IMPACT OF SIMULATION ON LEARNING TRANSFER IN NEW GRADUATE REGISTERED NURSES

By

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April, 2015

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The purpose of this study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development, and RN role preparedness. The study participants consisted of 251 new graduate registered nurses obtained from the North Carolina Board of Nursing (NCBON) registered nurse licensure database. A descriptive correlation design was utilized to explore the impact of simulation on perception of gains in transfer of learning, confidence and competence development, and RN role preparedness. Frequencies and percentages, independent t-tests, and Pearson product-moment correlation were applied to the data set. The study results showed simulation activities occurred more frequently in pre-licensure programs compared to new nurse orientation programs, and higher transfer of learning gains were noted in those nurses who participated in both pre-licensure and orientation simulation activities. Further, simulation exposure in both programs had positive influences on confidence, competence, RN role preparedness and pre-licensure transfer of learning. For nurses with both pre-licensure and new nurse orientation simulation experience, moderate to strong correlations were observed in associate degree nurses, with and without previous healthcare experience, and in bachelor degree

nurses with previous healthcare experience. Further research is needed on a larger representation of advanced beginner new graduates. Ideally, transfer of learning and new nurse outcome measures should be evaluated with a more diverse, national representation of new graduates. Continued research on simulation-based orientation experiences is needed as more hospitals are implementing this strategy into their new nurse transition programs.

IMPACT OF SIMULATION EXPERIENCES ON LEARNING TRANSFER IN NEW GRADUATE REGISTERED NURSES

A Dissertation

Presented To the Faculty of the Department of College of Nursing

East Carolina University

In Partial Fulfillment of the Requirements for the Degree

Doctor of Philosophy in Nursing

by

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April, 2015

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CHAPTER ONE: BACKGROUND AND SIGNIFICANCE OF STUDY

Background

Nurses practicing in the 21st century are challenged to deliver safe, high-quality nursing care to patients who are older as well as more diverse with respect to race, ethnicity, and socioeconomic factors. The increasingly vast body of nursing knowledge, combined with continuous medical and technological advancements, and high patient acuity, require that nurses have finely tuned critical thinking (CT) skills. Patient safety depends upon a competent nurse to recognize changes in a patient's condition and to intervene appropriately (Benner, Sutphen, Leonard, & Day, 2010; Candela & Bowles, 2008; National Advisory Council on Nurse Education and Practice (NACNEP), 2010; Tanner, 2006a).

Nurse educators are challenged to produce graduates who can safely and effectively manage complex patient conditions (Institute of Medicine (IOM), 2010). New nurses must be equipped with relevant competencies, knowledge, and skills that align with current workplace requirements (NACNEP, 2010). Yet, research suggests that entry-level nurses are not adequately prepared for practice in today's healthcare environment (Benner et al., 2010; IOM, 2010; Li & Kenward, 2006; Mould, White, & Galleger, 2011). New graduates often fail to recognize or respond to a crisis (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009), and lack competence in communication, critical thinking, leadership, and organizational skills (Theisen & Sandau, 2013).

Just as employers have expressed concerns, new nurse graduates also reported frustration regarding the transition to practice (Duclos-Miller, 2011; Hayden, Smiley, Alexander, Kardong-Edgren, & Jeffries, 2014). Results of a 2006 study by the National Council of State Boards of Nursing (NCSBN) indicated that registered nurse (RN) graduates felt unprepared to administer medications to a group of patients (52%), supervise others (24.5%), know when and how to call

a physician (21.7%), or delegate tasks (23%) to other team members. Further, one-fifth of the graduates stated their typical patient assignments were too difficult and challenging (Li & Kenward, 2006).

Clearly, nursing education must align student-learning opportunities with the realities of the current health care setting. Students need to be educated in new ways that better prepare them for 21st century nursing (IOM, 2010). In order to deliver a higher-level of nursing care, graduates need to have competencies in decision making, systems thinking, team leadership and quality improvement (IOM, 2010). Faculty aim to promote competencies such as critical thinking and confidence through various teaching strategies in order to prepare students for situations they may encounter in clinical practice (Kaddoura, 2010).

Traditionally, application of nursing knowledge occurs in the clinical setting where the students learn through experience with "real" patients and are given the opportunity to make clinical judgments and practice critical thinking skills (Benner, et al., 2010; Cant & Cooper, 2010; Kataoka-Yahiro & Saylor, 1994). Students are placed in clinical settings and assigned one or two patients. On many occasions, students may spend a great amount of time providing basic and total care to a single patient in a non-acute setting (Ironside & McNelis, 2011; Tanner, 2006a). Limited clinical exposure for students is further impacted by faculty shortages, limited numbers of clinical sites, fewer learning experiences, increased patient acuity, shorter length of stay and early discharges (Ard, Rogers, & Vinten, 2008; Elfrink, Kirkpatrick, Nininger, & Shubert, 2010; Feingold, Calaluce, & Kallen, 2004; Tanner, 2006b). Combining these practice realities with the complexity of the current healthcare environment makes it difficult to provide students with a variety of clinical situations to ensure competency development (Yuan, Williams, & Fang, 2012).

Significance

Nurses are expected to provide safe and competent nursing care after graduation and throughout their professional careers. Because of the challenges of the current clinical environment as outlined in the previous section, nurse educators are searching for alternative methods to teach and assess decision-making growth in their nursing students. Many programs have instituted patient simulations to augment clinical experiences and to help students with the complex patient situations encountered in today's health care setting (Harder, 2010; NCSBN, 2009; Onello & Regan, 2013). The American Association of Colleges of Nursing (AACN) Baccalaureate Essentials (2008) document suggests that simulation training can provide and enhance the clinical experiences required for developing the role of a professional nurse.

Results of a national survey on simulation use in nursing education indicated that 87% of responding pre-licensure nursing programs use simulation, and over half of these programs use simulation in at least five clinical courses (Hayden, 2010). Medium and high-fidelity simulations were used more often in medical/surgical, foundations, pediatric and obstetrics courses (Hayden, 2010). Further, sixty-nine percent of nursing programs substitute simulation for clinical experiences; Boards of Nursing in 16 states have granted schools permission to replace a certain percentage of clinical time with a simulation scenario (Hayden, 2010; Nehring, 2008). The NCSBN recently completed a longitudinal, randomized controlled study exploring whether simulation can be effectively substituted for traditional clinical experiences (Hayden, et al., 2014). A total of 665 students participated in the study. Incoming students from 10 nursing programs were randomized into one of three groups. These were a control group (traditional clinical experiences), a group of students who had 25% of the traditional clinical hours replaced with simulation, and a group of students who had 50% of clinical replaced with simulation.

Students were evaluated on clinical competency, nursing knowledge and the transferability of learning to the practice setting. Results suggested that there are no differences in educational outcomes when simulation replaced traditional clinical experience and that learning transfer did occur. There were no statistically significant differences in clinical competency or nursing knowledge among the three study groups (Hayden, et al., 2014).

Simulation provides opportunities for experiential learning during which students can learn new information, practice skills, and apply previous learned information, without harming actual patients (Adamson, 2011; Hayden, et al., 2014; Pilcher, Goodall, Jensen, Huwe, Jewell, Reynolds, & Karlson, 2012). Studies have demonstrated that simulation improves clinical judgment and critical thinking skills (Guhde, 2010; Lasater, 2007; Lindsey & Jenkins, 2013; Sullivan-Mann, Perron, & Fellner, 2009), "contributes to the safety and well-being of patients and the facilitation of more competent new graduate nurse upon entry to practice" (Robinson & Dearmon, 2013, p. 205); promotes interdisciplinary learning (Dillon, Noble, & Kaplan, 2009; Luctkar-Flude, Baker, Medves, Tsai, Rivard, Goyer, & Krause, 2013; Masters, Baker, & Jodon, 2013; Reese, Jeffries, & Engum, 2010), and knowledge acquisition (Brannan, White, & Benzanson, 2008; Jeffries & Rizzolo, 2006; Radhakrishnan, Roche, & Cunningham, 2007). Further, a simulated clinical environment offers an ideal setting to evaluate student performance, which may prove more difficult in patient care environments (Jenson, 2013). Recently a meta-analysis demonstrated that simulation-based training improves learning outcomes with a medium to large effect, compared with traditional education or no intervention (Shin, Park, & Kim, 2015).

Advocates of simulation believe that it may help bridge the theory-practice gap by providing an opportunity to apply knowledge and skills learned in the classroom to an

alternative, practice setting. Simulation also plays an essential role in acquiring the critical thinking skills needed to provide competent patient-centered care (Decker, Sportsman, Puetz, & Billings, 2008; Hayden, et. al, 2014; Twibell, Pierre, Johnson, Barton, Davis, Kidd, & Rook, 2012; Yuan, Williams, & Fang, 2012). Yet, previous studies have shown a gap in the literature related to the transfer of learning following simulation, suggesting that further study is needed in this area (Alinier, Hunt, Gordon, & Harwood, 2006; Feingold, Calaluce & Kallen, 2004; Foronda, Liu, & Bauman, 2013; Kirkman, 2013; Liaw, Chan, Scherpbier, Rethans, & Pua, 2012; Weaver, 2011).

Data regarding the direct clinical transfer of knowledge and skills from the simulation lab to the actual patient care setting is beginning to emerge, but further empirical research is needed (Ross, 2015). The purpose of the study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development and RN role preparedness. This study benefits nurse educators by strengthening the understanding of the influence of simulation-based training on new graduate RN's transfer of learning and transition into practice. Ongoing studies of the simulation-based activities are needed to validate the impact simulation has on new nurse outcomes. Results from this study will inform and guide nurse educators in developing simulation-based teaching strategies that best enhance transfer of learning, develop confidence and competence and prepare the student for the professional RN role.

Theoretical framework

This study is based on the integration of two theoretical frameworks: Benner's (1982, 2001, 2004) novice to expert nursing practice philosophy and Haskell's (2001) transfer of

learning framework. A theoretical framework in a study "is the overall conceptual underpinnings of a study" (Polit & Beck, 2008, p.142). It allows the researcher to use an established model to "knit together observations and facts into an orderly scheme" (p. 144) and make findings generalizable and meaningful. These frameworks provide an understanding and common language of the concepts under study (Polit & Beck, 2008). This study's framework incorporates the work of both Benner and Haskell into a model of new graduate transition developed by Scott, Engelke, and Swanson (2008).

Novice to Expert

Patricia Benner's (1982, 2001, 2004) theoretical work identified five levels of competency in nursing practice: novice, advanced beginner, competent, proficient, and expert. The levels describe the clinical performance characteristics as well as any teaching/learning needs required of the nurse. Benner's research identifies the limits of formal rules and addresses the discretionary nursing judgment used by the nurses. These levels identify the development of a more skilled nurse, who has an advanced understanding of the clinical situation and provides orderly nursing care without rigid rule following (Benner, 2001). Benner's model noted the period of novice to advanced beginner was from senior nursing students through the first year of practice. Table 1 shows the categories of the novice to expert model (see Appendix A).

Transfer of Learning

In order for RNs to progress from a novice to expert, transfer of learning and skills must occur. For example, a competent nurse must rely on previous knowledge and skills learned, in order to problem solve when encountering a new or novel patient care situation (Benner, 2001). For nurse educators, the goal for teaching nursing is to prepare students for actual clinical practice; specifically, educators want students to transfer what was learned in school to the real

world. Transfer of learning refers to how previous learning impacts "current and future learning when applied or adapted to similar to novel situations" (Haskell, 2001, p. 23). Further, transfer is a "way of thinking, perceiving, and processing information", and without it "we couldn't engage in our everyday thinking and reasoning nor even acquire the most basic of motor skills; transfer is responsible for the simplest of ideas and for the highest achievements of mankind" (Haskell, 2001, p.23).

There are six levels of learning transfer in Haskell's (2001) model: nonspecific, application, context, far, displacement and creative transfer. The first level, nonspecific transfer, refers to the idea that all learning depends on previous learned material. Level two, application, occurs when one is able to apply previous learned material to a specific situation. Context transfer, the third level, also refers to applying previous learned material, but to slightly different situations. The fourth level, near transfer, occurs when one is able to apply old knowledge to new situations that are very similar, but not identical to previous situations. Whereas in the fifth level, far transfer occurs when one applies previous learned material to completely different situations. Finally, the sixth level, displacement or creative transfer occurs when a new concept is created out of the realization of the similarity between the old and new learning (Haskell, 2001).

Certainly all these levels apply to nursing, but the higher ordered levels seem most important to a practice discipline. Students are taught about disease processes and nursing interventions from textbooks, but such rote learning does not describe how the disease can manifest with wide variety in diverse patient populations (Benner, 2001). In a clinical situation a student or nurse might need to rely on previous knowledge learned on the concept of oxygenation in an adult in order to provide safe, competent care to a child with asthma.

Ultimately new nurse graduates need to transfer knowledge and skills learned in nursing school to the actual practice care environment (Haskell, 2001).

Research Model

While Benner's (1982, 2001, 2004) novice to expert framework and Haskell' s (2001) transfer of learning model provide the theoretical underpinning for understanding the phenomenon of transfer of learning in simulation-based training, a conceptual scheme is needed to provide guidance and rationale for this study (Polit & Beck, 2008). Scott, Engelke, and Swanson (2008) developed and tested elements of a conceptual model related to new graduate transition that includes pre-work (anticipatory socialization), work (socialization), and new graduate outcomes. Using this framework, Haskell's transfer of learning is added as a dimension of new graduate outcomes and simulation experiences are added to both the pre-work and work influences on the transition experience. Additionally, the development of competence and confidence, and RN role preparedness related to simulation experiences were examined as outcome measures.

Thus, this research explored new North Carolina (NC) graduate registered nurses perceptions of transfer of learning related to the use of human patient simulations on the development of knowledge and cognitive processes required for communication, teamwork, critical thinking, and prioritization skills. In this study, the new graduate nurse transfer of learning and transition to practice model starts with student pre-work factors. Relevant influences identified in previous studies such as educational preparation, previous healthcare and simulation experience, were explored to determine the possible relationships among the variables. The second phase of transfer of learning and transition to practice begins when the new graduate enters the work place. Work factors such as simulation experiences were explored

as influencing variables. The final elements are new graduate outcomes. Perceived transfer of learning and the degree of confidence, competence and RN role preparedness was examined. The research model depicts both the theoretical components and the structure of the research study (see Figure 1).

Theoretical assumptions of this model include the influence of pre-work (undergraduate simulation experience, education type and previous health care work experiences) and work factors (hospital-based simulation experiences) have on measurable outcomes (perceived transfer of learning, confidence and competence development, and RN role preparedness). Simulation experiences were considered from the perspective of fidelity level and frequency, as well as in what courses in the pre-licensure curriculum simulation most often occurs. Relationships among these concepts are affirmed in the literature. However, previous studies attempting to link them have lacked rigor with respect to sample sizes and methodological design, while others have not been replicated. Further, the National League for Nursing (NLN) has identified the need for research to link education and practice (2012). Therefore, it is important for nurse researchers to continue to examine the transferability of knowledge and skills from simulation to the practice setting.

