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APPLICATION OF A JUDGMENT MODEL TOWARD MEASUREMENT OF CLINICAL JUDGMENT IN SENIOR NURSING STUDENTS

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ABSTRACT

Application of a Judgment Model toward Measurement of Clinical Judgment in Senior Nursing Students

by

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Clinical judgment, defined as "the application of the nurse's knowledge and experience in making decisions about client care" (The National Council of State Boards of Nursing, 2005, p. 2), has been recognized as a vital and essential skill for healthcare providers when caring for clients. Undisputedly, nurses represent the largest component of the healthcare profession and, therefore, play a major role in ensuring quality patient care in the United States. Although the concept of clinical judgment in nursing has been discussed for more than three decades, and in spite of numerous efforts to improve student clinical judgment, the recent literature indicates that most new graduate nurses do not meet expectations for entry-level clinical judgment ability.

The overall goal of this project was to investigate the feasibility of using Brunswik's Lens Model in the development of a quantitative instrument to measure clinical judgment in senior level nursing students. A newly designed instrument, Clinical Judgment Assessment (CJA) Instrument, was developed specifically for this study. A paper and pencil assessment was conducted, using two case vignettes based on authentic patients to measure clinical judgment of senior nursing students. Nurse expert responses served as criteria for the measure. A convenience sample of 250 senior nursing students in

baccalaureate and associate degree nursing programs were recruited from approved nursing programs in the Southern Nevada area.

Content validity of the instrument was reflected through the use of concept analysis, expert opinion, and the content validity index (CVI). The CVI for the instrument as rated by the experts reflected .86 to 1.00 for items designated as “important.”

Reliability of the instrument was estimated using Cronbach's alpha (α) and test-retest procedure. The scores from the test and the retest were calculated using Cohen's Kappa and found the statistical significance of Kappa ($p < .05$) at .750 for the medical case and .799 for the surgical case. For the adjusted CJA instrument, reliability coefficients (α) of .879 and .892 were found for the medical and the surgical case, respectively.

The final number of items in the CJA instrument was 172. The composite (CJA) scores, calculated by the formula proposed in this study, of students and experts were analyzed (*t*-test) and found a statistically significant difference ($p < .05$) between the two groups. This finding provided support to the validity of the CJA Instrument.

This study provided an initial understanding of the measurement of clinical judgment. Recommendations for further study include further establishment of the criteria for the instrument through administration to a larger sample of nurse experts. A web-based format is recommended due to the complexity of the assessment and the scoring.

ACKNOWLEDGEMENTS

This dissertation is one of the most significant challenges I have ever had to encounter. Without the guidance and supports of my committee members, friends and family, this study would not have been successfully completed. It is to them that I owe my deepest gratitude.

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My thanks and appreciation to senior nursing students and nursing instructors who cooperated and participated in my study. Last but not least, I wish to thank my family who has always believed in me and supported me from thousands of miles away.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

APPLICATION OF A JUDGMENT MODEL TOWARD MEASUREMENT OF CLINICAL JUDGMENT IN SENIOR NURSING STUDENTS

Safety remains a high priority in medical treatment and nursing care in the United States healthcare system despite state of the art technology and recognized leadership. The rising cost of healthcare, advanced technology, increased acuity of patients in acute care settings, and increased nurse to patient ratios demand that nurses be highly competent when responding to varying patient conditions. One of the most essential competencies needed by professional nurses to provide safe and effective care is clinical judgment (ANMC, 2005; Lenburg, 1999).

Clinical judgment in nursing, defined by the National Council of State Boards of Nursing (NCSBN, 2005) as "the application of nurse's knowledge and experience in making decisions about client care," has been recognized as a vital and essential skill that enables nurses to determine appropriate nursing interventions when planning care for a client. It is crucial for nurses to arrive at accurate clinical judgments in order to provide safe and effective patient care. More important, nurse educators must be able to prepare new graduates with an acceptable level of clinical judgment to ensure positive care outcomes.

This chapter will address background information regarding the concept of clinical judgment in nursing practice and nursing education, the purpose of the study, definition of terms, and the significance of the study to nursing.

Background

In nursing literature, clinical judgment has been used interchangeably with "critical thinking," "problem-solving," "decision-making," "clinical reasoning," and "nursing process." Tanner (2006), a prominent nurse educator, used the term “clinical judgment” to mean “an interpretation or conclusion about a patient’s needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient’s response" (p. 204).

