at accomplishing a task. People with a stronger sense of self-efficacy tend to set higher goals for themselves and view obstacles as challenges rather than insurmountable barriers (Bandura, 1986). Nursing students with higher self-

confidence tend to use their clinical skills more often (NCSBN, 2009). Shinnick and Woo (2014) studied the effects of HFHS on self-efficacy and knowledge in prelicensure nursing students. Two groups of nursing students were included in the study after successfully completing instruction in the care of patients with heart failure. Using a pretest and posttest experimental design, one student group participated in HFHS scenarios related to heart failure but the control group did not. Although a correlation between self-efficacy and knowledge was not found, study results showed significant gains in self-efficacy and knowledge for the experimental group only (Shinnick & Woo, 2014).

Mastery and situated learning. In an effort to evaluate the effects of simulation on knowledge retention, Elfrink, Kirkpatrick, Nininger, and Schubert (2010) used situated learning and mastery learning as the pedagogical framework. Situated learning suggests knowledge and skills are best learned in context (Khan et al., 2011). This strategy is characteristic of nursing education where students learn from "particular situations of specific patients" (Benner et al., 2010, p. 41). A situated learning episode involves four elements: content, context, community, and participation (Elfrink, Kirkpatrick, Nininger, & Schubert, 2010). Having students engage in HFHS addresses all of these elements by presenting learners with an "opportunity to analyze and solve (content) a clinical problem (context) within a shared learning environment (community) in which knowledge is partially constructed and communicated among the learners (participation)" (Elfrink et al., 2010, p. 98).

Mastery learning strategies help students focus on what is to be learned, uses guided practice to help students successfully apply what is learned, and summarizes the

learning experience and future expectations (Elfrink et al., 2010). With HFHS, students practice the application of relevant knowledge and skills within the parameters of the learning scenario. Instructors provide constructive feedback through debriefing, as well as opportunities for corrective practice and critical reflection (Dreifuerst, 2012). Repetitive practice facilitates mastery and the development of self-efficacy (NCSBN, 2009).

Experiential Learning Theory. Experiential Learning Theory has been used as the framework for research related to HFHS learning in nursing education. Kolb (1984) described learning as a "continuous process grounded in experience" (p. 28). Knowledge is acquired as the individual interacts with his or her environment, assimilating experiences into existing cognitive structures. The process of learning through experience brings about changes in the way a person thinks and behaves (Lisko & O'Dell, 2010). Cannon and Boswell (2012) further asserted when "individuals take an active part in the learning process, genuine, meaningful, and long-lasting learning occurs" (p. 191). The learner first has a concrete experience. The experience is followed by a period of reflection which adds perspective and significance. Abstract conceptualizations help the learner to consider the experience with regard to previous knowledge. The learner eventually applies what was learned to real situations and experiments with the knowledge (Cant & Cooper, 2011). Kolb (1984) contended all learning is actually re-learning and emphasizes adaptation rather than outcome.

Four learning styles were identified by Kolb (1984) related to the four learning competencies described in his work. These competencies include divergers, assimilators, convergers, and accommodators. Divergers prefer concrete, people-oriented learning

experiences and are capable of generating ideas and assessing situations from different perspectives (Kilmon et al., 2010; Kolb, 1984). Assimilators prefer symbolic learning experiences and are adept at conceptualizing experiences (Kilmon et al., 2010; Kolb, 1984). Convergers are good at problem-solving and are inclined to test theories, preferring situations with a single correct answer (Kilmon et al., 2010; Kolb, 1984). Accommodators seek new experiences, carry out plans, and have a tendency to be more instinctual and less analytical (Kilmon et al., 2010; Kolb, 1984). Kolb (1984) asserted there tends to be congruency between the learning style of persons within a discipline and the environmental nature of the discipline. For example, individuals in human service disciplines such as nursing tend to have concrete learning styles, diverger and accommodator. The learning environments in these disciplines are more prone to be concrete and affective in nature (Kolb, 1984).

Experiential Learning Theory was the basis of a study on the development of critical thinking skills in nursing students (Lisko & O'Dell, 2010). In this study, teaching strategies and enhanced learning opportunities were selected to incorporate the learning cycle and learning styles identified by Kolb (1984). Moderate fidelity simulation scenarios were used to evaluate critical thinking and the integration of classroom, laboratory, and clinical experiences. Study findings supported scenario-based activities (simulation) as a method to integrate learning and facilitate the development of critical thinking (Lisko & O'Dell, 2010).

Richardson and Claman (2014) conducted an extensive literature review framed by the theatre of high fidelity simulation (THFS) education model (Roberts & Greene, 2010). The THFS model is based on Kolb's Experiential Learning Theory, the Dreyfus

Model of skill acquisition, and Benner's Theory of Novice to Expert (Richardson & Claman, 2014). A summary of the findings indicated skills and knowledge acquired through HFHS experiences transfer to the clinical environment and enhance practice through improved conceptual understanding and critical thinking. Simulation facilitates experiential learning by providing an environment for the process of learning to occur. The HFHS patient scenarios present opportunities for problem-solving and reflective thinking, and challenges students to consider how he or she may respond differently in a similar real-life situation (Rutherford-Hemming, 2010).

Transformative Learning Theory. Mezirow (2000) contended adult learners have perspectives which are acquired through experience and shaped by context. Perspectives, or frames of reference, include the assumptions, values, and conditioned responses by which adults interpret their world. Transformative learning involves processes which bring about change in one's frames of reference (Mezirow, 2000). Perspective transformation usually results from a disorienting dilemma which challenges one's frames of reference. This can be brought on by a major life transition or over time by the accumulation of transformations in the meaning schemes (Mezirow, 2000). Less intense situations, such as those created by teachers, can also promote transformation (Parker & Myrick, 2010).

In addition to experience, rational discourse and the role of critical reflection of one's assumptions and beliefs are emphasized in the process which leads to perspective transformation (Mezirow, 2000; Parker & Myrick, 2010). Transformative learning requires dialogue to interpret and validate the meaning of experiences, and to filter the communication through our frames of reference (Mezirow, 2000). As expressed by

Mezirow (2000) “transformative learning refers to transforming a problematic frame of reference to make it more dependable in our adult life by generating opinions and interpretations that are more justified. We become critically reflective of those beliefs that become problematic” (p. 20). The same processes are involved when an individual attempts to integrate new information into their existing frames of reference.

High fidelity simulation offers challenging patient situations which require clinical judgment skills, exposing students to disorienting experiences (Parker & Myrick, 2010). The faculty-led debriefing sessions, which follow HFHS, encourage students to engage in critical reflection by reassessing the problems presented in the scenario and analyzing the way they solved them. It gives students an opportunity to pause and consider their thought processes, responses and performance, and to learn from peers and instructors (Smith, Witt, Klaassen, Zimmerman, & Cheng, 2012). Debriefing should provide students with a non-threatening environment to develop reflective thinking skills and express their feelings about the experiences (Lavoie, Pepin, & Boyer, 2013; Traynor et al., 2010). This sharing, or social discourse, facilitates the emergence of collective experiential knowledge which encourages reflection (Parker & Myrick, 2010). Mezirow (2000) concluded, “Autonomous thinking may be understood as a competence acquired through transformative learning” (p. 28). Well planned and debriefed HFHS experiences can play an important role in enabling students to become autonomous and empowered thinkers (Parker & Myrick, 2010).

Transformative Learning Theory was used to frame a recent study related to teaching legal and ethical issues effectively to undergraduate nursing students. The study emerged from faculty concerns over students failing to recognize the importance of these

concepts in their clinical practice (Smith et al., 2012). Faculty designed an HFHS scenario embedded with elements such as advanced directives, delegation of care, cultural diversity, and conflict management. Based on assessment and the feedback of students and faculty, HFHS afforded the best transformational learning experience as compared to in-person or online case-study discussions. According to Smith et al. (2012) HFHS "provided an effective disarming dilemma, a more personal experience, and the opportunity to reflect on and discuss their experiences in the debriefing session" (p. 396).

Responding to a call for reform in nursing and healthcare education by the Institute of Medicine and the National League for Nursing, an international study was conducted to identify innovative pedagogies in nursing education. Transformative Learning Theory provided the theoretical basis for this qualitative study. More than half of the 946 respondents reported critical thinking, knowledge acquisition, and independent learning as important outcomes for using more innovative strategies. Along with case-based learning and storytelling, simulation was considered to be the most innovative strategies used by the respondents (Brown, Kirkpatrick, Greer, Matthias, & Swanson, 2009).

Experiences with HFHS in Nursing Education

Simulation is defined as a method to replicate the essential aspects of reality in order to strengthen integration of knowledge, skill, and critical thinking in learners (Lee, Lee, Wong, Tsang, & Li, 2010). In nursing, simulation at any fidelity "may be defined as techniques used to represent nursing processes and actions in an educational context" (Schiavenato, 2009, p. 389). In the subsequent portions of this chapter, implementation strategies, practices, and outcomes related to HFHS in nursing curricula were presented.

Current practices and regulations. A systematic review by Shinnick et al. (2011) examining HFHS in prelicensure nursing education reported the existence of a gap between the current practice expectations of nurses and the education students receive to prepare them to enter professional practice (Shinnick et al., 2011). The study also identified a need for greater integration between classroom and clinical instruction. Shinnick et al. (2011) suggested HFHS may be a useful method to bridge the gaps in instruction and to better prepare students for nursing practice. Although efforts have been made to integrate simulation across the nursing curriculum, Schiavenato (2009) contended the way HFHS has been applied as a teaching tool in nursing education has been "piecemealed and lacking a comprehensive approach" (p. 392).

In undergraduate nursing curriculum, HFHS is most commonly introduced in courses which have a clinical component although concepts in nonclinical courses may be simulated as well. Instructors may choose to take advantage of HFHS by convening class in the simulation laboratory or by bringing a simulator to the classroom to assist with teaching difficult or complex material (Nehring & Lashley, 2010). Nursing students frequently become acquainted with HFHS when learning to perform physical assessment. The simulators permit students to identify abnormal finding such as wheezes in the lungs or hypertension in the context of a patient situation. These beginning scenarios often precede the students' initial clinical experience to help prepare for the first patient encounters and lessen anxiety (Nehring & Lashley, 2010). As students advance through the curriculum scenarios can increase in scope and complexity to facilitate teaching critical concepts (Nehring & Lashley, 2010).

Many nursing programs devote clinical time or lab hours to HFHS. Instructors frequently assign clinical groups to spend an entire day in the simulation laboratory as a substitute to spending time at a clinical site. Other common practices include holding clinical post-conferences in the simulation lab or assigning student groups to specific blocks of time to rotate through prepared HFHS stations (Nehring & Lashley, 2010). State board of nursing guidelines, if available, must be followed when nursing programs plan to substitute HFHS for clinical time in a patient care setting.

Members of the NCSBN were surveyed to ascertain current regulations and practices within each state or jurisdiction for using HFHS to replace clinical time in prelicensure nursing programs. As reported by Hayden, Smiley, and Gross (2014), 38 State Boards of Nursing did not address the amount of clinical time which may be substituted with HFHS, and of the remaining NCSBN members, eight states did not permit simulation to replace clinical hours. Other states with published guidelines for using HFHS allow replacing up to 25% of clinical time with simulation, make decisions on a case-by-case basis, or specify different practices between RN and LPN programs (Hayden et al., 2014). For example, one member board of nursing allowed their practical nursing programs to substitute HFHS for up to 75% of clinical hours in maternal-newborn and pediatric courses only (Hayden et al., 2014).

The NCSBN also completed a landmark study investigating the effects of using HFHS to substitute for clinical hours in prelicensure nursing programs. In this nationwide, longitudinal research conducted from 2009 to 2014, nursing students were assigned to three study groups based on the amount of clinical time substituted by HFHS (Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). The control group

spent no more than 10% of regular clinical time in simulation; in group two, 25% of traditional clinical time was substituted with HFHS; and group three spent 50% of traditional clinical time in HFHS (Hayden et al., 2014). Nursing students involved in the study were followed as they graduated, took licensing exams, and entered nursing careers to assess their preparation and competence for professional practice. Findings of the study present significant evidence to support, in prelicensure nursing programs, all clinical courses substituting up to 50% of clinical time with HFHS were as effective as courses using only traditional clinical placement in preparing students for professional nursing practice (Hayden et al., 2014). This information is valuable for both nurse educators and nursing boards to support decisions guiding the substitution of clinical hours with HFHS. When implemented using best practices and integrated with clinical activities, HFHS has been shown to be as effective as clinical experience alone (Hayden et al., 2014).

Other HFHS practices include using interdisciplinary scenarios and incorporating standardized patients. Interdisciplinary simulation involves a team of individuals from different healthcare practice disciplines in situations designed to improve communication and collaboration, which has been shown to have positive impact on patient care outcomes (Nehring & Lashley, 2010). Standardized patients are defined as individuals trained to portray a patient with a variety of specific health conditions (Sideras et al., 2013). Standardized patients are commonly used to teach patient interviewing skills, therapeutic interventions with mental health or substance abuse patients, patient education, or to present ethical and legal situations (Wilson & Rockstraw, 2012). When

available, theater students are often interested in the opportunities and challenges of becoming standardized patients for simulation (Sideras et al., 2013).

Debriefing and reflection. The debriefing session at the conclusion of HFHS scenarios is considered an essential component of the clinical simulation experience (Cannon & Boswell, 2012). Debriefing should take place as soon as possible following HFHS when information and emotions are fresh (Burke & Mancuso, 2012; Mastrian et al., 2011; Nehring & Lashley, 2010). The process offers a forum for discussion, reflection, and further learning (Decker et al., 2013; Traynor et al., 2010) which requires time to thoroughly accomplish. Some recommendations embrace planning for the debriefing session to last two or three times longer than the actual scenario (Lavoie et al., 2013; Middleton, 2012). Reflective thinking is considered central to developing clinical judgment. Nehring and Lashley (2010) noted:

> As a matter of fact, learners who question what they could do differently in the future tend to be better practitioners. The reflective thought process, as encouraged during debriefing, might focus not only on the pathophysiology of the condition, the interventions applied, and the outcomes of those interventions, but also on students' performance as both individuals and team members. (p. 373)

Debriefing should also provide students with a safe environment to express their feelings about the experience (Nehring & Lashley, 2010). Burke and Mancuso (2012) suggested students should document in the simulated patient record or reflective journal after HFHS to promote reflection.

There are a number of techniques and models recommended for debriefing. First, the facilitator should be a faculty member who is adept at asking appropriate questions to

stimulate students to think and analyze on a deeper level (Nehring & Lashley, 2010). Decker et al. (2013) recommended facilitators should be knowledgeable and skilled in debriefing methods to assist students in the learning process while preserving self-esteem (Burke & Mancuso, 2012). More importantly, competent facilitators are needed to avoid causing emotional harm to students who are vulnerable regarding their performance (Nehring & Lashley, 2010).

A common approach to debriefing consists of video-recording students engaged in HFHS and having them watch a replay of the events. This practice promotes self-assessment and allows students to see what actually happened, which may be different from what the student remembered or thought had happened (Nehring & Lashley, 2010). In a study by Elfrink et al. (2009), students described the practice of video-recording as very stressful and unproductive. The students reported being distracted during the scenario by the awareness of being video-recorded and found watching the playback during debriefing to be negative (Elfrink et al., 2009). However, Garrett et al. (2010) found while students may have experienced anxiety with being video-recorded, they became accustomed to it over time.

Other debriefing practices include having two student groups with each scenario. One group is interactively engaged in the scenario while the other group acts as reviewers. The participants learn from different perspectives during the activity (Mastrian et al., 2011). The two groups are debriefed together at the end of the scenario providing an opportunity for faculty to include viewpoints of both groups in helping students learn to think like a nurse (Cannon & Boswell, 2012).

Dreifuerst (2012) suggested a structured debriefing method using guided reflection to support the development of clinical reasoning in nursing students. Clinical reasoning is described as a higher level skill compared to critical thinking (Dreifuerst, 2012). Debriefing for Meaningful Learning (DML) is a systematic process involving six components: engage, explore, explain, elaborate, evaluate, and extend. The process begins with releasing emotions from the HFHS experience and continues through analysis and evaluation of the experience. Using DML as a method of structured debriefing can facilitate reflecting-in-action, thinking-like-a-nurse, reflecting-on-action, and reflecting-beyond-action behaviors in nursing students as demonstrated by the development of clinical reasoning (Dreifuerst, 2012).

Some techniques for effective debriefing were identified by Nehring and Lashley (2010). These included: (a) asking open-ended questions to stimulate thinking; (b) being aware of nonverbal behaviors and tone of voice to maintain a safe, nonjudgmental environment; (c) allowing time for students to think before answering questions; (d) giving positive feedback, pointing out what was done well; and (e) assisting peers in providing constructive criticism. The facilitator should avoid asking too many questions or answering their own questions. Faculty members frequently revert to teaching and correcting rather than encouraging students to take responsibility for their own learning. As Knowles (1984) asserted, adults learn best what they are able to discover for themselves. In addition, debriefing should not be a time used for student evaluation (Nehring & Lashley, 2010). Instead, the goal should be to see events “through the learner’s mind’s eye” (Middleton, 2012, p. 28) and help them cope with emotions and integrate the meaning of the experience (Mastrian et al., 2011).

Regardless of the preferred technique, it is essential for debriefing to be facilitated by faculty otherwise students will debrief themselves either alone or by talking with peers. This informal debriefing may be detrimental in terms of learning incorrectly or could result in harmful thinking (Nehring & Lashley, 2010). By helping students express thoughts, feelings, motivation behind action, and the result of actions, debriefing can be a venue where students process the simulation experience in a manner which promotes positive learning (Nehring & Lashley, 2010).

Student learning outcomes. In recent years, a number of studies have been conducted to measure student learning with HFHS in nursing education. Cant and Cooper (2010) conducted a systematic review of studies published between 1999 and 2009 related to assessment of knowledge, critical thinking, confidence, or student satisfaction with HFHS in the nursing curriculum. Of the 12 studies included in the review, all showed HFHS to be a valid instructional method. However, only half of the studies demonstrated additional gains in knowledge, critical thinking, and confidence using HFHS over a control group using traditional teaching methods (Cant & Cooper, 2010).

Knowledge increase and retention. Much of the published research reporting knowledge gains in nursing students related to HFHS have been based on student perceptions and self-reports (Gates et al., 2012). There has been little research evidence to measurably demonstrate the effects of HFHS on knowledge acquisition in nursing students (Gates et al., 2012; Nehring & Lashley, 2010). However, a few studies designed to investigate the relationship between simulation and knowledge gains have been published in recent years (Gates et al., 2012). In a study to assess knowledge gain and

retention related to HFHS, nursing students were given a pretest and posttest associated with a simulation activity (Elfrink et al., 2010). On the course final examination, students were given different questions related to the simulation content. Student scores on the simulation posttest showed a statistically significant improvement over pretest scores (Elfrink et al., 2010). In addition, the researchers found 93% of students in the second-year medical-surgical nursing course and 50% of students in the third-year high acuity, critical care nursing course retained knowledge gains from their HFHS experience posttests to the final course examination (Elfrink et al., 2010).

In other research, Gates et al. (2012) conducted a study involving students in their first medical-surgical nursing course to evaluate the effects of HFHS on acquisition of knowledge. Nursing students were randomly assigned to simulation and control groups. HFHS scenarios were conducted depicting two different course topics studied earlier in the semester Gates et al. (2012). Scores on both of the content specific post-simulation examinations were more than 8% higher for students who had participated in the simulation activities as compared with the control group (Gates et al., 2012). On a traditional grading scale, this difference represents an increase of almost a full letter grade (Gates et al., 2012).