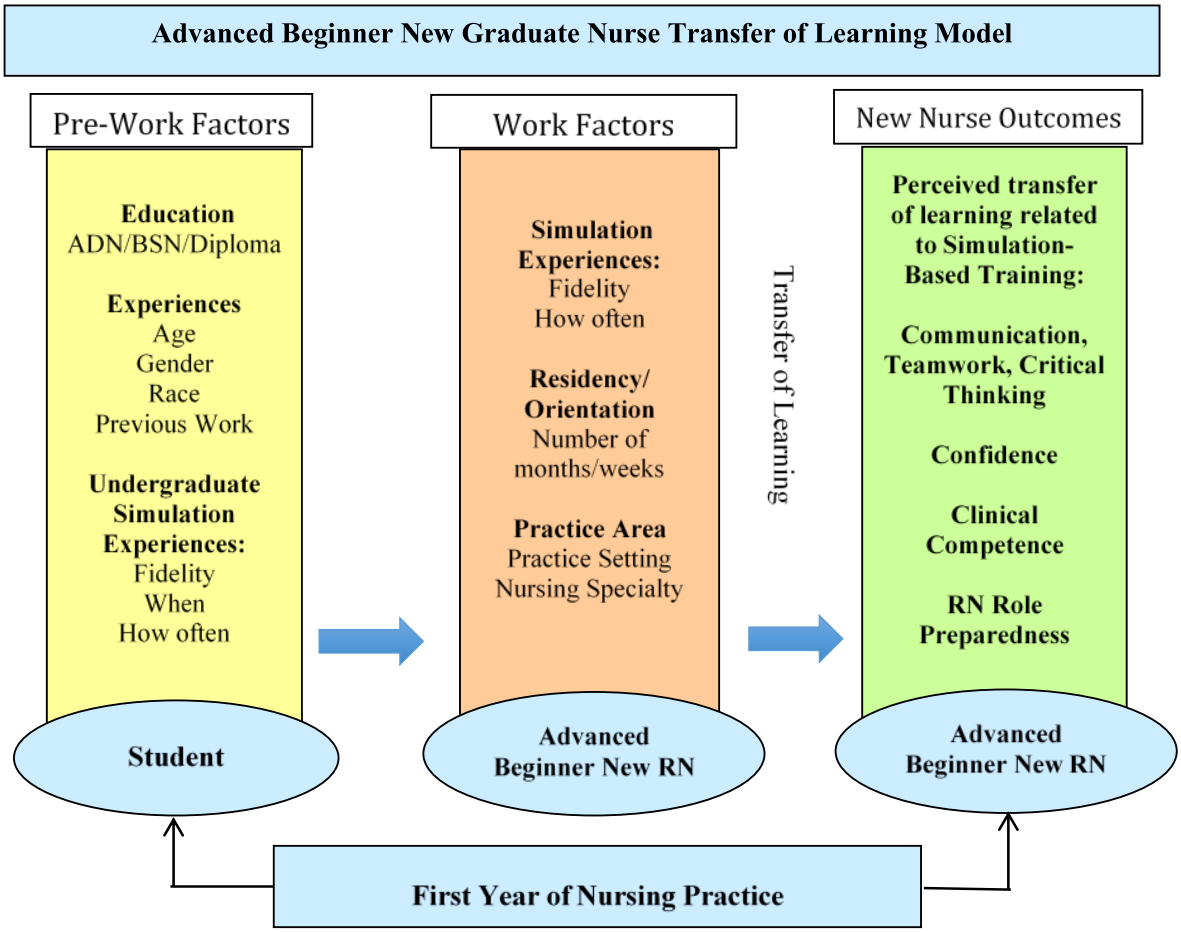

Figure 1. Research model of advanced beginner new graduate nurse transfer of learning.

Operational Definitions

For purposes of this study, the following operational definitions will be used:

Critical thinking – the cognitive process involved in decision-making, problem solving, or clinical judgment (Facione & Facione, 2008), and includes "all or part of the process of questioning, analysis, synthesis, interpretation, inference, inductive and deductive reasoning, intuition, application, and creativity. Critical thinking underlies independent and interdependent decision making" (AACN, 2008, p. 36).

Clinical Competence- the "ability of the nurse to integrate knowledge, skills, judgment, and personal attributes to practice safely and ethically in a designated role and setting in accordance with the scope of nursing practice" (NCSBN, 2012, p. 1).

Confidence –the formation of professional confidence through knowledge acquisition, experiences, and critical thinking (Leigh, 2008).

Transfer of learning - the ability to apply what was previously learned in "different contexts, and to recognize and extend that learning to completely new situations" (Haskell, 2001, p. 3).

Simulation-based learning experience- simulation learning experiences, either in pre-licensure nursing or new nurse orientation programs, are defined as activities that resemble actual or potential clinical situations (Pilcher, et al., 2012) which enable the participant to incorporate critical thinking, decision-making processes and psychomotor skills (Decker, et al., 2008) using either task trainers (low, medium fidelity), or high-fidelity simulators.

Fidelity- the believability or the degree to which the simulation experience or equipment approaches reality (Meakim et al., 2013). The three types of fidelity include low, medium and high.

Low fidelity task trainers- a manikin that is designed for training of a specific skill and represents a certain anatomical area of the body (i.e. arm used for learning intramuscular injections (Decker et al., 2008)). Task trainers are static and lack detail or realism (Seropian, Brown, Gavilanes, & Driggers, 2004).

Medium fidelity task trainer- fidelity trainers that use computer technology to assist students in learning heart, lung and bowel sounds (Decker et al., 2008).

High fidelity simulators - full body manikins that can be programmed to provide realistic physiologic changes in response to a student's intervention (Decker et al., 2008).

Advanced beginner, new graduate nurse - in this study, an advanced beginner, new graduate nurse is defined as a nurse with one year or less of work experience. North Carolina new nurses who graduated in 2013 and 2014 were invited to participate.

Clinical practice setting - the type of setting that corresponds to the nurses' employment specialty practice position.

Research Questions

The purpose of this study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development, and RN role preparedness.

Specifically, the following research questions were investigated in new RN nurses within the first 90 days to one year of nursing practice:

1. What are the characteristics of the study sample?
2. What is the factor structure and internal consistency reliability of the transfer of learning instrument responses generated by advanced beginner new graduate nurses?
3. What are the characteristics of the pre-licensure and orientation program simulation experiences of the study sample?
4. What is the influence of the setting where simulation occurred (pre-licensure or orientation programs) and the type of simulation on transfer of learning, confidence and competence development, and RN role preparedness?
5. What is the influence of simulation exposure on transfer of learning, confidence, competence, and RN role preparedness as a function of where the simulation occurred, first nursing degree and health care experience in nursing school?

Summary

Nurse educators have an obligation to ensure that students learn, develop and apply higher-order cognitive skills. New graduates are expected to practice at a higher performance level in order to care for more complex patients, yet barriers to clinical education have made it difficult for nurse educators to provide a variety of learning experiences. Many nursing faculty

are augmenting clinical experiences with simulation-bases training, with the goal of students transferring the knowledge and skills learned in the laboratory setting to the "real" patient care environment. This study explored advanced beginner, new graduate RN's perceptions of transfer of learning, confidence, competence and RN role preparedness following simulation training in their undergraduate and new nurse orientation programs.

The remainder of this work is organized into four chapters. Chapter two is a review of the literature regarding the use of simulation in nursing education programs and new graduate transition to work programs. Chapter three delineates the research design and methodology of the study. Analysis of the data and discussion of the findings are presented in Chapter four. Finally, Chapter five includes conclusions, implications and recommendations. References and Appendixes are found at the end of the study.

CHAPTER TWO: REVIEW OF LITERATURE

Nurse educators strive to graduate nurses who are competent and confident in the RN role. The transfer of learning (TOL) from school to the practice setting is a critical dimension of competency development. Transfer of learning is the ability to apply what is learned in one situation to another similar or new and novel situation (Lauder, Reynolds, & Angus, 1999). Because of the challenges facing clinical instruction, many nursing and new graduate transition programs are using simulation to optimize opportunities for patient care experiences that are critical for new nurse success.

This chapter is a review of the pertinent literature relevant to the variables in the conceptual model (figure 1) and discusses the research related to the outcome variable of transfer of learning, including the dimensions of communication, teamwork and critical thinking. Influences of pre-work factors (age, gender, race and previous healthcare experience), work factors and simulator fidelity on confidence and competence, and RN role preparedness are also included in the literature review.

New Nurse Outcome Variables

Transfer of Learning

Transfer of learning lays the foundation for learning, thinking and problem solving (Haskell, 2001) and occurs whenever existing knowledge and skills influence the learning or performance of new knowledge and skills (Cormier & Hagman, 1987). According to Simons (1999) there are three types of transfer: “from prior knowledge to learning, from learning to new learning, and from learning to application” (p. 577). Students need to first learn to select relevant prior knowledge and then recognize situations where transfer could occur. Often students do not see that two or more situations or conditions are similar which makes transfer difficult.

Furthermore, students develop habits in the learning process when they always learn in the same way and are unable to adapt to new ways of learning. This becomes problematic when students are confronted with unfamiliar situations requiring a change in thinking or behavior (Simons, 1999).

Definitions of learning transfer are rooted in psychological, social, and educational perspectives (Aita, Richer, & Heon, 2007). Psychology researchers view learning transfer as "the recruitment of previously known, structured symbolic representations in the service of understanding and making inferences about new, structurally similar cases" (Day & Goldstone, 2012, p. 153). In other words, for transfer to occur students must recognize the commonalities between concepts, and use previously learned knowledge to make inferences about the new concept. Similarly, others define transfer as "the ability to draw on or access one's intellectual resources where those resources may be relevant" (Prawat, 1989, p. 1) or metacognitive, knowledge strategies and psychomotor skills learned in one context that are applied in other new and novel situations (Lauder et. al, 1999).

Transfer of learning is of great importance to nursing. Several articles examined the effects of simulation on learning transfer. Transfer of learning was the outcome variable examined in three of the studies (Kirkman, 2013; Liaw, Chen, Klainin, Brammer, O'Brien, & Samarasekera, 2010; Ruggenberg, 2008); student perceptions on learning transfer were explored in four studies (Badir et al., 2015; Feingold, Calaluce, & Kallen, 2004; Maginnis, Croxon, L., & Croxon, C., 2010; Wooton, Davis, Buttin, & Kelton, 2010) and Domuracki, Moule, Owen, Kostandoff, and Plummer, (2009); Meyer, Connors, Hou, and Gajewski, (2011), Ravik, Havnes, & Bjork, (2015); and Ross (2015) examined the impact of simulation on performance.

Of the three studies that examined the influences of simulation on learning transfer to the practice area (Kirkman, 2013; Liaw et al., 2010; Ruggenberg, 2008), Kirkman (2013) and Ruggenberg (2008) found similar results. Baccalaureate of science nursing (BSN) students who participated in simulation had higher transfer scores than those students in the control group that experienced didactic lecture only. In both studies, author-developed instruments were used to measure the outcome variable of learning transfer. However, only Kirkman (2013) provided content validity and interrater reliability data for the measurement tool. In both studies, generalizability of the findings was limited due to the small convenience sample ($N = 42$; $N = 58$ respectively). Kirkman (2013) suggested that use of a time series design might have affected attrition, as six students chose not to complete the study.

A qualitative approach was used in the third study noted above (Liaw et al., 2010). Critical incident techniques were used in this study to explore nursing students' ($N = 15$) experiences of how a simulation helped prepare them to transfer learning into performance of caring for a deteriorating patient in the clinical setting. Four themes described factors that influenced transfer of simulation to the clinical area: memory (knowledge from simulation was retrieved and applied to recognize signs of deterioration), emotional response (simulation helped the student know what to expect, allowing them to remain calm), similar situation recognition (students compared the patient situation with similar simulation experiences), and mnemonics as transfer tools (mnemonics were used to guide patient assessment and immediate nursing care). A limitation of this study is that the sample consisted of only younger female students (ages ranged from 22 to 26 years. Further, interviewer bias may have affected the analytical interpretation, as the researcher knew the students and patients. Interviews were collected one to two months after

the critical incident, which may have affected the students' recall of the events. The researchers suggest that direct observation of students' clinical performance would enhance future studies.

Few studies examined student's perceptions of transfer of learning from simulation to the practice area (Badir et al., 2015; Feingold et al., 2004; Maginnis, Croxon, L., & Croxon, C., 2010; Wotton et al., 2010). One qualitative study (Feingold et al., 2004) found half of the BSN study participants agreed that simulation would prepare them for practice in the actual clinical setting, whereas all nursing faculty believed simulation prepared the students to perform in the clinical area. Referring to Benner's (1984) work, the authors suspected this finding demonstrated the difference between novice student nurses and expert faculty nurses. Novice nurses lack a unified view of the whole situation, and instead focus on individual bits of information. This study is limited by homogeneous sample.

Two studies on student perceptions of learning transfer used mixed methods (Maginnis, Croxon, L., & Croxon, C., 2010; Wotton et al., 2010). In Maginnis, L. Croxon and C. Croxon's (2010) study, participants believed that the simulation experience helped link the didactic material to the clinical setting. The students felt they were adequately prepared to use skills such as assessing pain and wounds, performing aseptic technique, removing sutures, transferring patients, as well as charting fluid balances and oxygenation saturation status. Wotton et al. (2010) found similar outcomes in an evaluative study exploring student perceptions of simulation in a clinical course. Findings indicated that high-fidelity simulation (HFS) was perceived as an enjoyable, attention-keeping and challenging medium that exposes students to the concepts studied in the course. Student comments indicated that they were able to see the link between theory and practice. For example one student replied, "I recently had a patient in a similar situation, and it is good to have an understanding of why things were/are done" (p. 636).

Strengths of the study included a large sample group ($N = 300$) and using quotes to support the qualitative results. Randomization and psychometric testing of the instrument would have further enhanced this study. Similarly, in a more recent work, Turkish researchers conducted a small-scale qualitative study ($N = 36$) to understand student's perceptions of using high fidelity simulations in an intensive care course (Badir et al., 2015). The findings revealed that simulations helped students transfer theory to practice; develop teamwork, confidence, and RN role awareness (Badir et al., 2015).

In the final three studies, the researchers each reported improved clinical performance after simulation (Domuracki et al., 2009; Meyer et al., 2011; Ravik et al., 2015; Ross, 2015). Domuracki et al. (2009) reported that simulation training significantly improved the clinical performance of applying cricoid pressure in a group of 101 nursing and medical students. This study suggests that criterion-based training on simulators may increase the likelihood of performance transfer in practice. However, the authors stated that many participants were unable to apply the appropriate amount of pressure despite feedback training. This may have been due to the fact the study involved only a short, one time training session. Meyer and colleagues (2011), found that nursing students who participated in a pediatric simulation before a pediatric clinical rotation had overall higher performance scores, more quickly achieved the higher scores, and maintained higher clinical performance levels than those who had not yet attended the simulation. Statistical methods used strengthen the results of both of these studies. Ross (2015) used a low fidelity simulation activity to examine BSN students ($N = 37$) competency in administering intramuscular injections with and without simulation training, and the transferability of the skill to the practice setting. Findings revealed that the simulation group had higher adjusted means at both posttesting times, but the results were not statistically significant

(Ross, 2015). Ravik et al., (2015) also used a low fidelity simulation to explore if peripheral venous cannulation skills transfer from the simulation lab to the clinical area. Five BSN students participated in the qualitative study. The authors reported that low fidelity simulation contributed to familiarity with the equipment and to experience with the skill, but the simulation lacked realism, which impeded the students' performance on actual patients. Replication of both of these studies with a larger, more diverse sample would enrich the simulation literature in regards to the transferability of skills learned in a low fidelity simulation to patient care.

Dimensions of Learning Transfer. In the model presented, communication, teamwork and critical thinking are included as dimensions of transfer of learning. In regards to communication, several articles were found that discuss simulation as a strategy to enhance communication in nursing students (Bambini, Washburn, & Perkins, 2009; Hunter, & Ravert, 2010; Fluharty et al., 2012; Kameg, Howard, Clochesy, Mitchell, Suresky, 2010; Krautscheid, 2008; Sleeper & Thompson, 2008). Additionally, development of communication skills were often linked with interdisciplinary simulations (Berg, Wong, & Vincent, 2010; Garbee, Paige, Bonanno et al., 2013; Garbee, Paige, Barrier et al., 2013; Liaw, Zhou, Lau, Siau, Chan, 2014; Marken, Zimmerman, Kennedy, Schremmer, & Smith, 2010; Reising, Carr, Shea, & King, 2011; Stewart, Kennedy, & Cuene-Grandidier, 2010).