Results from the literature review regarding the concept of clinical judgment between the years of 1980 to 2008 included studies from nursing, medicine, education, and psychology. A unified term for "clinical judgment" was not found. Based on the literature review, the following attributes were identified by this researcher as the defining attributes of clinical judgment:

Information Gathering

To develop a better understanding of a client's conditions, initially student nurses gather relevant information about a client, using knowledge and observation skills. Nursing knowledge is viewed as a prerequisite for “informed nursing action” (Lavin, 2005). In addition, as an important first step in the scientific method, Nightingale (1859/1992) emphasized observation as the most significant “practical lesson” for every nurse. Observation can be both objective and subjective, and involves taking in information.

Interpretation

Interpretation involves clarifying meaning, i.e., determining the significance of clinical information such as medical history, diagnostic tests, laboratory values, vital

signs, prescribed medications, and physical assessment findings. It also includes understanding the meaning of a patient's responses to nursing care.

Prioritization

Deciding upon the importance of tasks/events, as Benner and Tanner (1987) referred to as "sense of salience," is another key attribute of clinical judgment. Being able to prioritize the patient's needs or problems in order of importance is the basis of good clinical judgment.

Intuition

As an attribute of clinical judgment, intuition appears repeatedly in the literature review, and implies the ability to know instinctively what to do. Tanner (2006) referred to intuition as "readily solicited" knowledge needed by the experienced nurse when faced with a familiar situation. Tanner (2006) further characterized intuition as "immediate apprehension" of a client's situation and the response of an experienced nurse when dealing with similar situations.

The importance of clinical judgment for professional nursing practice was recognized early in modern nursing by Florence Nightingale (1859/1992) who expressed the concept of clinical judgment in her well-known book, *Notes on Nursing*:

> The most important practical lesson that can be given to nurses is to teach them what to observe – how to observe – what symptoms indicate improvement – what the reverse – which are of importance – which is of none – which are the evidence of neglect – and of what kind of neglect. All this is what ought to make part, and an essential part, of the training of every nurse (p. 59).

Aligned with Nightingale's emphasis on the need for observation skills the nurse must also be able to perform an accurate assessment. This is frequently based on limited information, yet the nurse must integrate and interpret the available information to understand its meaning and prioritize correctly. Clinical judgment, or "nursing diagnosis" as defined by the North American Nursing Diagnosis Association (NANDA), provides the foundation for decision-making regarding which course of actions (nursing interventions) to take in order to meet the established goals (client outcomes) for which the nurse is accountable (Herdman, 2008).

The NCSBN identifies as its mission “to protect the public health, safety, and welfare” by “overseeing and ensuring the safe practice of nursing” (NCSBN, 2005, p. 2). The council is accountable for guiding state boards of nursing in their evaluation of prelicensure programs regarding the clinical experience component. One premise proposed by the council is that “nursing faculty members facilitate the students’ development of clinical judgment and critical thinking abilities necessary for safe and effective practice” (NCSBN, p. 2).

In the 1990s, the Agency for Healthcare Research and Quality (AHRQ) identified “failure to rescue” as a patient safety indicator. Using this indicator, healthcare providers can be evaluated regarding the degree to which they respond appropriately to adverse patient occurrences. This indicator reflects the quality of surveillance and the effectiveness of the response. Hospital management does expect nurses, experienced and new graduates alike, to be able to accurately recognize changes in a patient’s condition, identify complications in a timely manner, and effectively respond to such complications in order to ensure positive patient care outcomes (Clarke, 2004).

Following the Institute of Medicine's (IOM) publication, *To Err Is Human: Building a Safer Health System (2000),* numerous studies have indicated the need for "an outcome-based" education system that better prepares healthcare providers to meet the demands from both patients and the ever changing health system (Greiner & Knebel, 2003). Nurses, undisputedly, represent the largest component of the healthcare profession and play a major role in ensuring safe quality patient care in the United States.

In nursing education, teaching strategies have been initiated to effectively prepare senior nursing students for the ever-changing healthcare environment. Nurse educators have utilized several innovative pedagogies such as concept mapping (Lin, Hsu, & Tasy, 2003), high-fidelity patient simulators (Lasater, 2007), reflection in active learning (Nielsen, Stragnell, & Jester, 2007), and proactive reflection (Bowen, McKenzie, & Bruce, 2008). In spite of numerous efforts to improve students' clinical judgment, the recent literature indicates that most new graduates have failed to meet expectations for entry-level clinical judgment ability (del Bueno, 2005).

Dorothy del Bueno (2005) reported that no significant improvement in clinical judgment in new graduate nurses has occurred since her study in early 1990. In reality, new graduates are facing increased expectations that require them to possess a much higher level of clinical judgment than ever before. As del Bueno (2005) further discussed, the majority of nursing education programs are still focusing on providing more and more information (content) and not enough focus on the application of nursing knowledge to the real world practice.