A similar study was conducted over a period of four semesters with students enrolled in a growing family nursing course. In each semester the students showed a statistically significant increase in knowledge following the HFHS experiences as demonstrated by their pretest and posttest scores (Lewis & Ciak, 2011). As HFHS becomes a more common element in undergraduate nursing programs, these findings are crucial in demonstrating a positive correlation to learning outcomes. This type of

evidence is necessary to justify the cost associated with establishing HFHS labs and expanding the effective use of simulation in nursing education (Gates et al., 2012).

Critical thinking and clinical reasoning. Critical thinking is frequently defined in terms of cognitive attributes engaged in purposeful contemplation (Fero et al., 2010). These attributes support the ability to analyze and comprehend relevant information in order to recognize the existence and nature of a problem, then determine a logical course of action (Fero et al., 2010). Even as new graduates, nurses are expected to think critically and intervene appropriately, and continue developing these competencies over the course of their professional career (Shinnick et al., 2011). Kaddoura (2010) studied the perception of critical thinking in new nursing graduates preparing to work in intensive care, and the study showed HFHS helps nurses integrate theory into clinical practice which is essential to confidence building and critical thinking behaviors. Kaddoura (2010) believed traditional nursing education should include HFHS to provide a safe environment for students to think critically, solve complex problems, and learn to make sound clinical decisions.

Goodstone et al. (2013) conducted a study to compare the effects of HFHS and case-study activities on critical thinking development in nursing students using the Health Studies Reasoning Test (HSRT). The HSRT is a critical thinking test for novice health professionals (Goodstone et al., 2013). The study found a statistically significant increase in critical thinking scores over time for students involved in HFHS as well as those using case studies as a type of simulation (Goodstone et al., 2013). However, the scores did not provide support for either method being a superior teaching strategy (Goodstone et al., 2013). A study was conducted by Fero et al. (2010) using the

California Critical Thinking Disposition Inventory (CCTDI) to explore the relationship between critical thinking and performance in HFHS situations. The CCTDI is an instrument designed to measure critical thinking habits of mind and is shown to be reliable with a median alpha coefficient of 0.9 (Fero et al., 2010). The study found students with strong critical thinking disposition scores were more likely to successfully meet HFHS performance objectives (Fero et al., 2010).

Among the few studies attempting to assess a measureable relationship between HFHS and the development of critical thinking, the findings were mixed or inconclusive. Despite the lack of quantitative evidence substantiating the role of HFHS in critical thinking development, HFHS continues to be considered a beneficial tool because students are challenged and actively engaged in problem-solving situations (Shinnick et al., 2011). These characteristics of HFHS provide the necessary elements for a transformational learning experience (Smith et al., 2012).

Knowledge transfer and confidence. Nursing students traditionally learn theory and patient care techniques through classroom and practice in the skills laboratory (Benner et al., 2010). Eventually, students are introduced to a clinical setting to begin the transfer of knowledge and skills to the care of patients (Kirkman, 2013). The complexities of today's healthcare system demand nurses with confidence in their skills and clinical judgment. High fidelity simulation has been identified as a means to bridge the gap between classroom learning and the clinical setting (Goodstone et al., 2013; Yuan et al., 2011).

Kirkman (2013) studied nursing students' ability to transfer learning from classroom and HFHS laboratory to the clinical setting. Students were evaluated while

conducting respiratory assessments on patients in the clinical setting before the respiratory assessment lecture, after lecture but before HFHS experience, and after HFHS experience with an asthma patient scenario (Kirkman, 2013). The findings showed students were able to transfer knowledge and skills from the HFHS experience to the patient care setting (Kirkman, 2013). In a systematic review, Shinnick et al. (2011) reported a number of qualitative studies with findings of positive perceptions by faculty and students regarding the value of simulation related to transfer of knowledge and skills.

As a strategy for facilitating greater confidence and competence in nursing students, Shinnick and Woo (2014) reported a significant increase in student confidence and knowledge in the care of patients with heart failure following HFHS. A systematic review conducted by Yuan et al. (2011) reported on 24 studies regarding the effects of HFHS on confidence and competence. An increase in student confidence and competence following simulation was reported in the studies using quasi-experimental, descriptive or qualitative design. There were mixed findings in the remaining studies either due to research outcomes or the strength of the design (Yuan et al., 2011). The authors concluded there was insufficient evidence to support HFHS as an adjunct in enhancing confidence in nursing students (Yuan et al., 2011).

Each of the studies cited expressed the need for larger, more robust investigation in the area of student learning outcomes related to HFHS (Goodstone et al., 2013; Kirkman, 2013; Shinnick et al., 2011; Shinnick & Woo, 2014; Yuan et al., 2011). Specific components such as student preparation for the scenario and debriefing methods have been recognized as best practices for using HFHS to enhance instruction; however,

no standardized curriculum or method of student evaluation has been adopted for the integration of HFHS (Elfrink et al., 2010; Garrett et al., 2010; Shinnick et al., 2011).

Student perceptions and satisfaction. Students respond to HFHS based on a number of factors from individual learning styles to the manner in which simulation experiences are implemented. Fountain and Alfred (2009) examined learning styles in nursing students related to satisfaction with the use of HFHS. The study found a significant correlation between students with social and solitary learning style preferences and satisfaction with simulation experiences. Students with a social learning preference learned through group discussion and problem-solving, and solitary learners benefitted by observing and reflecting (Fountain & Alfred, 2009).

Lisko and O'Dell (2010) studied the use of HFHS for conducting nursing student performance evaluations. The study revealed students believed the scenario-based evaluations helped them to integrate learning between the classroom, skills laboratory, and clinical practice. Students reported being surprised by what they actually knew and were able to apply during critical thinking situations (Lisko & O'Dell, 2010). Other students who had used memorization to learn material showed difficulty with the simulation scenarios but gained a better awareness of their learning deficits (Lisko & O'Dell, 2010).

A study was conducted by Elfrink et al. (2009) to discover ways to improve the HFHS experience for prelicensure nursing students. Findings from the focus groups indicated students felt anxious and unsure how to proceed at the start of scenario (Elfrink et al., 2009). In particular, the student in the role of primary nurse reported feeling singled out (Elfrink et al., 2009). Students also felt being video-recorded during the

scenario was stressful and distracted them from focusing on the situation (Elfrink et al., 2009). In addition, the practice of repeating a scenario was viewed as not helpful and wasted time which would be better spent in debriefing (Elfrink et al., 2009). After considering student feedback, several changes were implemented to simulation activities including eliminating video-recording and repeating scenarios (Elfrink et al., 2009). The faculty also added a group planning session following report on the simulated patient for the purpose of team collaboration and preparing to provide appropriate care (Elfrink et al., 2009). These changes resulted in students reporting less anxiety and feeling singled out, enhanced learning, and greater ownership of the nursing plan of care for the simulation experience (Elfrink et al., 2009). After implementing these changes, faculty were eventually able to reinstitute video-recording to improve the debriefing process (Elfrink et al., 2009). This study provides an excellent example of how the implementation process can impact the learning experience as well as students' perception of the benefit of HFHS in preparing them for professional practice.

Considerations for faculty and the nursing program. The literature is replete with research and experience supporting the implementation of HFHS. However, faculty face many challenges in making the implementation successful (Brewer, 2011). Bringing HFHS to a nursing curriculum is a significant undertaking. It obligates substantial financial resources for equipment, facilities, and an ongoing commitment to faculty training, planning learning activities, and evaluating student performance (Halstead et al., 2011). Simulation is a time intensive teaching strategy which must be done well to be effective (Parsh, 2010; Shinnick et al., 2011). Considering the shortage of appropriate clinical sites along with the time and financial investments in HFHS, efforts to maximize

the effectiveness of simulation activities is essential. In many instances, however, instructors are required to develop their own scenarios even when they lack the necessary training and expertise related to the equipment and simulation processes (Dowie, 2011).

Recognizing the challenges encountered by nursing faculty, manufacturers of high fidelity simulators began developing comprehensive scenario packages to facilitate the implementation of HFHS (Nehring & Lashley, 2010). These packages were developed in consultation with the National League for Nursing Accreditation Commission and the American Associate of Colleges of Nursing (Nehring & Lashley, 2010). The prepared scenarios reduce the amount of faculty preparation work considerably and can be adapted to the learning level of the student (Nehring & Lashley, 2010).

Well planned and executed HFHS experiences should render faculty involvement unnecessary during the active scenario except to act out supportive roles such as ancillary health personnel or being the voice of the hospital operator or physician over the phone. Scenarios should lead to either resolution or an adverse outcome which permits students to make errors and learn from the consequences of their decisions (Parsh, 2010; Wane & Lotz, 2013). The process of transformative learning commences when the individual confronts a situation which challenges their perspectives and initiates critical thinking behaviors (Mezirow, 2000). Permitting students to actively engage in problem-solving situations encourages autonomous thinking (Parker & Myrick, 2010).

Facilitated social discourse during the debriefing process enables students to reflect on thought processes and actions to integrate concepts into their frames of reference (Smith et al., 2012). Brydges, Carnahan, Rose, and Dubrowski (2010) asserted, “there is a fine balance between student and educator involvement in the learning

process" (p. 1842). When faculty members are too involved during the HFHS scenario, instruction becomes teacher-centered. In such an environment student learning is more passive and the depths of conceptual learning may be diminished (Brydges et al., 2010).

Horsley and Wambach (2015) studied the effect of faculty presence on anxiety, self-confidence, clinical performance, and student satisfaction in the nursing simulation lab. Results of this quasi-experimental study showed faculty presence in the simulation lab during summative evaluations led to an increased level of anxiety in students (Horsley & Wambach, 2015). Study outcomes provide partial support for encouraging faculty to position themselves in a control room or remote viewing location away from student view to avoid increasing student anxiety levels (Horsley & Wambach, 2015).

Preparing students for the simulation experience is essential to fully capitalize on the advantages of HFHS. Scaffolding is an approach where instructors provide support as students learn new skills, then permits the learner more autonomy as skill and confidence are gained (Mastrian et al., 2011). Instructor support should be appropriate for learning needs, sequenced with increasing complexity, and offer assistance only when required to navigate difficulties (Mastrian et al., 2011). Learners should be empowered to continually construct and refine their knowledge base by considering new situations and revising existing frames of reference (Mastrian et al., 2011), a process congruent with Transformative Learning Theory (Mezirow, 2000).

Mastrian et al. (2012) recommended scaffolding to prepare and enable novices to function in complex situations. Support for HFHS may be in the form of providing adequate orientation and clearly defining instructor expectations which may include arriving dressed in clinical attire, adhering to healthcare privacy standards, and

suspension of disbelief (Mastrian et al., 2011). In addition, strategies may include providing pre-simulation assignments conducive to fostering confidence and self-efficacy, and faculty skilled in following accepted debriefing practices (Brewer, 2011; Decker et al., 2013; Mastrian et al., 2011). Mastrian et al. (2011) contended, "Students may become frustrated in a simulation that does not contain adequate scaffolding" (p. 196).

To optimize the student HFHS experience, instructors should first conduct a pre-training analysis of the problem to be simulated (Guimond, Sole, & Salas, 2011). This activity helps faculty identify the desired knowledge, skills, and attitudes for students to achieve, and assists in providing a more targeted and intentional experience (Guimond et al., 2011). Important strategies to maximize student learning include pre-simulation preparation (Mastrian et al., 2011) and collaboration (Cannon & Boswell, 2012). Materials to assist students in a general topic review should be developed and distributed prior to the HFHS session (Mastrian et al., 2011). Students prepare by completing the necessary reading, and pre-simulation written assignments (Brewer, 2011). In addition, permitting students to engage in a planning session following the initial simulated patient report lessened anxiety, promoted collaboration, and increased group ownership in the plan of care (Cannon & Boswell, 2012; Elfrink et al., 2009).

Mastrian et al. (2011) identified two main reasons why HFHS integration fails to gain faculty acceptance. These situations include having a single member of the teaching faculty assume responsibility "for all aspects of the lab, including scenario development and delivery of all content areas, or each member of the faculty is responsible for developing and delivering his or her own content" (Mastrian et al., 2009, p. 220). A

simulation lab coordinator or specialist was suggested as an important way to provide faculty support and strengthen the integration process. The specialist is someone knowledgeable of the simulation equipment and processes, and whose primary role is to work closely with instructors to develop or modify scenarios (Mastrian et al., 2011). The simulation specialist should be permitted the time necessary to focus on integration of the simulation program (Nehring & Lashley, 2010).

High fidelity simulation activities can provide a venue for students to practice patient care skills and develop critical thinking ability in a safe environment (Nickerson & Pollard, 2010). The increase in acquisition of HFHS equipment across the country is acknowledged, however the initial purchase cost, facility, and maintenance are only a part of the investment (Brewer 2011). There are ongoing costs related to warranty, supplies, and training (Nehring & Lashley, 2010). Halstead et al. (2011) emphasized the need for development and support of nursing faculty in their efforts to integrate simulations throughout the curriculum. One recommendation to address the issues of resources and practice is the establishment of partnerships between education programs and provider agencies for the purpose of educator collaboration and development (Halstead et al., 2011; Richardson & Claman, 2014). Senger, Stapleton, and Gorski (2012) described the development of an HFHS partnership between a community hospital and university nursing program to improve the competency education for students and hospital staff. Despite challenges in scheduling and sharing space and supplies, this collaboration resulted in several advantages related to cost and workload efficiency of the faculty and hospital educators (Senger et al., 2012).

Summary

A review of current literature reveals numerous studies focused on HFHS in nursing education. Simulation can be an effective teaching tool and may have some advantages over other methods. Research outcomes may vary, but HFHS continues to be regarded as a useful strategy to enable nurses to integrate and apply knowledge in a safe environment (Cant & Cooper, 2010).

A definition of simulation and a description of the different simulator types and characteristics were provided in this chapter. Patient simulators are categorized in three basic levels of fidelity, which represents the degree of realism the simulator is capable of producing. High fidelity simulators, such as are the focus of this research, are defined as computerized mannequins which provide human like responses to nursing interventions (Parker & Myrick, 2010). A search of relevant literature provided an overview of simulation in adult education from an historical perspective, including military, transportation, and healthcare. A number of factors were discussed related to the dramatic increase in HFHS in healthcare education generally and nursing education in particular.

Educators have used major learning theories as the framework for implementing HFHS in nursing. Several of these theories were presented along with the results of studies demonstrating application and suitability with simulation. Experiences with HFHS in nursing education were discussed including current implementation practices and state nursing board guidelines on substituting HFHS for clinical experience. Finally, experiences related to student acceptance, learning outcomes and faculty considerations were reviewed.

The methodology used to explore practices and perceptions concerning implementation of HFHS in nursing programs with curricula of two years or less in duration was described in Chapter Three. In Chapter Four, an analysis of the data collected through the study was provided. Study findings and conclusions were discussed in Chapter Five along with recommendations for future research.

Chapter Three: Methodology

The widespread acquisition of HFHS across the country is well documented. However, the institutional commitment of purchasing this technology often requires unanticipated additional work for faculty and, therefore, many times the simulators are not fully utilized (Schiavenato, 2009). Studies related to curriculum integration are few and provide little assistance for faculty in terms of recommendations for best practices (Brewer, 2011). In this chapter, the problem statement and purpose of the study are presented, and the research questions are restated. The research design and rationale for use are discussed. Study participants, inclusion criteria, and sampling procedures are identified along with data collection procedures which included individual interviews, focus group interviews, and observation of proceedings. In addition, procedures used to analyze data and interpret the findings are described.

Problem and Purpose Overview

As discussed in previous chapters, HFHS has increasingly become an accepted and valuable pedagogy in nursing education programs in recent years (Foronda et al., 2013; Rutherford-Hemming, 2012). Nursing instructors are often expected to incorporate HFHS learning activities into the curriculum without adequate support, preparation or confidence (Dowie, 2011). Research in the field of nursing has produced numerous studies involving HFHS over the last decade (Nehring & Lashley, 2010). However, few studies have provided useful recommendations for guiding the integration of this technology into the nursing curriculum. In addition, the available nursing research is limited to RN education programs; no studies were identified involving HFHS in LPN programs.

This study was conducted for the purpose of examining current practices for implementing HFHS learning activities in associate degree RN and LPN education programs. Information generated from this study may inform faculty in similar nursing programs regarding their instructional practices and may provide insights into the learning outcomes associated with simulation activities. Qualitative research focuses primarily on human perception and understanding (Stake, 2010). Therefore, a qualitative study approach was used to facilitate the exploration of faculty attitudes, perceptions, and practices toward using HFHS as an instructional strategy. The study also provided the opportunity to explore student perceptions regarding the value of HFHS activities in support of learning and preparation for clinical success. In addition, student perceptions of faculty practices in the simulation lab were examined.

Research questions. The following research questions provided the structure guiding data collection for this research study.

1. What key factors do nursing program directors report influence the use of HFHS as part of the nursing school curriculum?

2. According to nursing school personnel, what changes to the program curriculum have taken place to promote the integration of HFHS learning activities?

3. What are the perceptions of nursing faculty regarding HFHS as an instructional resource and influence on student learning outcomes?

4. What are the perceptions of nursing students regarding HFHS as a pedagogical strategy and the implementation practices experienced?

Research Design

The goals of nursing education programs are to prepare graduates to be successful in taking the national nursing licensure examination and become competent practitioners. The traditional education model of lecture, skills lab, and clinical experience has been altered by the introduction of HFHS (Nickerson & Pollard, 2010). A qualitative research design was determined to be the most appropriate way to answer the research questions which were concerned with perceptions. There was no value in measuring perceptions or relationships among variables with statistical methods such as those used in quantitative research (Creswell, 2014). Instead, there was an interest in exploring "how people interpret their experiences, how they construct their worlds, and what meaning they attribute to their experiences" (Merriam, 2009, p. 23).

There are several types of qualitative designs. In this research, a case study approach was used to gain a deeper understanding of the experiences related to HFHS in nursing education programs. Creswell (2013) referred to case study research as "a qualitative approach in which the investigator explores a real-life, contemporary bounded system (a case) or multiple bounded systems (cases) over time, through detailed, in-depth data collection involving multiple sources of information" (p. 97). The case study researcher does not merely record behavior, but attempts to ascertain why an individual behaves as he or she does and how a person responds to the environment (Ary, Jacobs, Sorensen, & Walker, 2014). This research study employed a single-case design using embedded units of analysis, as described by Yin (2014). Nursing education programs leading to an LPN or associate degree RN which use HFHS in the curriculum represented

the case for this study. The embedded units of analysis included at least one of each type of nursing program described.

Population and Sample

Participants for this study were identified using purposeful sampling (Creswell, 2013). This approach was an important consideration to assist the investigator in selecting the sites and individuals from which more could be understood about the research problem (Creswell, 2013). Conducting qualitative research usually requires data to be collected in the natural setting with the researcher going to the site, or sites, where study participants experience the problem being explored (Creswell, 2014). The selected nursing programs were geographically situated in two Midwestern states which provided reasonable accessibility for the researcher to conduct site visits.

The researcher visited official board of nursing websites for the two states where data would be collected to identify potential programs for inclusion in the study. A compilation of nursing schools, program types, board approval status, National Council Licensure Examination (NCLEX) pass rates, and contact information were readily available from the state boards of nursing. Associate degree RN and LPN programs incorporating HFHS in the curriculum with full approval from their respective state nursing boards were eligible for inclusion in the study. Full board approval ensures the nursing schools have: (a) adequately prepared faculty, (b) a curriculum review process, (c) student selection processes, and (d) an 80% or higher pass rate on the first attempt for graduates taking the NCLEX (Missouri Nurse Practice Act, 2012). Nursing programs with conditional or probationary status due to falling below the standards listed above were excluded from the study.