Communication and nursing students. Several studies used high-fidelity simulations to explore communication skills in nursing students. For example, a program evaluation conducted by Sleeper and Thompson (2008) reviewed the use of high fidelity simulation (HFS) to enhance associate degree nursing (ADN) student's communication skills with psychiatric patients. The scenario involved a depressed and suicidal patient who needed to be assessed for safety prior to discharge. Ten students completed the faculty developed Likert-scale evaluation tool. The

authors concluded that HFS could be used to augment theory and practice, provide timely feedback, and enhance transferability of communication skills to the clinical setting. As this was a descriptive study, a rigorous research design was not used. Providing the evaluation results in percentage form would have strengthened this study.

Kameg et al. (2010) expanded upon Sleeper and Thompson's (2008) study. The effectiveness of high fidelity simulation was compared to traditional lecture on senior BSN students' self-efficacy of communication skills with psychiatric patients. Based on the results, the researchers concluded that simulation was beneficial for improving communication skills. Students reported that the knowledge gained from the simulation could be transferable to practice. A small sample size and lack of diversity (age, race, ethnicity) of the sample limits the generalizability of the results. Researcher bias may have affected the results, as the researcher provided the lecture content and facilitated the simulation. Strengths included use of measurement tools with established psychometric properties and inferential statistical analysis.

In a more recent quasi-experimental study by Fluharty et al. (2012), knowledge, levels of satisfaction, and self-reported communication skills in caring for a dying patient were measured in a sample of 370 associate degree nursing (ADN), BSN, and accelerated BSN students. Results from the pre-posttest scores found a significant increase in knowledge, self-confidence and communication skill. The authors concluded that knowledge and skills were transferable to the practice area since students learned how to communicate with a dying patient. This study's sample was noted to be the largest of all in the articles reviewed; however, a randomized sample and control group would have further strengthened the rigor of the study.

Communication and interdisciplinary students. High fidelity simulation was also used to examine the interprofessional communication skills among healthcare students (Garbee, Paige,

Bonanno et al., 2013; Garbee, Paige, Barrier et al., 2013; Liaw, et al., 2014; Reising, et al., 2011; Stewart et al., 2010). Three studies used both nursing and medical students. In a mixed methods approach, Stewart et al. (2010) measured clinical competencies, communication and team working skills in third-year undergraduate nursing and fourth-year medical students ($N = 95$). Results found no significant differences between the nursing and medical students in any of the measured domains except, "communication and team working approached significance, with nursing students scoring higher than medical students" (p. 94). Qualitative results supported the scores obtained from the statistical analysis. The authors suggested that a longer-term follow up was needed to determine if the results translated into improvement in the clinical setting. The study was limited by the sample of mostly female students ($N = 74$) less than 28 years of age ($N = 84$) and conducted in the United Kingdom, which limits generalizability to American students. Psychometric data was provided for the 32-item tool.

In Reising et al. (2011) mixed methods study, 60 nursing and medical students participated in a mock-code HFS. Both student groups reported that the simulation was helpful in learning interprofessional communication skills (100 %) and that they had a better understanding of their role on the team (98.3 %). Qualitative data analysis found that students should practice interdisciplinary communication before graduating "because that was real life" (p. 326). The study by Reising et al. (2011) lends support to the study findings of Stewart and colleagues (2010) in that interprofessional communication can be improved with HFS.

In a recent study by Liaw et al. (2014), 127 third-year nursing and fourth-year medical students in Singapore participated in interprofessional simulation designed to examine communication skills in caring for a deteriorating patient. Pre- and posttests were used to measure the students' self-confidence in interprofessional communication and perception with

interprofessional training. Like Stewart et al. (2010), no significant differences were found between the student groups; however, both nursing and medical students demonstrated a significant improvement on posttest scores for self-confidence ($p < .0001$) in interprofessional communication and perception ($p < .0001$) in interprofessional learning. A randomized control design would have strengthened the results of this study. Observation of the students, in addition to self-reported measures of communication skills, may have helped predict transferability to the clinical setting.

Two studies conducted by Garbee and colleagues (Garbee, Paige, Bonanno et al., 2013; Garbee, Paige, Barrier et al., 2013) supported using high-fidelity interprofessional simulation for teaching communication and teamwork skills. Two one-year quasi-experimental studies evaluated acquisition and retention of teamwork and communication skills among four pre-professional student groups. The first study (Garbee, Paige, Bonanno et al., 2013) used undergraduate nursing, medical, nurse anesthesia and respiratory students, whereas in the second study (Garbee, Paige, Barrier et al., 2013), physical therapy students replaced respiratory students. Although limited by small convenience sample sizes and attrition due to scheduling conflicts, significant increases were found in team-based behaviors and communication skills in both studies. Further, it appears that both studies used the same sample of nursing and medical students; therefore, generalizability is limited.

Teamwork. Traditional clinical settings often do not offer nursing students collaboration experiences with other disciplines (Titzer, Swenty, & Hoehn, 2012). Multidisciplinary simulation activities have been suggested to promote collaboration, problem solving, understanding, and confidence among students (Baker et al., 2008; Dillon, Noble, & Kaplan, 2009; Masters, Baker, & Jodon, 2013; Reese et al., 2010; Titzer et al. 2012; Luctkar-Flude et al. 2013; Whelan,

Spencer, & Rooney, 2008). In some studies, the interprofessional teams consist only of nursing and medical students, whereas other studies included a mix of healthcare professions students.

Three mixed methods studies explored the use of simulation to develop collaboration skills between nursing and medical students (Dillon et al. 2009; Luctkar-Flude et al. 2013; Reese et al. 2010). Dillon and colleagues (2009) used a pre- and posttest design to evaluate nursing and medical students' perceptions of interprofessional collaboration with a mock code HFS. The study found that nursing students had higher pretest scores than the medical students in regards to perceived collaboration; gains were seen in the medical students posttest perceived collaboration scores. Qualitative data analysis revealed the value of interprofessional, collaboration education using HFS as a teaching strategy. Similarly, Reese et al. (2010) found that student satisfaction ratings of simulation were high, with a majority of the students indicating that collaboration between the disciplines was beneficial for "learning to function in real-world situations" (Reese, 2010, p. 36). Limitations of the studies were the use of a convenience and small sample size. However, both provided the psychometric properties of the tools used.

In a recent study done by Luctkar-Flude et al. (2013), 96 third-year nursing and medical students participated in a pediatric simulation. The control group of 53 nursing students did not participate in the interprofessional simulation, but attended traditional instruction. Overall, team skills improved significantly for the interprofessional group, but not for the control group. Strengths of the study included a control group, using instruments with reliability and validity data, and student quotes, which supported findings from the quantitative data collected.

In four studies multidisciplinary groups were explored using nursing students, medical students, and junior medical residents (Baker et al. 2009), nursing, medical and pharmacy

students (Whelan et al. 2008), physician assistant, BSN, and associate degree respiratory students (Masters, 2013), and BSN, baccalaureate respiratory and occupational therapy, and associate radiologic technology students (Titzer et al., 2012). Baker et al. (2009) evaluated a mixed methods post-intervention study involving 101 nursing students, 43 medical students, and 70 junior medical residents. Skills taught with HFS included communication, team leadership, calling for help, initial assessment of a pulseless patient, bag-mask ventilation and initiation of chest compressions. They found that "86.3% of medical students and 90.3% of nursing agreed it was beneficial to participate in the session with students from other healthcare professions" (p. 477) and, students had a better understanding of team roles as a result of the simulation. The authors did not report findings related to the junior medical residents. A limitation in this study was the use of posttest data only.

Masters et al. (2013), Titzer et al. (2012) and Whelan et al. (2008) evaluated the influence of multidisciplinary simulations on collaboration and problem solving among various healthcare students. Whelan et al. (2008) found a positive shift in nursing, medicine and pharmacy students' understanding of interprofessional roles and practice, as well as an increase in the value of teamwork as a way of problem solving and improving patient outcomes. Similarly, students in Masters' et al. (2013) study had a greater understanding and respect for the importance of other team members and Titzer et al. (2102) reported that students felt HFS provided opportunities to work with each other to provide safe and effective care to patients with complex healthcare needs. Although the authors conclude that simulation is an effective method to promote teamwork and collaboration among healthcare students, lack of rigorous research designs limit the findings.

Critical thinking. Clearly, nurses must remain vigilant and have sound critical thinking skills in order to detect subtle changes in a patient's condition. Critical thinking is a major component to safe, evidenced-based, and cost-effective nursing care. However, CT is an ambiguous term that is inconsistently defined in the literature (Fero et al. 2010). Clinical judgment, critical thinking and clinical reasoning have been used interchangeably in the literature, as many of the underlying principles are similar. CT is a broad term that includes clinical judgment and reasoning and refers to the "important thinking" that nurses do to assess, prevent and manage patient care situations (Alfaro-LeFevre, 2014, p. 2).

This review focused on the CT literature, as it is one of the key variables in the advanced beginner new graduate nurse transfer of learning model. Ten studies were found that investigated the effect of simulation on CT skills in nursing students (Brown & Chronister, 2009; Fero et al. 2010; Goodstone et al. 2013; Howard, 2007; Sullivan-Mann et al., 2009; Ravert, 2008; Schumacher, 2004; Shinnick & Woo, 2013; Vieck, 2013; Wood & Toronto, 2012). The majority of the studies used one of three commercially prepared exams to assess CT development or progression following a simulation experience. For example, two researchers used the Health Education System, Inc. (HESI) exam to measure the impact of simulation on CT abilities (Howard, 2007; Schumacher, 2004). Schumacher (2004) compared three different teaching strategies (formal classroom, high-fidelity simulation, and a combination of the two) to deliver classroom content to 36 BSN students. The findings indicated a statistically significant difference between the critical thinking abilities when simulation or a combination of classroom and simulation were used to deliver the content.

Howard's (2007) study was a multi-site, quasi-experimental pre/post-test design, with a sample of 49 last semester diploma and BSN students randomly assigned to one of two groups.

The control group participated in an interactive case study and the intervention group participated in a high fidelity simulation. CT was measured by the HESI exam. Analysis of covariance (ANCOVA) revealed that the HFS group had a significant increase in critical thinking scores on the post-test when compared with the interactive case study group. Schumacher (2004) and Howard (2007) dissertation studies used pretest-posttest design and measured CT abilities with commercially prepared valid and reliable instruments (HESI). The studies were based on small convenience samples of local student populations that may limit the generalizability of their findings.

Other studies used the Health Sciences Reasoning Test (HSRT) to measure CT skills in associate degree nursing (ADN) students (Goodstone et al., 2013; Sullivan-Mann et al., 2009; Shinnick & Woo, 2013; Vieck, 2013). Sullivan-Mann's et al. (2009) used a pre-posttest experimental design to determine if CT in ADN students ($N = 53$) was improved after multiple exposures to HFS experiences. The control group participated in two simulation scenarios, and the experimental group received five scenarios. The students were randomly assigned to the experimental group. Those in the experimental group showed a greater increase in posttest CT scores than the control student group. Strengths of this study include use of an established, commercially prepared instrument for measurement of CT and randomization of participants to the experiment group.

Vieck's (2013) dissertation study used a quasi-experimental design and the HRST to evaluate the effects of moderate and HFS on the students CT competence. One hundred and twenty ADN students on two campuses were randomly assigned to either a control or simulation group. The control group received the traditional clinical experience, whereas the simulation group had 21% of the total clinical time replaced with simulation activities. Results showed the

simulation group had significantly greater deductive reasoning scores and students in the control group had non-significant increases in critical thinking scores. However, the simulation group from Campus A demonstrated greater improvements in CT scores than the traditional group from Campus A or either the control or simulation group from Campus B. The author concluded this difference might be due to curriculum variation and diverse teaching styles at the two campuses. Small sample size and homogeneity of the participants (95% white females) limits the generalizability of the study findings. Lastly, Goodstone et al. (2013) compared the effects of HFS and instructor-written cases studies on the development of CT in 42 first semester ADN students. Both groups showed an increase in CT scores, suggesting that HFS and case studies were associated with increased CT abilities.

In contrast to those studies linking simulation to improved CT, Shinnick and Woo (2013) reported no significant change in CT scores after simulation in their study of 154 BSN students. Using a pre-posttest design and the HRST exam, third year students from three schools were evaluated after a HFS experience. Although there was a mean improvement in knowledge, there was no significant gain in CT, leaving the authors to conclude, "gains in knowledge do not equate to changes in critical thinking" (p. 1062). The study met power calculations for sample size and used an established instrument, but randomization and a more diverse sample would strengthen the study results.

Other relevant studies used the California Critical Thinking Disposition Inventory (CCTDI) and California Critical Thinking Skills Test (CCTST) to measure CT skills (Fero et al., 2010; Ravert, 2008; Wood & Toronto, 2012). Ravert used a pre-posttest research design to evaluate critical thinking in 40 BSN students (enrolled in the first medical-surgical nursing course) who were randomized into a total of three group, two of which were experimental

groups: simulation, non-simulation. The non-simulation groups received the usual education plus five enrichment sessions and the simulation group participated in both the usual and enrichment instruction, plus a simulation activity. Participants in the control group received usual instruction without any enrichment sessions. All groups demonstrated a moderate to large effect size in critical thinking scores. However, there was no statistically significant difference among the groups, possibly due to the small and homogenous sample. The students were all from one college, had high grade point averages and were younger than the national average.

Wood and Toronto (2012) also explored the CT disposition scores in BSN students. Students ($N = 85$) were randomly assigned to either a simulation group (exposed to a 2-hour simulation practice session) or a control group (no HPS exposure) prior to a course examination. The CCTDI was administered before and after the examination and no between-group differences were found on the overall or subscales of the CCTDI mean scores. T-test analysis for each individual across time revealed higher mean post-test scores compared to the pre-test scores for those students in the simulation group. The findings suggest that even a brief simulation experience produced significant gains in CT disposition scores. Similar to previously mentioned studies, limitations include small and homogenous sample and therefore cannot be generalized to other nursing programs.

A combination of last semester diploma ($n = 14$), ADN ($n = 12$), and BSN ($n = 10$) nursing students were the focus of a study by Fero and colleagues (2010). The researchers wanted to compare simulation-based performance scores for either videotaped vignettes (VTV) or HFS and determine the relationship between critical thinking scores (as measured with CCTST and CCTDI) and simulation-based (either VTV or HFS) performance scores. In this study, both videotaped scenarios and high-fidelity simulations were used to evaluate learning

instead of a traditional paper and pencil examination. The results indicated that the majority of the students did not meet overall expectations on the VTV (75%) or HFS (88.9%) assessment categories. Students were unable to identify important clinical data to report to the physician, anticipate medical orders, or give rationale for their decisions. However the majority recognized the clinical problem in VTV (69.4%) or HFS (75%) and initiated appropriate interventions (VTV = 38% and HFS = 72.2%). There was no statistically significant difference between overall VTV and HFS performance, although, students in the HFS initiated more nursing interventions as compared with those in the VTV group.

A Cramer's V analysis revealed no significant relationship between the overall VTV performance and the CCTDI or CCTST scores. A statistically significant relationship was noted between overall HFS performance and CCTDI scores, but a minimal relationship between simulation performance and CCTST scores. Students with strong critical thinking disposition were able to identify the clinical problem, report important data to the physician, initiate interventions, and prioritize nursing care. Since the performance assessments were based on vignettes, it is possible that actual performance in the clinical setting may differ from the observed actions in the learning lab. Therefore, the authors suggest that further research is needed to determine if simulation-based performance skills transfer to the patient care setting. Strengths of this study include random assignment to the educational method, and established validity and reliability of the instruments.