Similar findings regarding student levels of clinical judgment were addressed by the NCSBN (2006) based on the report of findings from the survey of Chief Nursing Officers

conducted by Smith and Crawford in 2001 and 2003. Newly licensed nurses were being evaluated as inadequately prepared to recognize abnormal symptoms and unable to appropriately respond to emergency situations. In addition, inadequate training of nurses has been cited by the media as a major contributor to medical errors (Berens, 2000).

Tanner (2006), in her proposal to transform nursing education, particularly clinical education, to meet the demand of the current healthcare services, identified one of the problems with the old model of clinical education as “inefficient” use of time in clinical learning. Tanner commented that having students repeatedly perform routine tasks during clinical practice does not benefit the development of their clinical judgment. Tanner further proposed that new models of clinical education be focused on “essential competencies," one in particular being the development of clinical judgment.

Recognizing increased demands for competent nurses in the current healthcare system, nurse educators are challenged and held accountable for supplying high quality graduates. However, despite the National Council of State Boards of Nursing (NCSBN) developing the NCLEX-RN examination that tests entry-level nursing competence of new nursing graduates, this test cannot measure how new graduates will perform in the actual clinical setting when faced with limited information and uncertainty.

Current measures of clinical judgment have been developed primarily for experienced nurses. They are often aimed at measuring nurses’ abilities to accurately identify nursing diagnoses using laboratory tests, or reviewing patient notes and examining the nurses’ ability to accurately predict patients who are at risk of certain complications during hospitalization (Dowding & Thompson, 2003).

However, since nursing judgments are often based on uncertain information about a patient's condition, measurement of nursing judgments should consider not merely the outcome, but the key processes involved. Such processes include discovering, acquiring, and searching through information, as well as combining information and feedback (Newell, Lanado, & Shanks, 2007).

A major challenge for nursing educators today is the need to accurately measure clinical judgment in nursing students. Despite this crucial need, few measures of clinical judgment for nursing students exist.

Purpose of the Study

Nurse educators today are challenged with the important responsibility of assisting nursing students to develop accurate and reliable clinical judgment skills. The associated challenge of nursing educators is to measure the clinical judgment ability of nursing students. A valid and reliable quantitative measurement of clinical judgment ultimately can offer an effective teaching strategy which will improve the quality of new graduates and increase their potential to become competent practitioners sooner.

The purpose of this study is to investigate the feasibility of using Brunswik's Lens Model in the development of a quantitative instrument to measure clinical judgment in senior level nursing students. The five aims of the study are: 1) to design an assessment instrument to measure clinical judgment in senior nursing students, 2) to administer the instrument to senior nursing students, 3) to analyze the findings, 4) to establish validity and reliability for the instrument, and 5) to revise the instrument as necessary.

Definition of Terms

The following terms are defined for use in this study (See Appendix A).

Clinical judgment

For the purpose of this study, the theoretical definition of clinical judgment is defined as a process, used by student when planning care for a client that involves prior knowledge and experience, the identification of multiple cues, the acquisition and search for additional information, the combination and interpretation of available information, and prioritization. In this process, student nurses use knowledge and observation skill (when gathering information), interpretation, prioritization, and intuition to arrive at a clinical judgment. The operational definition of clinical judgment is scores obtained on the clinical judgment assessment (CJA) Tool.

Information Gathering

The ability to identify relevant clinical information requires student nurses to use both knowledge and observation skill. Theoretically, as described by Chinn & Kramer (2004), knowledge "represents what is collectively taken to be a reasonably accurate understanding of the world as it is known by the members of the discipline" (p. 2). Observation is conceptually defined as "the act of noticing client cues" (Craven & Hirnle, 2006, p. 159). Observation, guided by knowledge, is one of the primary means of collecting information about a client that can be perceived by one or more purposeful use of the senses to yield both objective and subjective information about a client (Bellack & Edlund, 1992). In this study, information gathering is operationally defined by a score earned by a student (number of items accurately identified by a student based on the experts' responses, one point was given for each correctly matched item) divided by the maximum possible score (70) on the measure.

Interpretation

In this study, the theoretical definition of interpretation is the act of establishing the meaning of information about a client's condition for diagnostic purposes (drawing a conclusion). Operationally, interpretation is defined by a number of clinical information accurately identified by student as the most supportive information for the identified nursing diagnoses based on the experts' responses, one point was given for each correctly matched item) divided by the maximum possible score (35 for medical case and 30 for surgical case) on the measure.