Using typical site sampling strategy (Merriam, 2009), four nursing schools were selected representing a combination of LPN, traditional associate degree RN, and LPN to RN bridge programs which use HFHS in the curriculum. Alternate programs were also identified in the event one or more schools declined to participate. Conducting interviews with program directors, nursing faculty, and student focus groups at the four programs involved 32 participants. Observation of students and faculty in HFHS and debriefing included 37 individuals. Data collection yielded a combined sample of 41 individuals who participated in the study.

Instrumentation

Data for this study were collected through interviews with program directors and nursing faculty, observations of students in HFHS activities, observation of students and faculty during debriefing sessions, and focus group interviews with students. A detailed description of each instrument can be found in the subsequent sections. Qualitative researchers gather and use data from more than one source, including interviews, observations, and document analysis (Creswell, 2014). Yin (2014) argued the use of multiple sources of evidence is a primary strength in case study data collection. These data collection practices facilitate triangulation, a strategy which enables the researcher to converge on emerging findings from multiple data sources (Creswell, 2013). Triangulation also promotes validity and reliability in qualitative research (Merriam, 2009).

Interview protocols. When conducting qualitative research in education, the most common form of data collection is accomplished through interviewing (Merriam, 2009). Data obtained through interviews contributed substantially to this study. The

researcher prepared interview questions for each type of participant. The interview protocols included a combination of structured and open-ended questions designed to elicit responses toward answering the research questions. The interview protocols provided for documentation of the date, time, and location code of the interviews, a pseudonym for the person interviewed, their position at the school, and provide space for the investigator to make notes (Creswell, 2013). All interviews were conducted in-person and video-recorded to facilitate accurate transcription. Interview questions were pilot-tested (Creswell, 2013) with nursing faculty from non-participating schools who were known to be familiar with HFHS activities, and necessary revisions were made prior to data collection. An interview protocol was developed piloted for nursing program directors (Appendix A). A separate interview protocol was developed and piloted for nursing faculty and personnel who engage students in HFHS situations (Appendix B).

According to Yin (2014), case study researchers are especially prone to preconceived ideas because they must understand the issues beforehand. The researcher for this this study came from the nursing profession and was familiar with HFHS in nursing education. Strategies used to reduce researcher bias included triangulation of data, inclusion of ideas contrary to the major themes, and reviewing preliminary findings with a critical colleague. These are also measures which increase validity and reliability (Stake, 2010).

Observation protocols. Observation is an important method for data collection in qualitative research (Creswell, 2013). Nursing students were observed while engaging in HFHS activities. High fidelity simulation laboratories frequently have an adjacent control room with a one-way mirror for operators and educators to manage the progress

of scenarios and evaluate student behaviors. The researcher assumed the role of complete observer during the sessions which, according to Merriam (2009), is a stance hidden from the group. To accomplish this stance, the investigator remained in the HFHS control room whenever possible.

An observation tool was used to record student interaction and patterns of communication during the learning scenario. Students and faculty were also observed during the debriefing session following the simulation. The researcher observed the interactions for patterns of guided social discourse and indications of student reflection (Parker & Myrick, 2010). The observation protocol (Appendix C) was used to document observations made during the learning scenario and debriefing process. The observation protocol was pilot-tested with students who were not involved in the study as they engaged in comparable HFHS and debriefing activities (Creswell, 2013). Results from the pilot-test indicated alterations were not indicated.

Focus group protocol. Student focus group interviews were conducted at each participating school of nursing. Four to eight nursing students at each school who had been observed in HFHS and debriefing were interviewed following those activities. Conducting focus group interviews provided greater insight into student perspective regarding HFHS (Ary et al., 2014). Focus group interviews were conducted in-person and video-recorded to facilitate accurate transcription. A separate protocol was prepared identifying the date, time, and location code of the focus group interview, with a specific set of questions prepared for the student groups (Appendix D). Focus group interview questions were piloted with nursing student volunteers familiar with HFHS who were not part of the study. Pilot-testing indicated revisions were unnecessary.

Validity

Qualitative validity refers to steps taken by the researcher to maintain consistency and accuracy in the way data are collected, analyzed, and interpreted, as well as in the manner findings are presented (Merriam, 2009). Creswell (2013) identified a number of strategies recognized as adding credibility to the findings in qualitative studies, and recommended researchers utilize at least two of them. The strategies employed in this study to increase validity included triangulation of different data sources to build coherent themes based on perspectives of the participants and presenting all pertinent information, including ideas contrary to the major theme(s) (Creswell, 2013). Presenting contrary findings is also a means to reduce researcher bias (Stake, 2010).

Reliability

Qualitative reliability reflects whether the findings of a study are consistent with the data collected (Merriam, 2009). Yin (2014) addressed the importance of procedural consistency for maintaining high validity and recommended establishing and documenting case study protocols as well as developing a detailed case study database. Triangulation is also recognized as a strategy to improve reliability of qualitative findings (Merriam, 2009). In addition to following documented protocols and maintaining an accurate database of information, the researcher pilot-tested all interview protocols and observation tools used in the study to ensure they would generate useful information for answering the research questions (Merriam, 2009). Study participants were offered the opportunity to review a draft of the transcribed interviews for the purpose of obtaining member checks for comment or correction (Stake, 2010). The participants indicated they

had no interest in reviewing drafts of the interview transcriptions. Instead, there was an interest expressed in the overall study findings.

Data Collection

After obtaining Institutional Review Board (IRB) approval from Lindenwood University (Appendix E), nursing program directors at the selected schools were contacted by telephone and informed of the study. The purpose of the study was explained emphasizing the intention of the research would not include any type of assessment regarding the quality of the nursing program or the HFHS activities. An invitation to participate was extended through email to each program director who indicated an interest in the study, and a copy of the institutional permission form (Appendix F) was attached to the message. Program directors were asked to sign, or have the appropriate person sign, and return the form indicating permission to proceed with participation and data collection.

Once institutional permissions were obtained, program directors were again contacted by email to arrange appointment dates for the researcher to collect data. Each nursing program had HFHS activities already scheduled for the entire semester. The researcher was able to plan appointments which permitted the interviews, observations, and student focus group interviews to be completed in a single visit to each location. Attached to the email messages was a list of interview topics for directors to consider and share with interested faculty prior to the site visit.

Data collection visits began at each site by meeting with the program director. The director was asked to sign the adult informed consent form (Appendix G) provided by Lindenwood University, which briefly described the study, the nature of participation,

identified any risk or benefit of participation, protection of privacy, and the right of individuals to refuse participation or to withdraw from the study at any time. After signing the informed consent form, each participating program director was interviewed to gain an understanding of resources, practices, concerns, and future plans related to including HFHS in the nursing program.

At each location, the nursing program director was the gatekeeper (Creswell, 2013) to access additional research data. With gatekeeper approval and assistance, purposeful sampling (Merriam, 2009) was again used to identify key faculty and other personnel to interview who would contribute to the study through sharing of experiences, and perceptions regarding the implementation of HFHS. Consent to participate was discussed with each participant and, after signing the informed consent form, selected faculty at each school were interviewed during site visits.

With approval from the gatekeeper (Creswell, 2013), students were observed while engaged in HFHS activities and post-simulation debriefing with faculty. Even though students were informed they were being observed, the researcher assumed the role of complete observer by remaining in the control room, or other discrete location, during active HFHS scenarios to avoid disrupting the natural flow of events. Creswell (2013) depicted the complete observer as being "neither seen nor noticed by the people under study" (p. 167). Observation provided the opportunity to note student communication, interaction, and problem-solving behaviors.

During the post-simulation debriefing, the researcher became an observer as participant, which Creswell (2013) described as "an outsider of the group under study, watching and taking field notes from a distance….without direct involvement with

activity" (p. 167). The investigator observed for indications of student reflection, types of interactions between the students, and interactions between students and the instructor.

When the debriefing sessions ended, students were invited to participate in focus group interviews related to their HFHS experiences. Students who volunteered to participate in the focus groups were presented with a copy of the adult informed consent form. Informed consent was described in detail, emphasizing protection of privacy and the right to refuse or withdraw at any time. Students were asked to sign the form if they wished to continue as participants. Focus group interviews were conducted in a private setting to encourage open dialog and minimize distraction (Creswell, 2013). In addition to permitting the researcher to interview several subjects at the same time, focus group participants were able to respond to the researcher as well as to the responses of other participants (Ary et al., 2014).

Data Analysis

Data interpretation in qualitative research involves following routines and patterns, triangulation, common sense, and intuition in looking for ways to offer insights into how things work, and reporting the findings in a way to help others understand (Stake, 2010). Creswell (2013) summarized the process of data interpretation as beginning "with the development of codes, the formation of themes from the codes, and then the organization of themes into larger units of abstraction to make sense of the data" (p. 187). The development of codes involves combining concepts into small categories of information. Categorical aggregation from a thorough analysis of the data was used to answer the research questions and convey an understanding of the case (Creswell, 2013).

According to Stake (2010), "qualitative research is based on the collection and interpretation of episodes" (p. 133). For this case study, every interview and observation session at each participating school of nursing represented a discrete episode. Recognizing the importance of accuracy in data collection, transcription, and organization of the database, it was considered more important to hear, see, and understand the context of what had transpired during each episode in order to facilitate interpretation (Stake, 2010). To support this process, the researcher video-recorded all interviews and kept field notes describing the physical settings, observed behaviors, interactions, and impressions related to each of the episodes. The data were transferred to computer files for storage and retrieval.

Data from each episodes were transcribed within two weeks following collection. Transcribed data were maintained on a private computer as Microsoft Word files and organized into a case study database (Merriam, 2009), according to the specific type of information and the location where it was gathered. Careful organization and maintenance of the database assisted the process of retrieval of specific data during analysis (Merriam, 2009).

In qualitative research, data collection and analysis occurs simultaneously, and the "design is emergent" (Merriam, 2009, p. 169). Following each site visit, the researcher reviewed the recordings and field notes numerous times during the transcription process. While reviewing the data, key concepts and ideas from the database were noted for the purpose of developing initial data codes (Creswell, 2013). As data collection continued, the database expanded providing an opportunity to compare concepts and ideas across different sources and types of data. The use of multiple sources of data enabled the

researcher to triangulate emerging concepts by comparing and substantiating evidence throughout the database (Merriam, 2009).

As concepts and impressions developed in the data, the process of coding data began by labeling and classifying the information. The researcher permitted concepts to emerge, rather than using priori codes which, according to Creswell (2013), are predetermined categories of expected findings. Data analysis began with five or six categories of codes which were revised each time the database was reviewed. Eventually, the codes were aggregated into themes. Themes, or patterns, are broad categories of information created as several codes are merged to form a common idea which formed form the basis of answering the research questions (Merriam, 2009).

Summary

The purpose of this study was to examine current practices for implementing HFHS learning activities in LPN and associate degree RN programs, along with the perceptions of faculty and students regarding the use of HFHS. Participation in the study was defined in terms of inclusion criteria of nursing programs and the use of purposeful sampling to identify participants. The data collection process was described along with strategies to promote validity and reliability in the collection of data. Data analysis procedures were discussed for case study research including transcription, organization, and the emergence of concepts and themes to make sense of the data.

In Chapter Four, an overview and description of the analysis data were provided relative to the purpose and design of the study. Study findings and conclusions were presented and discussed in Chapter Five along with implications for practice and recommendations for future research.

Chapter Four: Analysis of Data

The research data collected in this case study are presented in this chapter. The purpose of the study was to examine implementation practices for HFHS in associate degree RN and LPN education programs. In addition, nursing faculty attitudes, practices and perspectives regarding HFHS, and nursing student perceptions concerning their experiences with HFHS were also explored. Various studies and experiences based on the use of HFHS in nursing education were described in the current literature section of Chapter Two. However, as previously described, the literature has fallen short of yielding recommendations for best practice in implementation of HFHS. According to Hayden et al. (2014), most state boards of nursing do not publish guidelines for HFHS in the curriculum, leaving individual nursing programs to implement simulation as best they can. The data from this study may be useful as personnel in programs review their curriculum and align objectives with teaching strategies.

Transformative Learning Theory provided the theoretical framework for this study. As described by Mezirow (2000), the central concepts germane to Transformative Learning Theory include the challenging experience, rationale discourse, and critical reflection. These concepts are markedly congruent to the instructional processes surrounding HFHS activities (Parker & Myrick, 2010). However, HFHS activities must be well planned and implemented to be effective (Parsh, 2010; Shinnick, 2011). The interest in examining how HFHS is perceived, carried out, and experienced led to the following research questions which guided this study:

1. What key factors do nursing program directors report influence the use of HFHS as part of the nursing school curriculum?

2. According to nursing school personnel, what changes to the program curriculum have taken place to promote the integration of HFHS learning activities?

3. What are the perceptions of nursing faculty regarding HFHS as an instructional resource and influence on student learning outcomes?

4. What are the perceptions of nursing students regarding HFHS as a pedagogical strategy and the implementation practices experienced?

The data for this study were collected using multiple methods: interviews, student focus groups, and direct observations at four separate nursing programs in the Midwest. Researcher-prepared protocols were used during the entire data collection process which took place on-site at each of the participating schools. Each school and participant were assigned a number as an identifier code, which was known only to the researcher. To maintain confidentiality and anonymity, responses in the text were identified by the specific number code assigned to the school or individual.

Results from the interviews and observations are reported in this chapter. Responses to interview questions with program directors are presented first, followed by information gained in interviews with nursing instructors, and finally student perspectives. In addition, results from observations are linked to responses given to the interview questions, key concepts from the literature, and Transformative Learning Theory.

Demographic Analysis

Four nursing schools offering LPN or associate degree RN programs accepted an invitation to participate in the study. All four of the participating program directors were female. Three of the directors had oversight responsibility for associate degree RN

programs, which included traditional pathways of coursework, LPN to RN bridge programs, or both. The final director was responsible only for an LPN program. Each director had more than five years of experience with their respective programs. The four directors represent a combined total of 82 years in nursing education.

In addition to program directors, nursing instructors representing the four programs were also interviewed. The first program was an LPN to RN bridge program exclusively, but Programs Two and Three had both traditional coursework and LPN to RN bridge program tracks. Program Two had separate faculty members for the traditional and the LPN to RN bridge tracks, thus a faculty member from both tracks was interviewed. The instructors at Program Three taught in both program tracks. Program Four was an LPN program. The five nursing instructors interviewed included four from the RN programs and one LPN instructor. All instructors were female and experienced with HFHS. Nine faculty members in the four institutions were observed with students during HFHS and debriefing. Of the nine faculty members observed, six were RN program instructors, and three were LPN instructors.

A total of 23 students at the four institutions participated in the focus groups. Each of the RN students was enrolled in an LPN to RN bridge program track. None of the traditional track RN students were available to contribute in the focus groups during data collection episodes. Fifteen female students from the three RN programs contributed to focus group interviews. Of the eight LPN students who participated in focus groups, six were female and two were male.

Twenty six RN and LPN students from the four institutions were observed as they participated in HFHS and debriefing activities. This sample included 20 RN students, of

which 18 were female and two were male. Observations at Program Three included RN students in both the traditional and LPN to RN bridge program tracks. Traditional track students were unavailable for observations at the remaining two RN programs. Six LPN students were also observed, including five female and one male.

Simulation Environment

Simulation labs are typically designed as a clinical environment mock-up with an adjacent control room (Wilson & Rockstraw, 2012). Control rooms usually have two-way mirrors to observe and evaluate scenarios, computers to manipulate the simulation equipment, and video-recording equipment to record student activities which facilitate debriefing (Nehring & Lashley, 2010; Wilson & Rockstraw, 2012). Some nursing programs in this study had a dedicated HFHS lab, while others did not.

During on-site data collection, three different types of HFHS lab environments were observed. In the following description, programs will be discussed in order of the type and amount of resources available, beginning with the program with the least amount of resources. For example, Program Two did not have a separate space for HFHS. The faculty used part of the nursing skills lab where it was necessary to set up the simulators in preparation for student activity and put them away afterward. Having no discrete simulation lab meant there was no separate control room. Program Two used a portable screen with a two-way mirror designed for instructors to remain behind to operate the equipment, observe student interaction, and be separated from the immediate area as student engage in the simulation activity.

Program Three's facilities were more discrete with a dedicated space for the simulation lab in the room next to the nursing skills lab. There was a large control room

between the two labs with two-way mirrors facing both labs. The configuration of the control room made it possible to extend the function of either lab into the adjacent area as needed. The simulation lab was divided into two rooms with two hospital beds in one room and three beds in the other, providing space for five high fidelity simulators.

The First and Fourth programs observed had similar facilities which were designed to replicate hospital and home environments. In both programs, there were four rooms in the lab for conducting HFHS, a nurse-call system, video-recording equipment, and a medications dispensing machine, replicating those found in hospitals. Room One was equipped and arranged like an intensive care or emergency department space, Room Two was prepared to function as a regular hospital room, Room Three was set up like a birthing room, and Room Four was furnished like a small living room. All of the rooms could be converted to simulate a different environment by changing out the furniture. In both programs, there were two control rooms located between or adjacent to the simulation rooms and a conference room for debriefing. These labs supported multiple allied health programs as well as community healthcare interests.

Because the simulation labs described serve a number of programs and interests, the labs were staffed to meet the needs of the users. The simulation lab director was a master's prepared nurse. The staff members also consisted of nurses, emergency medical technicians, and others with training in HFHS procedures, who acted as standardized patients, family members, or physicians in scenarios. The simulation lab staff consulted with faculty to adapt and prepare scenarios for specific course objectives or student need, releasing teachers to focus their time on other aspects of instruction instead of simulation details. A simulation lab coordinator and staff are able to create, enhance, and participate

in scenarios to make them more true-to-life, as well as manage the equipment appropriately (Mastrian et al., 2011).

Not every nursing program has a simulation coordinator position. For some programs, the simulation lab is used predominantly by the nursing programs and, occasionally, one or two other allied health programs. Nursing programs without dedicated simulation personnel have either attempted to create and fill a simulation coordinator position, or have assigned the responsibilities to an interested faculty member, as reported by Directors Two and Three. In consideration of the simulation duties, a lighter teaching load may be arranged. Neither of these attempts has proved successful. According to Directors Two and Three, dividing responsibilities has made it difficult to avoid turnover in positions with combined responsibilities.

Responses to Interview Questions

Interview data were carefully transcribed and organized for analysis. Creswell (2013) recommended getting "a sense of the whole database" (p. 183) by reading and rereading transcripts. As transcripts were analyzed, key issues were noted and combined to form a list of initial codes. The initial codes were compared across the data set and the entire database, searching for further evidence and perspective (Creswell, 2013).

Nursing director interviews. In-person interviews were conducted with the program directors at the four nursing schools included in the study. A summary of their responses to the interview questions are included as follows.

Interview question #1. *How did the use of HFHS develop in your nursing program? (Follow-up: Who or what initiated the process?)* Each program director in the study stated their HFHS equipment was purchased from education grants. The

programs acquired additional simulators and related accessories as grant money was made available. The program directors acknowledged they would not otherwise have been able to acquire the simulators due to the large purchase price. Director One said her institution's first high fidelity simulator was Noelle, which is an obstetrical simulator. Director One went on to state, "We had difficulty getting enough clinical time in OB [obstetrics], so this was a good way to spend several hours working on Mom and then baby." Director Two responded, "The faculty in general wanted to do simulation; we just didn't know how we were going to fund it. But then we were the recipient of two grants in a six month period." Director Four described small beginnings when the college opened the simulation lab stating, "We started doing physical assessment with them, then including them when we talk about ostomies, continuous bladder irrigation, and those kinds of things. Then we worked our way into doing an end of course simulation."

