RELATIONSHIP BETWEEN SIMULATION AND INTUITION IN CLINICAL DECISION MAKING IN ASSOCIATE DEGREE NURSING STUDENTS

by

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Abstract

In the current health care environment, caring for the increasing numbers of seriously ill patients require novice nurses to use advanced, intuitive clinical decision-making skills like those of more experienced nurses. Educators are charged with developing instructional strategies to enhance clinical decision-making skills. The purpose of this quantitative study was to investigate the relationship between simulation as an instructional strategy and the use of intuition in clinical decision making among associate degree nursing students. In addition, the influence of age on student performance during simulation and the use of intuition in clinical decision making was examined. An explanatory, correlational design was conducted to examine the relationship between simulation, as measured by the Creighton Simulation Evaluation Instrument (Todd et al., 2008) and the use of intuition in clinical decision making, as measured by Rew’s (2000) Acknowledges Use of Intuition in Nursing Scale. Results from the study found a slight but statically significant relationship between simulation and the use of intuition and no relationship between age and the use of intuition. Indications for future research include further analysis of the concept of intuition and its role in clinical decision making.
Dedication

This dissertation is dedicated to my father, William M. Johnson (1923-1999), who said to me many times, “Education is the one thing no one can take away from you.” Poverty during the Great Depression and military service during World War II prevented him from completing formal education beyond Grade 8. In the 1950s, he earned his high school diploma through correspondence courses, studying late into the night after working as a welder all day. I am immeasurably proud to be his daughter.

You have always been, and will always be, my inspiration. Thank you, Dad.
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CHAPTER 1. INTRODUCTION

Novice nurses, including new graduates and inexperienced nurses, confront tremendous challenges as they enter the workforce (Christmas, 2008). Greater numbers of seriously ill, or high-acuity, patients and nursing shortages have contributed to a complex health care environment in which nurses, including novices, are required to function at an extremely high level in order to deliver effective patient care (Christmas, 2008). Factors contributing to the complexity of the health care environment include the sheer number of aging consumers accessing the health care system (U.S. General Accounting Office [GAO], 2001), fewer college-age people entering nursing (U.S. Department of Health and Human Services [USDHHS], 2010), and the large number of registered nurses (RNs) planning to retire in the near future (USDHHS, 2010).

Effects of Nursing Shortages, Stress, and Aging on the Nursing Workforce

Unresolved shortages are changing the dynamics of the nursing workforce as escalating work-related stress and the aging workforce has resulted in more experienced nurses exiting the profession (Buerhaus, Donelan, Ulrich, Norman, & Dittus, 2005). Not only will there be fewer nurses to provide care for increasing numbers of patients but also fewer experienced nurses in the overall nursing workforce (Buerhaus, Auerbach, & Staiger, 2009; USDHHS, 2010). In the absence of experienced nurses to serve as mentors, novice nurses are burdened with the responsibility of making high-consequence clinical decisions for greater numbers of complex patients with minimal support (Gillespie & Peterson, 2009).
Importance of Clinical Decision Making for Patient Safety

Clinical decision making is an essential core competency in nursing education because of the number of near misses and adverse events reported in health care each year (Ebright, Urden, Patterson, & Chalko, 2004). In 2000, the Institute of Medicine of the National Academies (IOM) estimated that between 44,000 and 98,000 hospital patients were dying each year as the result of medical errors. Rogers, Dean, Hwang, and Scott (2008) supported these estimates, finding 367 medical errors, namely, medication errors and neglected allergy alerts as but two examples, over a 28-day period in critical care units. Saintsing, Gibson, and Pennington (2011) found that patients in the care of novice nurses were more at risk for errors related to medication administration, patient falls, and delays in treatment.

Prominent health care organizations also have begun to recognize the importance of sound clinical decision making. The National League for Nursing (NLN, 2010) prepared education competencies that included nursing judgment as a core competency essential for nursing curricula to prepare graduates to function in a complex practice environment. In addition, the IOM (2010) contended that nursing curricula must be revised to move novice nurses from task-based proficiencies to comprehensive competencies involving higher level decision-making skills.

Background, Context, and Theoretical Framework

Clinical decision making varies greatly between novice nurses and experienced nurses, with the former taking a linear, task-oriented approach and the latter employing a more intuitive, holistic methodology (Benner, 1984; Benner, Sutphen, Leonard, & Day,
In the current complex health care environment, novice nurses must learn quickly to function at higher levels that belie their inexperience (Gillespie & Peterson, 2009). Benner’s (1984) seminal novice-to-expert theory asserted that the expert nurses’ intuitive decision making is the product of years of experience.

Given that nursing educators are charged with the task of using instructional strategies that will help novice nurses to develop advanced, intuitive decision-making skills, Kolb’s (1984) experiential learning theory provided the theoretical foundation of this study. Simulation, an instructional strategy widely used in nursing education, is an example of experiential learning. The following sections provide details of the background, context, and theoretical foundation of the study.

**Clinical Decision Making of Novice Nurses**

In making clinical decisions, novice nurses tend to be methodical, task oriented and dependent upon protocols and guidelines (Benner, 1984; Benner et al., 2010; Gillespie & Peterson, 2009). In using this type of decision making, novice nurses might miss the context of complex patient problems that deviate from textbook examples (Banning, 2008; Benner, 1984; Benner et al., 2010; Simmons, 2010). Consequences of novice decision making can be serious for patients, ranging from near misses, or nearly committed medical errors, to adverse events resulting in patient harm (Ebright et al., 2004; Guhde, 2010). According to del Bueno (2005), approximately 65% of novice nurses at the time did not have the clinical judgment skills for safe nursing practice. Conversely, experienced nurses were found capable of making decisions at a higher level by perceiving subtle changes in patients, recognizing overall implications that extended
beyond clinical diagnoses, and intervening quickly (Benner, 1984; Benner et al., 2010; Ferrario, 2003; Pyles & Stern, 1983; Simmons, Lanuza, Fonteyn, Hicks, & Holm, 2003).

**Clinical Decision Making of Experienced Nurses**

In the contemporary challenging health care environment, the holistic and intuitive decision-making skills of experienced nurses have facilitated the provision of timely and effective patient care (Simmons et al., 2003). Implications for patients have meant fewer medical errors and better outcomes on units staffed by experienced nurses (Blegen, Vaughn, & Goode, 2001). Achieving positive patient outcomes in the current health care environment will require novice nurses to use not only clinical knowledge but also the high-level, intuitive type of clinical decision-making skills traditionally attributed to experienced nurses (Gillespie & Peterson, 2009; McCutcheon & Pincombe, 2001; Ruth-Sahd & Hendy, 2005; Simmons, 2010).

**Nurses’ Use of Intuition in Clinical Decision Making**

Incorporating intuition into the clinical decision-making process has enabled nurses to integrate information and act quickly in response to patient needs (Benner, 1984; Truman, 2003). Some researchers have attributed the use of intuition exclusively to experienced nurses (Benner, 1984; Benner & Tanner, 1987; McCutcheon & Pincombe, 2001; Miller, 1993; Nyatanga & de Vocht, 2008; Polge, 1995; Rew, 2000). However, a small number of researchers have found that nursing students and novice nurses also have attempted to use intuition in making clinical decisions, though less openly and with less confidence than experienced nurses (Ruth-Sahd & Hendy, 2005; Ruth-Sahd & Tisdell, 2007; Smith, Thurkettle, & dela Cruz, 2004).
Other researchers have pointed out the need for novice nurses to develop the use of intuition in clinical decision making in order to manage the complexities of patient care in the current health care environment (Kosowski & Roberts, 2003; McCutcheon & Pincombe, 2001; Rew & Barrow, 2007; Ruth-Sahd & Tisdell, 2007; Truman, 2003). Traditionally, novices have developed the use of intuition in clinical decision making over time by being mentored by more experienced nurses in the workplace (Beck, 1998; Pyles & Stern, 1983); however, Gillespie and Peterson (2009) contended that in order to function effectively in today’s complex health care environment, strategies must be developed to help novices to acquire these skills quickly.

**Simulation as an Instructional Strategy**

Several studies on simulation in nursing have suggested that simulation is an effective instructional strategy for increasing knowledge, satisfaction, and critical-thinking ability. Alinier, Hunt, Gordon, and Harwood (2006); Brannan, White, and Bezanson (2008); Howard (2007); and Linden (2008) all reported increased knowledge in groups of students taught by simulation in comparison to groups taught by other instructional methods such as lectures and case studies.

Using instructional strategies that promote satisfaction with the learning experience is essential to instructional effectiveness (Alkhasawneh, Mrayyan, Docherty, Alashram, & Yousef, 2008). In a large study of 798 participants, Jeffries and Rizzolo (2006) found that the nursing students who comprised the sample reported greater satisfaction with simulation as an instructional method than with instruction using either static mannequins or case studies. Fountain and Alfred (2009) studied satisfaction with simulation among students who were categorized as having either social or solitary
learning styles. Study results suggested that simulation as an instructional strategy promoted the learning satisfaction of both types of learners.

Critical-thinking ability is a core competency for nursing education (Turner, 2005). Several researchers have reported improved critical-thinking ability among students who were taught using simulation as an instructional strategy (Brown & Chronister, 2009; Jeffries & Rizzolo, 2006; Linden, 2008; Ruggenberg, 2008; Shepherd, Kelly, Skene & White, 2007). Horan (2009) used simulation as an instructional strategy to improve the critical thinking of nursing students. Student survey responses indicated that 91% had improved critical-thinking skills, and 89% felt that simulation enhanced their ability in clinical decision making.

**Simulation as an Instructional Strategy for Clinical Decision Making**

Simulation as an instructional strategy has been linked to improved clinical decision making in students from several levels of nursing programs. Laney (2010) studied the use of simulation as an instructional strategy for practical nursing students. Results of the study indicated that clinical decision-making ability was better in those students experiencing simulation than in students who were taught the same content using a pencil-and-paper case study.

Guhde (2010) found that a combination of simulation and online discussions allowed third-year baccalaureate nursing students to improve clinical judgment through the analysis of their own mistakes. Bambini, Washburn, and Perkins (2009) studied the effects of simulation on baccalaureate students prior to their first clinical rotation and found that the students had an increased sense of self-efficacy, which subsequently led to improved clinical decision making in the clinical setting.
In a study involving graduate-level midwifery students, Cioffi, Purcal, and Arundell (2005) found that the students who learned about normal labor and physiological jaundice through simulation collected more clinical information and made clinical decisions more quickly than students who attended only lectures on those topics. Self-reported levels of confidence in decision making ranged from 70% to 80% for participants in the simulation group and 50% to 60% for participants in the lecture group.

**Simulation as an Instructional Strategy for Clinical Decision Making in ADN Programs**

Fewer researchers have investigated the use of simulation as an instructional strategy for clinical decision making with associate degree nursing (ADN) students. Horan (2009) found that using simulation to complement lecture content resulted in improved clinical decision making based upon the students’ self-reports. Partin, Payne, and Slemmons (2011) used simulation in an obstetrics course to augment limited clinical experiences. Students reported increased confidence and critical-thinking ability following the simulations. Comer (2005) found that students demonstrated increased knowledge and clinical understanding following simulations on hypoxia. These aforementioned researchers have supported the continued use of simulation in nursing education; however, no researchers have investigated the relationship between simulation and higher level, intuitive clinical decision making among nursing students, particularly ADN students.
Theoretical Framework

Given that simulation is an active and experiential instructional strategy (Lisko & O’Dell, 2010) and that the use of intuition in clinical decision making also is a product of knowledge gained through experience (Benner, 1984), Kolb’s (1984) seminal experiential learning theory (ELT) provided the theoretical foundation for this study. Several researchers who have presented the results of their simulation studies have used Kolb’s ELT as a theoretical framework. Lisko and O’Dell (2010) used Kolb’s ELT as the foundation for their study on simulation as an instructional strategy to provide critical-thinking experiences for nursing students. Waldner and Olson (2007) suggested a combination of Benner’s (1984) novice-to-expert theory and Kolb’s ELT to guide simulation designs and learning goals. Dreifuerst (2009) correlated simulation debriefing with the reflective observation component of the ELT.

Kolb (1984) described learning as a four-part cycle comprising concrete experience (do), reflective observation (observe), abstract conceptualization (think), and active experimentation (plan). Within the cycle, learners absorb new information through one of two processes, namely, participation in the experience (apprehension) or conceptual interpretation of the observed experience (comprehension). New information is then transformed into knowledge via either active external experimentation (extension) or internal reflection of the experience (intension). Kolb recognized that learners tend to gravitate toward more active or less active forms of information processing and transformation (i.e., apprehension and extension vs. comprehension and intension); however, he concluded that learning involves all four processes.
Benner (1984) asserted that experiential learning through the hands-on care of patients in the clinical setting is critical to education in a practice discipline such as nursing. In addition, Benner credited knowledge gained through experience as an integral part of the development of nurses’ use of intuition in making clinical decisions. Kolb (1984) recognized the role of intuition in learning in the area of reflective observation, in which learners interpret experience through a meaningful perspective or framework.

Experiential learning in the clinical setting is an integral part of nursing education; however, the declining number of available clinical sites has compelled many nursing education programs to turn to simulation activities to increase students’ opportunities for experiential learning (Ironside & McNelis, 2010). Simulation as an instructional strategy in nursing education closely follows Kolb’s (1984) ELT in that the simulation scenario provides the concrete experience (do) and the postsimulation debriefing engages students in reflective observation (observe). Following the simulation and debriefing, students formulate abstract conceptualizations (think) and construct knowledge as they think about the simulation. In the final stage, active experimentation (plan), students test newly constructed knowledge with new experiences or new simulation scenarios.

**Statement of the Problem**

The demands of a complex health care system strained by nursing shortages, fewer experienced nurses, and more high-acuity patients have compelled novice nurses to make high-consequence clinical decisions early in their careers (Kowalski & Roberts, 2003; McCutcheon & Pincombe, 2001; Rew & Barrow, 2007; Ruth-Sahd & Tisdell,
2007; Truman, 2003); however, the majority of novice nurses have not been prepared to function at this level (del Bueno, 2005).

Simulation as an instructional strategy to teach clinical decision making has been the focus of studies with nursing students from several levels of nursing education, including practical nursing (Laney, 2010); baccalaureate nursing programs (Bambini et al., 2009; Guhde, 2010); and graduate nursing programs (Cioffi et al., 2005). Few studies have been conducted to investigate the relationship between simulation and clinical decision making in ADN programs (Horan, 2009). Several researchers have suggested that intuition is central to the decision-making process of experienced nurses (Benner, 1984; Benner & Tanner, 1987; Benner et al., 2010; McCutcheon & Pincombe, 2001; Miller, 1993; Nyatanga & de Vocht, 2008; Polge, 1995; Rew, 2000); however, strategies to teach the use of intuition in clinical decision making have not been studied. To prepare novice nurses to function at a level commensurate with the challenges that they will face in a complex health care environment, nursing educators must find instructional strategies to help students to develop the use of intuition in clinical decision making.