The final study used a computerized exam to measure CT skills instead of one of the standardized instruments. Brown and Chronister (2009) investigated the effect of high-fidelity simulation activities on critical thinking and self-confidence among 140 senior-level BSN students. Critical thinking was measured using a computerized electrocardiogram (ECG) exam.

Students were randomly assigned to control or treatment group. The treatment group received lecture and simulation activities and the control group received lecture only. No significant differences were found between the control group and the intervention group, except when controlled by semester. The second-semester students scored significantly higher in both critical thinking and self-confidence measures. Semester progression and telemetry experience were potential influencing factors in this study. The authors explained that the lack of improvement in CT in the treatment group was possibly due to time constraint, contradicting Wood and Toronto (2012) study results. The students only spent 30 minutes in the simulation activity and had less didactic instruction, which may have affected the simulation group negatively. Further, small sample and researcher-developed tool limits the results of the study.

Competence and self-confidence in new graduate nurses

Competence is a complex concept that is difficult to define and assess (Kugler, 2010). Competence is a dynamic, situational ongoing process that emphasizes knowledge, skills and behaviors that are necessary for nursing practice success (Kugler, 2010). The National Council of State Boards of Nursing (NCSBN) defines competence as the "ability of the nurse to integrate knowledge, skills, judgment, and personal attributes to practice safely and ethically in a designated role and setting in accordance with the scope of nursing practice" (NCSBN, 2012, p.1). Competency development is the process by which a nurse obtains, maintains or improves clinical knowledge, skills and abilities. Competency development occurs through formal academic education, clinical practice, or continuing education programs. Professional nurses are expected to maintain competency throughout their professional careers (NCSBN, 2012).

To address new graduate nurse competency development, several national initiatives focusing on patient safety have emerged to advance the inclusion of quality and safety concepts

in both classroom and clinical instruction. For example, the Institute of Medicine's (2010) report recommends changes in the nursing educational system in order to prepare nurses for today's complex patient populations. Students need to attain competency in public health, community and geriatric nursing. Other required competencies include knowledge of health policy, leadership, research, system improvement, evidenced-based practice, collaboration, and teamwork. Further, nursing students must master emerging technology and information systems, and be prepared to fill expanding RN roles (IOM, 2010).

The Quality and Safety Education for Nurses (QSEN) initiative focused on preparing future nurses with the knowledge, skills, and attitudes (KSAs) necessary to continuously improve the quality and safety of patient care (Cronenwett, et al., 2007). The QSEN project integrated the IOM recommendations and developed safety and quality competencies for all nurses. Guidelines to help faculty incorporate KSAs into the nursing curriculum were also designed. These competencies include patient-centered care, teamwork and collaboration, evidence-based practice, informatics, quality improvement, and safety (Armstrong, Sherwood, & Tagliareni, 2009; Cronenwett, et al., 2007).

Confidence is another pre-licensure nursing student outcome of interest in the simulation literature. Nursing students form professional confidence by first acquiring knowledge, theory and the ability to think critically. Then by finding their own voice, the students are able to articulate and defend an evidence-based nursing position in both academia and practice situations (Crooks et al. 2005). Further, confidence is a major component of clinical decision-making, understanding the whole clinical picture, and becoming comfortable in the professional nurse role (White, 2003).

Simulation may help pre-licensure nursing students develop the higher-level

competencies and confidence required for success in the RN role (Yuan, Williams, & Fang, 2012). A systematic review by Yuan et al. (2012) examined the evidence about the impact of HFS on nursing students' confidence and competence. Included in the analysis were three experimental, three quasi-experimental studies, three qualitative and ten descriptive studies. Interviews or self-report instruments measured confidence and competence. Although the quasi-experimental, qualitative or descriptive studies presented positive results, the review did not provide robust evidence that HFS enhances students' confidence and competence. Results from the three experimental studies showed no significant differences in mean scores of clinical competency (Brannan et al., 2008) or self-confidence (Alinier et al., 2001) between the experimental and control groups. Blum, Borglund, and Parcells (2010) found no significant difference in clinical competence or confidence among 53 BSN students enrolled in either a simulation-based or a traditional learning activity. The lack of high quality randomized controlled trails, small samples, and insufficient power limited the strength of the findings. Further, most of the measurement tools lacked psychometric testing (Yuan et al., 2012).

Three recent studies also describe the effects of simulation on confidence and competence (Alfes, 2011; Merriman, Stayt, & Ricketts, 2014; Mould, White, & Gallagher, 2011). Alfes (2011) reported the results of a quasi-experimental study that compared the influence of HFS versus a traditional low-fidelity simulation to promote self-confidence and satisfaction with learning in beginning nursing students ($N = 63$). Students participating in the HFS were significantly more confident than those in the traditional group. Both groups reported higher levels of self-confidence following the learning activities. A limitation of this study is that the sample is not generalizable due to the majority of the population being young (95 % ages 18 to 19 years), white (76.2%) female (82.5%) students. Similarly, Mould et al., (2011) found that

weekly simulation exposure over a semester, increased nursing students confidence and competence. In a phase II, single, randomized, controlled trial with single-blinded assessments, Merriman et al. (2014) sought to determine if clinical simulation is more effective than traditional classroom setting for teaching assessment skills required to recognize a deteriorating patient. The results indicated that the experimental group (HFS) demonstrated better post intervention performance scores as measured by the Objective Structured Clinical Examination (OSCE) instrument compared to the control group (classroom teaching). But, both groups felt confident and competent in their assessment skills. Although, the sample was small, the use of a randomized, control trial with single-blinded assessments strengthened this study.

Pre-work Variables

Student Characteristics

Studies have explored the influence of demographic variables on new nurse outcomes of CT, confidence and competence (Hunter, Pitt, Croce, and Roche, 2014; Kelly, Forber, Conlon, Roche, and Stasa, 2014; Schlairet, 2011; Shinnick and Woo; 2013; Smith & Roehrs, 2009; Wangensteen, Johansson, Bjorkstrom, and Nordstrom, 2010). Findings vary on the impact of age, gender, race and previous health care experience on new nurse outcomes. Wangensteen et al. (2010) reported higher CT scores among those new graduates 30 years of age and older (n= 178 BSN). Shinnick and Woo (2013) also found age (mean 25.7 years) positively predicted higher CT skills, whereas gender or previous healthcare experience did not predict CT abilities (n=154 BSN). In these two studies, the majority of the study population was female. Wangensteen et al. (2010) sampled students from multiple universities ($N = 27$) and Shinnick and Woo (2013) collected data from three academic settings. Shinnick and Woo (2013) met power calculations for sample size, whereas Wangensteen et al. (2010) had a low response rate

that may have affected the statistical power of two-tailed analysis.

Hunter et al. (2102) measured CT in undergraduate nursing students ($N = 277$), and found that years of study, previous healthcare experience, and nationality were significant predictors of higher CT scores. Age and gender were not predictive. Strengths included a large sample and using a professionally prepared CT measurement tool (HSRT) with established reliability and validity. Kelly et al. (2014) found that previous healthcare experience had an impact on post simulation scores. Students rated their technical skill and communication abilities in recognizing and responding to a deteriorating patient condition; those with previous healthcare experience (5 or more years) had statistically significant higher scores than those with less than 2 years. Limitations of the study were a small, mostly female (86%) sample and lack of a psychometrically sound measurement tool.

The literature is varied on the impact of student characteristics and simulation on confidence and competence. Smith and Roehrs (2009) found no significant correlations between 68 BSN student's age (mean age 23.4 years), gender, previous degree, healthcare experience and confidence in caring for a patient with a respiratory condition. Similarly, Mould et al. (2011) reported no differences in confidence and competence scores post-simulation according to age. Schlairet (2011) found senior level, non-white students BSN students self-reported significantly lower self-confidence scores following a series of simulations conducted over a semester.

However, a more recent study reported increases in mean confidence scores, following a high fidelity pediatric simulation, in students 22 years and younger compared to students 23 to 29 years of age and those 30 years and older (Samawi, Miller, & Haras, 2014). Among this group of students ($N = 48$), those that worked between 10 and 19 hours weekly reported the greatest gains in confidence compared to those who worked between one and nine hours and

those who worked 30 hours or more. Students with previous simulation experience also reported gains in confidence compared to those with no previous simulation exposure. Age and hours worked per week were significantly correlated (r = .481, p = .001)(Samawi et al., 2014). Strengths of this study included the use of highly reliable instruments (Simulation Design Scale, Educational Practices Questionnaire, and Student Satisfaction and Self-Confidence in Learning Scale).

Simulator Fidelity

Several articles were found that compared new nurse outcomes with various levels of manikin fidelity. Four studies examined the effect of simulator fidelity on outcomes (Gore, Leighton, Sanderson, & Wang, 2014; Grady, Kehrer, Trusty, Entin, E.B, Entin, E. E., & Brunye, 2008; Guhde, 2011; King & Reising, 2011). Grady et al. (2008) tested the effect of simulator fidelity (low versus high) and student gender on skill acquisition in 39 first year nursing students. Results showed higher performance scores with the high fidelity than with low fidelity simulator training. Additionally, the men's (N = 12) performance was positively affected by high fidelity rather than low fidelity technology, suggesting that men benefited from the HFS more than females students. There were no such gender differences in low-fidelity simulators. Guhde (2011) found no significant differences between the CT mean scores of the simple scenario versus complex simulator scenario, suggesting that simple vignettes may be just as effective as complex scenarios for assessing CT abilities. In a quasi-experimental study, King and Reising (2011) randomly assigned 49 BSN students to either a static or high fidelity simulator when teaching advance cardiac life support. There were no significant differences between the two groups on the written examination. However, the high fidelity group consistently outperformed the static group at both the 2-week and 2-month data points as evidenced by higher percentage of

correct procedures and without procedural error on the megacode checklist.

In a recent study, Gore et al. (2014) explored BSN students' ($N = 66$) perceptions of how well their learning needs were met by comparing a HFS and traditional clinical environment and HFS-versus low fidelity simulation groups within simulated and traditional clinical setting. Students were randomized into either a high or low fidelity group to assess the students' perceived learning effectiveness. Both groups participated in a traditional clinical as well. Students felt high fidelity simulation better met learning needs than low fidelity simulation. There were no statistical differences in learning effectiveness between the high and traditional clinical setting, but students in the low fidelity group perceived that greater learning was achieved in the traditional clinical setting when compared with low fidelity simulation. Strengths included participant randomization, inferential analysis of the data, and a reliable and valid instrument. Finally, a meta-analysis found significant post-intervention improvements in various domains for participants who received HF simulation education compared to low fidelity simulation (Shin et al., 2015).

Work Variables

New Nurse Orientation Programs

Because of its success in academic nursing education, simulation is beginning to be incorporated into new graduate registered nurse (NGRN) orientation programs (Ackermann, Kenny, & Walker, 2007). However, research on the use and evaluation of simulation in orientation programs is limited (Beyea, Slattery, & von Reyn, 2010; Ulrich & Carden, 2014). This review focuses on new nurse outcomes in relationship to the use of simulation in NGRN orientation programs and on new nurse outcomes (Ackermann et al., 2007; Beyea et al., 2010; Bourgeois & MacDonald, 2014; Kaddoura, 2010; Maneval et al., 2012; Roche, Schoen &

Kruzel, 2013; Stefanski & Rossler, 2009; Young & Burke, 2010; Zigmont, Wade, Edwards, Hayes, Mitchell, & Oocumma, 2015).

Simulations are being integrated into NGRN orientation programs to promote critical thinking and confidence, to prepare for entry into specialty units, and to provide opportunities to train with other healthcare professionals. Olejniczak, Schmidt, and Brown (2010) published an integrative review of the use of simulation in NGRN orientation. Forty-three articles published over the previous 10 years were first identified; however, only three meet the inclusion criteria. Their review identified three common themes: socialization to the professional role, competence and confidence in self-performance, and learning in a safe environment. Simulation-based training allows the NGRN to learn about hospital-based policies and procedures, teamwork, collegiality, and safety. Also, competence and confidence during the transition period is further developed, while the NGRN's learn and practice in a safe training environment. However, the authors concluded that the quality of the research in this area was weak due to the lack of experimental design in the studies reviewed. The use of self-reporting measures, lack of randomization, diversity of the simulation, and the small number of articles reviewed, further limited the strength of the evidence. They suggest more rigorous research is needed to adequately assess the impact of simulation in NGRN orientation programs.

Ackermann, Kenny, and Walker (2007) described the results of adding two days of high fidelity simulation to an existing preceptor-based orientation focusing on critical thinking, clinical decision-making and professional development of the NGRNs. Qualitative data supported the use of simulation during orientation. The participants believed that the simulation was realistic, "helped ease the fear related to handling a code", allowed participants to see actual responses to interventions, and provided opportunities to apply critical thinking skills during an

emergency situation (Ackermann, et al., 2007, p. 137). Kaddoura (2010) also reported qualitative findings on new nurses' perceptions of the effects of simulation on CT, learning, and confidence. When the educators at Dartmouth-Hitchcock Medical Center completely redesigned a traditional orientation program to include simulation, significant increases in nurse ratings of competence, confidence, and readiness for independent practice were noted. Student quotes added to the richness of these articles.

Stefanski and Rossler (2009) reported on the development and evaluation of a critical care course that incorporated didactic lecture material with simulation activities. The authors used the NLN Student Satisfaction and Self-Confidence in Learning Scale instruments. The results indicated that 88% of participants ($N = 30$) agreed the simulation enhanced their confidence as a new critical care nurse.

In an orientation program evaluation, Beyea et al. (2010) examined the effects of HFS on new nurse graduates' confidence and readiness for practice. The sample included 260 new nurse graduates who participated in a pre and post-test study. Findings indicated that weekly high fidelity simulation significantly increased confidence, competence and readiness to practice. The authors also noted that retention increased and orientation time for recent new graduates decreased in all clinical areas. Strengths of the study include large sample and use of standardized instruments for data collection.

In a related article, Young and Burke (2010) describe a pilot residency program for multiple disciplines utilizing patient simulation. Two authors developed instruments contained both qualitative and quantitative items. The qualitative analysis indicated that both NGRNs and pharmacy students felt that the program prepared them for practice, helped develop critical

thinking skills and fostered a sense of community among the participants and facilitators. Specifically, the simulation enhanced communication, critical thinking, and prioritization skills.

Finally, more recent studies also found improved critical thinking among new graduates following orientation-based simulation programs (Bourgeois & MacDonald, 2014; Zigmont et al., 2015). Bourgeois and MacDonald (2014) explored if participation in a simulation during orientation improved CT skills in new graduate nurses ($N = 53$). Critical thinking was measured with The Critical Thinking Diagnostic tool at three different times during the orientation program. Differences between total scores revealed a statistically significant increase in CT measures between 10-week and six month assessments and between 10-week and 12-month assessments. In a related study, 153 new graduate nurses participated in a pilot simulation-based orientation program. The authors reported a 34% shorter orientation length during the pilot program compared to the previous orientation, more prepared RN's, and improved communication among orientees, staff, and administrators (Bourgeois & MacDonald, 2014).

However, Maneval, et al. (2012) utilizing a pre and post-test study design, to examine critical thinking and clinical decision-making skills in two groups of NGRN exposed to different orientation programs. The nurses ($N = 26$) were randomly assigned to either the control group (traditional orientation) or the intervention group (traditional orientation plus high-fidelity simulation). The HSRT and the Clinical Decision-Making in Nursing Scale (CDMNS) were used to measure CT and clinical judgment. The HFS intervention group did not show improvement in CT skills compared to the control group. Additionally, education level (BSN, ADN) or previous HFS experience did not impact HSRT scores. A limitation of the study is that the findings are not generalizable due to the majority of the population being white (96%) and female (96%). Further, the authors conclude that the small sample may have contributed to a type II error.