Interview question #2. *Describe the overarching philosophy or objectives for the HFHS program.* The program directors were unable to articulate an overarching philosophy to guide the use of HFSH in their program(s). Each director indicated two main purposes for which HFHS had been implemented, support for both classroom and clinical instruction. In most cases, directors reported programs began using HFHS as a substitute for a portion of clinical hours to augment or bridge the gaps in clinical experiences. As classroom support, simulation is used to illustrate difficult concepts or permit students to practice and apply what they have learned.

Inpatient clinical sites have changed over the years due to increased complexity of interventions, higher patient acuity, and shorter lengths of stay for patients (Yuan et al., 2011). As healthcare delivery evolves at collegiate clinical sites it becomes a greater

challenge to provide students with the learning experiences needed to become competent practitioners (Nehring & Lashley, 2010). Director One said, "We use them [simulators] in the classroom for some things and use them as clinical make-up, or to supplement the hours that we may not be able to get in the hospital." Director Four responded, "I think the overall objective is to try to instruct, to give the students more opportunities in areas where they would not have an opportunity to practice in when they get into clinical." Director Four further explained:

> We have a scenario where they [simulators] have hypoglycemia, a scenario where they're in congestive heart failure, which gets much worse. I think one is an allergic reaction, another one is a blood transfusion reaction. You know, just things that they [students] may not be able to see in clinical. And we do labor and delivery [clinical], which not all of them…. get to see a delivery. We really work to try to get that, but it doesn't always work out. In pediatrics we feel like we can simulate some, because we just can't get them into that clinical setting that easily. It's difficult to get them in there; it's difficult to get them a good experience. So you know we're trying to get them things that they would not necessarily see on their own when they're in the clinical setting.

Director Two described a program goal which had evolved through faculty experience and collaboration. Director Two was the only director to express an interest in developing the HFHS program to connect essential concepts throughout the curriculum and build in complexity as nursing students progress in their clinical judgment, ability, confidence, and initiative. Until recently, instructors in this program would develop

simulation activities for isolated course content, without building on the outcomes of the previous semester. Director Two explained her goal:

> That's what we're trying to do now is to make sure that if we present a simulation in Fundamentals, the next semester in Med-Surg I, it adds to it. So it's like a building process, and in every one we're striving to look at not only program outcomes but also course outcomes and make those mesh.

Interview question #3a. *What are the major enablers for the use of HFHS?* Two primary enablers to using HFHS were identified by all four program directors. These enablers included faculty willingness to embrace the technology because they recognized the value in simulated experiences and convenience because each participating program had a simulation lab in the same general areas as the nursing classrooms and faculty offices. Director One responded, "It's like having a complete hospital environment right here that's available to students to actually be nurses, to pretend – not pretend, but to play that nurse role."

Additional enablers mentioned by directors included student demand for more simulation experience. Director Three stated, "The students have a simulation charge every semester and they know that, so they're putting pressure [on faculty for more HFHS], which is good." Director Four also noted the expertise of the simulation lab staff to prepare and manage equipment, customize scenarios, and even make suggestions to improve experiences was an enabler, noting the faculty would not have time to do so.

Interview question #3b. *What are the major barriers for the use of HFHS?* Barriers identified by program directors include limited resources of time and finances. The limited resource mentioned by every program was time to include simulation within

the confines of the curriculum. Specifically identified was inadequate time to prepare the equipment and scenarios, especially in the absence of dedicated simulation personnel, and time related to scheduling conflicts in the simulation lab. Director Two responded:

> We've had the baby [simulator] for six to eight months….today's simulation was the first time we got it out of the box, so time is a barrier. The time it takes to learn the technology, to make sure everything works on the simulators. You don't just go in and flip a switch.

The simulation lab used by Director Four has a dedicated simulation staff, which has led to an unanticipated barrier of difficulty in scheduling simulation time for students. Recognizing the simulation lab is fully staffed, primarily because it supports several allied health programs at the college, the lab has become very busy making it difficult to schedule HFHS for individual programs and student groups. Director Four noted, "Time is always a premium; time is always a big deal. And I think scheduling, just getting into the lab is starting to become more of a problem."

Limited financial resources were cited as a barrier related to inadequate faculty, equipment, and disposable supplies. Instructors are needed to evaluate students while they care for simulated patients. Insufficient faculty was reported as a barrier, due to either budget restrictions, or a shortage of qualified instructors. Director One stated, "Because if you have to have faculty there to evaluate 'em, you've got to have extra faculty." Director Two shared, "They [faculty] don't feel like we have enough people recourses to facilitate it at its utmost."

Directors Two and Three also discussed how budgetary limitations make it difficult to provide adequate disposable supplies to suspend disbelief and fully engage in

the scenario. To suspend disbelief, students must avoid pretending, so it is necessary to actually use supplies when performing care for HFHS to mimic reality as much as possible (Mastrian et al., 2011). Director Three described additional financial investments required for an effective HFHS environment. The simulation facility, simulator maintenance, and equipment such as monitors and infusion pumps also depend on adequate funding. In addition, there are ongoing expenses related to warranties and simulator upkeep. When funds are too limited or priorities have to be made, Director Three discussed permitting the expensive extended warranties and maintenance plans to expire, using a strategy of applying for additional grants when simulator replacement is needed, or as newer technology becomes available.

Interview question #4. *What curriculum changes, if any, have occurred to integrate HFHS?* All four nursing directors replied no major changes in the curriculum were made in order to facilitate the inclusion of HFHS. The directors indicated HFHS is one method to provide students with the opportunity to care for patient problems to be experienced in their career, but may not see during clinical rotations. Some objectives for HFHS have been narrowed toward the intention of accomplishing this goal. Program directors also expressed an interest in enhancing the classroom environment by using high fidelity simulators to demonstrate complex patient care concepts. Some programs had already begun using HFHS in the classroom to illustrate more difficult concepts.

Director Three stated the nursing program was in the process of moving toward a blended, or flipped, classroom design, where instructors prepare voice-over presentations for students to use along with textbook reading and study assignments to prepare for active classroom experiences. During class time, the instructor may facilitate application

of learning objectives through in-depth case studies or, for some topics, preparing a simulated patient scenario for guided experiential learning. As Director Three stated, "We're supposed to be on a flipped classroom, and this is a perfect way to do it. So I see [students] having the prep work done and us teaching the material in the classroom with those simulators; just dragging it in the classroom or taking students to the lab."

Interview question #5. *How has HFHS impacted student learning outcomes? (Follow-up: Do you track student performance since adopting HFHS, e.g., test scores, clinical evaluations?)* All four program directors stated they had no method in place to link any specific outcome measure directly to HFHS. Director Four responded, "I think they [students] learn from it, and I think it's something that they don't forget." Director Two added, "They're [students] scared of it but once they get through it and they can reflect back and do the debriefing, they value it and they understand why we have to do this." Two programs use student satisfaction surveys related to HFHS and report, with rare exception, students value the simulation experience and request more time in the simulation lab (Directors Two & Three).

Interview question #6. *Please describe how HFHS is used to replace or make up clinical activities.* All four programs in this study began incorporating HFHS by substituting one clinical day during each clinical rotation for a day of simulation. The basic format used by all the programs was to prepare three or four stations, each with a different patient scenario. Students in the course were divided into small groups to rotate through the scenarios until all students completed each station in a single day. All of the study participants acknowledged this was a major undertaking. Directors Two and Four described efforts recently implemented to transition the process of having all students

complete HFHS in a single day, to one which will rotate students through the simulation lab in smaller clinical groups scheduled on different days. Director Four explained:

> We've always had one day [per rotation] for Med-Surg Sims. It was one day where all of the instructors were involved, and we'd all go through the whole thing for the entire day. What we're going to do is divide it up where one clinical group will be doing simulation, and then the next week it will be a different clinical group, and so on. We think that will make a difference.

According to Directors Two and Four, students would continue to substitute HFHS for one clinical day each rotation, but it would be more in-depth patient situations.

All four program directors in the study said students spend about four hours in HFHS substituting for an eight- or 12-hour clinical shift. The rationale for using the ratio of two or three clinical contact hours to one simulation contact hour is based on HFHS being planned and more focused and interactive than regular clinical time. In addition, students are often required to complete pre- and post-simulation assignments to enhance learning. Director Three stated, "They have prep work, so they probably put five or six hours in it actually by the time they're done." Directors One and Three have considered using HFHS for clinical make-up, but have not yet begun doing so.

Interview question #7. *What changes, if any, would you like to see in your HFHS program or equipment?* The desired changes expressed by directors were varied in terms of priority, but were mostly related to improving or increasing HFHS while having limited resources. Director Four was the exception, stating an initial concern of the faculty was related to simulation operators being from disciplines other than nursing.

Director Four described:

> I have seen some operators that their perceptions and my perceptions of what would be real in the clinical setting is not the same. And I think it's our difference in backgrounds, you know, coming from a nursing versus a paramedic or EMT [emergency medical technician] or something, with different perspectives running the scenarios. It depends on your background, how you see it, but I think we've got that fixed.

Director Three discussed increasing HFHS utilization throughout the program stating, "I don't think we have to do a sim[ulation] in every class, but maybe a certain percentage of every course would have some type of sim[ulation] built into the course." Director Three also discussed plans to implement a format she called a "running sim" where clinical groups spend time in the simulation lab every week taking care of an evolving patient situation. The patient diagnoses or details which evolve could be altered as needed to enhance the learning experience. In addition to debriefing, faculty and students discuss patient care issues in class or in an online discussion board format. Director Three stated, "I'd like to see us move on with that, because I think we've underutilized them in the classroom. But again, it gets back to time, time and training."

Director Two conveyed an interest in using HFHS to connect elements of the program. She expressed employing a full-time simulation coordinator was critical to making this happen stating, "That's my big wish." Director Two added:

> Historically what's happened with simulation is [when] an instructor would want to do simulation, they'd build their scenario, and they'd do it, and it's like a silo.

> We're doing it, but it's kind of piecemeal. There wasn't much of, "Well let's build this on the previous semester's outcomes," so there wasn't real flow there.

The other major change desired by Director Two was to have a fully equipped, dedicated simulation lab with video equipment and a control room to completely sequester faculty from students during HFHS. Accessibility of faculty was noted to impact student autonomy in the scenario. Director Two further explained:

> Even yesterday when she [instructor] and I were in the lab, she was at bedside posing as the baby's mother, I think. They [students] were still looking at her for answers. I suggested that she remove herself from bedside, and come behind the screen, and let's just see if it makes a difference. Not that they were overall improved necessarily in the performance, but they weren't looking to us. They looked more at each other. "What do we do now?" "What can we do?" So I think it stimulated that autonomy in "you've got to solve the problem; the instructor is not here for you to draw on." I think that's a very interesting aspect of simulation is that physical ability of whether the instructor is in the presence of the students.

Finally, Director One suggested HFHS could be incorporated well into any nursing program and conveyed the positive resource of having a fully staffed simulation lab, but reinforced the issues of program staffing and time. As previously stated by Director One, staffing was related to having enough qualified faculty to evaluate and debrief students. The time issue was defined as competing with other allied health programs to schedule simulations and the length of the curriculum.

Nursing instructor interviews. In-person interviews were conducted with nursing instructors from each of the four programs in the study. Two instructors were interviewed from Program Two because the traditional associate degree RN track and the LPN to RN bridge track did not share faculty. The director at Program Two arranged an interview with one instructor from each program track. A summary of nursing instructor responses to the interview questions are provided.

Interview question #1. *Please describe the courses and frequency students participate in HFHS.* Instructors in prelicensure programs, such as LPN and traditional RN, began introducing students to the simulators prior to clinical exposure to teach basic nursing concepts. Student learning needs included performing head-to-toe assessment, identifying signs of alterations in health, therapeutic communication techniques, and medication administration. After being introduced to the simulation lab, instructors in both prelicensure and LPN to RN Bridge programs represented in the study indicated HFHS was connected to the courses which have a clinical component as a means to augment and standardize the clinical experiences. Program Two instructors also prepared a capstone HFHS experience prior to graduation. The capstone lasts several hours and requires extensive preparation on the part of nursing students and faculty. Students are introduced to a critical situation which evolves to a cardio-pulmonary arrest. The students must be able to recognize the deteriorating status and implement advanced cardiac life support (ACLS) skills.

Interview question #2. *What are the primary objectives for HFHS in the course or program?* Most instructor responses to this question were varied. Program One

instructor said HFHS permits the instructor to observe the thinking process of students. Program One instructor elaborated by stating:

> When you're on the clinical area with five or six students, there's competition for your time. If I'm tied up in a procedure with another student, I may not have the time to fully explore how a student got to a particular conclusion. If it's the wrong conclusion, you have to address it right then. Simulation allows you to observe how the student is problem-solving the situation directly, and you know the scenario, how the appropriate decision-making needs to flow, and you can see if the student gets there or not.

Instructors from Program Two indicated their goals were to make sure students were practicing in a safe manner and to provide them with exposure to situations they would likely encounter in practice, but may not experience during clinical. The Program Three instructor focused on providing students with a safe learning environment stating, "If they kill the simulators, I can reset them. So I always tell students it's a safe place to learn. It's okay to make mistakes because you learn from the mistakes."

The instructor from Program Four stated her objectives were to engage students in active learning and encourage them to be aware of their own critical thinking abilities. The Program Four instructor believed students are quick to recognize their weaknesses, but also wanted to assist them in recognizing what they did correctly. In addition, she wanted students to be aware of their thought processes and to understand why they chose to act, or not act, during a scenario in an effort to facilitate stronger self-efficacy.

Interview question #3. *What changes have occurred in the nursing curriculum (including clinical) with HFHS?* Instructors from the four programs indicated no major

changes were made in the nursing curriculum to include HFHS. However, instructors from Programs One, Three, Four, and the Program Two LPN to RN Bridge instructor revealed HFHS was already in use in the nursing programs when they began teaching at their respective schools. Essentially, all of the instructors said HFHS was primarily used to substitute for a clinical day. The Program Two traditional RN track instructor added:

> Each year we have changed our curriculum to build in a little more and a little more. For instance, when we do that ACLS [advanced cardiac life support] simulation, we do a lecture-capture [video or voice-over presentation] for an actual lecture that day, so it's available to students online. We've changed some clinical time for that simulation time.

The Program One instructor stated she was involved with other nursing faculty on the state level and, because of her involvement, she was able to share a general concern and perspective regarding limited clinical opportunities:

> I know in all nursing programs that simulation is becoming integrated extensively into the curriculum. There's a variety of reasons for that, one especially is the competition for clinical sites. You're not getting as many, and you're not getting them for as many hours as we used to be able to. So simulation is being used to fill in and bridge that gap as we have issues with getting clinical sites. One big issue that happened this semester is we have the [clinical] sites, but we don't have access to the EMR [electronic medical record]. So in a Sim, you can set it up so they [students] have to chart and you can review their [students'] documentation in that EMR format.

Interview question #4. *Describe how your teaching methods have changed as a result of HFHS.* Instructors from each of the four programs in the study responded they were more deliberate with regard to having an interactive teaching environment after experiencing HFHS with their students. Instructors from Programs One and Four stated they gained ideas for adapting classroom content based on student needs that surfaced during HFHS activities. Program One instructor said, "It's the whole idea of being able to observe how students think, and you get ideas about exercises you can do in the classroom that are a little more interactive." Programs Four instructor shared, "So it's either you're going back and honing in on things that they [students] were weak in, or … [because] their knowledge base is great so I can teach them at a higher level."

Finally, instructors from Programs Two and Three said they used more case studies since becoming experienced with HFHS. When instructors use case studies, students are more actively engaged in problem-solving related to course material (Goodstone et al., 2013). The Program Two traditional RN track instructor added:

> I believe students learn better when they are able to do it themselves. The first time you teach a course, you're standing in front of them, and you're feeding them. Eventually you are developing case studies to let them feed themselves.

Program Three instructor replied:

> When I'm not using the simulators, I actually use a lot of case studies. I put my lecture on PowerPoint, and students are expected to look at it before they come, so I can work with them on case studies. When I'm not using simulators, I'm trying to simulate the information.

Interview question #5a. *What are significant enablers to using HFHS?* Most instructors stated the chief enablers for using HFHS were access and proximity of the simulation lab. The Program One instructor responded:

> The lab we have here is a very good environment, and the personnel in the simulation lab are very helpful. The operators in the control room are willing to work with you to change the scenarios if you need to see something or look at something the student is doing. They change it up.

The Program Three instructor discussed the recent loss of a major clinical site. The instructor responded:

> Unfortunately we've lost clinical sites, and so they don't get as much exposure on certain things in clinical that they can have here [in simulation], especially in labor and delivery. A lot of our male students especially can't get in to OB [obstetrics], but they can watch a delivery here.

Interview question #5b. *What are significant barriers to using HFHS?* Four of the five instructors listed time as a major barrier, but some of the other barriers were varied. Program One instructor stated, "When we're in Sim [HFHS], we're not doing something else. I think time and scheduling within the curriculum are the biggest barriers." Program Two's instructor responses were related to time in the curriculum and the challenge of logistically accommodating all of their students in the simulation lab. The lab facilities were mentioned as an issue because there was no discrete area for HFHS. The faculty schedules groups of three to five students in a scenario and notes, "that weak students may still be able to kind of hide behind the knowledge of that stronger student, so you don't always get a fair perspective of what's going on" (Program

Two traditional RN instructor). The Program Four instructor's response was related to competition for time in the simulation lab stating, "Always having people in the lab, so not being able to just use it whenever we want to, that's kind of a drawback." Program Four instructor also described the mechanical attributes of the simulators as being initially confusing for students initially by stating:

> Where you find pedal pulses or being able to listen for the blood pressure….is not really true-to-life. I have a scenario that's an absent pulse, and as the day does on and the simulators have been running longer, they start to vibrate more. I've had students go in and think they feel a pulse, but then we turn the pulse on during debriefing and show them the pounding pulse. So students need to learn the difference.

The instructor from Program Three focused on faculty comfort with the simulators as being a barrier. The instructor believed if other faculty members were more familiar with operating the simulators, they would be used more. Program Three instructor added, "Some of our [other] campuses don't use them at all, they just sit there. That's a waste in my opinion, because there's so much students can learn."

Interview question #6. *In what ways do you think HFHS has impacted student learning? (Follow-up: How do you assess the effects of HFHS on student classroom or clinical performance?)* Program One instructor believed HFHS has a positive impact on students' learning, but she had no specific method to substantiate her belief. According to the Program One instructor, simulation is not a stand-alone element, but is instead integrated throughout the curriculum. In Program Two, the instructors believed HFHS helps students connect theory to practice and improve critical thinking. In addition,

simulation is believed to improve student confidence. As Program Two traditional RN track instructor stated, "There are groups that fail miserably, but, in your debriefing, you can pull [focus on] what they have gained." Program Two does not formally assess student learning related to HFHS because they are continuing to work at improving the simulation experience. However, instructors solicit student feedback through surveys and debriefing evaluations. With rare exception, the feedback has given strong indications of how helpful HFHS was perceived by students. The instructors also prepare a list of objectives and evaluate the session to determine if objectives were met.

Instructors from Programs Three and Four discussed how HFHS helps identify areas of student weakness. The faculty can address these areas with students so efforts can be made in classroom and in clinical activities to overcome the identified weaknesses before students leave the program. Program Four instructor added, after observing students in simulation with different levels of mannequin fidelity, she believed the HFHS situations facilitate a higher level of critical thinking than those with static mannequins.

Interview question #7. *Please describe how students prepare for HFHS.*

Programs Two and Three require students to prepare before coming to the simulation lab. Programs One and Four responded HFHS was structured in a way for students to draw on knowledge they already have. Students received a status report on the simulated patient before entering the scenario, in the same manner they would receive a patient report when providing care in a real clinical settings. Program Four's instructor added the faculty were planning to implement an end-of-life scenario, which would engage students over several weeks as the situation evolved. Information on the simulated patient would be provided in advance, and then once students began providing care, they would update

fellow students through an on-line discussion board. All students were expected to prepare to participate in care as the situation unfolded. The faculty was interested in seeing how well students prepared, and whether preparation enhanced learning.