Related Studies

Although computerized simulation as an instructional strategy is relatively new to nursing education, other disciplines have been well acquainted with the use of simulation to improve decision-making skills (Nickerson & Pollard, 2010). Flight simulators, for example, have been used for decades to train commercial and military pilots and astronauts to react to critical in-flight incidents while remaining safely on the ground (Hays, Jacobs, Prince, & Salas, 1992). More closely related to nursing have been the
simulations used in anesthesia and surgery programs that have enabled anesthesia students and surgical residents to practice not only skill techniques but also decision making in emergency situations (Bradley, 2006).

Simulation has been found to have physiological effects resulting in rapid and accurate clinical decisions. Goon et al. (2013) monitored the neural responses of anesthesiology students responding to clinical questions following either an online tutorial or a simulation scenario. Students who participated in the simulation activity demonstrated more rapid and accurate clinical decisions. All of these simulations focused on making critical decisions that could save lives (Nickerson & Pollard, 2010); however, these studies, like studies from nursing, have not included the role of intuition in decision making. Therefore, a gap in the literature exists in examining simulation as an instructional strategy to help students to develop the use of intuition in clinical decision making.

**Purpose of the Study**

The purpose of this study was to determine whether a relationship exists between simulation as an instructional strategy and the use of intuition in clinical decision making in students enrolled in an ADN program. The influence of student age also was examined.

**Research Question and Subquestions**

One overarching research question (RQ) guided the study. Subquestions focused on the relationship between the separate elements of the Creighton Simulation Evaluation
Instrument (C-SEI; Todd, Manz, Hawkins, Parsons, & Hercinger, 2008) and the Acknowledges Use of Intuition in Nursing Scale (AUINS; Rew, 2000). One additional question investigated the relationship between age and the variables of the study.

**Primary Research Question**

What is the relationship, if any, between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students?

**Subquestions**

1. Is there a correlation between the element of patient assessment in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

2. Is there a correlation between the element of communication in simulation, as measured by the C-SEI, and the use intuition in clinical decision making among ADN students?

3. Is there a correlation between the element of critical thinking in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

4. Is there a correlation between the element of technical skill in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

**Additional Question**

What influence, if any, does student age have on the relationship between simulation and the use of intuition in clinical decision making?
Rationale, Relevance, and Significance of the Study

Novice nurses must be able to make high-consequence clinical decisions in complex situations, and they are expected to function at competent levels early in their careers (Gillespie & Peterson, 2009). Several researchers have suggested that simulation as an instructional strategy helps students to develop their clinical decision-making skills (Bambini et al., 2009; Guhde, 2010; Horan, 2009; Laney, 2010). This study could provide further support for the role of simulation as an instructional strategy for clinical decision making.

Experienced nurses use intuition in the decision-making process (Benner, 1984); however, methods to help novice nurses to use intuition in clinical decision making have not been studied. Several researchers have identified the importance of intuition in clinical decision making (Benner, 1984; Benner & Tanner, 1987; McCutcheon & Pincombe, 2001; Miller, 1993; Nyatanga & de Vocht, 2008; Polge, 1995; Rew, 2000). Rew (2000) further indicated that acknowledging the use of intuition is important to developing intuitive decision-making skills.

DeBrough and Prion (2011) found that simulation was an effective instructional strategy in teaching novice nurses to recognize patient risks and act to minimize patient harm, actions that can be attributed to the intuitive decision making of experienced nurses (Benner, 1984). Effken (2001) suggested that computer simulations and simulated clinical environments could provide the type of experiential learning that would lead novice nurses to use intuition when faced with unpredictable clinical experiences. More recently, in the examination of the mirror neuron system and the use of intuition by
nurses, Green (2012) proposed that simulation could serve as an important pedagogical tool to teach novice nurses to use intuition in practice to achieve better patient outcomes.

The rationale for this study was to investigate the use of simulation as an instructional strategy to help novice nurses to acknowledge and use intuition in clinical decision making. An examination of the relationship between simulation and the use of intuition in clinical decision making might provide educators with the means to help students to integrate the use of intuition into the decision-making process. In addition, Shinnick, Woo, and Mentes (2011) suggested the need for more quantitative research on simulation. This quantitative study could contribute to that goal.

### Nature of the Study

The following section provides details about the nature of the study, including the research design, sample, setting, and instrumentation. Data collection and data analysis methods also are explained. The section concludes with definitions of important terms.

#### Research Design

The relationship between simulation as an instructional strategy and the use of intuition in clinical decision making was examined using a correlational research design. Unlike experimental designs, which to seek to establish possible cause-and-effect relationships between and among variables, correlational designs seek to determine the relationships between and among variables (Creswell, 2008). Creswell (2008) categorized correlational designs as either predictive or explanatory based upon the purpose of the research. Predictive designs designate one or more variables as predictors of outcomes in another variable, whereas explanatory designs seek to determine the
covariance between variables, which is a measure of how much two variables change together (Creswell, 2008). This study investigated the relationship between student scores on simulation, as determined by the C-SEI (Todd et al., 2008), and the use of intuition in clinical decision making, as determined by scores on the AUINS (Rew, 2000).

Population and Sample

The target population for this study comprised students enrolled in ADN programs. A convenience sample of nursing students from an NLN-accredited ADN program at a rural community college in the Midwestern United States participated in the study. Although not as rigorous as random sampling, convenience sampling is appropriate when the participants are chosen based upon availability and willingness to participate, and represent a characteristic of interest to the researcher (Creswell, 2008). In this study, convenience sampling was the method of choice because of the lack of access to other ADN programs in close proximity to the study site. In addition, all nursing students in the ADN program at the study site were required to participate in a learning activity involving simulation, a variable of interest to the researcher.

Based upon the central limit theorem, the optimum sample size for a quantitative study is 30 participants per variable in order to achieve the greatest probability that the findings will be generalizable to the target population (Norwood, 2000). Other facets to be considered are level of significance, power, or probability of detecting a relationship, and effect size (Norwood, 2000). For a level of significance of .05, a power of .80, and medium effect size of .30, the sample size in the current study should have been a minimum of 88 participants. The anticipated sample size was 88 to 150 participants; however, because of a decrease in enrollment, the sample comprised 72 ADN students.
Setting

The setting for the study was a rural community college in the Midwestern United States with an average enrollment of 4,000 students. The ADN program enrollment averages approximately 180 students. Simulations took place in the simulation rooms of the nursing skills lab of the community college, where high-fidelity computerized mannequins were used as patients for the scenarios. Each simulation room is equipped with video and audio equipment to record and play back each scenario.

Instrumentation

Simulation was measured by the C-SEI, which Todd et al. (2008) designed to evaluate behaviors in the cognitive, psychomotor, and affective domains of learning during simulation. The participants received a cumulative score ranging from 0.0 to 1.0, along with scores on the elements of patient assessment, communication, critical thinking, and technical skills. A panel of experts established the content validity of the C-SEI, and interrater reliability ranged from 0.84 to 0.89.

A survey score from Rew’s (2000) AUINS was used to measure students’ use of intuition in making clinical decisions following participation in simulation activities. The AUINS was developed to measure acknowledging the use of intuition in clinical decision making by practicing nurses. Containing seven items with trinomial responses, this questionnaire demonstrates reliability through internal consistency with a Cronbach’s alpha coefficient of .91 (Rew, 2000). In addition, factor loadings of greater than 0.72 illustrate the conceptual clarity of each item on the scale (Rew, 2000).

Student demographics can vary widely in community colleges, where many students are older than traditional college students (U.S. Department of Education, 2014).
The average student age at the study site was 28 years. Following Benner’s (1984) theory that experience leads to expertise, the older students might have had life experiences that led them to use more intuitive decision-making processes; therefore, data on the influence of age were gathered from a demographic survey developed by the researcher.

**Data Collection**

All students enrolled in the final semester of the ADN program were invited to participate in the study. With permission from the dean of nursing and institutional review board (IRB) approval from the community college, the researcher met with the students in their classroom, explained the purpose of the study, and requested volunteers to participate in the study. Descriptions of the C-SEI, the AUINS, and the demographic survey were included, and a consent form was attached to the request.

Upon receiving consent from the participants, performance during the simulation learning activity was scored by the researcher using the C-SEI. Data from the demographic questionnaire and the AUINS were collected following the simulation learning activity. All data were stored in a locked file cabinet in the researcher’s office.

**Data Analysis**

Correlation statistics were used to determine the direction and strength of the relationship between the study variables of simulation and the use of intuition in clinical decision making. The influence of age also was considered. Data were analyzed using SPSS v.17 software to determine the Pearson product-moment correlation coefficient.
Definitions of Terms

**ADN program:** ADN programs prepare graduates for licensure and entry-level positions as RNs. These 2-year programs are offered at community or junior colleges.

**Clinical decision making:** Clinical decision making integrates the knowledge of medical science, individual patient information, and nursing care to formulate the best courses of action to benefit patients (Banning, 2008).

**Communication:** Communication refers to the verbal, nonverbal, and written documentation related to interactions with patients and the interdisciplinary health care team (Ironside, 2007).

**Critical thinking:** Critical thinking is the ability to reflect upon and interpret information to arrive at a plan of action (Horan, 2009). Todd et al. (2008) included the interpretation of data, formulation of priority interventions, evaluation, and reflection in the elements of critical thinking in simulation.

**Intuition:** Intuition is an immediate knowing that is distinct from deliberate analytical reasoning (Benner, 1984; Rew, 2000).

**Novice nurses:** Novice nurses might be students or practicing nurses who enter a new area or assume a new role in nursing (Benner, 1984).

**Patient assessment:** Patient assessment is the gathering of pertinent objective and subjective data related to patients’ health status and signs and symptoms of illness (American Association of Colleges of Nursing [AACN], 2008).

**Simulation:** Simulation is an experiential instructional strategy involving preset patient-care scenarios using role-play with task trainers, standardized patients, or lifelike patient mannequins. It concludes with a debriefing session (Shinnick et al., 2011).
**Technical skill:** Technical skill is the ability to perform nursing actions with competence (Wysong & Driver, 2009).

**Assumptions, Limitations, and Delimitations**

The following section discusses the assumptions and limitations that the researcher anticipated finding in the study. Assumptions refer to the concepts pertinent to the study that the researcher believed to be true. Limitations refer to inadequacies or weaknesses of the study anticipated by the researcher. Delimitations refer to potential restrictions in the study, none of which was identified.

**Assumptions**

1. The C-SEI is a valid and reliable instrument for evaluating simulation (Kardong-Edgren, Adamson, & Fitzgerald, 2010; Todd et al., 2008).
2. Scores on the C-SEI reflected an acceptable level (> 80%) of interrater reliability (Todd et al., 2008).
3. Simulation is an effective instructional strategy that helps students to improve clinical decision-making skills (Guhde, 2010).
4. The AUINS is a valid and reliable instrument for measuring novice nurses’ use of intuition in clinical decision making (Rew, 2000).
5. ADN students will give accurate and honest responses to the AUINS items.
6. Intuition is an integral element of clinical decision making (Benner, 1984; Benner & Tanner, 1987; Rew, 2000).
Limitations

Given that only ADN students from a community college in the Midwestern United States participated in this study, the generalizability of the findings was limited.

1. The AUINS is a self-reporting questionnaire, so the participants’ responses might have been biased.
2. The C-SEI was scored by the researcher, so unintentional researcher bias could not be discounted.
3. The number of participants ($N = 72$) was fewer than the minimum target of 88, thus decreasing the generalizability of the results.

Organization of the Remainder of the Study

Chapter 1 introduced the research topic and the background and context of the problem. The foundational theoretical framework was introduced, followed by the statement of the problem, the RQs, and the significance of the study. The nature of the study also was described, and important terms were defined. Chapter 1 concluded with details about the assumptions and limitations of the study.

Chapter 2 reviews pertinent literature on clinical decision making in nursing, the use of intuition in clinical decision making, and simulation as an instructional strategy in nursing education. Literature supporting the ELT as the theoretical foundation for this study is presented. Chapter 2 concludes with a review of simulation studies that have employed quantitative methods and correlational research designs.

Chapter 3 describes the methodology, instruments, and data collection used in the study. Limitations of the research design are presented. The target population, sampling
method, and instrumentation are described. Expected results and ethical issues conclude this chapter. Chapter 4 presents the analysis of data collected from the C-SEI, the AUINS, and the demographic survey. Data collection methods and statistical procedures are explained, followed by a detailed analysis of the results. Chapter 5 summarizes the results and provides a discussion of the findings in relation to the literature. Limitations of the study also are presented. Chapter 5 concludes with implications for nursing education and recommendations for future research.
CHAPTER 2. LITERATURE REVIEW

The purpose of this study was to examine the relationship between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students. This chapter begins with a review of the literature regarding the current demands and challenges faced by novice nurses in the health care environment, and it continues with a review of the literature related to clinical decision making by novice and experienced nurses and what is known about the use of intuition in clinical decision making. Studies that have used the AUNIS (Rew, 2000) also were examined.

Literature on simulation as an instructional strategy follows, beginning with the link between simulation and Kolb’s (1984) ELT and continuing with the application of simulation in nursing specialties. Studies focusing on simulation incorporated into 4-year and 2-year nursing education programs are explored next, followed by studies that have investigated the use of simulation to promote clinical decision making. Studies involving the C-SEI (Todd et al., 2008) also are presented. Chapter 2 concludes with the synthesis of research findings on clinical decision making, intuition, and simulation studies in nursing and a critique of previous research in these areas.

Challenges Confronting Novice Nurses

Novice nurses face tremendous challenges as they enter the health care workforce. A complex health care environment that includes more seriously ill patients and declining numbers of nurses requires all nurses, including novices, to function at high levels in order to deliver effective patient care (Christmas, 2008; GAO, 2001; USDHHS, 2010).
Buerhaus et al. (2005) analyzed data from two large surveys on the nursing shortage. Ninety-eight percent of the nurses who participated in the surveys felt that the nursing shortage has increased the amount of stress on nurses, and 93% felt that the nursing shortage has lowered the quality of patient care and has been a factor in nurses leaving the profession. Although data were collected from self-report surveys, the number of participants ($N = 7,600$ in 2002; $N = 3,500$ in 2004) lent validity to the findings.

A later report from Buerhaus et al. (2009) analyzing data from Current Population Surveys from 1973 to 2008 of all individuals who listed their occupation as RN ($N = 94,395$) projected a continued shortage and slower growth in the nursing workforce resulting from the retirement of nurses from the Baby Boomer generation. Gillespie and Peterson (2009) predicted that the retirement of experienced nurses will shift the burden of responsibility for patient safety and high-stakes decision making to novice nurses.