Similarly, Roche et al. (2013) also described the outcomes of a pilot study that compared clinical performance, satisfaction with orientation, and employment outcomes of two groups of new graduate nurses. One group completed case studies and one group participated in a HFS on the same complex clinical cases. The stratified sample included 20 nurses. There were no differences noted in the nurses' performance, suggesting that both teaching methods were effective.

Summary

The pertinent literature related to the study variables was presented in this chapter. Relevant research has reported that simulation is useful for skills training and knowledge development. Research is emerging on the transferability of simulation to the clinical setting, but further study is needed. Most studies were conducted with BSN students and used a variety of evaluation instruments, many of which lacked reliability and validity. Results of studies regarding the effects of simulation on CT, confidence and competence have revealed inconsistent findings. Similarly, results regarding influences on simulation such as, age, gender and fidelity level are varied and inconclusive. The evidence may be weak because of the lack of experimental studies, small sample sizes, and involving participants from just one site. Further, depending on self-reported measures to assess outcomes, such as CT, limits the strength of the findings.

Most of the studies reviewed indicated that adding simulation-based activities to NGRN transition programs enhanced the NGRN's competence and confidence, and fostered teamwork, and communication. The effect of simulation on CT skill development is varied and remains inconclusive. With the increasing popularity of simulation-based learning in nursing education and new-nurse orientation programs, more rigorous research is needed to strengthen the knowledge base regarding the transferability and impact on new nurse outcomes.

CHAPTER THREE: RESEARCH METHODOLOGY AND DESIGN

The purpose of this study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development, and RN role preparedness.

Specifically, the following research questions were investigated in new RN nurses within the first 90 days to one year of nursing practice:

1. What are the characteristics of the study sample?
2. What is the factor structure and internal consistency reliability of the transfer of learning instrument responses generated by advanced beginner new graduate nurses?
3. What are the characteristics of the pre-licensure and orientation program simulation experiences of the study sample?
4. What is the influence of the setting where simulation occurred (pre-licensure or orientation programs) and the type of simulation on transfer of learning, confidence and competence development, and RN role preparedness?
5. What is the influence of simulation exposure on transfer of learning, confidence, competence, and RN role preparedness as a function of where the simulation occurred, first nursing degree and health care experience in nursing school?

Study Design

A descriptive correlational design was used to designed the sampling plan and formulate the research questions in this study. Simulation characteristics examined included the setting (pre-licensure and orientation) type of courses in classroom exposure in pre-licensure settings, the frequency of exposure, and the level of fidelity in the exposures. Correlational research is

used to examine a relationship or association between variables for participants in a single group (Gliner et al., 2009; Polit & Beck, 2008).

Sample

Participants for this study were obtained from the North Carolina Board of Nursing (NCBON) licensure registered nurse database. The RN data file from the NCBON was used to identify those new graduate nurses whose initial NC licensure was granted between the years of 2013 and 2014. The invitation email was sent to 6,514 nurses (Appendix B). Ninety-two emails were returned as undeliverable. In an attempt to increase the response rate, two follow-up email messages were sent (Gliner et al., 2009). According to Dillman, Smyth and Christian (2009), there is no optimal timing sequence for web based surveys, but frequent reminders over a short period of time was avoided. Qualtrics™ was configured to send out reminder emails only to those participants who had not completed the survey. Therefore, one week after the initial email was sent, a second email was sent (Appendix C); and 2 weeks after the initial email, a third email reminder was sent (Appendix D). A thank you email was sent to those who completed the survey (Appendix E). Further, those emails that were returned as erroneous addresses were verified and an attempt to re-email the participant was made (Dillman et al., 2009). According to Dillman, Smyth, and Christian (2009), the sample size from a population of 6000 where the confidence level is 95% with 5% sampling error should be approximately ±361 participants. A total of 576 surveys were completed and returned (9.7%). Due to incomplete data, the final sample consisted of 251 eligible respondents.

Ethical Considerations

Prior to implementation, the researcher submitted the study to the University and Medical Institutional Review Board (UMCIRB) for approval. The protection of the rights and welfare of

the human subjects involved in this research was guaranteed by the submission of an application for exempt-status declaration. Approval for the study by the UMCIRB was obtained prior to proceeding with the study (Appendix F). There was minimal risk in this study and participation was voluntary. The nurse could exit the survey at any time. Study aims and potential benefits were explained in the email cover letter. The survey link was embedded in the email sent to the potential participants. Once the participant clicked on the link to begin the survey, the first screen provided more information and directions specific to the survey. Activating the link served as consent for participation in the study (see Appendix G for initial survey screen information). When using the Qualtrics™ survey mailer, participants each got their own unique survey link, which could only be used once and could not be shared (Qualtrics™, 2014.). This helped protect the integrity of the survey and population sample. It ensured that a participant answered the survey only once, and only invited nurses who were able to access the survey. Further, no identifying information was used in this study.

Data Collection

Data was collected using an online questionnaire (Appendix H) through the East Carolina (ECU) Qualtrics™ Survey platform. This platform is a research-based package available to faculty and students (ECU, n.d.) that allow researchers to develop, send, and analyze the results of data. Further, data can be imported from Qualtric*s*™ into the IBM® Statistical Package for the Social Sciences (SPSS®) for analysis (Qualtrics™, 2014).

Instrument

Content for the survey was derived from Elfrink's Learning Transfer Tool (V. L. Elfrink, personal communication, August 2, 2013, [Appendix I]). After review of this tool and with permission of the author, the survey was modified for this study (Appendix H). The original

Learning Transfer Tool (LTT) consisted of 13 items measuring learning outcomes following human patient simulation, specifically the "hierarchical cognitive process in the areas of delivering nursing care, prioritizing patient care needs, delegating care and identifying and communicating the data needed to make patient care decisions" (V. L. Elfrink, personal communication, August 2, 2013). These items were measured with a 3-point scale (do not agree, somewhat agree, strongly agree) and contained a demographic section. The revised instrument consisted of 14 items measured on a 5-point Likert-type scale ranging from one (strongly disagree) to five (strongly agree) with the total LTT scores ranging from 14 to 70. Along with extending the Likert scale, some items on the original survey were re-written for clarity regarding the cognitive domain (Q17.1, Q17.2). Two items related to communicating with the supervisor or health care practitioner, were changed to reflect communication with the physician and pharmacist (Q17.12 and Q17.13).

Further, items asking which pre-licensure courses contained simulation (Q15) and how many times per month the student participated in the simulation (Q16) were included. Several items were added for this study that related to simulation activities in the new nurse orientation programs (Q20, Q21, and Q23). Questions eighteen and twenty-three were added to discover the impact of simulation on confidence, competence, and RN role preparedness. Demographic-related questions were covered in the first section of the survey (Q2 through Q12).

Data Analysis Plan

The data were imported from Qualtrics™ to the IBM® Statistical Package for the Social Sciences Version 22, for analysis. Descriptive analysis of the sample and instrument was performed using means, standard deviations for continuous variables and percentages and means to describe categorical variables. All study variables were analyzed for missing data, to check for

and correct errors, and to check assumptions of the statistics (Leech, Barrett, & Morgan, 2011).

For research question 1, the characteristics of the new graduates are described. This description includes the number of participants in the sample, the number and percentage of females and males, the range and mean of ages, educational level and employment status.

Research question 2 utilized principal components factor analysis to explore the dimensionality of the TOL scores in this study sample and Cronbach's alpha to explore the internal consistency of the scale.

Research question 3 was answered with descriptive statistics including frequencies and percentages of the pre-licensure and orientation program simulation experiences and the distribution of fidelity level in pre-licensure courses for the total sample and for subgroups based on ADN and BSN education preparation.

Research question 4 used the independent-samples t-test to compare differences in the mean scores of transfer of learning, confidence, competence and RN role preparedness scores between nurses experiencing simulations only in their pre-licensure program and nurses with simulation experiences in both pre-licensure and new nurse orientation programs. Effect size for these mean comparisons was evaluated with the eta squared (η^2) statistic.

Research question 5 used Pearson correlations to evaluate the influence of total simulation exposure on the outcomes scores of transfer of learning, confidence, competence and RN role preparedness. Simulation exposure for pre-licensure simulations is the sum of high fidelity, low fidelity and medium fidelity frequency derived from Q16. Before the sum was computed, the response scale was recoded so that never = 0, less than once a month = 1, once a month = 2, 2-3 times a month = 3 and more than 3 times a month = 4. The pre-licensure simulation exposure scores could range from 0 (no exposure at all) to 12 (more than 3 times a

month for high, medium and low fidelity simulations). Similarly, the new nurse orientation exposure scores were computed in the same way from Q21. The total exposure score could be 12 for those with only pre-licensure simulation to 24 for those with both pre-licensure and job orientation exposure. The effect size of the correlations was based on Cohen's suggestion that correlations of .50 or greater represents a large effect size, correlations between .30 and .49 represent medium correlations, and correlations between .10 and .29 represent low correlations (Pallant, 2007). For research questions 4 and 5, statistical significance was evaluated with a p-value $\leq .05$.

Summary

This chapter described the study design, sample, ethical considerations, description of the instrument, data collection procedures, and data analysis and limitations. The purpose of this study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development and RN role preparedness. The limitations of the study design were described. In the next chapter, the results of the study are presented.

CHAPTER FOUR: RESULTS

This chapter contains the descriptive statistics of the study sample and statistical analysis related to each research question. The purpose of this study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development and RN role preparedness. The four study questions will be addressed, including statistical tests used and rationale for selection.

Descriptive Statistics

Research Question 1

What are the characteristics of the study sample?

Table 2 summarizes the demographic data of the study sample. The majority of the study sample respondents were white and female. The ADN was the most prevalent type of degree that qualified the nurse for initial RN licensing. The ages of the nurses ranged from 20 to 62 (M = 30, SD = 8.25). The sample had an even distribution of those with and without previous healthcare experience. Most nurses are employed at a full-time status. The common areas of clinical practice were medical-surgical (30%) and acute/critical care (28%). In examining the length of new nurse orientation programs, the majority of the programs lasted 3 months or longer.

Table 2

*Characteristics of the Study Sample (*N = *251)*

Characteristics	*n*	*%*
Year of initial licensure		
2013	106	42.2
2014	145	57.8

*Characteristics of the Study Sample (*N = *251)*

Characteristics	*n*	*%*
Race		
White	217	86.5
African American	16	6.4
Asian	6	2.4
Hispanic/Latino	4	1.6
Other	8	3.2
Age		
≤ 25	108	43.0
26-30	45	17.9
31-40	68	27.0
≥ 41	27	10.7
Missing	3	1.1
Employment status/nursing		
Full-time	235	93.6
Part-time	16	6.3
Education		
Diploma	12	4.7
ADN	126	50.1
BSN	109	43.4
MSN	1	<1
Other	3	1.1
Employed while in school		
Yes	126	50.1
No	124	49.4
Missing	1	<1
Setting where simulation occurred		
Only pre-licensure	161	64.1

*Characteristics of the Study Sample (*N = *251)*

Characteristics	*n*	*%*
Both pre-licensure and orientation	90	35.9
Orientation length		
One month	14	5.5
Two months	39	15.5
≥ Three months	132	52.5
Other	66	26.2

Note. Total of percentages are not 100 for every characteristics because of rounding.

Research Question 2

What is the factor structure and internal consistency reliability of the transfer of learning instrument responses generated by advanced beginner new graduate nurses?

Since the current sample consisted of recent new graduates and not nursing students as in Elfrink and Lee's (2010) group, principal component analysis and internal consistency reliability were performed on the revised Learning Transfer Tool to determine if the reported item-loadings and reliability would be replicated in this study sample. The original LTT was developed for use with nursing students "to address cognitive, psycho-motor or behavioral and affective types of learning from lower levels of learning to more higher-ordered thinking (what some might call critical thinking, but I specifically followed Krathwohl's verbiage)" (V. L. Elfrink, personal communication, July 7, 2014).

Prior to performing PCA, the suitability of the data for factor analysis was assessed. First, the correlation matrix revealed that all of the 14 items had coefficients above .3 with at least one other item, suggesting reasonable factorability. Secondly, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy value was .96, exceeding the recommended value of .7 (Leech et al., 2011), and the Bartlett's Test of Sphericity reached statistical significance ($p < .000$). Finally,

the communalities were all above .3 further confirming that each item shared some common variance with other items, therefore factor analysis was appropriate (Neill, 2008; Pallant, 2007). Principal components analysis without rotation revealed one factor with Eigenvalue exceeding 1, explaining 75.75 % of the variance. Table 3 displays the results of the principal component analysis.

The internal consistency of the LTT was also tested. Cronbach's alpha value for this study was .98 (N=251) suggesting very good internal reliability. Values above .7 are considered acceptable; however, coefficient's above.8 are preferable (Pallant, 2007). Further, the mean inter-item correlation was .74, with values ranging from .63 to .90, suggesting a strong relationship among the items (Pallant, 2007).

Table 3

Means, Standard Deviations, and Factor Loadings from Principal Component Factor Analysis: Eigenvalue, Percentage of Variance for Items of the Transfer of Learning Instrument

Item	M	SD	Factor Loadings
6. Prioritize existing needs of patients	3.60	1.11	.92
11. Identify relevant data	3.62	1.06	.91
5. Anticipate emerging needs	3.60	1.12	.90
7. Prioritize emerging needs	3.55	1.15	.90
1. Apply previously knowledge	3.65	1.03	.88
4. Recognize the existing needs	3.60	1.11	.88
9. Perform care as part of the team	3.75	1.07	.88
14. Anticipate follow-up communication	3.44	1.11	.88
10. Delegate care	3.48	1.13	.87
12. Communicate relevant data to MD	3.53	1.15	.86

Means, Standard Deviations, and Factor Loadings from Principal Component Factor Analysis: Eigenvalue, Percentage of Variance for Items of the Transfer of Learning Instrument

Item	M	SD	Factor Loadings
3. Evaluate the nursing care	3.61	1.13	.85
8. Understand the roles of the team	3.62	1.12	.83
2. Apply current evidence	3.45	1.06	.82
13. Communicate to a Pharmacist	3.12	1.17	.80
Eigenvalue			10.60
% of variance			75.75

Research Question 3

What are the characteristics of the pre-licensure and orientation program simulation experiences of the study sample?

Table 4 presents the simulation fidelity and frequency of simulations experienced by new nurse graduates during their pre-licensure nursing programs. Of the group of 251, 90% (225) reported experiencing one or more high fidelity simulations during their pre-licensure nursing programs, 62% experienced one or more medium fidelity simulations, and 72% experienced one or more low fidelity simulations. More than half of nurses (59.6%) experienced more than one type of simulation fidelity, with 53% having experienced all three fidelity types. For those reporting on the frequency of high fidelity simulations most experienced them less than once a month. For nurses reporting on the frequency of medium and low fidelity simulations, the largest percentage of individuals reported experiencing them greater than once a month compared to once a month or less than once a month. More nurses reported experiencing low fidelity simulations greater than once a month than either high or medium fidelity simulations.

Table 4

Fidelity Level and Frequency of Simulation Experiences in the Pre-Licensure Nursing Program

Characteristic	*n*	%
Simulation fidelity		
High	225	89.6
Medium	157	62.5
Low	180	71.7
High fidelity frequency		
Less than once a month	110	48.9
Once a month	50	22.2
Greater than once a month	65	28.9
Medium fidelity frequency		
Less than once a month	61	38.9
Once a month	34	21.7
Greater than once a month	62	39.5
Low fidelity frequency		
Less than once a month	61	33.9
Once a month	42	23.3
Greater than once a month	77	42.8

Note. Total of percentages are not 100 for every characteristic because of rounding.