Programs Two and Three provided students with a general list of topics to review on course subject matter, including medications. Students were not informed regarding the specific nature of the scenario, or how it would unfold. The manner in which scenarios evolved could be altered to provide a different experience for each student group. The instructors from these programs indicated, when students were given an assignment to prepare for simulation, they were usually less nervous about HFHS. Instructors also believed the preparation assignments helped students learn more from the experience and facilitated confidence building.

Interview question #8. *Please describe the post-scenario debriefing process used with students.* Each instructor from the four nursing programs described using a similar debriefing process which began by discussing what the students did well. This was followed by identifying major mistakes made, the implications for patients, assisting students to recognize and appraise their critical thinking and problem-solving skills, and finally, discussing what should be done differently in terms of real-world situations. The instructor from Program One added:

> I really emphasize that nursing is not a solo endeavor, and we always should be bouncing stuff off of our colleagues. I've been a nurse for a long time, and I still do that. I will ask another nurse to recheck my assessment or vitals. You need to do that to validate what you're seeing.

Program One instructors video-recorded students in HFHS and permitted them to review the recording afterward to reflect and prepare for debriefing with an instructor. The other three programs were not video-recording during the time of data collection, but indicated they plan to do so in the future. Although instructors at each of the four programs described following the same format, for some, the process was more formal than for others. In addition, in some programs there were inconsistencies among instructors regarding the debriefing process.

Program Four used student observers in HFHS and began debriefing by having the observer describe the activities from their perspective. Students who were actively involved in the scenario were then encouraged to discuss the issues from their standpoint. The instructor summarized what was good and what could be improved, and reinforced important concepts. Adding a student observer provided an opportunity for students to learn from a different point of view.

Interview question #9. *In your opinion, what are the most important aspects (positive or negative) of HFHS?* Instructor responses to this question were varied and are presented beginning with perceptions of the positive aspects. Program One instructor said she believed the most positive aspect of HFHS was students were in a position where, "they have to think, think out loud, and reflect their thinking processes to the instructor, because we want them to think out loud and say what they are doing and why in simulation." Program Two LPN to RN Bridge instructor stated she thought an important aspect was allowing students to learn from their mistakes, because they remembered the experience and benefitted from making those mistakes. Program Three's instructor indicated the safe environment to learn without risking harm to patients

was the most significant part of HFHS. Program Four's instructor responded the learning experience, including the ability to provide a standardized clinical experience, was the foremost aspect. Program Four's instructor added the safe learning environment was an important aspect as well.

Instructors reported several different negative aspects of HFHS. Program One's instructor said some students did not feel simulation was worth their time, and others were reluctant to participate. Program Two's LPN to RN Bridge instructor simply replied, "I think there's a definite place for simulation, but there's no substitute for real patients." Program Two's traditional RN track instructor said making sure the equipment was functioning correctly could be a problem. Without a simulation coordinator, if the equipment was not working correctly, it could take valuable time on the phone with the company to troubleshoot the problem. The instructor added, "Randomly you get in there, and it worked the day before. You go in there, you play with it, it's all good, and then nothing." Program Three's instructor felt if the instructors were not comfortable with the simulators, student learning was hindered.

Interview question #10. *What changes, if any, would you like to see regarding HFHS in this program?* Instructor responses to this question were varied and reflected the different program priorities. The instructor from Program One would like to see more simulation in the program, especially more end-of-life and scenarios related to cultural diversity. Because the geographic area of this study has very little diversity, students are not exposed to these situations. The Program One instructor is concerned students will be uncomfortable taking care of a more culturally diverse population. Program Two instructors would like to have a simulation coordinator and a discrete lab space. The

instructors from Program Two indicated this was important to solidify a simulation plan for nursing students from the beginning of the program until completion. Program Three instructor identified a need for better consistency in student preparation and debriefing. She added the instructors at Program Three would also like to begin using video-recording to aid in debriefing. Program Four instructor would like students to have more time in the simulation lab and for simulators to be more life-like, and less mechanical, with features such as realistic breath sounds and pulse quality.

Student focus group interviews. In-person interviews were conducted with nursing students from each of the four programs in the study. Program One students were LPNs enrolled in the final semester of an LPN to RN Bridge program. Students from Program Two were LPNs enrolled in the first semester of a Bridge program to become RNs. The Program Three focus group included a combination of traditional and LPN to RN bridge students in the final semester of the program. Program Four participants were LPN students at the end of their first semester. Interviews occurred after a round of HFHS activities were completed. Student responses to the interview questions are summarized below.

Interview question #1a. *What do you like best about HFHS activities?* In responding to this question, the students from Program One focused on learning without harming a patient. Student One commented, "If you make a mistake, you can learn from it without jeopardizing someone's life." The remaining students in the group concurred with Student One's response by nodding affirmatively, or saying "Yes." Program Two students responded similarly regarding being challenged and making mistakes without

harming real patients. Program Two students also commented on HFHS making them think about the care they are providing. Student Three stated,

> It [HFHS] helps you organize your level of care and kind of think critically through it and what you're going to do when it's not emergent, because it's not a real person. You can prioritize what's important and what's not and decide who you can delegate to and when, stuff like that.

Program Three students' responses echoed the previous comments made by students in Program Two. In addition to prompting students to think through problems, students said experiencing the scenarios permitted them to practice what they learned in class and made clinical time less stressful. Student One stated, "I like that it's hands-on and more realistic. You can read as much as you want, but you're in here and actually doing it, practicing it." Student Three said, "It's less scary in clinical once you've done it in simulation and then go into real-life, so you're not thrown in to it." Student Five added, "It's a good experience for you to think and you can apply this to a real situation and that makes you think better." Remarks from Program Four students corroborated the responses above, with Student Five adding a comment about learning from the experience, "I guess the way it's set up, you aren't going to forget the information you just learned today."

Interview question #1b. *What do you like least about HFHS activities?* Students from three of the four programs referred to simulation as being an unnatural situation, regardless of their efforts to suspend disbelief. The reasons include the lack of true interaction and physical limitations in the simulators themselves. Program Two, Student

Three stated, “I don’t like that they don’t talk back to you.” Student Five from the same program responded:

> Your patient is right here and the speaker over there, and you tend to want to look toward the person talking, since the person talking is your patient most of the time. So you turn and tend to speak to that person speaking instead of focusing on your technical patient.

Student One from Program Two added, “Like with edema, you don’t know unless you make sure you specifically ask because that’s something you would notice in a real patient, or capillary refill that you’d check as well. I have to make sure to ask [if the patient has edema].” Program Four, Student Two responded, “I think it’s the fact that it’s not a real person, it’s a dummy, and I need to pretend this is a real person.”

Program Three, Student Two commented on the anxiety related to HFHS and making mistakes as the aspects least liked stating, “Um, not knowing what to do. Sometimes it’s stressful, and I don’t like not knowing what I’m doing.” Student Six from Program Three expressed a desire for better continuity in expectations when in the simulation lab. Student Six stated, “I’d like to see it where we’re all supposed to be washing our hands every time” instead of sometimes pretending to do certain actions.

Interview question #2. *Describe your preparation (assigned or not) before going to the HFHS Laboratory.* Not every nursing program gives students an assignment or identifies material to review to assist in preparing for the HFHS experience. Of the four programs in this study, students from Programs Two and Three stated they may be given a list of topics to review including medications, a general skill set, or a limited case-study to prepare. All participating students from Programs Two and Three agreed preparation

helped to make HFHS less stressful. Program Three, Student Three replied, “It lets you know what you’re walking in to, but it didn’t tell you exactly what you’re going to be doing. You might review asthma, but you don’t know what the situation is going to be.”

Programs One and Four do not currently have students prepare for simulation lab. Program One, Student One stated, "It’s not going to be like that in real-life either.” Program Four, Student Seven said, “We’ve been taught everything that we did see [in the scenarios]”. Student Four from Program Four responded:

> We’re not going to get a report on our patients the day before in the hospital either. You go in, you get report from your nurse, and you do what you do. You figure out the problems, so I think it’s really realistic in that sense.

Student Eight from Program Four commented, “This is actually more valuable for us so that we know what we know.”

Interview question #3. *How do you benefit from the opportunity to repeat or remediate the scenarios?* Nursing students in each of the four programs in this study shared there was no formal remediation for HFHS. The students indicated debriefing provided a venue to review the scenarios and was a type of remediation. Program One, Student Three said, “After we’re done [scenario complete] and come in here to discuss what happened, we tell ourselves what we should’ve done [differently], that’s one way to know what we can do better next time.” Program Two offers students an option to remediate, according to Student Five, “They [instructors] tell you if you want to come back, you can.” Program Three, Student Six stated, “There’s not a pass or fail mode, it’s just an experience.” Program Four, Student Seven responded, “These aren’t for any sort of grade, these are for learning experiences. We just get critiqued at the end.” None of

the four nursing programs conduct high-stakes simulation to validate competence or skill which might result in failure to graduate or progress in the curriculum.

Interview question #4. *Tell me about the debriefing sessions following scenarios. (Follow-up: What is most/least effective?)* Students from Program One described the use of video-recording to facilitate debriefing following HFHS. Students reported watching the recording immediately upon completion of the scenario. A faculty member then joins the students to assist with the debriefing process. Program One, Student Three said, "We say what we think didn't go correctly, like why did I do that?" Student One added, "Then the instructor comes in and says 'this is what I saw' from the outside looking in. And they're good to tell you what you did right as well as what you did wrong."

Although Programs Two, Three, and Four do not utilize video-recording during HFHS, debriefing proceeds in a similar manner to Program One. Program Two, Student Five responded, "We say positives and negatives from our perspective, what we thought went well or could have gone better." Student Four added, "In analyzing yourself you know what you could do better, where your strengths and weaknesses lie." Program Three, Student Three commented, "They [instructors] teach us what we did wrong, what we should've done, and it kind of makes you think about that." Program Four, Student Two said, "They [instructors] talk about things you missed, and talk about the good things you did. Then they ask us what we would like to have done differently."

Students described the most effective part of debriefing. Program One, Student Three said, "Talking about it [scenario], because when we go over it, that will stick with us." Program Two, Student One responded:

> When I get to sit down and talk through something…. and to hear everybody's opinion and say oh, I never thought of that angle before. So for me it's just talking about it and hearing what everybody has to say and think how I could have done it differently next time, or another tip that I didn't know that I can use next time.

Program Two Student One added, "Without her [the instructor] feedback I might feel ten times worse walking out of simulation without debriefing." Program Three and Program Four students expressed how the most effective part of debriefing was to learn from mistakes experienced during the scenario.

Program One students were the only ones to discuss the least effective part of debriefing, which they identified as video-recording. The students commented how knowing they were being watched affected their performance in the scenario, and watching themselves on video during debriefing was very uncomfortable. As expressed by Student Three, "Like if we were watching another group I'd be fine but, when you watch yourself and other people who know you are watching you, you're like ugh, what did I do?"

Interview question #5a. *What are the most effective aspects of the entire HFHS experience?* Students from each of the four programs represented in the study commented the most effective aspect of HFHS was the experience itself. Program One, Student Three said, "The experience stays with you." Program Two, Student Two stated, "Some things you cannot get experience with at the hospital. If it wasn't for simulation, you wouldn't get to see some things." Program Three, Student Three offered, "Being in the experience, actually being there and doing it instead of just talking about it." Student

Two from Program Three added, “It’s nice to take something you’ve just learned and then apply it. If you apply it immediately, I think you might retain it better than just taking a test.” Program Four, Student Two responded, “The most effective is how you can go in there and learn without harming a real person.”

Interview question #5b. *What are the least effective aspects of the entire HFHS experience?* Program One, Student Three shared, “When you’re in the room and you’re just waiting like to hear back from the doctor. In real-life you’d be making conversation and tidying up the room.” Program Three students offered several comments. Student Two replied, “We don’t do it that often and not enough time.” Student One said, “We need more [disposable] supplies; we make-believe a lot.” Student Three stated, “Sometimes we still have to say, let’s pretend we did this.” Program Four, Student Four responded, “You don’t get that adrenaline like, if I walk into a patient’s room and they’re hypoxic and their O_2 saturation is at 73%, I’m going to have adrenaline; I’m going to want to fix this.”

Interview question #6. *Please discuss how your experiences with HFHS have affected you regarding:*

a*. Preparation for/confidence during clinical.* Program One students shared they had only one HFHS experience in the program and did not have enough information to say if it helps prepare for clinical. Program Two, Student Two said, “It helps me a lot with confidence for sure. Program Three, Student Two responded, “It makes you remember to always come prepared.” Program Four students responded regarding the timing of HFHS. The simulation lab experience was scheduled after completing clinical

for the semester. In general, the students believed HFHS would help them prepare if it were scheduled before clinical.

b. *Critical thinking/clinical judgment.* Students from the three RN programs indicated HFHS had a positive influence on critical thinking and clinical judgment. Program One, Student Three responded:

> It makes me think, but it makes me over think sometimes. We have two people, and we talk to each other in here. In the real-world, we wouldn't have two people, but we'd go to other nurses for feedback.

Program Two, Student Five responded, "I think it helps tremendously because you have someone to share ideas, and you just learn a lot from each other." Program Three, Student Six said, "I think it helps, because they [simulators] can have reactions to what you're doing, so it can make you think this might be causing it or it might be something else." Program Four, Student Four responded, "I think it goes back to your critical thinking skills, [they] are going to be critical in more critical situations with a real, live, breathing patient. That's when you pop in to action."

c. *Nursing program exams.* Program One, Student Three said, "I think it does, I'll always remember [what was learned from the experience]." The Program Two students agreed HFHS did not help with nursing program exam. Program Three, Student One said, "By the time we get into simulation, we've already taken an exam over it. If we did it before the exam, I think it would help." Program Four students replied they were not sure yet, because this was their first simulation.

d. *Preparation for NCLEX.* The Program One students agreed HFHS would probably not be helpful for the NCLEX. Program Two, Student One stated, "I think the

whole critical thinking process that you have to use with those test questions, where all of the answers are right but one of them is the most right; just prioritizing stuff." Program Three, Student Two offered, "In some way yes, because when you experience something it sticks more with you, otherwise you're just reading." Program Four, Student Seven responded, "I hope so but I've read some NCLEX questions and, I'm going to guess no because those are difficult." Student Two from Program Four added:

> I think it does to a degree because it takes the knowledge that we've learned in the classroom and makes us critically think about it and apply it in situation. And that's kind of what the NCLEX does, according to my understanding.

e. *Preparation for nursing career.* Program One, Student One shared, "I wouldn't say completely because the [simulated] patient isn't a real person. So it's not a substitute for clinical." Program Two, Student One said, "I think it does, it's been good to try to figure out what my role will be as an RN." Program Three, Student Three replied, "It prepares you for real, whereas these are somewhat like a normal person so you kind of know what to do." Program Four, Student Seven offered, "Yes, prioritizing especially and learning most important to least important." Program Four, Student Four replied, "The first thing we want to go in there and do is a head-to-toe assessment. With one of our patients the problem was at the toe so it helps to prioritize patient's needs [instead of the nurse's]." Student Three added, "It also helps learn how to communicate with the family, rather than just the patient."

Interview question #7. *What changes, if any, would you like to see in how HFHS is used in your program?* Program One Student Two said, "I think it would be beneficial if they actually used the actors as our patients [instead of family members]. I would feel

better assessing the actor than the mannequin." Program Two, Student Five responded, "I say make sure all nursing programs get to use it, because as an LPN student, we didn't touch the Sim Man" [high fidelity simulator]. Program Three students agreed on the advantage of having more HFHS in the nursing program and intentionally having a greater degree of consistency in how HFHS is carried out. Program Four, Students Four and Seven said more time in the simulation lab would be beneficial. Student Four added:

> It needs to be more consistent. In one of my scenarios, they made me take a manual blood pressure, and then in my last scenario she came [over the speaker] and said, "You can just touch this button on the computer, and it will give you a blood pressure".

Student Seven also responded, "I think it's incredibly beneficial, especially for people that don't have any hospital experience before coming to nursing school."

Observation of HFHS and debriefing. Students and faculty from the four participating nursing programs were observed during HFHS and debriefing experiences. Because the simulation labs used by these programs varied in terms of physical facilities and available resources, the following descriptions are presented in order of type and amount of resources, beginning with the program which had the least amount of resources.

Program two simulation. Program Two was an associate degree RN program which had both traditional and LPN to RN educational tracks. LPN to RN nursing students were observed during an HFHS activity. Simulation activities at Program Two were conducted in a 12 bed nursing skills lab, because the program did not have a discrete simulation lab facility. High fidelity mannequins were placed on the beds in the

lab, and a portable screen with a two-way mirror was moved to the bedside as a divider between the learning activities and the instructor who also severed as the operator. This arrangement did not provide for sound dampening. Students knew the instructor was behind the screen and looked in her direction during the simulation, especially when they were unsure of what steps to take next. The instructor intermittently moved from behind the screen to interact with students.

The observed activity involved a pediatric simulator called Sim Baby. The exercise began by providing background information for the scenario and having each student perform a physical assessment of the mannequin separately, preventing them from relying on the strengths of classmates. Because Sim Baby could not display all assessment findings, the instructor placed small laminated signs with information such as nasal flaring, sternal retractions, or chest congestion under the baby's clothing. These could only be seen if students performed a comprehensive and focused assessment.

After completing individual assessments, the instructor convened a brief question and answer session with the students. The instructor then assigned each of the five students to specific functional positions as the scenario continued. The assigned functions included charge nurse, medication nurse, two staff nurses, and one student to document activities. The instructor had prepared laminated sheets with details such as physician orders, lab values, and medications which would be needed as the scenario evolved. When students simulated calling the physician to report findings and request interventions, the instructor, acting as the physician, gave students a laminated card with instructions. Students were required to determine the appropriateness of physician orders or lab values to proceed.

The group worked collaboratively through discussion and calculated dosage amounts together. Students regularly looked to the instructor for confirmation or prompting, and questioned the instructor instead of looking up information related to oxygen, medication administration, or intravenous infusion. Eventually students were able to work through the situation and convened to the debriefing and to complete the written assignment.

The environment in the nursing skills lab was not conducive to students acting autonomously or suspending disbelief. In addition, some supplies were unavailable and IV fluids were incorrectly labeled. These issues added to student uncertainty and became a distraction to them. When errors were discovered, students were unsure if the errors were intentional, or something requiring them to pretend, which prompted them to frequently clarify with the instructor if the concerns were to be treated as an error.

Program two debriefing. The scenarios were not video-recorded at Program Two. Debriefing occurred immediately following the learning activity with students seated at a conference table in the nursing skills lab. The conference table was located near the bedside where the scenario had transpired. Students were asked what they thought went well or did not go well, and why. The instructor reinforced principles of patient care, medication administration, and responsibilities of the RN; the instructor also validated correct actions. The debriefing session was not directed at having students contemplate their thought processes. Reflection was encouraged only when students were asked what aspects of simulation was done well or needed improvement. Much of the discussion involved giving rationales in defense of actions, rather than examining concepts and patterns of thinking.

Students primarily responded to questions by the instructor and spent time clarifying who said or acted in a particular way. Instead of asking the students what they would do differently in the future and why, they were asked what the instructor should do to improve the simulation experience. The instructor provided positive feedback of a good performance overall. Students prepared for HFHS by completing case studies and drug cards which focused on the material presented. Following the debriefing session, which lasted approximately 20 minutes, students were required to complete the follow-up assignment consisting of content review questions. Students were not encouraged to remediate because time was very limited. If an instructor was available in the lab, they had access to remediate on their own.