In a microethnographic study examining nursing workplace issues, Ebright, Patterson, Chalko, and Render (2003) identified several human and environmental factors that added to the challenges faced by nurses, including patterns of work complexity such as communication breakdowns; interruptions; and patterns of cognitive factors, for example, knowing individual patients, that influence nurses’ performance and decision making. Although the study sample was small ($N = 8$) and the findings were not generalizable, the results were supported by Lin and Liang (2007) in their assessment of nurses’ work environment related to threats to patient safety.
Clinical Decision Making

Clinical decision making varies greatly between novice and experienced nurses (Benner, 1984). The following section describes the literature related to clinical decision making by novice nurses, experienced nurses, and those educated in baccalaureate and ADN programs. The role of intuition in clinical decision making also is examined.

Clinical Decision Making of Novice Nurses

Benner’s (1984) landmark work detailing the novice-to-expert model of nursing practice was based upon the Dreyfus model of skill acquisition, wherein expertise is achieved by passing through five levels of proficiency: novice, advanced beginner, competent, proficient, and expert. Dreyfus and Dreyfus (as cited in Benner, 1984) theorized that acquiring skill expertise takes place in three stages. The first stage moves from reliance upon abstract principles to guide decisions to reliance upon past experience. The second stage involves a change in the perception of a situation from a compilation of segments to a holistic state. In the third stage, one moves from being a detached observer to being an engaged performer in the situation. Benner described the decision making of novice nurses as being dependent upon abstract principles, devoid of situational experience, and clearly within the first stage of the Dreyfus model.

In investigating factors contributing to near-miss or adverse-event situations involving novice nurses, Ebright et al. (2004) conducted interviews with 12 nurses who had been out of nursing school for less than 1 year. The researchers identified seven themes related to human performance factors and found that one of the most prominent was novice nurses’ clinically focused critical thinking, or inability to see the whole picture, a theme that was consistent with Benner’s (1984) model. Novice nurses’
decisions focused on the organizational aspects of setting priorities and completing tasks, meaning that they frequently missed important patient cues. Ebright et al. recommended that experienced nurses be available to help novice nurses to function in the current unpredictable health care environment.

If, as Benner (1984) contended, the goal of nursing education is to produce graduate nurses at the advanced beginner or even competent level, del Bueno’s (2005) report of results from the Performance-Based Development System, a nursing competency assessment, described disappointing outcomes. From 1995 to 2004, survey results from more than 350 health care agencies across the United States indicated that 65% to 76% of new RNs failed to meet entry-level requirements for clinical judgment. Del Bueno concluded that nursing education must focus less on teaching ever-increasing amounts of content and more on experiential teaching strategies using simulation and real patients to help nursing students to develop clinical judgment skills.

Strategies for enhancing clinical decision making of novice nurses. Several researchers have investigated strategies for enhancing clinical decision making, also referred to as clinical reasoning or clinical judgment, in novice nurses. Gillespie and Peterson (2009) described the decision making of novice nurses as theory dependent, linear, and overly reliant on guidance from mentors. They proposed a situational clinical decision-making framework incorporating context, foundational knowledge, decision-making processes, and thinking processes to assist novice nurses in making effective clinical decisions. The decision-making process, as guided by this framework, includes recognizing patient cues, forming judgments, determining courses of action, and
evaluating outcomes, all of which are similar to the components of the standard nursing process of problem identification, planning, implementation, and evaluation.

Murphy (2004) investigated the use of focused reflection and articulation through journal writing to help first-semester nursing students to develop clinical reasoning. Using an instrument developed by Murphy, clinical instructors evaluated four groups of students on the extent of reflection demonstrated in patient assessment papers. Students in two of the groups received instruction on focused reflection; students in the two control groups did not receive this instruction. Results suggested that teaching the students to use focused reflection and articulation helped them to develop better clinical reasoning skills.

Murphy (2004) extended her study further to investigate differences between students with high-level and low-level clinical reasoning. Through interviews with the six students who scored the highest on clinical reasoning and the six students who scored the lowest, Murphy found that the high reasoners demonstrated greater depth of reflection and intrinsic motivation and the low reasoners were less detailed in their reflections and were concerned about their peers’ opinions.

In a similar study, Edelen and Bell (2011) investigated the effects of analogy-guided learning activities, including critical incident reflective journaling, on the clinical decision making of 51 ADN students. Students in the treatment and control groups were scored on their decision making during clinical activities using a researcher-developed rubric that assessed problem definition, information analysis, identification of nursing diagnoses, identification of resources, explanation of decisions, evaluation of outcomes, and reflection on learning. Students in the treatment group demonstrated better clinical
decision-making skills than those in the control group. Edelen and Bell suggested that guiding students to compare and reflect on similarities between current and past experiences leads to enhanced knowledge retention and transfer.

Clinical Decision Making of Baccalaureate Nursing Students

Using focus group interviews and participant observation, Slater (1999) investigated the clinical decision-making process of 28 baccalaureate nursing students. She found that the clinical decision making of the nursing students involved a problem-oriented process, a priority-setting process, and a validating process. Like the later studies by Edelen and Bell (2011) and Murphy (2004), Slater recommended teaching strategies that emphasized not only the cognitive aspects of learning but also experiential strategies that included interpersonal skills.

In a comparative descriptive study, Krumwiede (2010) compared the decision-making skills of 113 students from a basic baccalaureate nursing program to 29 students from an accelerated nursing program. Using the Clinical Decision Making in Nursing Scale, which includes an overall score and four subscores, Krumwiede found that students in the accelerated program had higher overall scores and higher scores on three of the four subscores, including search for alternatives and options, evaluation and reevaluation of consequences, and search for information and unbiased assimilation of new information. Krumwiede attributed the higher scores of the accelerated students to having earned a previous degree and having work experience. Students in the basic baccalaureate program scored higher on the canvassing of objectives and values. Krumwiede conjectured that similar to Murphy’s (2004) findings, the basic nursing students were more concerned about peer pressure.
Clinical Decision Making of ADN Students

Jones (2008) found that students in an ADN program struggled to connect and transfer theory to practice and lacked the skills necessary to make effective clinical decisions. Using a quasi-experimental pretest-posttest design, Jones investigated the effect of problem-based learning on the critical-thinking and communication skills of 60 second-year nursing students. Data were collected from two nursing care plans and two communication interactions from the control and treatment groups, with the addition of a reflective journaling assignment for the treatment group. Nursing care plans were evaluated based upon Bloom’s taxonomy of the cognitive learning domain for evidence of comprehension, organization of ideas, and evaluation of information. Bloom’s taxonomy of the affective learning domain was used to evaluate students’ verbal and nonverbal communications with hospital staff as well as their written communications. Students who participated in reflective journaling improved in critical thinking and communication, a finding that was consistent with those of Edelen and Bell (2011) as well as Murphy (2004).

Clinical Decision Making of Experienced Nurses

Benner (1984) described expert nurses as nurses who have extensive experience and “an intuitive grasp of each situation and zeroes in on the accurate region of the problem without wasteful consideration of a large range of unfruitful, alternative diagnoses and solutions” (p. 32). In addition, the performance and clinical decisions of experienced nurses cannot be explained adequately by structured decision-making models (Benner, 1984).
Qualitative studies. Several researchers have investigated the factors contributing to the decision-making skills of experienced nurses. Pyles and Stern (1983) conducted a qualitative study examining the decision-making process used by 28 critical care nurses to detect early signs of cardiogenic shock. The researchers found that the decision-making process was a combination of logic and intuition that they termed *nursing gestalt.* They also found that novice nurses were able to learn advanced clinical decision-making skills from having mentoring relationships with experienced nurses.

Ramezani-Badr, Nasrabad, Yekta, and Taleghani (2009) studied the clinical decision making of 14 critical care nurses in Tehran. Through semistructured, in-depth interviews, the researchers found that the participants used intuition, recognition of similar situations, and hypothesis testing to make decisions related to the conditions of critically ill patients. In making intervention-related decisions, the nurses considered patients’ risk benefits; organizational protocols; and other sources of information, for example, consultation with colleagues and physicians.

In a qualitative, descriptive study involving 15 experienced nurses, Simmons et al. (2003) examined the nurses’ decision-making processes when analyzing patient assessment findings. Results from audiotaped sessions suggested that the participants used specific conceptual language in analyzing patient assessment findings and employed heuristic thought processes, for example, pattern recognition, to arrive at decisions quickly. Other researchers have proposed the use of heuristics as shortcuts to decisions made by experienced nurses (Cioffi, 1997; Ferrario, 2003; O’Neill, 1995); however, O’Neill (1995) and Cioffi (1997) proposed that such strategies could result in erroneous conclusions. The strategy of pattern recognition is consistent with the findings by

Traynor, Boland, and Buus (2010) used focus groups to explore the clinical decision-making processes of 26 RNs. Referencing Jamous and Pelouille’s concept of the indeterminacy-to-technicality ratio, the researchers found that the decision-making process of experienced nurses included a combination of indeterminate features such as intuition and technical features such as protocols; however, the most influential factor recognized by the participants was personal experience.

**Quantitative studies.** The majority of nursing literature about clinical decision making has involved qualitative studies; however, Hoffman, Donoghue, and Duffield (2004) conducted a correlational study of the contributing factors to clinical decision making. Using two questionnaires developed by Rhodes, Hoffman et al. surveyed a convenience sample of 96 RNs, which was fewer than the 200 participants required for a power of 80%. Unlike the results of qualitative studies on decision making, their results suggested that there was neither a significant relationship between the factors of experience and decision making nor a significant relationship between education and decision making. However, positive correlations were found between decision making and nurses’ value of role, professional outlook, and age. A negative correlation existed between area of clinical practice and decision making. The researchers acknowledged that the generalizability of the results was limited by the small sample size and that the stepwise regression method employed might have resulted in falsely narrow confidence intervals.
In all of the qualitative studies reviewed, experience and intuition were identified as factors essential to the decision making of experienced nurses. Pattern recognition also was identified as an important element. Hoffman et al. (2004) disagreed with the importance of experience in decision making, finding the value placed upon one’s role to be the most influential factor. Their sample of 174 participants was smaller than the optimal size of 200, thus decreasing the generalizability of the results.

**Intuition in Clinical Decision Making**

Several researchers have identified intuition as one of the key factors used by nurses in decision making. Previous research by Pyles and Stern (1983), Ramezani-Badr et al. (2009), and Traynor et al. (2010) on the decision making of experienced nurses found that intuition played a vital role in the clinical decision-making process. In another qualitative study, Benner and Tanner (1987) investigated the role of intuition in the decision making of 21 expert nurses. The researchers found that the nurses’ intuitive knowledge consisted of pattern recognition, similarity recognition, flexible understanding, skill, and the ability to differentiate important events. These elements were combined with analytical knowledge to arrive at clinical decisions.

The use of intuition as a valuable tool in clinical decision making has been described in nursing studies on surgery, intensive care (IC), emergency care, and mental health care. King and Clark (2002) conducted a qualitative study on the decision making of 30 nurses who worked in surgery and 31 who worked in postoperative IC units (ICUs). Using data collected from observations and interviews, the researchers found that participants of all experience levels used a combination of analytical thinking and intuitive awareness to reach decisions related to patient care. Trust in intuitive awareness
increased with nurses’ experience. In a qualitative study of 14 emergency care nurses, Lyneham, Parkinson, and Denholm (2008) also found that trust in intuition was demonstrated by experienced nurses.

Welsh and Lyons (2001) investigated the use of intuition by eight mental health nurses during their risk assessments of potentially suicidal patients. Based upon data from interviews and a review of the nurses’ documentation, the researchers found that the nurses used a combination of research evidence, tacit knowledge, and intuition to arrive at decisions about their clients. In addition, the researchers found that the research evidence served the nurses only to a point, after which their tacit knowledge and intuition would complete the decision-making process.

**Research on intuition.** McCutcheon and Pincombe (2001) investigated intuition in a mixed methods study using interviews and a Delphi survey technique with a sample of 262 RNs. Results indicated that the RNs’ intuition was a synergy of experience, expertise, knowledge, personality, environment, and acceptance of intuition as a valid behavior. Several of these elements were similar to those in the findings by Benner and Tanner (1987). For example, both sets of researchers found that experience and expertise incorporated the elements of pattern recognition, similarity recognition, skill, and the ability to differentiate important events. In addition, they both recognized the important role of knowledge in decision making; however, McCutcheon and Pincombe found that personality, environment, and acceptance of intuition as a valid behavior also contributed to the use of intuition.

McKinnon (2005) examined intuition in relation to physical evidence through an analysis of literature on neuroscience and cognitive imaging technology. McKinnon
surmised that as nurses become more experienced, experiential memories are stored in a part of the brain that is connected to the senses. Familiar patterns and situations trigger a physiological response, or “gut feeling,” that leads to immediate recognition and response, bypassing conscious thinking. This hypothesis was consistent with the concept of pattern recognition described in many studies on intuition.

In a descriptive, correlational study involving a random sample of 179 critical care nurses, Polge (1995) used a case study questionnaire to measure nursing proficiency and the Rew Intuitive Judgment Scale to measure the use of intuition. Polge found a positive correlation between level of proficiency and use of intuition.

**Intuition and novice nurses.** In agreement with Benner’s (1984) novice-to-expert model, several researchers have attributed the use of intuition in clinical decision making exclusively to experienced nurses; however, a few researchers have recognized the use of intuition by novice nurses. Ruth-Sahd and Hendy (2005) conducted a quantitative study involving 323 novice nurses to identify the predictors of intuition use in clinical decisions. Using a scale of the Miller Intuitive Instrument (MII; Miller, 1993) and demographic surveys, the researchers found that novice nurses who had experienced more hospitalizations themselves and were older used intuition more than younger novice nurses to guide patient care. In addition, the novice nurses who had more social support from family and friends also were more likely than other novice nurses to use intuition in their clinical decisions.

Later, Ruth-Sahd and Tisdell (2007) investigated the meaning and use of intuition in a phenomenological study of 16 novice nurses. Three themes emerged from the researchers’ analysis of the interview transcriptions: prior experiences; life connections;
and dimensions of time, space, and touch. The researchers suggested that nursing educators encourage students to explore multiple ways of knowing, including intuition, to aid in dealing with complex clinical decisions.

In an effort to help students to acknowledge intuition as a valid method of knowing, Beck (1998) recommended a teaching strategy in which undergraduate nursing students should be encouraged to incorporate intuitive thinking into their decision making by reading the accounts of graduate students who used intuition in nursing practice. The undergraduate students indicated that this teaching strategy helped them to value their own intuitive insights as a legitimate source of knowledge to aid in making clinical decisions.

The theme of valuing intuition also arose in an interpretive, phenomenological study of the use of intuition by novice nurse practitioners (Kosowski & Roberts, 2003). Ten nurse practitioners who had been practicing for an average of 2.5 years were asked to recall clinical situations in which intuition had played a part in their decision making. Transcripts of the recollections were analyzed using the hermeneutic method, resulting in six consistent themes: reflecting, backing it up, knowing the rules, playing the game, learning lessons, and taking care. The study participants indicated that receiving validation of their intuitive decision making enhanced their confidence and assertiveness for future decisions.