Table 5 presents the simulation fidelity and frequency of simulations experienced by new nurse graduates during their new nurse orientation programs. Of the 251 nurses who experienced simulation during their pre-licensure educational program, 90 (35.9%) also reported experiencing one or more simulations during their new nurse orientation program. For this group of 90, the majority (77%) reported experiencing one or more high fidelity simulations during their new nurse orientation programs, 53% experienced one or more low fidelity simulations, and 42% experienced one or more medium fidelity simulations. Thirty-eight percent of the nurses reported

having experienced all three fidelity types. For those reporting on the frequency of high fidelity simulations, most experienced them once a month. For nurses reporting on the frequency of low fidelity simulations, the largest percentage of individuals reported experiencing them less than once a month. More nurses reported experiencing medium fidelity simulations once a month than either high or low fidelity simulations.

Table 5

Fidelity Level and Frequency of Simulation Characteristics of the Simulation Experiences in the New Nurse Orientation Program

Characteristic	*n*	*%*
Simulation fidelity		
High	68	77.7
Medium	38	42.2
Low	48	53.3
High fidelity frequency		
Less than once a month	23	33.8
Once a month	29	42.6
Greater than once a month	16	23.5
Medium fidelity frequency		
Less than once a month	13	34.2
Once a month	18	47.4
Greater than once a month	7	18.4
Low fidelity frequency		
Less than once a month	19	39.6
Once a month	18	37.5
Greater than once a month	11	22.9

Note. One subject with missing data (n = 89). Total of percentages are not 100 for every characteristic because of rounding.

Table 6 presents the summary of the simulation experiences in the pre-licensure nursing courses for the ADN and BSN nurses. Of the total group (N = 251), 80% reported experiencing

high fidelity simulation in medical-surgical courses, followed by 43% in foundations, 36% in pediatrics, and 35% in obstetric (OB) courses. A higher percentage of BSN students (44%) reported experiencing high fidelity simulation in their OB courses compared to 29% of ADN nurses. Of the total sample of 251, over half reported no simulation experiences in mental health, followed by both community and leadership courses at 54%.

Table 6

*Simulation Fidelity Experiences in Pre-Licensure Nursing Courses for ADN Nurses (n = 126), BSN Nurses (n = 109) and for the Total Sample (*N = *251)*

	ADN		BSN		Total Sample	
Course/Fidelity	*n*	*%*	*n*	*%*	*n*	*%*
Foundations						
High	54	42.9	51	46.8	110	43.8
Medium	36	28.6	39	35.8	82	32.7
Low	46	36.5	42	38.5	94	37.5
None	17	13.5	13	11.9	33	13.1
Medical-surgical						
High	100	79.4	92	84.4	201	80.1
Medium	33	26.2	33	30.3	76	29.5
Low	38	30.2	33	30.3	71	30.3
None	2	1.6	5	4.6	7	2.8
Pediatric						
High	41	32.5	43	39.4	91	36.3
Medium	23	18.3	30	27.5	57	22.7
Low	37	29.4	27	24.8	69	27.5
None	21	16.7	20	18.3	43	17.1
Obstetrics						
High	37	29.4	48	44.0	89	35.5

*Simulation Fidelity Experiences in Pre-Licensure Nursing Courses for ADN Nurses (n = 126), BSN Nurses (n = 109) and for the Total Sample (*N *= 251)*

	ADN		BSN		Total Sample	
Course/Fidelity	*n*	*%*	*n*	*%*	*n*	*%*
Medium	26	20.6	25	22.9	53	21.1
Low	34	27.0	27	24.8	66	26.3
None	29	23.0	19	17.4	53	21.1
Community						
High	17	13.5	9	8.3	26	10.4
Medium	11	8.7	6	5.5	17	6.8
Low	16	12.7	14	12.8	31	12.4
None	63	50.0	63	57.8	136	54.2
Leadership						
High	24	19.0	12	11.0	36	14.3
Medium	11	8.7	2	1.8	13	5.2
Low	12	9.5	7	6.4	20	8.0
None	58	46.0	68	62.4	136	54.2
Geriatrics						
High	42	33.3	22	20.2	68	27.1
Medium	21	16.7	13	11.9	38	15.1
Low	20	15.9	15	13.8	38	15.1
None	41	32.5	54	49.5	100	39.5
Mental health						
High	13	10.3	10	9.2	23	9.2
Medium	13	10.3	7	6.4	20	8.0
Low	12	9.5	11	10.1	24	9.6
None	67	53.2	67	61.5	144	57.4

Note. Total of percentages are not 100 for every characteristic because of rounding.

Research Question 4

What is the influence of the setting where simulation occurred (pre-licensure or orientation programs) and the type of simulation on transfer of learning, confidence and competence development, and RN role preparedness?

Table 7 presents the mean comparisons on the measures of transfer of learning, confidence, competence and RN role preparedness between nurses with only pre-licensure simulation experiences and nurses who experienced simulation during their pre-licensure and new nurse orientation programs. Significantly higher transfer of learning mean scores was observed in those nurses who had simulation experience in both their pre-licensure and orientation programs compared to those nurses who only experienced simulation in their pre-licensure programs. There were no significant differences between the two groups on confidence, competence or RN role preparedness.

Table 7

Group Differences on Simulation Measures Between Groups with Pre-licensure Simulation Experience Only (n = 161) and with Both Pre-licensure and Orientation Simulation Experiences (n = 90)

Measure	Only pre-licensure		Both pre-licensure and orientation		*df*	*t*	*p*	η^2
	M	*SD*	*M*	*SD*				
TOL	48.05	14.34	52.17	11.34	249	2.34	.02	.02
Confidence	3.45	1.19	3.70	1.10	249	1.66	.10	.01
Competence	3.47	1.23	3.71	1.10	249	1.57	.12	.01
Preparedness	3.20	1.25	3.48	1.18	249	1.72	.09	.01

Research Question 5

What is the influence of simulation exposure on transfer of learning, confidence, competence, and RN role preparedness as a function of where the simulation occurred, first nursing degree, and health care experience in nursing school?

Table 8 presents the intercorrelations of the measures of total frequency of exposure, confidence, competence, preparedness, and transfer of learning scores for nurses with pre-licensure simulations only and nurses with both pre-licensure and new nurse orientation simulation experience. For nurses with both exposures, higher frequency of simulation experiences had medium positive and statistically significant correlations with confidence (r = .40), competence (r = .39), preparedness (r = .38) and pre-licensure transfer of learning (r = .40). For nurses with pre-licensure only simulation experiences, frequency of simulation exposure had only small correlations with confidence, competence, preparedness, and pre-licensure transfer of learning.

Table 8

Intercorrelations of Scores on Six Simulation Measures as a Function of Setting of Simulation Exposure

Measure	1	2	3	4	5	6
1. Total exposure	—	.40**	.39**	.38**	.40**	.23*
2. Confidence	.19*	—	.88**	.87**	.76**	.59**
3. Competence	.20*	.91*	—	.83**	.77**	.59**
4. Preparedness	.15	.88**	.88**	—	.75**	.54**
5. TOL-Pre-license	.16*	.78**	.81**	.76**	—	.67**
6. TOL-Orientation	—	—	—	—	—	—

Note. Intercorrelations for nurses with both pre-licensure and orientation simulation (n = 90) exposure are presented above the diagonal, and intercorrelations of the nurses with only pre-licensure exposure (n = 161) are presented below the diagonal.
* p < .05. ** p < .01.

Table 9 presents the correlation of a measure of total frequency of exposure with confidence, competence, preparedness, and transfer of learning scores for nurses with pre-licensure only simulations and nurses with both pre-licensure and new nurse orientation simulations, where nurses are classified by whether their pre-licensure program was an associate degree program or a bachelor of nursing degree program and whether they had health care experience during their education program. Simulation frequency had medium significant correlations with confidence (r = .32) and preparedness (r = .31) in associate degree nurses with only pre-licensure simulation experience and no healthcare experience. For nurses with both pre-licensure and new nurse orientation simulation experience, medium and large correlations were observed in associate degree nurses with and without experience, and in bachelor degree nurses with experience. Large significant correlations were observed in ADN's with experience between frequency of exposure and confidence (r = .57), competence (r = .61) and orientation transfer of learning (r = .50), and between frequency of exposure and orientation transfer of learning (r = .63) in ADN's with no experience.

Table 9

Correlation of Simulation Exposure Score with Five Simulation Outcome Scores as a Function of Setting of Exposure, First Nursing Degree, and Health Care Experience as a Licensed Practical Nurse, Nursing Assistant or Patient Care Assistant while in Nursing School

Group	*n*	Confidence	Competence	Preparedness	Pre-license TOL	Orientation TOL
Pre-licensure						
ADN exp	41	-.08	-.00	-.01	.13	—
ADN no exp	50	.32*	.27	.31*	.11	—
BSN exp	32	.24	.17	.01	.26	—
BSN no exp	28	.16	.18	.07	.18	—
Pre-lic and orient						
ADN exp	18	.57*	.61**	.47*	.46	.50*
ADN no exp	17	.37	.26	.39	.38	.63**
BSN exp	28	.22	.32	.15	.34	.18
BSN no exp	20	.22	.19	.21	.29	-.08

Note. * $p < .05$. ** $p < .01$.

CHAPTER FIVE: DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

The purpose of this study was to evaluate the influence of pre-work factors (healthcare experience, type of education, type and frequency of simulation exposure) and work factors (type and frequency of simulation exposure) on perceptions of transfer of learning, confidence and competence development and RN role preparedness. This final chapter discusses of the major findings of the study and provides recommendations for practice, education and future research.

Discussion of Findings

Research question 1. The sample population in the study closely paralleled the NC RN population characteristics for gender, race, and type of nursing program (NCBON, 2015). The majority (88%) of the new graduates in this study were female and white (86%) compared to 89% and 72% (female and white, respectively) as reported by the NCBON (2015). Many (50%) students in this study graduated from ADN programs, which is similar to the 48 % reported by the NCBON (2015). The largest percentages of nurses (43%) were between 20 and 25 years, followed by 27% of nurses between 31 and 40 years of age. This is consistent with the NCBON (2015), in which the largest age category was 21 to 25 years (36%) and the majority of the NCBON sample was between 21 to 40 years of age (76%). The most common clinical practice area for this sample of NC new graduates was the medical-surgical unit (30%) followed by acute/critical care (28%), whereas practice statistics for NC RNs reported that 18% were employed in acute/critical care, and 14% in medical-surgical units (NCBON, 2015). It is not unusual for new graduates to start their nursing career in a less acute unit compared to more experienced RNs. The sample of new graduates used in this study was comprised of 50% who had previous healthcare experience compared to a national survey which reported that 68% of RN's worked in a healthcare occupation prior to enrolling in nursing school (U.S. Department of

Health and Human Services, Health Resources and Services Administration, 2010). The majority of new graduates (52%) in this study had an orientation program lasting ≥ 3 months, whereas the NCSBN (2006) survey reported that 65% of graduates had orientation programs of seven weeks or longer (Li & Kenward, 2006).

Research Question 2. The second research question addressed the psychometric properties of the Learning Transfer Tool and whether the instrument measured the cognitive, psychomotor or behavioral and affective types of higher level learning as proposed by the original author. The most frequent learning opportunities offered by simulation include assessment, psychomotor skill practice, communication, clinical decision-making/critical thinking, prioritization and delegation (Hayden, 2010). According to Elfrink and Lee (2010) the LTT was designed to determine the type of cognitive process dimension and learning dimension that occurred in response to a simulation-based educational intervention. Specifically, the instrument was to measure the cognitive process in the areas of delegating care, prioritizing patient care needs, delivering patient care, identifying and communicating the data needed to make patient care decisions, and if transfer of intended learning outcomes occurred between simulation and clinical practice (V. L. Elfrink, personal communication, August, 2, 2013; Elfrink & Lee, 2010).

The Learning Transfer Tool in the current study demonstrated good internal consistency (Cronbach's alpha = .98). Although, consistent with Elfrink and Lee's (2010) result, the current study had a smaller sample size (N = 251) for 14 items compared to the larger original sample of 684 for 13 items (Cronbach's alpha .96). According to Pallant (2007) the reliability of an instrument can vary depending on the sample size, therefore it was important to check internal consistency with the current study sample of new graduates.

Factor analysis of LTT in the current study demonstrated that 75.75% of the variance in the items was explained by the 1 extracted component. This is similar to Elfrink's results of all items loading on a single variable (Elfrink & Lee, 2010). However, she did not report the loading factors or variance. The loading factors for the study sample revealed several items that were close to 1, such as "prioritizing existing needs" (.92), "identifying relevant data to communicate to the team" (.91), "prioritizing emerging needs" (.90), and "anticipating emerging needs of patients" (.90). The psychometric results imply that when used with new graduates, the LTT measures higher-order learning skills.

Research Question 3. Research question three described the characteristics of the pre-licensure and orientation program simulation experience of the new nurse graduates. For the purpose of this study, simulation was defined according to level of fidelity. The respondents were asked if they participated in simulation during both their pre-licensure educational program and their orientation programs, and whether these programs used low, medium or high fidelity simulation activities. In both programs, high fidelity simulation activities were more common than low fidelity simulation experiences. In pre-licensure programs, the nurses experienced low fidelity simulations greater than once per month compared to high fidelity, which was experienced less than once per month. This may be due to low fidelity simulators are most often used for skill practice whereas higher fidelity simulations may be used to develop more advance critical thinking skills. Also, high fidelity simulations can be more time-consuming to set-up and manage compare to low fidelity simulations. Similar to the national survey on simulation use in nursing education (Hayden, 2010), participants in this study used high fidelity simulation more frequently in medical-surgical and foundations courses than other courses, and mental health and community courses tended to incorporate high fidelity simulation less frequently than other

courses. However, this study presents data revealing that more BSN students experience high fidelity OB experiences compared to ADN nurses. It is possible that the birthing manikin is more prevalent in baccalaureate pre-licensure programs than in ADN programs. The literature on simulation in new nurse orientation programs is emerging, and consistent with the current study, high fidelity simulations were more common than low fidelity in orientation programs (Olejniczak et al., 2010). Orientation programs may use more HFS in order to better address the specific competencies of NGRNs.

Research Question 4. Question four was formulated to examine the effect of where simulation occurred and what affect the type of fidelity exposure had on the outcome variables (TOL, confidence, competence, RN role preparedness). In the current study, the results indicated that nurses who experienced simulation in both their pre-licensure and orientation programs perceived greater gains in transfer of learning. These finding are consistent with previous research that reported students are able to transfer knowledge and skills learned from simulation activities to the actual clinical setting (Domuracki et al., 2009; Hayden et a., 2014; Kirkman, 2011, 2013; Maginnis and Croxon, 2010; Meyer et al., 2011; Wotton et al., 2010). However, the group of 90 nurses completed the TOL instrument twice (once for pre-licensure simulation and again for orientation simulation), which makes it difficult to attribute the higher means to just the exposure they had during orientation or to just the exposure they had in their pre-licensure program. Administering the TOL instrument immediately after nursing school and the orientation programs would more accurately reflect true differences.

Research Question 5. The last question examined the interrelationships between simulation exposures; pre-work, work and new nurse outcome variables. In the group of 90 nurses, total exposure was correlated with confidence, competence, RN role preparedness and

TOL-pre-licensure outcome measures. One reason for this finding may be because these nurses had higher dosages of simulation as compared to those in the pre-licensure programs. Also, simulations during orientation may focus on the attributes of professional development, whereas simulation experiences during pre-licensure programs may be more general and focus on basic knowledge and skills development.