Program three simulation. Program Three was an associate degree RN program offering traditional and LPN to RN educational tracks. The simulation lab at Program Three, which was used almost exclusively by the nursing programs, consisted of a large space divided into two rooms by a partition wall. The first room had two beds with adult simulators and was designed to resemble a semi-private hospital room. The second room had three beds with pediatric and obstetric simulators. Both rooms had patient care equipment. The lab had a large control room with two-way mirrors positioned to provide viewing into all lab areas. The control room was reported to have been used when the simulation lab was initially renovated, but had not been used for the intended purpose for some time. Instead, the space was used by nursing faculty and as office space when the programs had a Simulation Coordinator. Faculty did not use the control room for HFHS during the time of observation for this study. The control room was equipped with computers, manuals, and simulator parts. Faculty reported HFHS was previously video-

recorded, but they currently did not incorporate this practice, even though the equipment was available.

Two scenarios were observed at Program Three, including both traditional and LPN to RN students. Students were assigned to groups of five or six as they rotated through multiple stations. Students were encouraged to suspend disbelief; however, the instructors remained at the bedside instead of the control room. The first situation was an adult patient with emphysema, which progressed to a pneumothorax requiring chest-tube placement. Students were assigned to different roles which did not reflect authenticity in a patient care setting.

Even though in reality, one RN typically performs multiple functions, students were assigned to roles as the charge nurse, an assessment nurse, a procedure nurse, a medication nurse, a nursing assistant, and one student acted as a family member. By assigning students to these roles, more students could participate in the activity, but they seemed confused about what to do. Supplies were not plentiful, and students were unsure whether to pretend or to actually perform certain activities, which made it more difficult for students to suspend disbelief.

Students were familiar with the lab and HFHS, but the scenario did not flow well. In the beginning there was little interaction and teamwork, possibly due to the number of students, confusion over responsibilities in the assigned roles, the presence and interaction of faculty, or other variables. Eventually students began working together, even though communication appeared awkward. Students immediately began to assess the patient, but focused their efforts on only a portion of what an appropriate and thorough assessment would entail for a patient experiencing the problems which were

simulated. No one interacted with the student in the role of family member. The student charge nurse did not show assertiveness, nor did she gather complete information before phoning the physician. The instructor role-played as the physician and asked leading questions which provided clues to necessary assessment parameters, but students continued to seem unsure about how to proceed.

After several attempts and cues from the instructor, students concluded the patient had absent breath sounds which resulted from a pneumothorax. Students assigned to active roles became engaged when prompted by the instructor; although others mostly stood by and observed. The scenario ended when the procedure nurse gathered items for a chest-tube set-up and insertion. At this point, the instructor began teaching and reviewing how a chest-tube drainage system works.

The second scenario was an obstetric patient with preeclampsia which involved a different group of students. This student group demonstrated better communication patterns during the activity, perhaps because the students had been working together throughout the day to complete other scenarios. One of the students was an emergency medical technician with experience in being assertive and using assessment information to guide interventions. The instructor was present during this scenario also. Even though one student assumed a leadership role, they all continued to look to the instructor for clues regarding their findings and direction. The students intervened correctly and the scenario ended quickly.

Program three debriefing. For all stations observed, debriefing took place at the bedside immediately following the scenarios. Instructors validated correct actions, then asked content review questions and used the time for teaching and reinforcing concepts.

Instructors did most of the talking during debriefing, coaching students on correct interventions, instead of permitting them to problem-solve the situations. Students responded primarily to questions by the faculty and were encouraged to be more assertive and demonstrate confidence in the care of patients.

In this debriefing, the students again seemed to focus more on how they performed in areas where they felt less comfortable, instead of how to prioritize patient needs and improve care. Students were not encouraged to reflect on the scenario or contemplate their thought processes. There was no opportunity for students to formally remediate.

Program one simulation. Program One was an associate degree RN program offering an LPN to RN course track only. The program carried out HFHS in the college simulation lab which had four separate patient rooms. The area was set up to resemble a hospital with a typical patient care room, an emergency treatment room, a birthing suite, and a home living room environment. Each room could accommodate a variety of scenarios by changing the furnishings. The simulation lab had two control rooms with two-way mirrors; each simulation suite had video equipment to permit recording student activities for critique and debriefing. A conference room was available for debriefing.

During the simulations, students were encouraged to suspend disbelief and treat the simulators and scenarios as though they were real. To minimize pretending, disposable supplies were available which students were expected to use. Actors portraying family members were also involved, adding realism to the scenario.

The observed scenario involved two students caring for a patient diagnosed with pancreatitis and cholelithiasis, commonly known as gall stones. The patient had pain,

low blood pressure, and an elevated temperature. Students were familiar with the simulation lab and worked together, communicating with each other in the beginning and during the physical assessment. One student seemed to take the lead; the other appeared less comfortable with the situation. Both students initially interacted well with the actor portraying a family member.

The more assertive student left the room to call the physician for orders, leaving the other student alone with the simulated patient and family member, who became more insistent about getting faster interventions. The student remaining in the room became nervous and seemed unsure about how to respond to the patient and family. The more assertive student returned with new orders and proceeded to consult with the patient, the family member, and the student who had been left in the room. Together they administered IV fluids and medications, taking the patient's vital signs into account. The scenario ended as appropriate measures were taken by the students.

Program one debriefing. Students convened in the conference room with computers and a video-recording of their performance during the scenario. After viewing the video, the instructor asked students to critique their performance. The actor portraying the patient's family member was also present. The instructor validated some of the students' responses, confirming what was done well and identifying areas for improvement. Students reflected on their thought process and feelings, explaining specific action or inaction. The instructor reinforced basic principles, framing concepts with statements like, "if you were taking care of a real patient with this diagnosis." The instructor also explained what students should have picked-up on during the physical assessment and identified what the priorities were for the patient.

Students asked questions for clarification of concepts and shared concerns about their clinical reasoning in attending to the patient's needs while the family member insisted on faster response. The instructor stressed the need for assertiveness and confidence when explaining to patients and families that everything is being addressed as quickly as possible. The instructor did most of the talking during the debriefing session, which included reassuring students. In addition, the instructor provided correct responses and actions more frequently than facilitating students in using their problem-solving abilities. Students seemed to focus more on how they performed in areas where they were less comfortable, instead of on how to prioritize patient needs and improve care. Program One students did not formally prepare in advance for HFHS, nor did they have post-simulation assignments or remediation opportunities. Remediation was considered part of debriefing.

Program four simulation. Program Four was the only LPN program included in the study. The simulation lab used by Program Four was able to accommodate HFHS in four separate rooms. The simulation rooms could be adapted to different patient care settings, including a typical hospital room, emergency department, birthing room, or even a home care environment. The simulation lab had two control rooms with two-way mirrors which made it possible to observe students in either of the patient care rooms. Each room in the simulation lab had video equipment to record student activities for debriefing. There was a conference room to provide privacy for student debriefing. The environment was designed to encourage students to suspend disbelief by providing adequate equipment and supplies to minimize pretense, and live actors to portray standardized patients, family members, physicians, or other roles.

Students were observed in two different scenarios. For each scenario a student observer was assigned to watch from the control room and then discuss his or her perspectives during debriefing. The first scenario involved a patient being treated for a pneumothorax with a chest-tube. The scenario was accomplished by having the patient simulator lying on the kinked chest-tube.

Students were assigned in pairs and worked well together, with one student assuming the lead. During physical assessment both students communicated with the patient, as well as the actor portraying a family member. While interviewing and assessing the patient, students discovered an oxygenation problem, and proceeded to locate and correct the kinked tube. Students then raised the head of the bed and monitored the patient for signs of resolution.

The second scenario involved a standardized patient in a bariatric suit which simulated a morbidly obese patient. Standardized patients are an important aspect of simulation (Sideras et al., 2013), even though their use was not directly the focus of this research. The standardized patient scenarios were carried out in a similar manner to mannequin based situations, but placed a strong emphasis on therapeutic communication and soft skills, including patient respect and dignity.

Program four debriefing. Debriefing was conducted at the bedside with the instructor and student observer summarizing correct actions and areas for improvement. Students were given an opportunity to respond to critiques, which consisted primarily of explaining thought processes and decision-making. However they were not asked to reflect on what they thought was done well or how they could improve. The instructor did most of the talking, reinforcing basic principles and reassuring students. The instructor

also discussed an assessment finding which students should have identified, as well as the priorities for patient care. The scenarios were not video-recorded and the entire debriefing process took only a few minutes. Students had no opportunity to formally remediate.

Emerging Themes

During the early phase of data analysis, initial codes were formed and compared across the database as transcripts were reviewed multiple times. In the next phase of analysis, known as categorical aggregation (Creswell, 2013), the initial codes which emerged from the data were examined, refined, and coalesced into major themes. The following themes represented key findings and were the basis for interpretation, understanding the complexity of the case, and answering the research questions (Creswell, 2014).

Emerging theme: Time limitation. Each of the four program directors and four of the five nursing instructors identified time limitations as a factor related to integrating HFHS in the nursing program. Specific issues concerning time constraint included the ability to plan time within a course to implement HFHS. When asked about barriers to using HFHS the Program One instructor simply responded, "Time in the curriculum." In addition, the time needed to actually plan and develop or adapt scenarios for the appropriate student level was perceived as limited. Director One stated, "The barriers I see [to using HFHS] are….the time it takes to plan 'em, the time it takes to put 'em together, honestly, faculty time." Planning also involved establishing learning objectives, pre- and post-simulation assignments, evaluation criteria, and time to prepare the environment, equipment and necessary supplies. In many cases, the time required for

faculty to learn HFHS and debriefing methods, in order to make simulation an effective tool, is not adequately considered.

Logistically, scheduling HFHS experiences can be challenging. The Program Four instructor commented, "Always having people in the lab, so not being able to just use it whenever we want is a drawback." Depending on the number of simulators available, the number of programs sharing simulation resources, and the number of students in each of the programs, the ability to schedule adequate time in the simulation lab can be not only difficult, but may actually become an impediment to providing sufficient, well-executed HFHS experiences.

Emerging theme: Limited resources. Limited resources were most frequently associated with financial restrictions. Adequate financial resources were necessary to build dedicated simulation labs and purchase patient care equipment and supplies for students to suspend disbelief and approach scenarios in the same manner as they would with a real patient. Although the high fidelity simulators were purchased for each of the schools using educational grants, additional assets were required to renovate facilities and create an environment conducive to HFHS learning. Program Two did not have a discrete simulation lab due to limited funding. Programs Two and Three did not have, or did not use, disposable supplies during HFHS, due to supply budgets constraints. Program Three, Student Two commented, "I think we need more supplies. For being as high-tech as they are and the things you can do with it, we pretend we some things where we should actually be doing it."

Limited resources were also associated with the ability to employ adequate personnel for simulation. Depending on the location of the nursing program, finding

additional qualified faculty to evaluate and debrief students was seen as a challenge. Director Two noted, “They [faculty] don’t feel like we have enough people resources to facilitate it at its utmost.” When supplemental faculty could be secured, financial resources were again a factor related to sufficient personnel budgets. In addition, adequate personnel budgets were necessary to employ actors in portrayal of standardized patients or family members.

Emerging theme: Instructional disconnect. Nursing directors and faculty in this study articulated the purpose of HFHS was to augment classroom and clinical instruction. Competition for clinical sites and changing clinical environments make the instructional possibilities of HFHS especially favorable. The current literature supports well planned and executed HFHS as a method to enhance connections between classroom and clinical settings and to promote the development of critical thinking (Shinnick et al., 2011).

Subtheme: Curriculum integration. In order to enable critical connections between classroom and clinical settings, a key factor resides in the ability to provide well planned and executed HFHS. The quality of the HFHS experience may be overshadowed when faculty struggle with methods to integrate simulation due to workload and limited time within the curriculum. Director Two expressed the need to have a simulation director, “to make it [HFHS] flow across the curriculum.” However, an overarching plan to integrate HFHS in the curriculum was lacking in all four programs in the study. In addition, there was no evidence of consistency in the manner of HFHS implementation.

Subtheme: Instructor mindset. Faculty should be educated in appropriate simulation and debriefing methods to achieve the full purposes of HFHS. Preparing

students for effective simulation experiences should begin with orientation, and an understanding of simulation lab expectations, including privacy and suspension of disbelief. These components provide a necessary foundation to facilitate scaffolding as students manage more complex patient scenarios.

Among the nursing programs in this study, faculty expertise and student preparation were found in varying degrees. However, faculty expertise was observed to be minimized by the logistics of limited time and student numbers. During some of the observations there was a pressing need by faculty to get as many students as possible, sometimes in groups of five or six, to rotate through the prepared scenarios. In these situations, a few students were able to silently observe events within the group rather than actively engage in the scenario. Students were also frequently observed to exhibit uncertainty on how to proceed, giving the indication of inadequate scaffolding (Mastrian et al., 2011). In addition, instructors were repeatedly present during the scenarios, which was observed to disrupt autonomy and the critical thinking process (Brydges et al., 2010).

Emerging theme: Student perspectives. Overall, students responded favorably regarding their experiences with HFHS, and most students indicated the desire for more learning opportunities in the simulation lab. As stated by Program Three, Student One, "I wish we had more….we don't get enough exposure." Program Four, Student Four stated, "We only got in there each semester. I think if it was more frequent, it would be a better learning experience."

Two concerns were identified from the students' responses including the suspension of disbelief and perceived self-efficacy. Several factors were associated with the ability to suspend disbelief with high fidelity simulators. The first factor was related

to student preparation for HFHS, including faculty expectations and consistency with activities such as hand sanitation or methods for performing assessment. The physical environment was a factor in terms of being sequestered from external distractions, interruptions, and the presence of faculty during the scenario. The number of students attempting to participate in a scenario made suspension of disbelief a problem, due to assigning each student to a role which did not reflect reality in patient care.

Unrealistic role assignments were observed to contribute to student uncertainty and inactivity during the scenario. Inadequate or inaccurate disposable supplies were distracting and appeared to add to uncertainty regarding whether students were expected to identify a patient care error or just pretend the inaccuracy did not exist. In addition, the mechanical attributes of the simulators were mentioned by students as reminding them it was not a real patient. Program Four, Student Four stated, "The pulses are really hard to find on these mannequins." Program Two, Student Four added, "They can make heart sounds, lung sounds, and make them cyanotic [with blue lights] but some things that you'd want to check like edema or capillary refill, I have to make sure I ask."

Student perceptions of self-efficacy appeared to be connected to faculty attitudes. In programs where faculty assigned pre-simulation activities to prepare for HFHS, students expressed feeling less stressful and more confident with HFHS participation. Program Three, Student Two stated, "They gave us a list to review, but it didn't tell you what you'd be doing. But, when you come in you're more prepared and it helps." The instructors who gave pre-simulation assignments indicated they wanted students to come to HFHS prepared to apply what they had learned. According to instructors, without preparation students tended to be more nervous and learning was hindered.

In programs where pre-simulation assignments were omitted, faculty indicated the scenarios were adapted to permit students to draw on previous learning. Those students verbalized having learned everything they would need to complete the HFHS scenarios. Some of the students were observed to be confident, but others were very nervous and avoided opportunities to take the lead. In the programs which did not assign pre-simulation activities, it is unknown if some students have been employed in patient care and whether the experience contributes to student confidence, or if some instructors verbally advise students to review certain aspects of care prior to HFHS.

Summary

In this chapter, results from interviews with nursing program directors, faculty, and nursing student focus groups were presented along with data from observations of students and faculty engaged in HFHS and debriefing. The interviews and observations lead to the emergence of four major themes which were representative of the findings. These major themes included 1) time limitations, 2) limited resources, 3) instructional disconnect, and 4) student perspectives. Each of the themes was derived from concepts which influence the manner in which HFHS is implemented and the effectiveness of the implementation methods.

In Chapter Five, an overview of this case study is presented in response to the research questions. In addition to presenting study findings, conclusions are described and supported, and implications for practice discussed. Recommendations for future research are also considered.

Chapter Five: Summary and Conclusion

This study was conducted to examine practices and perceptions of faculty and students regarding the integration of HFHS in associate degree RN and LPN programs. These specific nursing education programs were selected because the length of their curricula is usually two years or less, creating a greater challenge to effectively implement new pedagogies into an abundantly full course of study. Information from this study may elicit evaluation of current HFHS practices and provide considerations for improvement within similar nursing programs.

In this chapter, research findings are briefly summarized and a detailed description of the relationship of the findings to each of the research questions which guided the study is provided. Relevant connections to the literature review from Chapter Two are also made. In addition, conclusions from the data, implications for practice, and recommendations for future research are discussed.

Findings

In this section results from interviews with participating nursing program directors and faculty members are summarized along with interviews conducted with student focus groups. Finally, information from observing students and faculty in HFHS and debriefing sessions is reviewed.

Nursing director interviews. Information shared by program directors during in-person interviews are summarized as follows:

Interview question #1. *How did the use of HFHS develop in your nursing program? (Follow-up: Who or what initiated the process?)* Each program in the study used educational grants to purchase HFHS equipment. As more grant money became

available the programs acquired additional simulators, accessories, and related equipment. Each of the program directors acknowledged, without the grants, the simulators would have been unaffordable due to their large purchase price.

Interview question #2. *Describe the overarching philosophy or objectives for the HFHS program.* Program directors were unable to convey an overarching philosophy for using HFHS in their program(s). However, support for both classroom and clinical instruction were the two primary purposes identified for HFHS. Instructional support included using simulation to illustrate difficult classroom concepts or to ensure more standardized clinical experiences. The goal of using HFHS to connect and build on curriculum content throughout the program of study also emerged.

Interview question #3a. *What are the major enablers for the use of HFHS?* Enablers identified by all four program directors for using HFHS included acceptance by faculty and the convenience of having a simulation lab in close proximity to classrooms and faculty offices. Another enabler was identified as student demand for more HFHS experiences and, for some programs, having a simulation lab with a full-time director and experienced staff was also recognized as an enabler.

Interview question #3b. *What are the major barriers for the use of HFHS?* Program directors indicated limited time and financial resources were barriers to using HFHS. Limited time was related to incorporating simulation within the confines of the curriculum, and also for faculty to prepare scenarios, equipment, and the environment. For some programs, competing with others to schedule time in the simulation lab was also recognized as a barrier.

Limited financial resources were identified as a barrier by all directors in terms of providing adequate patient care equipment, disposable supplies, and additional qualified faculty to evaluate students. Limited funding was a barrier to providing specialized simulation facilities as well. Equipment warranties and maintenance also required adequate funding to keep simulators in proper working condition.

Interview question #4. *What curriculum changes, if any, have occurred to integrate HFHS?* Nursing directors responded there were no major curriculum changes to accommodate the addition of HFHS. Directors indicated HFHS made it possible to ensure students gained experience in providing care for the types of patients they would likely encounter in their career, but may not have the opportunity to see during scheduled clinical time. The directors also conveyed an interest in increasing the use of high fidelity simulators in the classroom as a means to create a more interactive learning experience. Having students prepare in advance to participate in this type of classroom activity is an example of the innovative teaching strategies described.

Interview question #5. *How has HFHS impacted student learning outcomes? (Follow-up: Do you track student performance since adopting HFHS, e.g., test scores, clinical evaluations?)* Program directors stated they had not begun measuring learning outcomes specifically linked to the addition of HFHS, though some programs garnered feedback from students through satisfaction surveys. Results of the student surveys showed positive feedback for simulation and a preference for more time in the simulation lab.