**Measuring Intuition in Nursing**

**Measuring intuition in experienced nurses.** Early research on intuition in nursing consisted of descriptive qualitative studies; however, a few instruments have been developed to measure intuition quantitatively. Himaya (1991) contended that nurses
were reluctant to acknowledge their use of intuition because of the emphasis on scientific reasoning as a basis for clinical judgment. To facilitate the collection of data on intuition as a component of nursing clinical judgment, Himaya developed the Himaya Intuition Semantic Scale (HINTS). Consisting of four scales (i.e., wholeness, approximation, spontaneity, and personalization), the instrument was designed to help nurses to discover their use of intuition in their preferred modes of decision making. Initial testing of the instrument with 450 nurses demonstrated internal consistency, with an alpha coefficient of 0.8870. Construct validity was established through factor analysis.

Miller (1993) agreed with Himaya (1991) about the importance of nurses acknowledging their use of intuition in clinical judgment; however, Miller contended that nurses must first be able to recognize their use of intuition. To that end, Miller developed the MII to measure practicing nurses’ perceptions of their own intuitiveness. Miller based the instrument upon six characteristics of intuitiveness identified from the nursing literature as having meaningful intuitive experiences, having confidence in the experiences, being competent in practice, accepting nontraditional treatments, valuing their sense of the patients’ experiences, and having an interest in abstract concepts. In a three-phase process consisting of item proposal, pretesting, and correlation of results from the MII with results from the intuition component of the Myers-Briggs Type Indicator (MBTI; Myers, McCaulley, Quenk, & Hammer, 1998), the final version of the MII was tested on 1,075 practicing nurses. The instrument was found to have a high degree of internal consistency, with an alpha coefficient of 0.9432. Construct validity was established through factor analysis.
Rew (2000) narrowed the focus of investigating the use of intuition in clinical decision making by developing the AUINS specifically to measure nurses’ acknowledgment of using intuition when making clinical decisions. Developed over three phases and ultimately tested with 112 RNs, the AUINS demonstrated internal consistency, with an alpha coefficient of 0.91. Construct validity was established through factor analysis. Rew asserted that the AUINS would be a way to collect useful information related to the development and use of intuition in clinical decision making.

Measuring intuition in novice nurses. The three previously discussed instruments were designed for and tested with practicing nurses; however, Smith et al. (2004) developed the Smith Intuition Instrument for Nursing Students (SIINS) to measure the use of intuition by nursing students. Based upon the concepts of emotional awareness, physical awareness, and the making of connections, test items were developed and tested in a three-phase process. The final phase of psychometric testing involved the participation of 349 students from baccalaureate and ADN programs. Results indicated that the SIINS was reliable, with an alpha coefficient of 0.89. Factor analysis demonstrated construct validity. Smith et al. reasoned that this instrument could be useful in promoting and fostering the intuitive abilities of nursing students and could facilitate the integration of the concept of intuition into nursing curricula.

Limitations of instruments measuring intuition. Given the amount of early qualitative research on intuition, the search for instruments that could quantify intuition increased in the 1990s; however, Rew (2000) contended that intuition is a concept “difficult to describe objectively” (p. 105). For this reason, all of the instruments reviewed rely upon self-reports from participants to measure intuition. Even though the
Instruments have established validity and reliability, Smith et al. (2004) considered a self-report format to be a limitation because study participants could be less than truthful in their responses, thus limiting objectivity.

At this time, options for measuring intuition quantitatively are limited. Of the instruments reviewed, those by Himaya (1991), Miller (1993), and Smith et al. (2004) tested multiple factors contributing to intuition. Rew’s (2000) AUINS provided an acutely focused measurement of one aspect of intuition, namely, acknowledgment of using intuition, based upon careful factor analysis.

Studies Using the AUINS

In a descriptive, correlational study, Meeks-Sjostrom (2008) investigated nurses’ clinical decision making regarding suspected incidents of elder abuse. Five variables were investigated: nurses’ knowledge of elder abuse, years in nursing practice, use of intuition, clinical practice level, and decisions made in relation to suspected elder abuse. The 84 RNs in the sample had an average of 14 years of clinical experience. Data about the participants’ knowledge of elder abuse were collected in a survey developed by Meeks-Sjostrom. Practice decisions related to suspected elder abuse were compiled from participants’ responses to questions based upon three vignettes on elder abuse. Use of intuition was measured by Rew’s (2000) AUINS. The results suggested that the strongest relationship existed between nurses’ years of clinical practice and the recognition of elder abuse and implementation of effective interventions; however, no significant correlation was found between nurses’ clinical decision making regarding suspected elder abuse and the use of intuition.
Further investigation into intuition was conducted by Pretz and Folse (2011) in a correlational study that compared the results from multiple instruments from nursing and psychology, including Miller’s (1993) MII; Rew’s (2000) AUINS; Smith et al.’s (2004) SIINS; Pretz and Folse’s (2011) Types of Intuition Scale (TIntS); Pacini and Epstein’s (1999) Rational Experiential Inventory (REI); and the MBTI (Myers et al., 1998). Results indicated that trust in intuition is domain specific, in this case, nursing, and is related to possessing a sense of skill in reading patient cues and having a spiritual connection with patients. However, the researchers found that trust in nursing intuition did not translate to trust in intuition in general. This finding reflected Benner’s (1984) premise that intuitive clinical decision making develops with experience.

**Simulation as an Instructional Strategy to Promote Clinical Decision Making**

Simulation is an experiential instructional strategy involving preset patient care scenarios using role-play with task trainers, standardized patients, or lifelike patient mannequins. It concludes with a debriefing session (Shinnick et al., 2011). The following section presents literature on simulation from nursing and other practice-related disciplines.

**Educational Theory Related to Simulation**

Nursing is a practice discipline in which clinical experiences play a pivotal role in helping students to develop crucial decision-making skills (Benner, 1984; Benner et al., 2010); therefore, Kolb’s (1984) ELT provided the theoretical framework for this study. Based upon the works of education theorists Dewey and Lewin and developmental theorist Piaget, Kolb developed a cyclical theory of learning that posited that learners
transition through four stages in the process of transforming experience into knowledge. Kolb described learning as a “continuous process grounded in experience” (p. 27) and identified the four elements of the learning cycle as concrete experience, reflective observation, abstract conceptualization, and active experimentation.

Within the stage of concrete experience, learners experience activities or situations. In the current study, the concrete experience was the simulation of a clinical scenario. Stage 2, reflective observation, involves conscious reflection upon the experience. Participants in this study engaged in reflective observation during the debriefing session, in which they watched videos of their respective performances during the simulation scenario. During Stage 3, abstract conceptualization, learners form conceptualizations of what they experienced. This process occurs during the evaluation phase of the simulation, which is when the participants evaluate not only the learning experience but also what they gained from the experience. Stage 4, active experimentation, is when learners plan to apply knowledge gained to new experiences. This stage was beyond the scope of this study; however, it is hoped that the participants in this study applied what they learned about intuitive clinical decision making from the simulation experience and applied it to patient care in the clinical setting.

**Simulation studies based upon Kolb’s ELT.** Simulation as an instructional strategy closely follows the cycle of Kolb’s (1984) ELT. Several studies in nursing simulation have been based upon the ELT. Concerned with the decreasing clinical opportunities for nursing students to develop critical-thinking skills, Lisko and O’Dell (2010) supported use of the ELT as a theoretical foundation to facilitate the development of critical-thinking skills through simulation instructional activities and scenario-based
evaluations. Faculty and students agreed that the simulation activities and evaluations promoted critical thinking and increased student confidence, which supported the ELT framework of transforming experience into knowledge.

Brannan et al. (2008) compared the effects on learning of the traditional teaching strategy of classroom lecture and the experiential strategy of simulation. Results suggested that students taught through the experiential learning method had an increase in knowledge. However, unlike the study by Lisko and O’Dell (2010), no significant difference was found in students’ levels of confidence.

**Kolb’s ELT and Schön’s theory of thought in action.** Dreifuerst (2009) focused on a combination of the reflective observation phase of Kolb’s (1984) ELT and Schön’s (1983, as cited in Dreifuerst, 2009) theory of thought in action in her concept analysis of debriefing in simulation. Jeffries (2005) contended that the debriefing phase of simulation is equally important to learning as are the creation and implementation of simulation scenarios. Dreifuerst agreed with Jeffries and offered several examples of debriefing methods that facilitated or, in some cases, inhibited learning. Dreifuerst concluded the concept analysis of debriefing with the deduction that the reflective phase of experiential learning is critical to the development of clinical reasoning skills.

**Kolb’s ELT and Benner’s novice-to-expert model.** In developing a framework for simulation as a teaching strategy in nursing, Waldner and Olson (2007) proposed a combination of Benner’s (1984) novice-to-expert model and Kolb’s (1984) ELT. Benner’s model was based upon nursing skill acquisition that accumulates and is refined through experience. The transition through Benner’s five stages of novice to expert, or practitioner (i.e., novice, advanced beginner, competent, proficient, and expert), is
dependent upon knowledge gained through a process of experiences that are incorporated into existing knowledge through reflection and conceptualization (Waldner & Olson, 2007).

**Opposing studies.** In contrast to the studies previously mentioned, Paige and Daley (2009) disagreed with the use of Kolb’s (1984) ELT as a theoretical foundation for simulation, contending that the theory was too broad to provide direction for the design and evaluation of simulation as an instructional strategy. Instead, they proposed the use of the situated cognition framework, which considers not only the experience through which learning occurs but also the context that provides meaning to the experience. Rourke, Schmidt, and Garga (2010) also disagreed with the use of the ELT as a foundation for simulation and suggested that self-efficacy theory would more closely reflect simulation experiences and learning outcomes.

In comparing the ELT to other models of scientific inquiry and problem solving, Kolb (1984) contended that although other models have applicability limited by situation and time, the ELT’s holistic scope encompasses lifelong learning. In an analysis of the ELT used in 26 nursing studies, Laschinger (1990) concluded that the research supported use of the ELT in guiding nursing curricula because of the theory’s holistic view of learning.

This study of the relationship between simulation as an instructional strategy and the use of intuition in clinical decision making used Kolb’s (1984) ELT as the theoretical foundation for the reason that the ELT accurately describes the experience of learning through simulation and recognizes the role of intuition in learning. Kolb described intuition as “the capacity for choosing meaningful perspectives and frameworks for
interpreting experience” (p. 160), an activity that occurs during the conclusion of reflective observation and early in active experimentation.

**Simulation Related to Specific Areas of Health Care Practice**

Nursing educators have been charged with ensuring that nursing graduates have the clinical decision-making abilities to provide safe and effective care to acutely ill patients; however, traditional methods of exposing students to severely ill patients in clinical rotations have declined because of the decreasing availability of clinical opportunities. In an attempt to provide experiences in a variety of clinical scenarios, nursing educators have turned to simulation as an instructional strategy for clinical decision making in various nursing practice areas.

**Anesthesiology.** Simulation has been found to have physiological effects resulting in rapid and accurate clinical decisions. Goon et al. (2013) monitored the neural responses of anesthesiology students to clinical questions following either an online tutorial or a simulation scenario. Students who participated in the simulation activity demonstrated more rapid and more accurate clinical decisions.

**Obstetrical simulations.** Several researchers have explored the link between simulation as an instructional strategy and clinical decision making in nursing. Cioffi et al. (2005) used a posttest-only, control group design in a study involving 36 midwifery students to investigate the effect of learning through simulation on clinical decision making. Information on normal labor and neonatal physiological jaundice was delivered to the control group through lectures. Participants in the experimental group received information on the same topics through simulations. Data were gathered from audiotapes of participants in the experimental group thinking aloud during the simulations, in
addition to the posttest and self-confidence questionnaire. Interrater reliability from the analysis of audiotaped segments was 89%. Results suggested that the students who learned through simulations gathered more information in a shorter amount of time and reported more confidence in their clinical decision-making abilities than the participants in the control group did.

Bambini et al. (2009) used an integrated, quasi-experimental, repeated-measures design to investigate the effects of simulation on communication, confidence, and clinical judgment. A convenience sample of 112 baccalaureate nursing students participated in simulations designed to provide information in preparation for the students’ first obstetrical clinical rotation. Data were collected from a pretest, a posttest, and a follow-up survey developed by the investigators. Content validity of the instruments was established by a panel of experts in obstetrical nursing and nursing education. Results suggested that learning through simulation increased the students’ confidence in patient interactions and psychomotor skills; enhanced communication with patients; and improved clinical judgment, including prioritization, recognition of abnormal findings, and initiation of timely interventions.

**Acute care simulations.** In an experimental, differentiated treatment study, Laney (2010) investigated differences in the clinical decision making of students who were taught about myocardial infarction through simulation and those who were taught through a case study. A convenience sample of 133 practical nursing students were randomly assigned to either a simulation group or a case study group. Data were collected by pretest, posttest, and clinical performance scoring developed by Laney and evaluated by a panel of experts for content validity and reliability. Study results
suggested that the students who learned about myocardial infarction from simulation gained significantly more knowledge and intervened more quickly in an emergency patient situation than those who learned about myocardial infarction through a case study.

Two studies investigated the effects of simulation on the clinical decision making of new graduate nurses during hospital orientation. Kaddoura (2010) conducted an exploratory, qualitative, descriptive study involving 10 newly graduated nurses orienting to the ICU in a large hospital. The nurses participated in simulations involving situations and skills common to the ICU for 8 hours every 3 weeks for a period of 6 months. Data were collected using semistructured interviews at the completion of the training period. Analysis of the interview responses suggested that simulation helped the new nurses to solidify cognitive and psychomotor skills, sharpen their critical-thinking and leadership skills, and manage stress in critical situations. In addition, the participants indicated that working with simulations helped to increase their confidence when providing care for critically ill patients.

Different results were obtained by Maneval et al. (2012) in a study involving the orientation of 26 new nursing graduates hired to work in acute care areas of a large hospital. Using a pretest-posttest design, the participants were randomly assigned to either a group that went through the standard hospital orientation or to a group to which simulation had been added to the orientation program. Study participants completed the Health Sciences Reasoning Test to measure critical thinking and the Clinical Decision Making in Nursing Scale to measure clinical decision making at the beginning and again at the conclusion of the 10-week orientation. Although scores for both groups improved from pretest to posttest, no significant differences were found between the groups on
either measure. Maneval et al. suggested that further research into simulation should be conducted using standardized tests to measure critical thinking.

**Limitations of simulation studies.** The very nature of simulation contributed to limitations in the reviewed studies. As a teaching strategy, simulation limited the number of participants per scenario, which led to small sample sizes for the quantitative studies and possibly inadequate effect size. In addition, all studies used convenience sampling, another protocol that limited generalization of the results because the researchers did not have control over the characteristics of their samples (Creswell, 2008). Many researchers have relied upon self-report measures to gather data because of the lack of objective instruments to measure participant performance during simulations. Self-report measures can be biased toward acceptable norms and might lack objectivity and veracity (Lapkin, Levett-Jones, Bellchambers, & Fernandez, 2010).