The current study showed significant relationships between ADN prepared new nurse graduates subgroups (those with healthcare experience, and those without experience) and confidence, competence, RN role preparedness and TOL-orientation measures. In the pre-licensure group, 50 ADN prepared nurses, with no healthcare experience during school, felt simulation exposure impacted confidence, competence and RN role preparedness. However, working in healthcare had an inverse low correlation with confidence, competence and preparedness. Thus being employed during school may present more opportunities to gain confidence, competence, and RN role preparedness, allowing these nurses to feel that simulation did not further enhance growth in these areas. The findings also provide evidence that frequency of simulation exposure mediated the relationship between confidence, competence, and RN role preparedness, especially in the ADN's with and without healthcare experience. Both subgroups of ADN nurses also felt that simulation strongly impacted transfer of learning measures. There is little research that examines the frequency of simulation exposure and transfer of learning or confidence, competence, and RN role preparedness. However, these findings are consistent with studies that found weekly simulation significantly increased confidence and readiness to practice (Beyea et al., 2010; Hayden et al., 2014; Mould et al., 2011).

Conceptual Model

This study was guided by Haskell's (2001) transfer of learning framework. This framework incorporates the work of Haskell into a model of new graduate transition developed by Scott, Engelke, and Swanson (2008) (Figure 1) that theorizes there are interventions organizations can take to improve transition into practice and socialization into the RN role. This study demonstrated that simulation experiences during pre-licensure educational programs and orientation programs are associated with improved transfer of learning, confidence and competence development, as well as RN role preparedness. The group of new graduates that received simulation in both their pre-licensure program and orientation reported greater gains in TOL, confidence, competence and RN role preparedness.

Implications for Education and Practice

A major strength of this study is the contribution to the growing body of simulation literature. Results from this study will inform and guide nurse educators in developing simulation-based teaching strategies that best enhance transfer of learning, developing confidence and competence, and assisting with RN role preparedness. The complexities of patient care have led to the need for new graduates to deliver a higher-level of nursing care than in the past. Undergraduate educators are implementing simulation as a learning strategy to develop and improve nursing students decision-making skills. Integrating high fidelity simulation is a costly endeavor, and some educators may question the impact that simulation has on the transfer of knowledge and skills to the actual clinical setting. Transfer of learning outcome measurement is an important source of evidence about the effectiveness of simulation-based learning. Findings of this study indicate that transfer of learning did occur, which is consistent with previous research that reported students are able to transfer knowledge and skills learned

from high fidelity simulation activities to the actual clinical setting (Domuracki et al., 2009; Hayden et al., 2014; Kirkman, 2013; Maginnis and Croxon, 2010; Meyer et al., 2011; Wotton et al., 2010).

Further, the results support the assumption that high fidelity simulation training may be a valuable teaching strategy for increasing learner's confidence and competence, and for preparing students for the workplace. Thus affirming previous findings that confidence and competence increased following simulation in pre-licensure nursing programs (Alfes, 2011; Merriman, 2014; Yuan et al., 2012). Nurse educators should be more motivated to increase the frequency of simulation activities because of the strong association between higher exposures and increased gains in perceived TOL, confidence, competence, and RN role preparedness. Further, since TOL did occur, educators may want to use simulators more often for rare or hard to find patient experiences. Clearly, simulation has great potential for providing educational programs with valuable avenues for better equipping new nurse graduates for the transition to work.

This study lends support to the IOM report, which recommends the incorporation of technology, including high fidelity simulation in nursing education (IOM, 2010) as well as the AACN Baccalaureate Essentials (2008) document that suggests simulation training can provide and enhance the clinical experiences required for developing the role of a professional nurse. This study may be important to Boards of Nursing as they support the use of that simulation in lieu of clinical hours. This study affirms the results of the NCSBN National Simulation Study (Hayden et al., 2014) adding further evidence that simulation promotes transfer of learning, develops competence and confidence in new nurse graduates, and improves RN role preparedness.

Simulation use in orientation programs is growing, yet research is limited. The descriptive and inferential statistics of orientation program simulation experiences among NC new nurse graduates provides a foundation for further work in this area. Previous literature revealed that using simulation in orientation programs helped with the socialization of the new nurse to the RN role. Specifically, the nurses learned about teamwork, communication, and patient safety. Confidence and competence were also enhanced during the transition period between nursing school and professional practice. Simulation activities also allowed for hands-on experiences to assess and manage complex patients safely (Olejniczak et al., 2010). Typically, new nurse graduates enter an orientation program that includes both classroom and clinical components. However, complexity of patient conditions and amounts of patient contact can vary greatly among the new nurses (Maneval et al., 2012). The findings from this study provide evidence to support the rationale for adding more simulation activities in new nurse orientation programs. To help enhance the new graduates exposure to various patient situations, staff development educators can design simulation experiences to target specific critical incidents that occur in the hospital setting, thereby increasing the new nurses' confidence and competence with difficult clinical situations. Overall, this study supports previous research findings indicating that confidence and competence increased following simulation in new nurse orientation programs (Beyea et al., 2010; Kaddoura, 2010; Stefanski & Rossler, 2009).

Nurse educators and healthcare administrators also want to ensure that nurses continue their education and participate in lifelong learning in order to maintain the competencies that are needed to provide safe patient care (IOM, 2010). Simulation-based activities can also be used during the annual RN competency assessments. Hospitals must meet accreditation standards set by The Joint Commission including making sure nurses have the competencies, skills and

knowledge needed to provide safe and high-quality patient care (NACNEP, 2010). Clearly, practice implications include improved communication among caregivers, enhanced knowledge and skill, teamwork, competence and confidence (NACNEP, 2010). The Joint Commission issued the National Patient Safety Goals (NPSG), which identified problem areas in the hospital setting and how to solve them (The Joint Commission, 2009). Two of the goals pertinent to this study include (1) recognizing and responding to changes in a patient's condition and (2) improving staff communication. Findings from this study lend evidence that simulation can be used to train nurses in this and other areas of patient care. The Learning Transfer Tool can be used to evaluate the competency of skills (communication, teamwork, decision-making) learned through simulation. Therefore, staff development educators can design simulation scenarios to maintain competency throughout the RN's professional career. The results of this study support that simulation can and should be used during new nurse orientation programs to develop confidence and competence in nurses transferring to new practice areas or for competency development. It also has implications for hospitals to provide space for simulation activities and to equip simulation laboratories with the most advanced technology available. This suggests a need for stronger academic-practice partnerships where the high cost of simulation laboratories can be shared and the use of the simulators can be maximized.

Additionally, this study has the potential to support the argument in favor of HFS programs and funding dedicated to the development of simulation laboratories in nursing education and new nurse orientation programs. Considering a basic simulation laboratory can cost well over $100,000, most educational and hospital institutions have to pursue funding from outside sources. Federal agencies and private foundations can be major sources of grant funding, but identifying the projects unique niche maybe needed to successfully procure a grant (Hanberg,

Brown, Hoadley, Smith, & Courtney, 2007). Nursing is an active learning, practice profession and has traditionally relied on direct patient care for developing and maintaining clinical competency. However, because of barriers to clinical placements, students are not always able to demonstrate competence. In orientation, it may be difficult for preceptors or unit educators to manufacture a specific patient situation when the new nurse is available (Sportsman et al., 2009). Therefore, simulation is the unique niche, which can provide opportunities that allow for nurses to develop or maintain competency.

Recommendations for Research

Further research needs to be conducted with a larger sample of advanced beginner new graduates. Ideally, transfer of learning and professional development characteristics should be evaluated with a more diverse, national representation of new graduates. More focus on orientation simulation experiences needs to be explored, as this is an emerging topic in today's simulation literature. The Learning Transfer Tool demonstrated good internal consistency, confirming that this instrument was reliable when used with new nurse graduates. This instrument can be used to evaluate the impact of an interdisciplinary simulation on communication, decision-making, and teamwork. The LTT could also be adapted to use with specific learning needs (e.g. specific patient populations) and administered immediately after pre-licensure and orientation programs to better capture the impact of simulation on transfer of learning outcomes measures. In this study, there was low correlation in the BSN subgroups between pre-licensure exposure and confidence, competence, TOL, and RN role preparedness. Thus, future research should employ a mixed-methods approach to better understand the impact of HFS on transfer of learning, confidence and competence development, and RN role preparedness in the BSN population. Testing of the research model may uncover whether other

factors influence or are predictors of transfer of learning. Further, research studies should be conducted examining the impact of simulation in under-utilized nursing courses identified in this study.

Limitations

This study was limited to the random sample of advanced beginner, new graduate nurses who were listed in the NCBON dataset and chose to respond to the survey. This study may not be generalizable to other states or other RN's since the study population was restricted to North Carolina nurses with one year or less of clinical experience. Further, the sample was small and relatively homogenous (primarily white females) which impacts the generalizability of the findings. An initial projection of ±361respondents was planned. Out of 6,514 emails sent, only 576 surveys were completed and 251 were usable. Providing an incentive may have reduced the large nonresponse rate. The results were also limited as data collected relied on a self-reporting instrument. Additionally, there were several poorly constructed questions in Qualtrics™ survey instrument that did not allow respondents to give accurate and precise answers. Since the survey is web-based only, nurses with computer access were able to participate.

Summary

To prepare nursing students for today's demanding healthcare environment, nurse educators can no longer rely solely on traditional clinical experiences to develop higher-order thinking skills. Nursing programs across the United States continue to invest in simulation as a way to meet the challenges of educating nurses. Simulation-based learning provides a safe and non-threatening environment for students to practice skills and learn to care for complex and rare patient conditions that may be uncommon in a traditional clinical setting. However, further empirical research is needed to examine the transferability of the simulation experience into

actual situations. This study provides ongoing information on the use of simulations in pre-licensure and orientation programs. Significant differences were noted in transfer of learning, confidence and competence development, and RN role preparedness among the nurses who had simulation exposure in both their pre-licensure and orientation programs compared to those that had pre-licensure simulation exposure only.

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Appendix A: Novice to Expert

Table 1

Benner's Novice to Expert Categories

	Years in Practice	Characteristics
Novice	Nursing student in first year of education Nurses new to a clinical area Nurses with little or no experiential background Nursing student in first year of education	Focuses on developing knowledge base and technical skills Relies on textbooks and rules to guide practice Uses more experienced nurses (or instructors) as resources Focuses on developing knowledge base and technical skills Relies on textbooks and rules to guide practice
Advanced beginner	Senior level nursing students New graduates	Beginning to accrue real life experiences Starting to notice re-occurring cues or aspects of clinical situations Continues with difficulty integrating cues with other clinical findings Relies on textbooks and clinical guidelines to dictate practice Difficultly with judging level of severity and subtleties of a patient's condition Depends on more experienced nurses to fill in the gaps Beginning to accrue real life experiences Starting to notice re-occurring cues or aspects of clinical situations Continues with difficulty integrating cues with other clinical findings Relies on textbooks and clinical guidelines to dictate practice Difficultly with judging level of severity and subtleties of a patient's condition
Competent	Employed for 1 to 3 years in same or similar job	Mastered basic technical skills Beginning to set priorities and anticipating patient needs or possible complications of illness Nursing actions are deliberate, organized and efficient Lacks flexibility and speed

Benner's Novice to Expert Categories

	Years in Practice	Characteristics
Competent	Employed for 1 to 3 years in same or similar job	Able to manage complex patient care Most in-services geared toward competent Nurses may remain in this stage indefinitely
Proficient	Employed in same job or with same patient population for 3 to 5 years	Able to view the whole picture Quickly notices changes in a patient's condition Learned from experience what works and what typical events to expect in certain patient conditions Able to alter care in response to events Able to differentiate between what is important and what is not Patient care is automatic and uses nuances to guide care
Expert	Employed in same job of with same patient population over 5 years	Practice no longer guided by rules Vast clinical background Developed greater sense of salience and intuitive grasp of patient conditions Takes initiative in emergencies Able to identify resources quickly and efficiently Has confidence in abilities Remains calms in a crisis Promotes professionalism in self and others Mentor to others in decision-making process

Note. Adapted from "From Novice to expert: Excellence and power in clinical nursing practice" by P.E. Benner, 2001. Copyright 2001 by Prentice-Hall, Inc.

Appendix B: Initial Email Invitation

From: Lori S. Anderson, RN, PhD (c) [andersonl07@students.ecu.edu]
To: North Carolina New Nurse Graduates
Subject: Transfer of Learning Survey
Date: October 14, 2014

Hello New RNs,

I am writing to ask for your help in understanding the perceptions of new nurse graduates on the impact simulation-based training has on transfer of learning regarding communication, critical thinking, teamwork, confidence and competence in the RN role. I am asking newly licensed North Carolina nurses like you, to reflect on your experiences with simulation-based training in your pre-licensure and orientation/residency programs when answering a short questionnaire.

Your responses to this survey are very important and will help advance simulation-based training and inform and guide nurse educators towards developing simulation-based activities that best enhance transfer of learning.

This is a short survey and should take you no more than 10 minutes to complete. Please click on the link below to go to the survey website (or copy and paste the survey link into you internet browser) to begin the survey.

Your participation in the survey is entirely voluntary and all of your responses will be kept confidential. No personally identifiable information will be associated with your responses in any published reports of this data. Should you have any further questions or comments, please feel free to contact me at andersonls07@students.ecu.edu or 919-333-8051.

I appreciate your time and consideration in completing this survey. Thank you for participating in this study! It is only through the help of newly licensed NC nurses like you that we can begin to understand the impact simulation-based training has on the transfer of learning.

Many thanks,

Lori S. Anderson, RN, PhD (c)
Doctoral Candidate
East Carolina University College of Nursing
Greenville, NC
919-333-8051

Appendix C: Follow-Up Email #1

From: Lori S. Anderson, RN, PhD(c) [andersonl07@students.ecu.edu]
To:
Subject: Transfer of Learning Survey

Date:

Hello,

I recently sent you an email asking for your participation in responding to a brief survey about your perceptions of the impact of simulation activities and transfer of learning. Your responses to this survey are very important in understanding the role simulation experiences play in learning transfer.

The survey is short and should only take you ten minutes to complete. If you have already responded, I appreciate your participation! If you have not yet completed the survey, I encourage you to take a few minutes to do so.

Please click on the link below to go to the survey website (or copy and paste the survey link into you internet browser) to begin the survey.

Link:

Your response is important. Getting direct feedback from new nurses is critical in understanding the impact simulation has on learning transfer. Thank you again for your help by completing this survey.

Sincerely,

Lori S. Anderson, RN, PhD (c)
Doctoral Candidate
East Carolina University College of Nursing
Greenville, NC
919-333-8051

Appendix D: Follow-Up Email #2

From: Lori S. Anderson, RN, PhD (c) [andersonl07@students.ecu.edu]
To:
Subject: Transfer of Learning Survey

Date:

Hello,

Fall is a busy time for new nurse graduates, and I understand how valuable your time is as you begin your nursing career. I am hoping you are able to give about 10 minutes of your spare time to help me collect important information about simulation and learning transfer by completing a short survey.

If you have already completed the survey, I really appreciate your participation. If not, I would urge you to complete the survey. I plan to end the study next week *[insert date],* so I wanted to e-mail everyone who has not responded to make sure you had a chance to participate.

Please click on the link below to go to the survey website (or copy and paste the survey link into you internet browser) to begin the survey.

Link:

Thank you in advance for completing the survey. Your responses are important! Newly licensed nurses are the best source of information to help understand the impact simulation has in learning transfer.