Interview question #6. *Please describe how HFHS is used to replace or make up clinical activities.* Program directors stated they began using HFHS in courses which

have a clinical component. One simulation day was substituted for one clinical day during each rotation. The process involved dividing all students in a particular course into small groups and having them rotate through different scenarios in a single day. Discussion about changing this process to a system which would assign students to HFHS in smaller clinical groups on different days was revealed. Students would continue to substitute HFHS for one clinical day each rotation, but the scenarios would provide more in-depth patient situations. Directors also noted students spent about four hours in HFHS activities as a substitution for an eight- or 12-hour clinical shift. Simulation has not yet been used for clinical make-up although some directors have considered it.

Interview question #7. *What changes, if any, would you like to see in your HFHS program or equipment?* Although the directors expressed different priorities related to simulation, the responses given were concerned with improving or increasing HFHS. Once again, time and staffing emerged as challenges as well as competition with other programs to schedule HFHS and limited time in the curriculum. The desire to employ a full-time coordinator for the simulation lab was expressed by some directors. A simulation coordinator was perceived as necessary to connect program content using HFHS.

Other changes desired by directors illustrated the differences in how programs are able to utilize HFHS. Changes directors said they would like to see included a discrete simulation lab with a separate control room and video equipment, implementation of evolving patient situations which would extend over a period of weeks, and simulation operators from the same healthcare discipline as the students.

Nursing instructor interviews. In-person interviews were conducted with instructors from the four participating nursing programs. Responses to the interview questions are summarized below.

Interview question #1. *Please describe the courses and frequency students participate in HFHS.* Instructors reported introducing prelicensure students to HFHS prior to the first clinical experience to teach basic nursing concepts. Once students were introduced to the simulation lab, HFHS was used primarily in courses with a clinical component to augment and standardize the clinical experiences. Some students also participate in an in-depth capstone simulation prior to graduation.

Interview question #2. *What are the primary objectives for HFHS in the course or program?* Instructors shared different priorities in response to this question. Simulation was reported to permit faculty to observe the student thinking process when they were confronting a problem, which is difficult to accomplish in a clinical group with several students. Simulation allowed instructors to encourage student awareness related to their own critical thinking abilities and to understand the rationale for their actions. Instructor priorities included being able to provide a safe learning environment and to ensure students were actually practicing what they had learned in a safe manner.

Interview question #3. *What changes have occurred in the nursing curriculum (including clinical) with HFHS?* Nursing instructors in the study indicated there were no major changes in the nursing curriculum to include HFHS. All of the instructors stated HFHS was used to substitute for one clinical day in each rotation.

Interview question #4. *Describe how your teaching methods have changed as a result of HFHS.* Instructors shared they had become more intentional in terms of creating

an interactive learning environment, offering examples such as using more case studies to engage students in problem-solving related to course material. Instructors also reported focusing on student strengths and weakness which surfaced during HFHS as the basis for adapting classroom content.

Interview question #5a. *What are significant enablers to using HFHS?* Instructors noted chief enablers for using HFHS included proximity of the simulation lab, the support provided by simulation lab personnel, and simulation making it possible to bridge the gaps in identified in clinical experiences.

Interview question #5b. *What are significant barriers to using HFHS?* Time emerged again as a major barrier to using HFHS; however, the specific reasons were varied. Instructors reported time constraints in the curriculum, competition with other allied health programs to schedule time in the simulation lab, and accommodating large numbers of students in HFHS as obstacles. Other barriers identified by instructors included the lack of comfort with the simulators among nursing faculty, the mechanical attributes of the simulators, and physical facilities for simulation to be carried out.

Interview question #6. *In what ways do you think HFHS has impacted student learning? (Follow-up: How do you assess the effects of HFHS on student classroom or clinical performance?)* Instructors verbalized their beliefs in HFHS as having a positive effect on learning. In addition to improving student confidence, critical thinking, and the ability to connect theory to practice, instructors noted HFHS helped them identify areas of student weaknesses so these could be addressed. Some instructors solicited student feedback through surveys and debriefing evaluations, but no method was used to link student learning specifically to simulation. High fidelity simulations was viewed as

being an integrated component instead of a stand-alone strategy, a possible explanation for not making efforts to measure the effects on student outcomes.

Interview question #7. *Please describe how students prepare for HFHS.* Some instructors required students to prepare before coming to the simulation lab. Students were provided with a general list of topics to review on course subject matter including medications, but did not know what the scenario would entail. Instructors from these programs reported students were less anxious during HFHS and believed preparation facilitated learning and confidence.

Other instructors reported HFHS was planned for students to draw on knowledge they should already have, and did not instruct them to prepare in advance. One instructor indicated the faculty in her program planned to implement an evolving simulation which would continue over several weeks and require students to be prepared to participate as the situation unfolded. The faculty was interested in determining if student preparation enhanced learning.

Interview question #8. *Please describe the post-scenario debriefing process used with students.* The debriefing process described by instructors began with discussing what the students did well. Discussions continued with identifying major mistakes and what should have been done differently. The instructor in one program reported students were video-recorded during HFHS and viewed the recording to prepare for debriefing with a faculty member. Instructors in the remaining programs stated they planned to use video-recording in the future. One program included students as observers in HFHS. The student observer was included in debriefing which provided a different learning perspective for the observer.

Interview question #9. *In your opinion, what are the most important aspects (positive or negative) of HFHS?* Instructor comments on the positive aspects of HFHS were varied. Some of the responses included allowing students to learn from their mistakes because they remembered the experience and the importance of a safe learning environment without risking patient harm. Also mentioned was having students actively think and articulate their thought processes during the scenarios, proving faculty with insight into how they were problem-solving.

When identifying the negative aspects of HFHS, instructors asserted the opinion simulators could never replace real patients. Other comments which reflected the negative attributes of HFHS included the amount of time wasted in dealing with simulators when they suddenly stopped functioning correctly for no apparent reason. In addition, one instructor noted the reluctance of some students to participate in HFHS, believing it was not worth their time.

Interview question #10. *What changes, if any, would you like to see regarding HFHS in this program?* Responses to this question were varied and reflected priorities of the different programs. Instructors stated they would like more time for HFHS in the nursing programs, including scenarios related to end-of-life and cultural diversity. The need for a simulation lab and coordinator was mentioned by some instructors, indicating these were central to achieving a simulation plan for nursing students from the beginning to completion of the program. Other changes desired by instructors included resuming the practice of video-recording students to assist with debriefing, improving consistency in student preparation and debriefing, and for simulators to have more realistic attributes like breath sounds and pulse quality.

Student focus group interviews. Student focus groups from the four nursing programs were completed following a round of HFHS activities. Their responses to the focus group questions are summarized below.

Interview question #1a. *What do you like best about HFHS activities?* In responding to this question, students focused on several aspects of HFHS. The first benefit viewed as important was the ability to learn without risking patient harm. This was supported by students who addressed the simulation lab and learning from practice trials where errors could be corrected. Students also commented on HFHS making them think about the care they provided and how the experience made clinical time less stressful.

Interview question #1b. *What do you like least about HFHS activities?* Students did mention how simulation was unnatural, even with attempts to suspend disbelief. The lack of authentic interaction and the mechanical features of the simulators were among the reasons given. The process of talking to the simulator, but having the responding voice come from a speaker in the room was distracting. Another example was how assessing edema is observable in a real patient but, with simulation, students need to ask if edema is present. Students also commented on being anxious about making mistakes during HFHS, and the desire for greater continuity related to expectations for faculty and students in the simulation lab.

Interview question #2. *Describe your preparation (assigned or not) before going to the HFHS Laboratory.* Some of the programs expected students to complete pre-simulation assignments which may have included a list of review topics including medications, a general skill set, or a limited case-study. The students acknowledged

preparation made HFHS less stressful. In programs where advanced preparation for simulation is not practiced, students remarked they had learned everything needed for the scenarios and the value of HFHS was in validating what they had already learned.

Interview question #3. *How do you benefit from the opportunity to repeat or remediate the scenarios?* All of the nursing students in the study commented there was no formal remediation for HFHS. Debriefing was considered a form of remediation by providing an opportunity to review the scenarios. Some students may opt to remediate in the lab if an instructor is available.

Interview question #4. *Tell me about the debriefing sessions following scenarios. (Follow-up: What is most/least effective?)* Debriefing in all of the programs followed the same general format which, according to students, involves an instructor facilitating discussions on what was done correctly, incorrectly, and student rationale for their actions. Students reported the most effective part of debriefing was the social discourse, talking through the scenario together and hearing the perspectives of fellow students and the instructor. Learning from mistakes was also recognized as very important. One of the programs had students watch a video-recording of their actions immediately following the scenarios. An instructor would then facilitate debriefing in the manner described above. Only students from this program identified a negative aspect of debriefing, which was watching the video-recording.

Interview question #5a. *What are the most effective aspects of the entire HFHS experience?* Students reported the experience was the most effective aspect of HFHS because they believed the experience improved their retention of learning. Students also

noted HFHS provided patient experiences which were not always available during hospital clinical.

Interview question #5b. *What are the least effective aspects of the entire HFHS experience?* In responding to this question, students described feeling awkward when conversing with the simulator. Other students reported having inadequate time in HFHS, or having insufficient disposable supplies needed to suspend disbelief. Some students discussed the inability to initiate an adrenalin response during HFHS the way they would in a real situation.

Interview question #6. *Please discuss how your experiences with HFHS have affected you regarding:*

a*. Preparation for/confidence during clinical.* Students who had enough experience to answer this question indicated HFHS helped them be more confident and prepared for clinical.

b. *Critical thinking/clinical judgment.* Responses to this question revealed students believed HFHS had a positive influence on critical thinking and clinical judgment. Because the simulators were interactive, most students said they were required to think through multiple options when providing care. Other students believed critical thinking skills were activated in critical situations and only with real patients.

c. *Nursing program exams.* Students provided varied responses to this question. Some suggested the ability to remember what was learned from HFHS experiences was helpful for nursing program exams. Other students felt HFHS did not help with nursing exams, or were unsure, since simulation was scheduled after exams.

d. *Preparation for NCLEX.* Responses were mixed regarding the usefulness of HFHS in preparing for NCLEX, with some students believing it would probably not be helpful. Other students indicated the HFHS experiences and critical thinking processes would be helpful with NCLEX.

e. *Preparation for nursing career.* Students revealed several reasons why they believed HFHS was helpful in preparing for a nursing career. Reasons included learning to prioritize patient needs, understanding the role of the RN, and experience in caring for different patient types. The reason given for HFHS being viewed as not helpful in career preparation was related to simulators being unable to substitute for real patients.

Interview question #7. *What changes, if any, would you like to see in how HFHS is used in your program?* Student recommendations for improving HFHS included having actors to portray patients, because assessing an actor would be more realistic, providing more HFHS for all levels of nursing students, and greater consistency in how HFHS was carried out.

Observation of HFHS and debriefing. Students and faculty participating in the study were observed during HFHS and debriefing experiences. What emerged during the interviews was supported through the observation of simulation and debriefing. The following is a synopsis of these activities.

Simulation. Faculty were observed conducting HFHS in specifically designed and equipped settings, or in the nursing skills lab when a simulation lab was not available. Students were assigned to rotate through different prepared scenarios in pairs or in groups of as many as five or six. The extent to which students collaboratively engaged in the scenarios was largely dependent on the size of the group. When students

worked in pairs, there was better communication and less confusion and/or silent observation. In addition, instructor presence in the immediate area of HFHS tended to interfere with student autonomy and problem-solving.

Student ability to suspend disbelief was observed to be affected by several factors including preparation for the HFHS experience. Preparation included adequate scaffolding through orientation, clearly articulated faculty expectations, and content review material. Sufficient time and resources to prepare the simulation environment and execute scenarios were noted to be crucial, including having correct and ample supplies, patient care equipment, and accurate simulator gender. Some programs used live actors to portray family members or physicians, adding realism to the scenarios. Suspension of disbelief was noted to be achievable when the situation was as realistic as possible.

Debriefing. The process of debriefing students was carried out at the bedside and also in more remote locations. When video-recording was used, students viewed their recording before an instructor facilitated debriefing. Live actors and/or student observers involved in the scenario were included in debriefing to share their perspectives of the events. The discussions were predominantly led by faculty and followed a pattern of identifying correct and incorrect actions, student rationale for actions, clarifying concepts, and encouragement. Instructors were also noted to engage in teaching more frequently when debriefing was conducted at the bedside. Fostering reflective thinking behaviors was not regularly observed, and on several occasions debriefing sessions lasted no more than five minutes.

Conclusions

Conclusions reached from this research are presented in this section. Research questions which guided the study form the basis for these conclusions. Much of the data gathered during the study were directed toward answering the research questions. The formation of the conclusions discussed in the next sections were supported by the study findings and the literature review in Chapter Two. Themes which emerged from analyzing the data are discussed in relation to the research questions.

Research question #1. What key factors do nursing program directors report influence the use of HFHS as part of the nursing school curriculum?

Time limitation*s*. The program directors interviewed reported limited time as a major factor in providing HFHS experiences for their students. Specifically mentioned was inadequate time in the curriculum to include simulation, time needed to prepare the equipment and scenarios, and time related to scheduling conflicts with others who use the simulation lab. Programs which assigned HFHS responsibilities to existing faculty indicated time constraints were especially impactful. These same findings were reported by Mastrian et al. (2011) as a reason HFHS fails to gain faculty acceptance. Directors also discussed an interest in using HFHS to enhance classroom learning and to connect essential concepts throughout the nursing curriculum, but time and personnel were identified as obstacles.

Limited resources. Program directors identified different examples of limited resources which were related to financial restrictions. In all cases, the high fidelity simulators were purchased with grant money; however, on-going expenses of providing quality HFHS experiences was an area of concern. The importance of sufficient

personnel to evaluate and debrief students, as well as adequate supplies to facilitate the suspension of disbelief was supported by Gantt and Webb-Corbett (2010) and Halstead et al. (2011). However, the ability to offer these provisions was not always funded in department budgets.

Research question #2. According to nursing school personnel, what changes to the program curriculum have taken place to promote the integration of HFHS learning activities?

Time limitations. Nursing faculty reported very few curriculum changes have taken place occurred to incorporate HFHS. Changes which have occurred were incremental. Simulation was primarily used to augment clinical experiences due to changes in clinical environments, or competition for scheduled time in clinical sites. However, frequency and quality of simulation experiences was influenced by the time available to prepare and execute HFHS, and the number of students considered.

Some faculty indicated they were interested in adapting classroom instruction to include interactive experiences with simulation, though doing so required time to make adequate preparations. Parsh (2010) and Shinnick et al. (2011) emphasized the time intensive nature of using simulation as a teaching strategy and the need for it to be done well to be effective.

Research question #3. What are the perceptions of nursing faculty regarding HFHS as an instructional resource and influence on student learning outcomes?

Instructional disconnect. In addition to augmenting classroom and clinical instruction, some nursing faculty reported the value of observing the thought process of students engaged in problem-solving behaviors. In other programs, this level of student

observation was hampered by the number of students assigned to a particular scenario, faculty presence at the bedside, or both. Faculty presence promotes a more passive learning environment (Brydges et al., 2010).

Curriculum integration. Faculty reported using HFHS to substitute for clinical time and to provide more standardized clinical experiences. Richardson and Claman (2014) found no significant difference in clinical nursing skills and critical thinking when comparing the effectiveness of HFHS to clinical rotations. Instructors indicated they were interested in using simulation as a classroom teaching component, and added they had revised course content based on student learning needs identified during simulation. Faculty also stated their own teaching methods had become more intentional and interactive following HFHS with their students.

Nursing faculty expressed their belief regarding HFHS in helping students connect theory to practice, as well as improve critical thinking and confidence. However, integration of HFHS across the curriculum requires faculty time and planning. An overarching plan to integrate simulation throughout the curriculum was lacking in all four programs in the study. The manner of implementation of HFHS and debriefing was observed to be inconsistent among the four nursing programs and their faculty.

Instructor mindset. Implementation practices for HFHS varied among programs in the study. These practices included differences in the level of scaffolding, in pre-simulation assignments, and in post-simulation debriefing. Inadequate scaffolding leads to frustration when students confront challenging situations in HFHS (Mastrian el al., 2011). Debriefing should assist students to safely express thoughts and feelings and to

reflect on actions. Reflective thinking is integral to the development of clinical judgment (Nehring & Lashley, 2010) and requires adequate time to facilitate (Lavoie et al., 2013).

Faculty should be skilled in simulation and debriefing and have adequate time to prepare and execute HFHS to maximize its effectiveness (Decker et al., 2013; Nehring & Lashley, 2010). However, quality of the HFHS experience and learner time in the simulation lab were affected in this study by scheduling, faculty time to prepare and execute, and the need to rotate numbers of students through several scenarios in a single day, sometimes in groups of five or six. Instructors were frequently interacting with, or located near, students during HFHS, which was observed to interfere with autonomy and critical thinking. Students should be permitted to make mistakes and learn from the consequences of their decisions (Parsh, 2010). In addition, access to, and preparation of, supplies and equipment were noted to be insufficient in some locations. Study participants reported these inadequacies to be the result of limited budgets and planning time. Inappropriate patient care items were noted to be available for use, which added to student anxiety and distracted from the learning process.

Research question #4. What are the perceptions of nursing students regarding HFHS as a pedagogical strategy and the implementation practices experienced?

Student perspectives. Although some students appreciated HFHS more than others, they all reported positive aspects of the experiences. The most frequently mentioned advantage to simulation was the opportunity to learn from experience, including mistakes, without putting patients at risk. The importance of learning in a safe interactive environment was asserted by Campbell and Daley (2013). Other benefits identified were learning to think critically, prioritizing patient care needs, greater

confidence, less stressful clinical time, and understanding the nurses' role. Many students expressed an interest in having more time in the simulation lab.

Student perspective on pre-simulation assignments reflected the opinions verbalized by their instructors. Those who were assigned course content review commented the assignments made HFHS less stressful. Instructors who assigned pre-simulation material said students were less anxious, exhibiting confidence in applying what they had learned. The students without assigned HFHS preparation stated they had learned everything needed to be successful in the scenarios. Instructors who did not assign a pre-simulation review said they wanted students to apply what they should have already learned. In either situation, students reported simulation as validating what they knew and identifying areas of difficulty. Self-efficacy, whether perceived or authentic, was influenced by the simulation environment and the ability to suspend disbelief.

Suspension of disbelief was frequently an issue related to unnatural attributes of the mannequins and the simulation environment. Students conveyed a sense of awkwardness when attempting to converse with the simulator, with some suggesting the use of actors instead of simulators in order to gain a degree of realism. In addition, students acknowledged inconsistencies in the scenarios leading to confusion and stress, such as the expectation to suspend disbelief while being asked to pretend some aspects of care. The importance of an authentic HFHS environment was emphasized by Gantt and Webb-Corbett (2010). Inconsistencies among instructors regarding the manner in which they executed HFHS and debriefing were also noted by students.

Students who watched a video of the scenario began to critique their actions prior to formal debriefing with faculty. According to students, the opportunity to discuss

details of the scenario, or social discourse (Mezirow, 2000), was the most effective part of debriefing. Although faculty emphasis was not placed on critical reflection, students reported instructor comments helped them acquire a better perspective on their performance.

Implications for Practice

Findings from the study illustrated the degree of commitment in nursing programs for using innovation to educate students. Nursing faculty regularly balance heavy workloads and tight schedules in addition to planning for simulation, many times in less than optimal circumstances. Some programs lack sufficient resources and many instructors need education in techniques to optimally integrate and implement HFHS. All programs lacked a comprehensive plan to incorporate and scaffold simulation throughout the curriculum. However, what emerged from the study was evidence of determination to improve and even increase simulation, acquiring ideas through collaboration, networking, or through trial and error. Based on the findings, two key recommendations were identified for nursing programs and their sponsoring institutions regarding efforts to take full advantage of having high fidelity simulators.