**Creighton Simulation Evaluation Instrument**

Evidence from the reviewed studies indicated a lack of standardized evaluation instruments in simulation scenarios. In their review of existing evaluation instruments for simulations, Kardong-Edgren et al. (2010) cautioned against the “indiscriminate development of new evaluation tools” (p. e26) resulting from the lack of nursing faculty who have expertise in simulation and instrument development.

One quantitative evaluation instrument for simulation that has survived intense scrutiny is the C-SEI (Todd et al., 2008). Based upon the core competencies established by the AACN (2008), the instrument is a 22-item dichotomous scale that evaluates student performance during simulations on assessment, communication, critical-thinking,
and technical skills. Content validity was determined by an expert panel of seven nursing instructors who were experienced in using simulation as an instructional strategy. Interrater reliability was established in a pilot study of 72 participants in simulation. Interrater reliability ranged from 84.4% to 89.1% over the four categories tested.

The instrument was further tested for reliability and internal consistency by Adamson et al. (2011). Thirty-eight nursing educators from across the United States participated in the study, which involved evaluating video-archived simulations using the C-SEI (Todd et al., 2008). Results indicated that the C-SEI demonstrated reliability through an intraclass correlation of 0.95 and test-retest reliability of 0.88. Internal consistency measured by Cronbach’s alpha of 0.97 indicated that all items were scored consistently.

Patton (2013) tested the interrater reliability of the C-SEI (Todd et al., 2008) from 126 ratings by three clinical instructors and one course instructor. Agreement percentages across the four instrument categories ranged from 50% to 100%; however, all instructors agreed on which students achieved a passing percentage of 75%. Patton attributed the inconsistencies to insufficient training of the evaluators on the use of the instrument and cited the need to clarify the underlying dimensions of the instrument.

A form of the C-SEI, the Creighton Competency Evaluation Instrument (C-CEI) is currently being used in a large multisite simulation study by the National Council of State Boards of Nursing (Hayden, 2010) to investigate the effects of simulation on clinical competency. The C-CEI evaluates the same elements as the C-SEI, but the term critical thinking has been changed to clinical judgment, and the term technical skill has
been changed to *patient safety*. Otherwise, all 23 items on the instruments contain identical wording. Results from this study are pending.

**Synthesis of Research Findings**

Predictions of a nursing shortage and its impact on health care have been reported in the health care literature for several years (GAO, 2001; USDHHS 2010). Analysis of surveys involving more than 10,000 nurses indicated that the nursing shortage is increasing the stress on nurses and lowering the quality of patient care (Buerhaus et al., 2005). A prominent factor in the nursing shortage is the retirement of a large number of nurses from the Baby Boomer generation and the subsequent loss of experienced nurses in the workforce (Buerhaus et al., 2009). In the wake of the nursing shortage and the looming mass retirement of experienced nurses, novice nurses will be responsible for making high-stakes clinical decisions about patient care (Gillespie & Peterson, 2009).

**Summary of Literature on Clinical Decision Making**

Nursing educators are charged with ensuring that novice nurses have the skills necessary to make high-stakes clinical decisions. Much of the literature on decision making in nursing has referred to Benner’s (1984) novice-to-expert theory, which asserts that clinical decision-making skills are developed through experience. The decision making of experienced nurses is a combination of logic and intuition (Pyles & Stern, 1983); situational recognition and hypothesis testing (Ramezani-Badr et al., 2009); and heuristic thought processes (Cioffi, 1997; Ferrario, 2003; O’Neill, 1995; Simmons et al., 2003).
The decision making of novice nurses has been described as dependent on abstract principles and devoid of situational experience (Benner, 1984); focused on the organization and completion of tasks (Ebright et al., 2004); and inadequate to make even entry-level clinical judgments (del Bueno, 2005). Krumwiede (2010) found that students in accelerated nursing programs scored higher on a clinical decision-making scale than students in basic nursing programs. She attributed the difference to the fact that the accelerated students had previous degrees and work experience. Slater (1999) studied the nature of the clinical decision making of baccalaureate nursing students and found that it comprised problem orientation, priority setting, and validation processes.

Several researchers have investigated strategies to enhance the clinical decision making of novice nurses. Gillespie and Peterson (2009) developed a situational clinical decision-making framework that expanded the traditional nursing process decision-making model to include situational context and patient cues. Although nurses who have used the framework have attested to its usefulness, Gillespie and Peterson acknowledged that the framework has not yet been empirically tested.

Edelen and Bell (2011), Jones (2008), and Murphy (2004) studied the effect of focused reflection and reflective journaling on clinical decision making. Results from researcher-developed instruments suggested that reflection helped students to develop better clinical decision-making skills. In agreement with Slater (1999), Edelen and Bell (2011) as well as Murphy (2004) recommended the use of experiential teaching strategies such as simulation to help students to develop clinical decision-making skills.
Summary of Literature on Intuition

The use of intuition as a valuable tool in the clinical decision making of experienced nurses has been described in nursing studies on surgery and intensive care (King & Clark, 2002); emergency care (Lyneham et al., 2008); and mental health care (Welsh & Lyons, 2001). All of these aforementioned researchers found that the nurses used a combination of analytical thinking, research evidence, and intuition to arrive at clinical decisions; however, trust in intuition increased with the nurses’ experience levels. This result was consistent with Polge’s (1995) earlier finding of a positive correlation between nursing proficiency and use of intuition. McKinnon (2005) described intuition as pattern and situational recognition that stimulates a physiological response leading to immediate recognition and response. McCutcheon and Pincombe (2001) asserted that nurses who accepted intuition as a valid behavior were more likely to use intuition in clinical decision making.

Although the relationship between nursing experience and the use of intuition in clinical decision making was prevalent in much of the literature, some studies revealed the use of intuition by novice nurses. Ruth-Sahd and Hendy (2005) found that novice nurses who were older and had experienced hospitalizations were more likely than younger novice nurses to use intuition in clinical decision making. Ruth-Sahd and Tisdell (2007) found that prior experiences, life connections, time, space, and touch influenced novice nurses’ use of intuition. Beck (1998) and Kosowski as well as Roberts (2003) found that validation of intuition as an integral part of clinical decision making was important to novice nurses and increased their confidence in the use of intuition.
Several instruments have been developed to measure intuition, including Himaya’s (1991) HINTS, Miller’s (1993) MII, Pacini and Epstein’s (1999) REI, Pretz and Folse’s (2011) TIntS, Rew’s (2000) AUINS, and Smith et al.’s (2004) SIINS. Common findings from studies using these instruments indicated that trust in intuition is domain specific to nursing and might not translate to other domains. In addition, intuition is related to skill in reading patient cues and possessing a spiritual connection with patients.

**Summary of Literature on Simulation**

Learning to read patient cues is facilitated by experience in clinical areas; however, novice nurses are being pressed to make high-consequence clinical decisions with minimal clinical experience (Gillespie & Peterson, 2009). Patient care simulation is a teaching strategy being investigated to augment clinical experience (Hayden, 2010). Several researchers have found that novice nurses who experienced simulation had increased confidence in making clinical decisions (Bambini et al, 2009; Cioffi et al, 2005; Kaddoura, 2010); gathered information more quickly (Cioffi et al., 2005); intervened more quickly (Bambini et al., 2009); and had increased knowledge (Laney, 2010). However, Maneval et al. (2012) did not find any significant differences in critical thinking and clinical decision making between novices who went through a standard hospital orientation and those who went through a hospital orientation that incorporated simulation.
Critique of Previous Research

Studies on clinical decision making, intuition, and simulation have varied in scope and design. Several of these studies were qualitative in design and focused on identifying and understanding new themes and concepts (Benner & Tanner, 1987; Ebright et al., 2004; Kaddoura, 2010; King & Clark, 2002; Kosowski & Roberts, 2003; Pyles & Stern, 1983; Ramezani-Badr et al., 2009; Ruth-Sahd & Tisdell, 2007; Simmons et al., 2003; Slater, 1999; Traynor et al., 2010; Welsh & Lyons, 2001.) Although data generated from the qualitative studies tended to be highly detailed and often laid the groundwork for subsequent studies, the subjective nature of the findings limited their transferability. In addition, replication often was difficult to achieve (Norwood, 2000).

Of the quantitative studies reviewed, two had limited generalizability because of the small sample sizes (Hoffman et al., 2004; Maneval et al., 2012), and this fact was recognized by the researchers of each study. Although other studies had robust samples, a few of them used self-report instruments (Cioffi et al., 2005; Krumwiede, 2010; Meeks-Sjostrom, 2013). According to Lapkin et al. (2010), self-report instruments can lack objectivity, and they can produce biased responses.

Summary

Chapter 2 presented a review of recent and past literature related to challenges facing novice nurses, clinical decision making, intuition, Kolb’s (1984) ELT, and simulation. Evidence from the literature strongly supported the need for further research on instructional strategies to promote the use of intuition in clinical decision making in order to assist novice nurses to function in the challenging health care environment.
Chapter 3 presents the methodology of the study, including the sampling technique, data collection, and data analysis. Procedures taken to protect the participants are presented. Expected findings of the study, limitations of the research design, and issues related to validity and reliability conclude the chapter.
CHAPTER 3. METHODOLOGY

Chapter 3 describes the methodology, including data collection and data analysis, used in this study. Beginning with a review of the problem and purpose of the study, the RQs are presented, followed by a description of the study design. Explanations of the target population being studied and the sampling technique are followed by information about the protection of the participants, the data collection, and the data analysis. The chapter concludes with a discussion of the expected findings, limitations of the research design, and measures taken to ensure validity and reliability.

Review of the Problem

Novice nurses, including new graduates and inexperienced nurses, face tremendous challenges as they enter the workforce (Christmas, 2008). Greater numbers of seriously ill patients and nursing shortages have contributed to a complex health care environment in which nurses, including novices, are required to function at an extremely high level in order to deliver effective patient care (Christmas, 2008). In the absence of experienced nurses to serve as mentors, novice nurses are burdened with the responsibility of making high-consequence clinical decisions with minimal support for higher numbers of complex patients (Gillespie & Peterson, 2009).

Incorporating intuition into the clinical decision-making process enables nurses to integrate information and act quickly in response to patient needs (Benner, 1984; Truman, 2003). Several researchers have identified the need for novice nurses to develop the use of intuition in clinical decision making in order to manage the complexities of patient care in the contemporary health care environment (Kosowski & Roberts, 2003;

Nursing educators have been charged with ensuring that nursing graduates have the clinical decision-making abilities to provide effective care to high-acuity patients; however, traditional methods of exposing students to severely ill patients in clinical rotations have declined because of the decreasing availability of clinical opportunities. In an attempt to provide experiences in a variety of clinical scenarios, nursing educators have turned to simulation as an instructional strategy for clinical decision making. Several researchers have investigated the link between simulation and clinical decision making, but none has investigated the relationship, if any, between simulation as an instructional strategy and the use of intuition in clinical decision making. There was a need to conduct this study to determine whether a relationship exists between simulation and the use of intuition in clinical decision making.

**Research Question and Subquestions**

One overarching RQ guided the study. Subquestions focused on the relationship between the separate elements of the C-SEI (Todd et al., 2008) and the AUINS (Rew, 2000). One additional question investigated the relationship between age and the variables of the study.

**Primary Research Question**

What is the relationship, if any, between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students?
Subquestions

1. Is there a correlation between the element of patient assessment in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

2. Is there a correlation between the element of communication in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

3. Is there a correlation between the element of critical thinking in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

4. Is there a correlation between the element of technical skill in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students?

Additional Question

What influence, if any, does student age have on the relationship between simulation and the use of intuition in clinical decision making?

Research Design

Data were collected using a quantitative, explanatory, correlational research design. Instruments used in data collection include Todd et al.’s (2008) C-SEI, Rew’s (2000) AUINS, and a demographic survey. The C-SEI evaluates behaviors in the cognitive, psychomotor, and affective domains of learning during simulation through elements related to clinical decision making, including assessment, communication,
critical-thinking, and technical skills. Participants receive cumulative scores ranging from 0.0 to 1.0 as well as scores on the elements of patient assessment, communication, critical-thinking, and technical skills. The AUINS is a seven-item trinomial scale that measures participants’ acknowledgment of using intuition when making clinical decisions. Demographic data on age were collected from a survey developed by the researcher. The study investigated the degree of association between simulation as an instructional strategy for elements related to clinical decision making, including patient assessment, communication, critical-thinking, and technical skills during simulation, as collected from the C-SEI, and the use of intuition in clinical decisions made during simulation, as collected from the AUINS.

**Target Population, Sampling Method, and Related Procedures**

A convenience sample of ADN students from a community college in the Midwestern United States was recruited for this study. Students in the final course of the nursing program were asked to participate. The following sections provide details about the population, sampling method, setting, and recruitment method.

**Target Population**

The target population comprised ADN students. According to the NLN’s (2012) survey of basic nursing education programs, 59% of RN students graduated from ADN programs in 2011, 38% from baccalaureate programs, and 4% from diploma programs. The primary rationale for selecting ADN students was to produce a study generalizable to the majority of nursing students.
A secondary rationale for targeting ADN students was the proportionately low number of studies on simulation involving ADN students in comparison to the higher number of studies involving baccalaureate nursing students. In a systematic literature review on simulation, Norman (2012) found that 13 of the 17 studies reviewed involved baccalaureate nursing students. Cant and Cooper (2010) reviewed 12 simulation studies, eight of which involved baccalaureate nursing students. In a review of nine human patient simulation studies in prelicensure nursing education, Shinnick et al. (2011) reported only one study that did not involve baccalaureate degree students.

**Sampling Method**

Participants in this study were ADN students from an NLN-accredited ADN program in a community college in the Midwestern United States. A convenience sample from all students enrolled in the ADN program was obtained. Convenience sampling uses individuals who are available and willing to take part in the study (Creswell, 2008). Based upon the central limit theorem, the optimum sample size for a quantitative study is 30 participants per variable in order to achieve the greatest probability that the findings will be generalizable (Norwood, 2000). Other factors to be considered are level of significance, power, or probability of detecting a relationship, and effect size (Norwood, 2000). For a level of significance of .05, a power of .80, and a medium effect size of .30, the sample size for this study had to be 88 participants. The anticipated sample size was 88 to 150 participants; the final sample comprised 72 participants.

**Setting**

This study took place at a rural community college in the Midwestern United States. About 4,000 students are enrolled at the college, with approximately 180 students
enrolled in the ADN program. Simulations occur in the simulation rooms of the nursing skills lab of the community college, where high-fidelity computerized mannequins are used as patients for the scenarios. Each simulation room is equipped with digital video and audio equipment to record and play back simulation scenarios. The study was conducted in these same simulation rooms.