Sincerely,

Lori S. Anderson, RN, PhD (c)
Doctoral Candidate
East Carolina University College of Nursing
Greenville, NC
919-333-8051

Appendix E: Thank You Email

From: Lori S. Anderson, RN, PhD(c) [andersonl07@students.ecu.edu]
To:
Subject: Transfer of Learning Survey

Date:

Hello,

Thank you for completing the Transfer of Learning survey! I appreciate your participation in this research study. Your feedback is important in understanding the impact of simulation-based training on learning transfer.

Good luck in all your future endeavors and welcome to nursing!

Sincerely,

Lori S. Anderson, RN, PhD (c)
Doctoral Candidate
East Carolina University College of Nursing
Greenville, NC
919-333-8051

Appendix F

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Exempt Certification

From: Social/Behavioral IRB
To: Lori Anderson
CC: Elaine Scott
Date: 10/14/2014
Re: UMCIRB 14-001336
Impact of Human Patient Simulation on Learning Transfer

I am pleased to inform you that your research submission has been certified as exempt on 10/14/2014 . This study is eligible for Exempt Certification under category #2 .

It is your responsibility to ensure that this research is conducted in the manner reported in your application and/or protocol, as well as being consistent with the ethical principles of the Belmont Report and your profession.

This research study does not require any additional interaction with the UMCIRB unless there are proposed changes to this study. Any change, prior to implementing that change, must be submitted to the UMCIRB for review and approval. The UMCIRB will determine if the change impacts the eligibility of the research for exempt status. If more substantive review is required, you will be notified within five business days.

The UMCIRB office will hold your exemption application for a period of five years from the date of this letter. If you wish to continue this protocol beyond this period, you will need to submit an Exemption Certification request at least 30 days before the end of the five year period.

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

Appendix G: Initial Survey Screen

You are being invited to participate in a **research** study titled *"Impact of Simulation on Transfer of Learning"* being conducted Lori Anderson, PhD(c), RN a doctoral student at East Carolina University in the College of Nursing department. The goal is to survey *650* individuals who are recent nursing school graduates. The survey will take approximately *10* minutes to complete. It is hoped that this information will assist us to better understand the impact of simulation-based training has on learning transfer. The survey contains an individual link, which can only be used once. However, your name, email, and date of original licensure information will automatically be saved with the survey data. This link allows me to track 'responses in progress' and send out reminder and Thank You messages to the participants. *However, your responses will be kept confidential. No data will be released or used with your identification attached*. Your participation in the research is **voluntary**. You may choose not to answer any or all questions, and you may stop at any time. There is **no penalty for not taking part** in this research study. Please call *Lori Anderson* at *919-333-8051* for any research related questions or the Office of Research Integrity & Compliance (ORIC) at 252-744-2914 for questions about your rights as a research participant.

Further, there are no known risks from your participation in this study. The Institutional Review Board of East Carolina University has approved this research. Completion of this survey serves as your consent to participate in this research study.

Please click the next button at the bottom right corner to move to the next page of the survey. During the survey, you may click the "back" button to go back and change an answer. Use this button instead of your browser's back feature. You will be able exit and return to the survey after beginning it.

Thank you in advance for your time. Again, your participation assists me and other nurse educators understand the impact of simulation-based training has on learning transfer.

Thank you,
Lori S. Anderson, RN, PhD (c)
Doctoral Student at East Carolina University, College of Nursing
Greenville, NC
Andersonl07@students.ecu.edu
919-333-8051

Appendix H: Impact of Simulation on Learning Transfer Survey

Q1 You are being invited to participate in a **research** study titled *"Impact of Simulation on Transfer of Learning"* being conducted Lori Anderson, PhD(c), RN a doctoral student at East Carolina University in the College of Nursing department. The goal is to survey *650* individuals who are recent nursing school graduates. The survey will take approximately *10* minutes to complete. It is hoped that this information will assist us to better understand the impact of simulation-based training has on learning transfer. The survey contains an individual link, which can only be used once. However, your name, email, and date of original licensure information will automatically be saved with the survey data. This link allows me to track 'responses in progress' and send out reminder and Thank You messages to the participants. *However, your responses will be kept confidential. No data will be released or used with your identification attached*. Your participation in the research is **voluntary**. You may choose not to answer any or all questions, and you may stop at any time. There is **no penalty for not taking part** in this research study. Please call *Lori Anderson* at *919-333-8051* for any research related questions or the Office of Research Integrity & Compliance (ORIC) at 252-744-2914 for questions about your rights as a research participant.

Further, there are no known risks from your participation in this study. The Institutional Review Board of East Carolina University has approved this research. Completion of this survey serves as your consent to participate in this research study.

Please click the next button at the bottom right corner to move to the next page of the survey. During the survey, you may click the "back" button to go back and change an answer. Use this button instead of your browser's back feature. You will be able exit and return to the survey after beginning it.

Thank you in advance for your time. Again, your participation assists me and other nurse educators understand the impact of simulation-based training has on learning transfer.

Thank you,
Lori S. Anderson, RN, PhD (c)
Doctoral Student at East Carolina University, College of Nursing
Greenville, NC
Andersonl07@students.ecu.edu
919-333-8051

Q2 In what year did you obtain your INITIAL US nursing licensure?

Q3 What is your gender?
- ❍ Male (1)
- ❍ Female (2)

Q4 What is your race?
- ❍ White/Caucasian (1)
- ❍ Black/African American (2)
- ❍ Asian (3)
- ❍ Hispanic/Latino (4)
- ❍ Other (5) _____

Q5 What is your age?

Q6 What type of nursing degree/credential qualified you for your first US nursing license?
- ❍ Diploma nursing (1)
- ❍ Associate degree nursing (2)
- ❍ Baccalaureate degree nursing (3)
- ❍ Master's degree nursing (4)
- ❍ Other (5) _____

Q7 What is your current level of education?
- ❍ Diploma-nursing (1)
- ❍ Associate degree-nursing (2)
- ❍ Baccalaureate degree-nursing (3)
- ❍ Master's degree-nursing (4)
- ❍ Other (5) _____

Q8 While in nursing school, did you have a job as a Licensed Practical Nurse, nursing assistant, or similar role, such as patient care assistant?
- ❍ Yes (1)
- ❍ No (2)

Q9 What is your employment status?
- ❍ Employed full time in nursing (1)
- ❍ Employed part-time in nursing (2)
- ❍ Employed in a job that does not use my nursing knowledge or license (3)
- ❍ Not employed but looking for a nursing position (4)
- ❍ Not employed but looking outside of nursing (5)
- ❍ Not employed and not looking (6)

Q10 Please identify the type of setting that most closely corresponds to your current nursing practice position:

- ❑ Hospital (1)
- ❑ Nursing Home/Extended Care/Assisted Living Facility (2)
- ❑ Home Health (3)
- ❑ Correctional Facility (4)
- ❑ Academic Setting (5)
- ❑ Public Health (6)
- ❑ Community Health (7)
- ❑ School Health Service (8)
- ❑ Occupational Health (9)
- ❑ Ambulatory Care Setting (10)
- ❑ Operating room (11)
- ❑ Policy/Planning/Regulatory/ (12)
- ❑ Licensing Agency (13)
- ❑ Other (14) _____
- ❑ Not employed in nursing (15)

Q11 Please identify the employment specialty that most closely corresponds to your nursing practice position:

- ❍ Acute Care/Critical Care (1)
- ❍ Adult Health/Family Health (2)
- ❍ Anesthesia (3)
- ❍ Community (4)
- ❍ Geriatric/ Gerontology (5)
- ❍ Home Health (6)
- ❍ Maternal-Child Health (7)
- ❍ Medical Surgical (8)
- ❍ Occupational Health (9)
- ❍ Oncology (10)
- ❍ Palliative Care (11)
- ❍ Pediatrics/Neonatal (12)
- ❍ Public Health (13)
- ❍ Primary Care (14)
- ❍ Psychiatric/Mental Health/Substance Abuse (15)
- ❍ Rehabilitation (16)
- ❍ School Health (17)
- ❍ Trauma/Emergency (18)
- ❍ Women's Health (19)
- ❍ Other (20) _____
- ❍ Not employed in nursing (21)

Q12 How many months/weeks did your new nurse orientation program last?

- ❍ One Month (4 weeks) (1)
- ❍ Two Months (8 weeks) (2)
- ❍ Three Months (12 weeks) (3)
- ❍ Four Months (16 weeks) (4)
- ❍ Other (5) _____

Q13 Did you participate in simulation activities in your pre-licensure nursing program?

- ❍ Yes (1)
- ❍ No (2)

If No Is Selected, Then Skip To End of Block (skip to question 19)

Q14 What levels of fidelity were used in your pre-licensure nursing program? (Select all that apply)

	Yes (1)
High-fidelity Simulation (computerized full body mannequin that is capable of audible sounds and realistic physiologic changes in response to interventions (i.e. SimMan or Meti-Sim) (1)	❍
Low-fidelity simulation (a partial body mannequin or specific anatomical model used for learning a specific skill (i.e. prosthetic arm used to learn how to give intramuscular injection practice or take blood pressure readings) (2)	❍
Medium-fidelity (task trainer mannequin that uses computer technology to assist students in learning heart, lung, and bowel sounds). (3)	❍

Q15 Which of your pre-licensure nursing courses used simulation? (Select all types of simulation that apply)

	High-fidelity (1)	Low-fidelity (2)	Medium-fidelity (3)	None (4)
Foundations (1)	❑	❑	❑	❑
Medical-Surgical (2)	❑	❑	❑	❑
Pediatrics (3)	❑	❑	❑	❑
Obstetrics (4)	❑	❑	❑	❑
Community (5)	❑	❑	❑	❑
Leadership (6)	❑	❑	❑	❑
Geriatrics (7)	❑	❑	❑	❑
Mental Health (8)	❑	❑	❑	❑
Other (9)	❑	❑	❑	❑

Q16 Approximately how often did you participate in simulations in your pre-licensure nursing program?

	Never (1)	Less than Once a Month (2)	Once a month (3)	2-3 Times a Month (4)	More than 3 Times a Month (5)
High-fidelity Simulation (1)	❍	❍	❍	❍	❍
Low-fidelity Simulation (2)	❍	❍	❍	❍	❍
Medium fidelity Simulation (3)	❍	❍	❍	❍	❍

Q17 "As a result of my simulation experiences during my pre-licensure nursing program, I have a GREATER ABILITY to":

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Apply previously acquired knowledge to deliver patient care (1)	❑	❑	❑	❑	❑
Apply current evidence to deliver nursing care (2)	❑	❑	❑	❑	❑
Evaluate the nursing care that I deliver (3)	❑	❑	❑	❑	❑
Recognize the existing needs of a patient (4)	❑	❑	❑	❑	❑
Anticipate emerging needs of patients (5)	❑	❑	❑	❑	❑
Prioritize existing needs of patients (6)	❑	❑	❑	❑	❑
Prioritize emerging needs of patients (7)	❑	❑	❑	❑	❑
Understand the roles of the health care team (8)	❑	❑	❑	❑	❑
Perform care as part of the health care team (9)	❑	❑	❑	❑	❑
Delegate care to members of	❑	❑	❑	❑	❑

the health care team. (10)					
Identify relevant patient care data to communicate with other healthcare providers (11)	❑	❑	❑	❑	❑
Communicate relevant patient care data to a Physician (12)	❑	❑	❑	❑	❑
Communicate relevant patient care data to a Pharmacist (13)	❑	❑	❑	❑	❑
Anticipate the data needed for follow-up communication with other health care practitioners (14)	❑	❑	❑	❑	❑

Q18 Overall, simulation experiences in my pre-licensure nursing program helped me:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Develop confidence in my professional nursing practice (1)	❍	❍	❍	❍	❍
Develop clinical competence in my professional nursing practice (2)	❍	❍	❍	❍	❍
Feel prepared for my role as an RN (3)	❍	❍	❍	❍	❍

Q19 Did you participate in simulation activities in your new nurse orientation program?

❍ Yes (1)

❍ No (2)

If No Is Selected, Then Skip To End of Survey

Q20 What types of fidelity were used in your new nurse orientation program? (Select all that apply)

	Yes (1)
High-fidelity Simulation (1)	❍
Low-fidelity simulation (2)	❍
Medium-fidelity (3)	❍

Q21 Approximately how often did you participate in simulations in your new nurse orientation program?

	Never (1)	Less than Once a Month (2)	Once a month (3)	2-3 Times a Month (4)	More than 3 Times a Month (5)
High-fidelity Simulation (1)	❍	❍	❍	❍	❍
Low-fidelity Simulation (2)	❍	❍	❍	❍	❍
Medium fidelity Simulation (3)	❍	❍	❍	❍	❍

Q22 "As a result of my simulation experiences during my new nurse orientation, I have a GREATER ABILITY to":

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Apply previously acquired knowledge to deliver patient care (1)	❑	❑	❑	❑	❑
Apply current evidence to deliver nursing care (2)	❑	❑	❑	❑	❑
Evaluate the nursing care that I deliver (3)	❑	❑	❑	❑	❑
Recognize the existing needs of a patient (4)	❑	❑	❑	❑	❑
Anticipate emerging needs of patients (5)	❑	❑	❑	❑	❑
Prioritize existing needs of patients (6)	❑	❑	❑	❑	❑
Prioritize emerging needs of patients (7)	❑	❑	❑	❑	❑
Understand the roles of the health care team (8)	❑	❑	❑	❑	❑
Perform care as part of the health care team (9)	❑	❑	❑	❑	❑
Delegate care to members of	❑	❑	❑	❑	❑

the health care team. (10)					
Identify relevant patient care data to communicate with other healthcare providers (11)	❑	❑	❑	❑	❑
Communicate relevant patient care data to a Physician (12)	❑	❑	❑	❑	❑
Communicate relevant patient care data to a Pharmacist (13)	❑	❑	❑	❑	❑
Anticipate the data needed for follow-up communication with other health care practitioners (14)	❑	❑	❑	❑	❑

Q23 Overall, simulation experiences in my new nurse orientation program helped me:

	Strongly Disagree (1)	Disagree (2)	Neither Agree nor Disagree (3)	Agree (4)	Strongly Agree (5)
Develop confidence in my professional nursing practice (1)	❍	❍	❍	❍	❍
Develop clinical competence in my professional nursing practice (2)	❍	❍	❍	❍	❍
Feel prepared for my role as an RN (3)	❍	❍	❍	❍	❍

Appendix I: Learning Transfer Tool **(***with Knowledge and Cognitive Process Dimensions Identified)*

Please select the number that best reflects your answer to the following question,

"As a result of my simulation experiences, I have a greater ability to":

	Do Not Agree	**Somewhat Agree**	**Strongly Agree**
1. Identify the building blocks for delivering nursing care e.g. equipment needed or contributing pathophysiology *(FU)*	0	1	2
2. Deliver nursing care *(PAP)*	0	1	2
3. Evaluate the nursing care that I deliver *(PE)*	0	1	2
4. Recognize the existing needs of a patient *(PAP)*	0	1	2
5. Anticipate emerging needs of patients *(CA)*	0	1	2
6. Prioritize existing needs of patients *(PA)*	0	1	2
7. Prioritize emerging needs of patients *(CA)*	0	1	2
8. Understand the roles of the health care team *(CU)*	0	1	2
9. Perform care as part of the health care team *(PAP)*	0	1	2
10. Delegate care to members of the health care team. *(PA)*	0	1	2
11. Identify relevant patient care data to communicate with a supervisor or health care practitioner *(PA)*	0	1	2
12. Communicate relevant patient care data with a supervisor or other health care practitioner *(PAP)*	0	1	2
13. Anticipate the data needed for future communication with a supervisor or other health care practitioner *(PA)*	0	1	2

Key: Knowledge domain (F=factual, C= conceptual, and P= procedural knowledge), Cognitive domain (U=understand, AP= apply, A= analyze, E= evaluate)