Suspension of disbelief. The importance of suspending disbelief when students engage in HFHS was documented by Gantt and Webb-Corbett (2010). A high degree of authenticity in simulation activities is needed for students to achieve the appropriate mindset. In addition to the simulator, an overall commitment to realism is recommended and includes eliminating the need to pretend where possible.

Mastrian et al. (2011) suggested scaffolding learners through new skills, then permitting more autonomy as confidence increases. Students should be thoroughly

oriented to HFHS and permitted time to become acquainted with the equipment. In addition, expectations of faculty should be consistent and clearly communicated. Education and support are needed for instructors to embrace best practices in executing HFHS and debriefing (Halstead et al., 2011). Practices shown to enhance HFHS effectiveness include: 1) pre-simulation assignments to reduce student stress and maximize learning (Mastrian et al., 2011), 2) minimizing faculty involvement in or near the scenario to promote autonomy and problem-solving behaviors (Brydges et al., 2010), and 3) skilled debriefing to facilitate critical reflection and social discourse among students (Smith et al., 2012).

Other strategies to support suspension of disbelief which emerged from this study include the use of actors and assigning smaller groups of students to a scenario. Actors trained to portray family, physicians, or even patients add an element of realism to the setting. More than two or, at most, three students creates an unrealistic situation, adds to confusion, and allows some students to remain passive during the activity.

In light of faculty work commitments, some nursing programs have created a simulation coordinator position. Mastrian et al. (2011) suggested this as way to support faculty in the integration process of HFHS. However, if the creation on a new position is not feasible, faculty could be called on to identify a champion for HFHS to manage simulation lab functions. The individual should ideally have a reduced teaching load and oversight for curriculum integration, faculty in-service, scheduling of nursing students, and preparation for learning experiences. Work-study students could also be involved to assist in maintaining equipment and supplies. In addition, instructors with advanced degrees are called upon to precept graduate students during their practicum semester.

Developing appropriate goals related to simulation could benefit the graduate student as well as the nursing program.

Scheduling grueling simulation lab days where large numbers of students are rotated through different scenarios is not a good utilization of equipment or time, and does not provide an optimal learning experience. Instead faculty members should consider assigning HFHS to smaller clinical groups, implement evolving simulations to engage smaller student groups over time, or plan less elaborate intermediate simulations using case studies to promote critical thinking.

Financial investment and support. Beyond the acquisition cost of simulators, using HFHS requires ongoing expenses for supplies, equipment, maintenance, and faculty to evaluate and debrief students (Halstead et al., 2011). Although these expenses are often not considered in department budgets, they are necessary to successfully support a simulation lab where students are able to suspend disbelief and experience an optimal learning environment. When planning for a simulation lab, sponsoring institutions should factor in these ongoing expenses to attain the outcomes intended.

In the absence of sufficient budgetary resources, strategies for having adequate supplies to accommodate students in suspension of disbelief may include developing ways to re-use items. Most disposable supplies used in the simulation lab are not actually contaminated as they would be in human use. Items like syringes, intravenous fluids and tubing, medication vials, and dressing material could be repackaged and used repeatedly. Here again, a work-study student could assist in preparing and packaging items for reuse. The simulation lab should have an inventory of frequently used items, maintained separately from skills lab supplies. Developing partnerships with other departments

interested in using HFHS or clinical agencies for assistance in obtaining additional supplies or equipment, such as oxygen flowmeters, and intravenous pumps should be explored. Finally, applying for grants or foundation gifts to fund warranties and replacement equipment may be appropriate. The goals to be advanced are proving authenticity to support students in fully engaging in the learning scenarios, promoting the development of critical thinking, and achieving the best use of simulation equipment.

Recommendations for Future Research

Implementing any time-intensive teaching strategy, such as HFHS, places additional workload demands on faculty (Brewer, 2011; Dowie, 2011; Foronda et al., 2013). Nursing programs with shorter curricula, similar to the focus of this study, may find the task especially challenging. Although this study contributes to the general knowledge of how simulation is integrated in associate degree RN and LPN programs, the findings and conclusions may be suitable for any nursing program facing issues comparable to those which emerged.

Numerous studies have been documented in the literature attempting to measure changes in student knowledge, confidence, and critical thinking related to HFHS (Cant & Cooper, 2010; Fero et al., 2010; Gates et al., 2012; Shinnick et al., 2011). Regardless of the outcomes, these studies frequently lack the strength to be generalizable (Goodstone et al., 2013; Kirkman 2013; Shinnick & Woo, 2014; Yuan et al., 2011). However, further research is needed to more broadly substantiate student outcomes associated with HFHS implementation. Additional quantitative or mixed methods research should be considered to measure the impacts of HFHS, while managing the numerous variables inherent in nursing education.

A landmark study by the NCSBN (Hayden et al., 2014) found, in prelicensure programs, substituting HFHS for up to 50% of clinical time was as effective as traditional clinical placement in preparing nurses for professional practice. These findings are vastly important for state boards of nursing in establishing new guidelines for nursing programs wishing to substitute HFHS for clinical time. When nursing boards begin to publish new regulations for HFHS use, the study should be replicated on a smaller scale following the individual state guidelines. A study of this nature could yield valuable information, especially in the absence of other measureable outcomes.

Summary

This qualitative study was undertaken to explore current practices for integrating HFHS in nursing education. In Chapter One the background for the study was introduced, including a brief history of simulation in the education of healthcare professionals. Transformative Learning Theory (Mezirow, 2000) was determined to be well suited for HFHS and became the framework for the study. The problem statement was described in relationship to findings in the literature, which revealed a lack of recommendations for integrating HFHS in RN programs, and the absence of studies involving LPN students. The study purpose was defined as focusing on implementation of HFHS in associate degree RN and LPN nursing programs, having a course of study which may be completed in two years or less. The research questions were articulated and key terms used in the study were defined for the reader.

Chapter Two included a robust review of the literature which began by defining simulation as an educational strategy, and describing human simulation in terms of low, moderate, or high fidelity. A brief history of simulation as a training method in the

military, transportation, and healthcare professions was presented (Nickerson & Pollard, 2010). The expanded use of HFHS in healthcare was presented, along with discussion related to the remarkable increase in the use of HFHS in nursing education. Learning theories used to frame research studies related to HFHS in nursing education were presented. In addition, experiences with HFHS in nursing education from the current literature were summarized and aggregated into topics, including implementation practices (Nehring & Lashley, 2010; Shinnick et al., 2011), student learning and satisfaction (Elfrink, 2009), and instructional considerations (Brydges et al., 2010; Mastrian et al., 2011; Parker & Myrick, 2010; Smith et al., 2012).

The research methodology was introduced in Chapter Three. Qualitative design was determined to be the most appropriate research method as the study focused primarily on human perceptions (Stake, 2010) and rationale for behavior (Ary et al., 2014). A case study approach was utilized, which Creswell (2013) described as a qualitative method used to explore a real-life system, by collecting and analyzing data from multiple sources of information.

Purposeful sampling (Creswell, 2013) was used to identify sites and individuals who could more substantively contribute to the study. From the population of associate degree RN and LPN programs which utilized HFHS in curriculum, four typical nursing schools in the Midwest were invited to participate in the study. Data collection included in-person interviews with program directors and faculty members who were identified as knowledgeable regarding HFHS practices. Nursing students and faculty were observed while engaged in simulation and debriefing activities, and nursing students from each

program participated in focus group interviews expressing their experiences and opinions related to HFHS. A total of 41 individuals participated in the study.

In the final two chapters, a detailed analysis of the data was presented including a demographic analysis of the participants. Simulation environments and the utilization of resources which had been observed and documented were described in comparison to those depicted in the literature (Nehring & Lashley, 2010; Wilson & Rockstraw, 2012). Themes which emerged as a result of this study were 1) time limitation, 2) limited resources, 3) instructional disconnect, including subthemes of curriculum integration and instructor mindset, and 4) student perspectives. These themes were the basis for understanding the complexity of the case and for answering the research questions (Creswell, 2013). Study finding were summarized and conclusions were made based on the data collected. In addition to framing answers to the research questions, the themes provided a foundation for suggesting implications for practice and recommendations for future research.

For many programs, acquiring high fidelity simulators was the first of numerous challenges. Findings of this study revealed program directors and faculty dealt with a several issues related to time constraints beginning with how to best incorporate HFHS in the curriculum. Time limitation was also a factor related to planning and preparing for scenarios, and scheduling student time in the simulation lab. Other challenges confronting nursing programs involved limited financial resources, which were manifested in terms of insufficient supplies, equipment, and physical facilities. The need for additional faculty skilled in simulation and debriefing techniques and, in some cases,

the need for a simulation coordinator emerged. Mastrian et al. (2011) suggested a coordinator to support faculty and facilitate the integration process.

Limited time and resources contributed to another significant finding which emerged, and is reflected substantively in the literature review in Chapter Two. Despite faculty efforts to improve and increase HFHS, instructional disconnect was revealed in several respects. First, a comprehensive curriculum plan for integrating HFHS was lacking in all four programs, leaving instructors to implement HFHS for an individual course in isolation of the remaining courses in the program. Inconsistency was noted in the manner HFHS was implemented, including insufficient scaffolding (Mastrian et al., 2011), which was identified by students as adding to confusion and stress during an active scenario.

The ability to suspend disbelief was hindered when students reported the need to pretend certain aspects of the scenario due to inadequate disposable supplies or equipment (Gantt & Webb-Corbett, 2010). Instructors were frequently present during HFHS, suppressing student autonomy and critical thinking (Brydges et al., 2010). On several occasions there were five or more students assigned to a single scenario which interfered with critical thinking and permitted some students to remain passive. Even with recognized flaws, most students in the study acknowledged the benefits of HFHS as learning to prioritize patient care, developing greater confidence, and the opportunity to learn from experience without putting patients at risk.

Debriefing provided students the opportunity to discuss events of the scenario, but critical reflection was not always encouraged, especially in situations where debriefing was conducted at the bedside and lasted only a few minutes. Debriefing is central to the

experience, supporting the development of clinical judgment (Nehring & Lashley, 2010). However, adequate time and appropriate setting should be factored in to facilitate safe discussion, critical reflection, and further learning Decker et al., 2013; Lavoie et al., 2013; Traynor et al., 2010).

Current practices for integrating HFHS in nursing programs were examined in this study. The intent was not to be critical of the programs or faculty, but to shed light on how common challenges are confronted. Nursing program personnel were observed to be dedicated to student learning and determined to discover ways to improve their methods, even in less than optimal circumstances. On behalf of nursing educators and students, the researcher is hopeful the outcomes and recommendations from this study will facilitate obtaining the support necessary toward realizing desired enhancements to HFHS programs.

Appendix A

Interview Protocol for Nursing Program Directors using High Fidelity Simulation

Date and Time of Interview:	Location Code:
Alias and Position of Interviewee:	Interviewer:

1) How did the use of HFHS develop in your nursing program?

2) Describe the overarching philosophy/objectives for the HFHS program.

3) What are the major enablers/barriers for the use of HFHS?

4) What curriculum changes, if any, have occurred to integrate HFHS?

5) How has HFHS impacted student learning outcomes? Do you track student performance since adopting HFHS, e.g., test scores, clinical evaluations?

6) Please describe how HFHS used to replace or make-up clinical activities.

7) What changes, if any, would you like to see in your HFHS program/equipment?

Appendix B

Interview Protocol for Nursing Faculty using High Fidelity Simulation

Date and Time of Interview:	Location Code:
Alias and Position of Interviewee:	Interviewer:

1) Please describe the courses and frequency students participate in HFHS

2) What are the primary objectives for HFHS in the course/program?

3) What changes have occurred in the nursing curriculum (including clinical) with HFHS?

4) Describe how your teaching methods have changed as a result of HFHS.

5) What are significant enablers/barriers (including faculty support) to using HFHS?

6) In what ways do you think HFHS has impacted student learning? How do you assess the effects of HFHS on student classroom or clinical performance?

7) Please describe how students prepare for HFHS.

8) Please describe the post scenario debriefing process used with students.

9) In your opinion, what are the most important aspects (positive or negative) of HFHS?

10) What changes, if any, would you like to see regarding HFHS in this program?

Appendix C

Observation Protocol for Nursing Students and Faculty in HFHS Scenario and Debriefing

Date and Time of Observation:	Location Code:
HFHS Learning Situation (type of scenario)	Observer:
Educational Level of Students (first semester, second year, etc.):	

Part I – Students engaged in scenario

Description of Environment:

Description of Proceedings:

Faculty Prompting:

Student Response /Interaction:

Evolution of Scenario:

Part II – Student debriefing following scenario

Description of Environment:

Description of Proceedings:

Faculty Prompting:

Student Response/ Interaction:

Summary and Closure:

Opportunities to Remediate:

Appendix D

Interview Protocol for Student Focus Group regarding High Fidelity Simulation

Date and Time of Interview:	Location Code:
Number of Interviewees:	Interviewer:
Position (student level) of Interviewees:	

1) What do you like best/ least about HFHS activities?

2) Describe your preparation (assigned or not) before going to the HFHS Laboratory.

3) How do you benefit from the opportunity to repeat or remediate the scenarios?

4) Tell me about the debriefing sessions following scenarios. What is most/least effective?

5) What are the most/ least effective aspects of the entire HFHS experience?

6) Please discuss how your experiences with HFHS have effected your:

   a. Preparation for/confidence during clinical

   b. Critical thinking /clinical judgment

   c. Nursing program exams

   d. Preparation for NCLEX

   e. Preparation for nursing career

7) What changes, if any, would you like to see in how HFHS is used in your program?

Appendix E

LINDENWOOD

LINDENWOOD UNIVERSITY ST. CHARLES, MISSOURI

Thank you for your submission of New Project materials for this research project. Lindenwood University Institutional Review Board has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a study design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

This submission has received Expedited Review based on the applicable federal regulation.

DATE:	March 24, 2014
TO:	Sheila Kaylor
FROM:	Lindenwood University Institutional Review Board
STUDY TITLE:	[518076-1] Factors Influencing the Integration of High Fidelity Simulation in Associate Degree RN and LPN Nursing Programs.
IRB REFERENCE #:	
SUBMISSION TYPE:	New Project
ACTION:	APPROVED
APPROVAL DATE:	March 24, 2014
EXPIRATION DATE:	March 24, 2015
REVIEW TYPE:	Expedited Review

Project is approved, but the following conditions must be made:

1. The researcher writes: Individual participants will remain anonymous, identified only by program, position, and number for the purpose of transcribing and coding data. **What are position and number? Please clarify.**
2. **The consent form needs to make it clear that students may be recorded (audio and video).**

Please remember that informed consent is a process beginning with a description of the study and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the study via a dialogue between the researcher and research participant. Federal regulations require each participant receive a copy of the signed consent document.

Please note that any revision to previously approved materials must be approved by this office prior to initiation. Please use the appropriate revision forms for this procedure.

All SERIOUS and UNEXPECTED adverse events must be reported to this office. Please use the appropriate adverse event forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to the IRB.

This project has been determined to be a Minimal Risk project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the completion/amendment form for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of March 24, 2015.

Please note that all research records must be retained for a minimum of three years.

If you have any questions, please contact Robyne Elder at (314) 566-4884 or relder@lindenwood.edu. Please include your study title and reference number in all correspondence with this office.

If you have any questions, please send them to IRB@lindenwood.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within Lindenwood University Institutional Review Board's records.

Appendix F

Lindenwood University

School of Education
209 S. Kingshighway
St. Charles, Missouri 63301

Permission Letter from Institution

[redacted]

Dear _____,

I am conducting a research study titled, "Factors Influencing the Integration of High Fidelity Simulation in Associate Degree RN and LPN Nursing Programs" in partial fulfillment of the requirement for a doctoral degree at Lindenwood University.

The purpose of this research is to examine current practices for using high fidelity simulation (HFHS) in practical nursing and associate degree registered nursing programs.

I am seeking your permission as the Director of the [redacted] Nursing Program(s) at [redacted] College, to contact the faculty and students interested in participating in this study.

Participation in the study is completely voluntary. The participants may withdraw from the study at any time without penalty. The identity of the participants and the institution will remain confidential and anonymous in the dissertation or any future publications of this study.

Please do not hesitate to contact me with any questions or concerns about participation in the study. A copy of this letter and your written consent should be retained by you for future reference.

Yours truly,

Sheila A. Kaylor

Sheila A. Kaylor
Doctoral Candidate
Lindenwood University
[redacted]
Email: [redacted]

Permission Form

I, [redacted], grant permission for the instructors and students of [redacted] College, to be contacted regarding participation in the study, "Factors Influencing the Integration of High Fidelity Simulation in Associate Degree RN and LPN Nursing Programs" by Sheila A. Kaylor.

By signing this permission form, I understand that the following safeguards are in place to protect those who choose to participate:

1. The participants may withdraw from the study at any time without penalty.

2. The identity of the participants and the institution will remain confidential and anonymous in the dissertation or any future publications of this study.

I have read the information above, and any questions that I have posed have been answered to my satisfaction.

_____ _____

[redacted] Date

Appendix G

LINDENWOOD

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH ACTIVITIES

"Factors Influencing the Integration of High Fidelity Simulation in Associate Degree RN and LPN Nursing Programs"

Principal Investigator: Sheila A. Kaylor Telephone: [redacted] E-mail: [redacted]

Participant: _____ Contact info: _____

1. You are invited to participate in a research study conducted by Sheila Kaylor under the guidance of Dr. Sherry DeVore. The purpose of this research is to examine current practices for using high fidelity simulation (HFHS) in practical nursing and associate degree registered nursing programs.
2. a) Your participation will involve a one-time interview with the nursing program director and a one-time interview with nursing faculty who are familiar with HFHS. In addition, students will be observed while engaging in HFHS and debriefing activities at your institution one time during spring, 2014, semester. Six to 10 students will also be asked to participate one time in a focus group to discuss their simulation experiences.

   b) The amount of time involved in your participation will be approximately one hour for the nursing director and faculty interviews, one to three hours observing students in the simulation lab, and approximately one hour for the student focus groups. The total time involvement for participating nursing programs will be approximately three to six hours during spring, 2014, semester.

   Approximately six to 10 students from your nursing program(s), the nursing program director and at least one nursing faculty member will be involved in this research. There are four research sites participating in the study, with a total student involvement of approximately 24, plus eight to 10 faculty members.

3. There are no anticipated risks associated with this research.
4. There are no direct benefits for you participating in this study. However, your participation will contribute to the knowledge about the use of high fidelity simulation as an instructional method in practical nursing and associate degree nursing programs.

5. Your participation is voluntary and you may choose not to participate in this research study or to withdraw your consent at any time. You may choose not to answer any questions that you do not want to answer. You will NOT be penalized in any way should you choose not to participate or to withdraw.

6. We will do everything we can to protect your privacy. As part of this effort, your identity will not be revealed in any publication or presentation that may result from this study and the information collected will remain in the possession of the investigator in a safe location.

7. If you have any questions or concerns regarding this study, or if any problems arise, you may call the Investigator, Sheila Kaylor at [redacted] or the Supervising Faculty, Dr. Sherry DeVore at (417) 881-0009. You may also ask questions of or state concerns regarding your participation to the Lindenwood Institutional Review Board (IRB) through contacting Dr. Jann Weitzel, Vice President for Academic Affairs at 636-949-4846.

I have read this consent form and have been given the opportunity to ask questions. I will also be given a copy of this consent form for my records. I consent to my participation in the research described above.

_____	_____
Participant's Signature Date	Participant's Printed Name
_____	_____
Signature of Principal Investigator Date	Investigator Printed Name

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Vita

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