**Recruitment**

The opportunity to participate in the study was offered to all students enrolled in the ADN program at the study site. Recruitment took place in nursing classes at the beginning of the semester. Selection of participants was achieved through a convenience sample. Before any students agreed to participate, they were informed of the purpose of the study, the risks associated with participation, and measures that would be taken to ensure the security of the data and the confidentiality of their participation. Once students chose to participate, they were provided with a consent form to sign and return to the researcher and then were asked to complete a brief demographic questionnaire. To account for extraneous variables, the researcher investigated age that might, or might not, have been unique to the participants at this study site.

Regarding age, the average student at the rural community college where this study was conducted was 30 years old. Life experience that comes with increasing age might have influenced the outcomes. To account for the possibility of this influence, the relationship between participant age and scores on the C-SEI and the AUINS was examined. As part of Capella University’s research protocol, the researcher had to sign a statement of confirming that the study was original work.
Instrumentation

Two reliable and well-validated instruments were used in this study, namely, Todd et al.’s (2008) C-SEI and Rew’s (2000) AUINS. The C-SEI was used to evaluate students’ performance on assessment, communication, critical-thinking, and technical skills during simulation. The AUINS measured the use of intuition in clinical decision making. The following sections describe these instruments.

C-SEI

The effectiveness of simulation as a teaching strategy was assessed using the C-SEI (Todd et al., 2008), which evaluates student learning and performance based upon core competencies established by the AACN (2008), including assessment, communication, critical-thinking, and technical skills. Written permission to use this instrument was given by the developers with the stipulation that the researcher had to complete an orientation exercise provided on a CD from the developers prior to using the instrument.

The C-SEI (Todd et al., 2008) holds 23 statements divided among four categories used to evaluate participant performance during simulation. Items are scored on a dichotomous scale of zero for “does not demonstrate competency” and 1 for “demonstrates competency.” Items that do not apply to a particular scenario are rated “not applicable” and are not counted in the final total. The instrument developers set an overall score of 0.75 as indicative of competency.

Content validity and reliability. Content validity of the instrument was established by a panel of seven faculty members who were experts in the use of simulation. On a 4-point Likert scale of responses ranging from 1 (strongly disagree) to
4 (strongly agree), the mean rating among reviews was 3.83 (SD = 0.10), indicating that the C-SEI was effective in evaluating simulation.

Following extensive training in the use of the C-SEI, faculty evaluators participated in pilot testing of the instrument with 16 groups of students (N = 72) participating in simulation scenarios. Interrater reliability was 84.4% (SD = 12) for items in the Assessment Skills category, 89.1% (SD = 10.7) for Communication Skills, 87.5% (SD = 12.5) for Critical-Thinking Skills, and 85% (SD = 13.7) for Technical Skills. According to Burns and Grove (2005), interrater reliability of 80% is acceptable, and 90% is good.

AUINS

The AUINS (Rew, 2000) is a seven-item self-report instrument that measures the use of intuition in clinical decision making. Participants respond with “agree,” “disagree,” or “don’t know” to each item. A higher number of “agree” responses indicate acknowledgment of greater use of intuition in making clinical decisions. The researcher received permission to use the AUINS.

Construct validity and reliability. Rew (2000) developed the AUINS in three phases, beginning with 50 items in Phase 1. Feedback from two panels of experts resulted in a reduction in the number of items to 28 and a content validity index of 0.96. Phase 2 testing with 106 participants resulted in a Cronbach’s alpha coefficient of internal consistency of 0.84. Through factor analysis, the instrument was reduced to 21 items, with eigenvalues, or underlying factors, ranging from 1.01 to 5.78 and explaining 64.5% of the scores (Rew, 2000). In Phase 3, the instrument was tested on 112 participants and produced the final AUINS version, which demonstrated internal
consistency with a Cronbach’s alpha of 0.91. Convergent validity was established by comparing scores on the AUINS to a second measurement of intuition, the Agor Intuitive Management Survey (Agor, as cited in Rew, 2000).

**Data Collection**

After obtaining the required IRB approval, the researcher gave the potential participants the consent form to sign and return to the researcher, along with the demographic survey, at the beginning of the semester. The demographic survey contained individual student codes to conceal the identities of the participants. Data from the completed demographic surveys were entered into SPSS v.17 for analysis.

**C-SEI Data Collection**

All students in the ADN program at the study site are required to participate in ungraded acute care simulation exercises involving clinical decision making related to patient safety. All simulations are digitally recorded for debriefing purposes and are filed in a password-protected computer in a locked simulation control room. Using the C-SEI, the researcher scored all second-semester ADN students as they participated in the required simulations and debriefing sessions. Scores from those students who agreed to participate in the study were entered into SPSS v.17 for analysis.

**AUINS Data Collection**

Following the simulation and debriefing exercises, each student was given the seven-item AUINS in paper-and-pencil format. Scores were tabulated by hand and entered into SPSS v.17 for analysis.
Pilot Test

According to Creswell (2008), pilot testing is a procedure in which changes are made to an instrument following evaluation of the instrument by a small number of individuals. Because of the extensive testing conducted in the development of the C-SEI and the AUINS, a pilot test was not conducted for this study.

Operationalization of Variables

Operationalization of the variables defines and describes the measurement of variables used in a study (Creswell, 2008). Simulation was measured by the composite score on the C-SEI (Todd et al., 2008). The use of intuition was measured by the composite score on the AUINS (Rews, 2000). Clinical decision making was not measured separately, but was included with the measurement of use of intuition. Patient assessment was measured by the total score for the four-item Patient Assessment Skills section of the C-SEI. Communication was measured by the total score on the five-item Communication Skills section of the C-SEI. Critical-Thinking Skills were measured by the total score of the eight-item section of the C-SEI. Technical Skills were measured by the total score of the five-item section of the C-SEI.

Data Analysis

Correlational statistical tests are used to describe and measure the relationships between or among sets of two or more variables (Creswell, 2008). The purpose of this study was to examine the relationship, if any, between simulation as an instructional strategy and the use of intuition in clinical decision making. In addition, descriptive
statistics were used to describe the demographic data related to age. Data were entered into SPSS v.17 to calculate the mean and standard deviation for each variable. Scores for the AUINS and scores for each section and composite scores for the C-SEI were calculated by the researcher and entered into SPSS v.17. Pearson’s correlation coefficients were calculated for the instrument scores. The value of each correlation coefficient was assessed at an alpha level of 0.05. Regression analyses were calculated on all data. All calculations and statistical analyses were verified by an independent expert in statistical procedures.

**Limitations of the Research Design**

This study had limitations in generalizability and instrumentation. Generalizability was limited by the convenience sampling design. Although the number of participants was adequate based upon level of significance, power, and effect size, the participants were from a single nursing program, meaning that characteristics of the sample might not have been reflective of the target population.

Regardless of the extensive psychometric testing conducted on the C-SEI and the AUINS, limitations for this research design related to the instruments were present in this study. For example, accurate scoring of the C-SEI is dependent upon the adequate training and experience of the evaluator. Although detailed training materials had been provided by the instrument developers, the C-SEI was new to the researcher; therefore, item interpretation and scoring accuracy could have been questioned. The AUINS is a self-report instrument that could have produced biased results because of any intentional or unintentional lack of truthfulness from the participants. In order to minimize this
limitation, a statement reminding the participants about the importance of truthful responses was included in the instructions.

**Internal Validity**

Internal validity refers to the extent to which the findings are the result of the study variables, not the extent to which they are influenced by extraneous variables (Norwood, 2000). In this study, instrumentation could have posed a threat to internal validity because of changes in scoring that were the result of changes in the researcher’s familiarity and skill with the instrument over time. The C-SEI is an evaluation tool that was new to this researcher. Potentially, scoring could have changed as the researcher became more familiar with the instrument. In realizing the importance of consistency in scoring, instrument developers Todd et al. provide an extensive training program delivered by DVD for all researchers who request permission to use the C-SEI. This researcher completed the training with the goal of maintaining the consistency of the evaluation throughout the study.

**External Validity**

External validity refers to the generalizability of the findings (Norwood, 2000). In this study, external validity could have been threatened by the characteristics of the sample. For example, the participants in the convenience sample resided in rural communities in the Midwestern United States and attended a rural community college. Findings from this sample might not have been the same as those from a similar study conducted in a densely populated urban setting.
Expected Findings

The predominant expected finding for this study was that a relationship did exist between simulation as an instructional strategy, as measured by the C-SEI (Todd et al., 2008) and the use of intuition in clinical decision making, as measured by the AUINS (Rew, 2000). Conclusions drawn from the findings were limited to the study sample. Strong relationships indicated simulation as an instructional strategy to strengthen the use of intuition in clinical decision making. In the event that no relationship had been found between simulation as an instructional strategy and the use of intuition in clinical decision making, this study would still have made a contribution to the literature by eliminating simulation as a teaching strategy to help students to strengthen the use of intuition in clinical decision making. Further research would be required to investigate other strategies to meet this goal.

Ethical Issues

Guidelines for the ethical treatment of human research participants were outlined in the Belmont Report (USDHHS, 1979). Three principles contained in the report to guide the recruitment and treatment of research participants are respect for the individual, beneficence/nonmaleficence, and justice. Respect for the individual encompasses issues surrounding the recruitment of participants, informed consent, and confidentiality. Beneficence/Nonmaleficence involves risk assessment and ensures that participants receive the most benefit and the least harm while involved in a study. The principle of justice examines issues surrounding study interventions and access to
participants. This principle serves to protect individuals who are unable to protect their own interests from exploitation.

To conduct this study with ADN students, the researcher gained permission from the dean of nursing and IRB approval from both the community college and Capella University. A consent form was given to each potential participant that explained the purpose of the study, all procedures involved, and any potential risks or benefits to the participants. The researcher addressed the students in person in their nursing classrooms to answer questions and provide clarification about the study. Students were reassured that they would have the opportunity to pose questions to the researcher throughout the study and that participation or nonparticipation in the study would not have any influence on course grades.

Upon receiving the signed consent from the participants, the researcher collected data using the C-SEI (Todd et al., 2008) during simulation scenarios. The researcher also had the participants complete the demographic survey and the paper-and-pencil AUINS (Rew's, 2000) following the simulation exercises. Consent forms, questionnaires, AUINS response forms, and C-SEI score sheets were stored in a locked file cabinet in the researcher’s office. All computer data were stored on the researcher’s computer in a password-protected file.

**Chapter 3 Summary**

A quantitative, explanatory, correlational research design was used to investigate the relationship, if any, between simulation as an instructional strategy and the use of intuition in clinical decision making. Simulation as an instructional strategy was
measured by scores on the C-SEI (Todd et al., 2008), and the use of intuition in clinical
decision making was determined by the AUINS (Rew, 2000). To further describe
characteristics of the sample, demographic data on age were collected. Data analysis
consisted of descriptive and correlational statistics. Chapter 4 describes the data
collection methods and the statistical procedures, along with a detailed analysis of the
results.
CHAPTER 4. DATA ANALYSIS AND RESULTS

Introduction

Novice nurses face tremendous challenges as they enter the current health care workforce (Christmas, 2008). In addition to providing care for increasing numbers of seriously ill patients, novice nurses have fewer experienced mentors in the workplace simply because older nurses are retiring and are no longer available to act as mentors (Christmas, 2008; USDHHS, 2010). This burdens novice nurses with the responsibility of making high-stakes decisions about patient care (Gillespie & Peterson, 2009).

Nursing educators are challenged to design instructional strategies to help students to develop the high-level, intuitive decision-making skills necessary to function effectively in high-acuity health care settings. A few researchers have suggested that simulation as an instructional strategy improves clinical decision making by nursing students (Comer, 2005; Horan 2009; Partin, Payne, & Slemmons, 2011); however, this researcher found no studies that have investigated the relationship between simulation and higher level, intuitive clinical decision making.

The primary purpose of this study was to determine whether a relationship existed between simulation as an instructional strategy and the use of intuition in ADN students. Data on simulation for this study were collected using the C-SEI, which evaluates students’ performance in the areas of assessment, communication, critical thinking, and technical skills during a simulation learning activity (Todd et al., 2008). Use of intuition in clinical decision making was measured using Rew’s (2000) AUINS.
Chapter 4 begins by describing the participants’ characteristics. Study results are presented next, followed by details of the data analysis. A summary of the findings concludes this chapter.

**Description of the Sample**

The sample for this study comprised nursing students from an NLN-accredited ADN program in a community college in the Midwestern United States. Convenience sampling was used because of the remote location of the study site and the lack of other ADN programs in the area. A request for participation was presented in person and in writing to second-level nursing students prior to their participation in a simulation learning activity. Data were collected during late spring and summer 2015 semesters.

The anticipated number of participants for this study was at least 88; however, because of the unusually low enrollment during the year preceding the time of data collection, only 72 participants were available. Sixty-six of the participants were female nursing students (91.7%), and six were male students (8.3%), with the latter percentage being similar to the percentage of men (i.e., 9%) employed as RNs in the United States (Landivar, 2013) but less than the national average (15%) of men in ADN programs (NLN, 2013). Data on the ages of the participants were grouped into four categories: 18 to 24 years (42%), 25 to 30 years (22.2%), 31 to 39 years (17.3%), and over 40 years (7.4%). Of the participants, 24.7% were over the age of 30 years, compared to 50% of ADN students nationally (NLN, 2013).
Summary of the Results

The primary RQ asked whether a relationship existed between simulation as an instructional strategy and the use of intuition in clinical decision making by ADN students. Simulation as an instructional strategy was measured by student scores on the C-SEI (Todd et al., 2008), including a composite score that was the sum of scores on the elements of assessment, communication, critical-thinking, and technical skills. Intuition was measured by Rew’s (2000) AUINS, a self-report survey designed to determine the use of intuition in clinical decision making. Subquestions asked whether a relationship existed between each of the four elements on the C-SEI and the use of intuition in clinical decision making. One additional question addressed the influence of age on simulation as an instructional strategy, as measured by student scores the C-SEI, and on the use of intuition in clinical decision making, as measured by the AUINS.

Primary RQ

Data analysis of the composite score on the C-SEI and the AUINS indicated that a slight ($r = .233$) but statistically significant ($p = .049$) relationship existed between simulation as an instructional strategy and the use of intuition in clinical decision making. However, further analysis indicated that the majority of the results from the C-SEI could have been attributed to variables other than intuition, meaning that no relationship could be established.

Subquestions

Subquestions addressed the relationship between the individual elements on the C-SEI, namely, patient assessment, communication, critical-thinking, and technical skills,
and the use of intuition in clinical decision making, as measured by the AUINS. Results for the subquestions follow:

1. Data analysis of the C-SEI scores on patient assessment and the AUINS scores indicated little, if any, relationship \( r = .099 \), with no statistical significance \( p = .409 \) between these variables.

2. Data analysis indicated a slight \( r = .243 \) but statistically significant \( p = .04 \) association between student scores on communication and the use of intuition in clinical decision making, as indicated by AUINS scores.

3. Data analysis indicated little, if any, relationship \( r = .10 \), with no statistical significance \( p = .401 \) between student scores on the element of critical thinking and AUINS scores.

4. Data analysis indicated that the strongest relationship, although still slight, existed between technical skills and the use of intuition in clinical decision making \( r = .267 \), with a statistical significance of .023.

**Additional Question**

In consideration of Benner’s (1984) theory that the use of intuition in clinical decision making is developed through experience, the influence of life experience gained through increasing age was explored in this study. Data analysis indicated that age was the most influential of all variables, with the strongest, although slight, correlations occurring between student age and the composite C-SEI score \( r = .282 \) and student age and the element of critical thinking \( r = .332 \). The relationship between age and the use of intuition in clinical decision making was minimal \( r = .131 \).
Detailed Analysis

The purpose of an explanatory, correlational research design is to explain the relationship between variables rather than to predict a result or establish causality (Creswell, 2008); hence, the terms DV and IV were not applicable to this study. Data analysis included determining the correlation coefficient ($r$) using Pearson’s product-moment correlation and determining the coefficient of determination ($r^2$), which involved squaring the correlation coefficient. A correlation coefficient describes the relationship between variables, the strength of which is represented by a range of values from -1.00 to +1.00, with ± 1.00 indicating the strongest relationship (Norwood, 2000). The coefficient of determination indicates the importance of the correlation coefficient, or the degree to which the variation in one variable explains the variation of a second variable (Norwood, 2000).

Primary RQ: Relationship Between Simulation and the Use of Intuition

Student scores on the C-SEI included evaluations of patient assessment, communication, critical-thinking, and technical skills, culminating in a composite score. Students were evaluated by the researcher during a simulation scenario involving an ST elevation leading to a myocardial infarction (STEMI). Following the simulation and debriefing, students completed the AUINS to disclose their use of intuition in clinical decision making during the simulation. Scores for the 72 students in the sample were entered into an Excel spreadsheet by the researcher and imported into SPSS v.17 for statistical analysis.

The primary RQ was addressed by analyzing the composite C-SEI scores and AUINS responses. Analysis of the Pearson’s product-moment correlation resulted in a
correlation coefficient of .233, indicating a slight relationship between simulation, as measured by the C-SEI, and the use of intuition in clinical decision making, as measured by the AUINS. The statistical significance (2-tailed) was established at .049 ($p < .05$; see Table 1).

Table 1. Correlations: C-SEI Total Score and AUINS

<table>
<thead>
<tr>
<th></th>
<th>AUINS</th>
<th>Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>AUINS</td>
<td>Pearson correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.049</td>
</tr>
<tr>
<td></td>
<td>$N$</td>
<td>72</td>
</tr>
<tr>
<td>C-SEI total score</td>
<td>Pearson correlation</td>
<td>.233*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.049</td>
</tr>
<tr>
<td></td>
<td>$N$</td>
<td>72</td>
</tr>
</tbody>
</table>

*Correlation was significant at the .05 level (2-tailed)

To gain further information about the relationship between simulation and the use of intuition, the coefficient of determination ($r^2$) was calculated. The coefficient of determination indicates the importance of the correlation, or the amount to which variation in one variable can be attributed to a second variable (Norwood, 2000). Because the sample size was smaller than optimal, the coefficient of determination for simulation and the use of intuition was determined by the adjusted $r$ square. Results indicated that 4% of the composite C-SEI scores were influenced by the use of intuition in clinical decision making and 96% were influenced by other variables not included in this study (see Table 2). Therefore, regardless of evidence of a slight, statistically significant correlation, a relationship between simulation as an instructional strategy and the use of intuition in clinical decision making was not established.
Table 2. Model Summary Coefficient of Determination: Simulation (Composite C-SEI) and Use of Intuition (AUINS)

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
<th>SE of the estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.233*</td>
<td>.054</td>
<td>.041</td>
<td>2.485</td>
</tr>
</tbody>
</table>

*Predictors: (Constant), AUINS

Subquestion 1: Relationship Between Patient Assessment and Use of Intuition

Data analysis by Pearson’s product-moment correlation of patient assessment and the use of intuition in clinical decision making indicated that with $r = .09$ and no statistical significance ($p = .409$), there was no relationship between these variables, as measured by the instruments in this study (see Table 3). A correlation of determination was not calculated.

Table 3. Correlations: Patient Assessment and AUINS

<table>
<thead>
<tr>
<th>Assessment</th>
<th>Pearson correlation</th>
<th>Sig. (2-tailed)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessment</td>
<td>1</td>
<td>.099</td>
<td>72</td>
</tr>
<tr>
<td>AUINS</td>
<td>.099</td>
<td>.409</td>
<td>72</td>
</tr>
</tbody>
</table>

Subquestion 2: Relationship Between Communication and the Use of Intuition

Data analysis revealed a slight ($r = .243$) but statistically significant ($p = .04$) relationship between communication, as measured by the C-SEI, and the use of intuition in clinical decision making, as reported on the AUINS (see Table 4).
Table 4. Correlations: Communication and AUINS

<table>
<thead>
<tr>
<th></th>
<th>Communication</th>
<th>AUINS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Communication</strong></td>
<td><strong>Pearson correlation</strong></td>
<td>1</td>
</tr>
<tr>
<td></td>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td><strong>N</strong></td>
<td>72</td>
</tr>
<tr>
<td><strong>AUINS</strong></td>
<td><strong>Pearson correlation</strong></td>
<td>.243***</td>
</tr>
<tr>
<td></td>
<td><strong>Sig. (2-tailed)</strong></td>
<td>.040</td>
</tr>
<tr>
<td></td>
<td><strong>N</strong></td>
<td>72</td>
</tr>
</tbody>
</table>

*Correlation is significant at the .05 level (2-tailed).

Calculation of the correlation of determination indicated that nearly 5% ($r^2 = .046$) of communication was influenced by the use of intuition and that slightly more than 95% could have been attributed to the influence of other variables not included in this study (see Table 5). Regardless of the slight correlation and the statistical significance, based upon the coefficient of determination, no relationship was established between communication and the use of intuition in clinical decision making, as measured by the instruments used in this study.

Table 5. Model Summary Correlation of Determination: Communication and AUINS (Use of Intuition)

<table>
<thead>
<tr>
<th>Model</th>
<th>$R$</th>
<th>$R^2$</th>
<th>Adj. $R^2$</th>
<th>SE of the estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.243***</td>
<td>.059</td>
<td>.046</td>
<td>.692</td>
</tr>
</tbody>
</table>

*Predictors: (Constant), AUINS

Subquestion 3: Critical Thinking and the Use of Intuition

Data on critical thinking, as measured by the C-SEI, and the use of intuition in clinical decision making, as measured by the AUINS, were analyzed using the Pearson’s product-moment correlation. Results indicated little, if any, relationship between critical thinking and the use of intuition ($r = .10$). In addition, no statistical significance was found at .401 ($p = < .05$; see Table 6). A coefficient of determination was not calculated.
Table 6. Correlations: Critical Thinking and AUINS

<table>
<thead>
<tr>
<th></th>
<th>Critical thinking</th>
<th>AUINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Critical thinking</td>
<td>Pearson correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.401</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
</tr>
<tr>
<td>AUINS</td>
<td>Pearson correlation</td>
<td>.100</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.401</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
</tr>
</tbody>
</table>

Subquestion 4: Technical Skills and the use of Intuition

The correlation between technical skills and the use of intuition in clinical decision making was the strongest of the four elements of the C-SEI. A correlation coefficient of .267 and statistical significance of .023 indicated a slight relationship between the variables (see Table 7).

Table 7. Correlations: Technical Skills and AUINS

<table>
<thead>
<tr>
<th></th>
<th>Technical skills</th>
<th>AUINS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical skills</td>
<td>Pearson correlation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.023</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
</tr>
<tr>
<td>AUINS</td>
<td>Pearson correlation</td>
<td>.267*</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.023</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
</tr>
</tbody>
</table>

*. Correlation is significant at the .05 level (2-tailed).

A correlation of determination was calculated to determine the influence of technical skills on the use of intuition. Because of the sample size, the adjusted $R^2$ was the determining factor. Results indicated that slightly less than 6% ($r^2 = .058$) of technical skill, as measured by the C-SEI, could have been attributed to the influence of the use of intuition, as measured by the AUINS, and that more than 94% could have been influenced by variables other than those investigated in this study. Regardless of the evidence of a slight correlation between technical skills and the use of intuition at a
statistically significant level, the correlation of determination indicated that no
meaningful relationship existed between the variables (see Table 8).

Table 8. Model Summary Correlation of Determination: Technical Skills and AUINS

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R²</th>
<th>Adj. R²</th>
<th>SE of the estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.267&lt;sup&gt;a&lt;/sup&gt;</td>
<td>.071</td>
<td>.058</td>
<td>.825</td>
</tr>
</tbody>
</table>

<sup>a</sup>Predictors: (Constant), AUINS

Additional Question: Age, Simulation, and Intuition

In keeping with the tenet of Benner’s (1984) novice-to-expert theory that
experience leads to higher level, intuitive decision-making skills, the influence of
experience that occurs with increased age was examined related to simulation, as
measured by the C-SEI, and intuition, as measured by the AUINS. Four categories of
ages were included in the study, that is, 18 to 24 years, 25 to 30 years, 31 to 39 years, and
age 40 years and over. A Pearson product-moment correlation was used to compare
participants in each age category to their C-SEI composite scores. Table 9 illustrates the
relationships between age categories and composite scores.

The strongest correlation among the age categories was a moderate inverse
relationship between members of the 18-to-24 year group and composite scores on the C-
SEI, resulting in a correlation coefficient of -.394, with a statistical significance of .001.
An inverse relationship indicated that the younger students scored lower on the C-SEI.
Students ages 40 years and over also scored lower on the C-SEI, as indicated by a
correlation coefficient of .098.

Students in the midrange age categories performed better on the C-SEI. The
correlation coefficient between those in the 25-to-30 year category and composite scores
on the C-SEI was .251, with a statistical significance of .03. In the 31-to-39 category, the correlation coefficient was similar at .248 and also was statistically significant ($p = .036$).

Table 9. Correlations: Composite (Total) C-SEI Scores and Age

<table>
<thead>
<tr>
<th></th>
<th>18-24</th>
<th>25-30</th>
<th>31-39</th>
<th>40+</th>
<th>Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-24</td>
<td>Pearson correlation</td>
<td>1</td>
<td>-.546**</td>
<td>-.394**</td>
<td>-.285'</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.001</td>
<td>.015</td>
<td>.001</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>25-30</td>
<td>Pearson correlation</td>
<td>-.546**</td>
<td>1</td>
<td>-.284*</td>
<td>-.174</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.000</td>
<td>.016</td>
<td>.144</td>
<td>.033</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>31-39</td>
<td>Pearson correlation</td>
<td>-.394**</td>
<td>-.284*</td>
<td>1</td>
<td>-.148</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.016</td>
<td>.214</td>
<td>.036</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>40+</td>
<td>Pearson correlation</td>
<td>-.285'</td>
<td>-.174</td>
<td>-.148</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.015</td>
<td>.144</td>
<td>.214</td>
<td>.412</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
<tr>
<td>Total</td>
<td>Pearson correlation</td>
<td>-.392**</td>
<td>-.251*</td>
<td>-.248*</td>
<td>.098</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed)</td>
<td>.001</td>
<td>.033</td>
<td>.036</td>
<td>.412</td>
</tr>
<tr>
<td></td>
<td>N</td>
<td>72</td>
<td>72</td>
<td>72</td>
<td>72</td>
</tr>
</tbody>
</table>

**Correlation is significant at the .01 level (2-tailed).**

*Correlation is significant at the .05 level (2-tailed).

To achieve a more comprehensive representation of the relationship between age categories and composite scores on the C-SEI, midpoint categories were calculated for each age range and regressed against the C-SEI, resulting in a curvilinear distribution. A curvilinear distribution indicates an increase, plateau, and decline, or the inverse, along the Y-axis as scores change on the X-axis (Creswell, 2008; see Figure 1). A coefficient of determination of .165 indicated that more than 16% of the variation in the C-SEI composite scores could have been attributed to age. Conversely, more than 83% could have been influenced by variables other than age; therefore, age had a weak influence on the scores on the C-SEI.
The relationship between age and the use of intuition was determined by a correlation coefficient of .132, indicating little, if any, relationship with no statistical significance ($p = .269$). Of the four age categories, the strongest but nonsignificant correlation between age and the use of intuition occurred in participants in the 18-to-24 age category, with an inverse correlation coefficient of -.179, suggesting that the younger students used intuition less often than the older students did. Although there was no statistically significant relationship between or among any of the age categories and the use of intuition in clinical decision making, those in the 31-to-39 age category used intuition more than those in other groups did (see Table 10).

Table 10. Correlations: Age and AUINS

![Figure 1. Curvilinear distribution of age range regressed against C-SEI total scores.](image)
As with the variables of age and scores on the C-SEI, median age points were regressed against scores on the AUINS. Results suggested that 4% of the use of intuition, as measured by the AUINS, could have been related to age ($r^2 = .042$) and 96% could have been related to variables other than those in this study, confirming that no relationship existed between age and the use of intuition in clinical decision making (see Figure 2).
Chapter 4 Summary

The purpose of this study was to investigate the relationship, if any, between simulation as a teaching strategy and the use of intuition in clinical decision making in ADN students. Chapter 4 began with a description of the sample of second-level ADN students from a community college in the Midwestern United States. Convenience sampling produced 72 participants ranging in age from 18 to over 40 years.

Variables included simulation, as measured by four elements of the C-SEI (Todd et al., 2008), namely, patient assessment, communication, critical-thinking, and technical skills; intuition, as measured by the AUINS (Rew, 2000); and age subdivided into four categories (18-24, 25-30, 31-39, and 40 years and over). Statistical analysis was

Figure 2. Curvilinear distribution of age range regressed against AUINS.
conducted using Pearson’s product-moment correlation coefficient and the coefficient of determination.

Results related to the primary RQ concerning the relationship between simulation as a teaching strategy and the use of intuition in clinical decision making suggested that a slight statistically significant relationship existed. However, upon further investigation using the coefficient of determination, the majority of scores on simulation could have been attributed to other unknown variables. Thus, no convincing evidence for the relationship was established.

Subquestions included the four elements of the C-SEI that were analyzed individually in relation to intuition. Results suggested that no relationship existed between patient assessment and the use of intuition, nor between critical thinking and the use of intuition. A slight statistically significant correlation was found between communication and the use of intuition as well as between technical skill and the use of intuition. However, as with the findings for the primary RQ, the relationships could have been attributed to other variables.

The additional question of the study investigated the influence of age on simulation, as measured by composite C-SEI scores, and the influence of age on the use of intuition in clinical decision making, as measured by the AUINS. Age was found to have the strongest influence on C-SEI scores. Students in the youngest and oldest age categories scored lower on the C-SEI, whereas students in the middle categories performed at a higher level. Nevertheless, statistically, age had a weak influence on scores.
An inverse correlation between participants in the youngest age category and the use of intuition suggested that the younger students relied less on intuition. No relationship was found between students in the other age categories and the use of intuition in clinical decision making. Further discussion of these results and their relation to the literature is included in Chapter 5, in addition to information about limitations of the study, implications for nursing education, and recommendations for further research.
CHAPTER 5. CONCLUSIONS AND DISCUSSION

Introduction

This correlational study examined the relationship between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students. Simulation has been defined as an experiential instructional strategy involving preset patient care scenarios using role-play with task trainers, standardized patients, or lifelike patient mannequins and concluding with a debriefing session (Shinnick et al., 2011). For this study, student performance during a simulation learning activity involving a cardiac emergency scenario was measured by the C-SEI (Todd et al., 2008). Cumulative scores on the C-SEI were the sums of scores from the elements of patient assessment, communication, critical-thinking, and technical skills. Intuition has been defined as an immediate knowing that is distinct from deliberate analytical reasoning (Benner, 1984; Rew, 2000). Intuition was measured by Rew’s (2000) AUINS, a survey containing seven items using a scale of responses: “agree,” “disagree,” or “don’t know.”

In deference to Benner’s (1984) novice-to-expert theory, which attributes the use of intuition in clinical decision making to clinical nursing experience, the variable of age also was included in this study. The ages of participants were categorized into four groups, 18 to 24 years, 25 to 30 years, 31 to 39 years, and 40 years and older. Data were collected during the spring and summer of 2015. Chapter 5 includes a summary of the results and a discussion of the results related to the literature. Limitations of this study are presented, along with the implications of the results for nursing research, education, and practice. The chapter concludes with recommendations for future research.
Summary of the Results

One RQ, four subquestions, and one additional question provided direction for this explanatory, correlational study. Participants comprised 66 women and six men ages 18 years to over 40 years who were enrolled in the final semester of the ADN program at a rural community college in the Midwestern United States. The primary RQ asked whether a relationship existed between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students.

Total scores of the C-SEI measured simulation, and the number of agree responses to the items on the AUINS measured the use of intuition. Correlation and regression statistics were used to analyze the RQ. Results indicated a slight but statistically significant relationship \((r = .233, p = .049)\) between simulation as an instructional strategy and the use of intuition in clinical decision making; however, results of the regression analysis suggested that 96% of the scores on simulation could have been attributed to variables not included in this study.

Subquestions 1 to 4 examined the relationship between the specific elements of patient assessment, communication, critical-thinking, and technical skills on the C-SEI and the use of intuition in clinical decision making. Subquestion 1 asked whether a correlation existed between the element of patient assessment in simulation, as measured by the C-SEI, and the use of intuition in clinical decision making among ADN students. Results for Subquestion 1 found, little, if any, relationship between patient assessment during simulation and the use of intuition in clinical decision making \((r = .099)\). Similar results were found for Subquestion 3, indicating that little, if any, relationship existed between critical thinking and the use of intuition in clinical decision making \((r = .10)\).
Slight but statistically significant correlations were found for Subquestions 2 and 4 between the elements of communication ($r = .243, p = .04$) and technical skills ($r = .267, p = .023$) in simulation and the use of intuition in clinical decision making; however, results of the regression analysis suggested that 95% of the scores on communication and 94.2% of the scores on technical skills could have been attributed to variables not included in this study.

The additional question asked what influence, if any, student age had on the relationship between simulation and the use of intuition in clinical decision making. The results suggested that age was the most important of all variables, with the strongest but still slight correlations occurring between student age and the composite C-SEI score ($r = .282, p = .016$) and student age and the element of critical thinking ($r = .332, p = .001$). The relationship between age and the use of intuition in clinical decision making was minimal ($r = .131$).

**Discussion of the Results**

Previous studies have provided support for the use of simulation as an instructional strategy in nursing education to increase students’ knowledge (Brannan, White, & Bezanson, 2008); confidence (Cioffi et al., 2005; Lisko & O’Dell 2010); and critical thinking (Kaddoura, 2010). In addition, a few studies have investigated the relationship between simulation and clinical decision making (Bambini et al., 2009; Cioffi et al., 2005; Laney, 2010); however, no known studies have explored the possibility of a relationship between simulation as an instructional strategy and the use of intuition in clinical decision making.
The use of intuition in clinical decision making has been attributed to nursing experience (Benner, 1984; Benner & Tanner, 1987; Pyles & Stern, 1983; Ramezani-Badr et al., 2009; Traynor et al., 2010). In the challenging contemporary health care environment, novice nurses also must learn to use intuition in making high-consequence clinical decisions. Pyles and Stern (1983) suggested that novice nurses could learn intuitive clinical decision making by being mentored by experienced nurses. However, the experienced nurses in the current nursing workforce are reaching retirement age (USDHHS, 2010). In the absence of experienced nurses to serve as mentors, novice nurses are responsible for making high-consequence clinical decisions for greater numbers of patients with minimal support (Gillespie & Peterson, 2009). Furthermore, novice nurses must be prepared to meet the challenges of high-acuity patient care as soon as they enter the workforce. Clearly, a need exists for an instructional strategy that will strengthen the intuitive decision-making skills of novice nurses.

The purpose of this study was to explore the possibility of a relationship between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students. Results of this study found a slight but statistically significant relationship between overall performance during simulation and the use of intuition in clinical decision making, suggesting that the participants used intuition to a slight degree during simulation. Even though a strong relationship was not found, it could be argued that increasing students’ awareness of the opportunity to use intuition during simulation might encourage students to cultivate this more advanced decision-making process.

In addition, the results indicated slight correlations between communication during simulation and the use of intuition, as well as between technical skills used during
simulation and the use of intuition. These results suggested that these senior students used intuition more when engaging in activities that they felt more comfortable with, such as communicating with their team members and performing technical skills. An inverse correlation between participants in the youngest age category and the use of intuition suggested that the younger students relied less on intuition. A slight relationship was found between age and overall performance during simulation and between age and the element of critical thinking during simulation, indicating that older students performed better and demonstrated more critical thinking during simulation.

Study variables for which no relationship was found included patient assessment and the use of intuition, critical thinking and the use of intuition, and age and the use of intuition. Patient assessment is a process of gathering data (AACN, 2008); therefore, it is possible that the intuitive decision-making processes would not come into play at this point in patient care. The complexity of patient situations also could influence the degree to which nurses employ intuition during patient assessment, and it is possible that a more complex simulation scenario in the study could have had a similar influence on students.

Critical thinking implies a deliberate reflection upon and interpretation of data (Horan, 2009; Todd et al., 2008), whereas intuition is an immediate knowing (Benner, 1984; Rew, 2000). Thus, the absence of a relationship between critical thinking and the use of intuition was expected. Unexpected, however, was the lack of a relationship between age and the use of intuition. According to Benner’s (1984) novice-to-expert theory, expertise in clinical decision making comes with experience. It was assumed that increased age would be related to increased experience, not necessarily in nursing experience, but in life experience, which would lead to greater use of intuition in making
decisions. No relationship was found between any age category and the use of intuition; however, a statistically significant inverse relationship was found between the youngest students’ ages and their use of intuition ($r = -.285, p = .015$), indicating that the youngest students used intuition even less than the older students did. This finding does not contradict Benner’s theory, but it does identify a false assumption of this study. Benner correlated the use of intuition with expertise and experience in nursing, whereas this study equated the use of intuition with the life experiences that come with increased age.

**Discussion of Results in Relation to the Literature**

In researching the difficulties facing novice nurses as they enter the health care workforce for this study, the ability to make high-stakes patient-care decisions was found to be of primary importance. Research into clinical decision making led the researcher to Benner’s (1984) novice-to-expert theory, which describes expert clinical decision making as intuitive. A review of the literature on the use of intuition in decision making resulted in this investigation of simulation as an instructional method that could inspire nursing students to use intuition in clinical decision making in order to be better prepared to work in the challenging field of health care.

**Literature on Kolb's Experiential Learning Theory**

Kolb (1984) proposed that learning is accomplished through four stages of experience: concrete experience (do), reflective observation (observe), abstract conceptualization (think), and active experimentation (plan). Intuition is used in the second stage of reflective observation, during which learners interpret their experiences through a meaningful framework. Following the simulation learning activity in this study,
students participated in a debriefing session that was commensurate with the reflective observation stage of experiential learning.

In simulation of a real clinical situation, students would reflect on and interpret their decisions and actions, comparing themselves to more experienced colleagues, in this case, instructors. They then would think about how they would react in another similar situation and test their plan. Students in this study moved through Stages 1 to 3; however, whether they had the opportunity to test their new knowledge remains unknown.

**Literature on Intuition**

Several researchers have found that experienced nurses can and do use intuition in clinical decision making (Benner & Tanner, 1987; King & Clark, 2002; Lyneham et al., 2008; Pyles & Stern, 1983; Ramezani-Badr et al., 2009; Traynor et al., 2010; Welsh & Lyons, 2001); however, fewer studies have been conducted with novice nurses. Studies involving experienced nurses have found that the clinical decision-making process includes a combination of analytical reasoning and intuition. Moreover, trust in the use of intuition increases with experience in nursing. In contrast, this study with novice nurses found only a slight use of intuition when making clinical decisions during simulation.

Ruth-Sahd and Hendy (2005) investigated the influences on novice nurses that could predict the use of intuition, for example, life experience and age. Conversely, the current study found little, if any, relationship between student age and the use of intuition. Other studies involving novice nurses have suggested ways to encourage the use of intuition in clinical decision making, such as encouraging students to explore multiple ways of knowing (Ruth-Sahd & Tisdell, 2007); assigning students to read the accounts of graduate students who used intuition in nursing practice (Beck, 1998); and
providing validation of students’ intuitive decision making (Kosowski & Roberts, 2003). Given the evidence that simulation has resulted in improved clinical decision making, this study investigated the use of simulation as a strategy to encourage the use of intuition in clinical decision making.

**Literature on Simulation**

Research has suggested that simulation as an instructional strategy helps students to develop clinical decision-making skills (Bambini et al., 2009; Cioffi et al., 2005; Goon et al., 2013; Kaddoura, 2010); however, no studies were found on the relationship between simulation as an instructional strategy and the use of intuition in clinical decision making. This study was based upon the premise that there could be a relationship between simulation, an instructional strategy that improves clinical decision making, and the use of intuition, a more advanced process for making clinical decisions. With only a slight but statistically significant relationship found, this premise could not be supported strongly.

**Study Limitations**

The study had several limitations. First, the sample size of 72 participants was smaller than the minimum of 88 required for a level of significance of .05, a power of .80, and a medium effect size of .30, as discussed in Chapter 1. This limitation not only detracted from the significance of the findings but also limited the generalizability of the results.

Second, the instruments used for data collection could have produced biased results. The C-SEI (Todd et al., 2008), which was used to measure student performance
on simulation, relied on scoring by a single data collector, the researcher, who could have inadvertently awarded biased scores, regardless of the training provided by the instrument developers. The use of two or more scorers who had no vested interest in the study might have reduced the potential for researcher bias.

The AUINS (Rews, 2000) relied on the participants’ self-reported answers, which could have posed a threat to validity by the participants responding in accordance with the researcher’s objective or responding in ways that would have made them appear favorable (Norwood, 2000). Although the researcher instructed the participants to answer the survey truthfully, the possibility of bias did exist. Considering the difficulty of measuring an intangible quality such as intuition, it is understandable that all known instruments on intuition rely on self-reported data.

The exclusivity of this study’s correlational design limited the findings to those that could be extrapolated from essentially two variables, simulation and intuition, whereas another design might have produced more significant results. A pretest-posttest design could have facilitated the collection of data on the use of intuition in clinical decision making before and after the simulation, a protocol that might have provided additional information to address the primary RQ. In addition, taking into consideration the participants’ experience working in health care rather than their ages exclusively might have provided insight into additional influences.

Finally, the nursing students at the community college where this study was conducted had little experience with simulation. The STEMI simulation, during which data for this study were collected, was only the third simulation experienced by the participants in the 2 years of their nursing education. Greater familiarity with simulation
might have decreased distractions caused by the technical aspects of the scenario, for example, the computerized mannequin and the touch-screen cardiac monitor might have allowed more innate decision-making skills to emerge.

**Implications of the Results for Practice**

Implications of the results to practice in the field of nursing education include the providing information about the role of intuition in decision making as a complement to the linear process of critical thinking in an effort to inspire novice nurses to use different ways of knowing. Instructional strategies that emphasize analytical and intuitive decision-making skills must be incorporated into nursing education in order to help novice nurses to gain these advanced skills.

An unexpected result suggested that the older students in the study performed at a higher level during the simulation scenario than younger students did. Thus, educators must recognize that not all simulation scenarios appeal to or demonstrate the abilities of students of diverse ages equally. It is imperative to use a variety of scenarios that encourage and engage students of all ages. This recommendation might be more pertinent to nursing programs in community colleges, where there is greater diversity in the ages of the students.

**Implications for Further Research**

The results indicated that further research on instructional strategies that acknowledge and emphasize the use of intuition in clinical decision making is essential in preparing novice nurses to function effectively in a complex health care environment.
Further analysis of the concept of intuition and its role in clinical decision making could help educators to recognize and incorporate this critical concept into nursing education. In addition, research to identify simulation scenarios that inspire decision making at the highest level is needed.

Regression analysis results indicated that composite scores on simulation and scores on communication and technical skills, although statistically significant, could have been the result of variables not included in this study. Further research into the variables that influence students to perform well during simulation might assist educators in identifying ways to help students to receive the most benefit from simulation learning activities.

Replication of this study with a larger sample of students who are more familiar with simulation could produce more meaningful results and increase their generalizability. Because this study was conducted in a rural community college in the Midwestern United States, replication in a more heavily and diversely populated setting could result in more concrete findings. In addition, incorporation of a pretest-posttest design into this correlational study would have provided a clearer measure as to what amount of intuition used in decision making was stimulated by the simulation scenario.

Simulation as an experiential teaching strategy allows educators to incorporate very specific learning outcomes into scenarios. Further research into simulation scenarios that target and allow learners to achieve specific learning outcomes, such as identifying and acknowledging the use of intuition in clinical decision making, could help novice nurses to prepare for the types of high-stakes decisions that they will have to make in the workplace.
Conclusion

The need for an instructional strategy to help novice nurses to develop the intuitive decision-making skills used by experienced nurses is imperative. This study examined the possibility of a relationship between simulation as an instructional strategy and the use of intuition in clinical decision making among ADN students. Although the results showed slight but statistically significant relationships between performance during simulation and the use of intuition, performance during simulation and age, communication and the use of intuition, and technical skills and the use of intuition, the results of the regression analysis indicated that these findings could have been attributed to variables not included in this study. No significant relationship was found between critical thinking and the use of intuition, patient assessment and the use of intuition, and age and the use of intuition. Therefore, further research is needed to discover instructional strategies that will inspire novice nurses to acknowledge, develop, and use analytical and intuitive clinical decision-making skills far earlier in their careers than their predecessors did.
REFERENCES