Prioritization

The theoretical definition of prioritization is an act of evaluating a group of items and arranging them in order of importance or urgency to the welfare of a client at a given time. In this study, prioritization is defined by the rank order assigned for each nursing diagnosis (1 = highest priority). The score for prioritization was calculated by using the absolute value of each nursing diagnosis identified by the experts (ideal rank) minus the ranked nursing diagnosis (by student) and subtract the sum of all values from the ideal ranked.

Intuition

Benner (1987) defined intuition as "understanding without a rationale" (p. 23). In this study, the theoretical definition of intuition is the ability to act or decide appropriately without deliberately and consciously balancing alternatives, without rule or even without awareness (Gigerenzer, 2007; Hogarth, 2001; Klein, 2003; Myers, 2002). Gladwell (2005) described, in his book "*Blink*," that intuition is derived from implicit knowledge developed and enriched in years of experience. A similar notion of intuition has been

addressed by nursing scholars (Benner, 1987; Leners, 1992). For this reason, the present study, with the purpose of measuring clinical judgment in nursing students, will not attempt to measure intuition.

Clinical Information

The theoretical definition of clinical information is "the commodity" used to assist practitioners in making patient care decisions (Wyatt, 1996). Furthermore, in nursing practice, it is defined as data about an individual patient obtained from a shift change report, initial observation, interview, physical examination findings, diagnostic evaluations, medical interventions, and outcomes. The operational definition of clinical information is the data provided on the CJA Instrument about a hypothetical patient.

Senior Nursing Students

Theoretically, senior nursing students can be defined as nursing students in their last semester of Associate Degree in Nursing (ADN) or Baccalaureate Degree of Science in Nursing (BSN) programs. The operational definition of senior nursing students is the nursing students, completing the last semester of their program, participating in this study.

Significance of the Study

On January 16, 2009, US Airways Airbus A320, flight 1549 crashed into the Hudson River and all 155 passengers and flight crew members on board were saved. The pilot, Captain Chesley B. Sullenberger III, was hailed as an aviation hero. Nursing educators, interested in enhancing the clinical judgment ability of nursing students, can use this aviation success story to ask the following two questions: What contributed to the pilot's

superior judgment under such pressure allowing him to select the action he did at that particular moment? Can good judgment be taught or it can only come with experience?

Similar to a curriculum in nursing education, the Federal Aviation Administration (FAA) requires pilots to be trained to respond to a given set of situations, based on available information, in a systematic manner using 3Ps (perceive, process, and perform) to determine the best course of actions (FAA, 2008). More important to the purpose of this study is the shared belief that good judgment can be taught. Nursing educators analogously seek methods to teach nursing students good clinical judgment skills.

Over the last three decades, nursing education has focused on the concepts of "critical thinking" and "clinical judgment" with the emphasis on "critical thinking." Not until the early 1990's has clinical judgment gained more attention in nursing education, in large part due to increasing demands for patient safety. As previously discussed, "failure to rescue" has been identified as one of the patient safety indicators that directly reflects the performance quality of nurses when monitoring a client and the appropriateness of actions taken once complications are early detected, or both.

According to HealthGrades, an independent healthcare ratings organization (2008), from 2004 to 2006 “failure to rescue” (number of death among surgical inpatients with serious treatable complications) claimed 188,329 lives. Although some studies indicated lower rates of "failure to rescue" with low patient-nurse ratios (Clarke & Aiken, 2003), others indicated that even when staffing is adequate the "failure to rescue" rates still rise (Mitchell & Shortell, 1997).

Hughes and Mark (2004) reported the most likely causes of such failure included failure to inform the physician regarding client’s condition, failure to obtain a proper

response from the physician, and failure to initiate prompt response as warranted by the clinical situation. The authors concluded with recommendations to improve the ability of nurses to effectively monitor patients and interpret available clinical information, or in other words, to improve the clinical judgment of nurses.

For more than 40 years the cost of U.S. healthcare has been in "crisis" for a number of reasons ranging from the high costs of specialized services, medical technology, and administrative overhead. Cost containment is crucial. One of the most common cost containment strategies is to control the operational costs, which include the cost of delivering care. The nursing service department, which carries expenses incurred by educating newly graduate nurses, is considered the largest cost center in the hospital budget. The cost of orienting a newly licensed nurse is reported to be between $39,000 and $65,000 (Reiter, Young, & Adamson, 2007). In addition, media focus on patient safety events (i.e., medical errors) in acute care hospitals has claimed that nurses are inadequately prepared (Burns & Poster, 2008). These patient safety events were reported to cost the federal Medicare program $6.9 billion and resulted in 92,882 “potentially preventable deaths” from 2005 through 2007 (HealthGrades, 2009). When facing budget cuts, nursing administrators are pressured to balance the budget and improve quality patient care.

Nurse educators are further challenged to demonstrate the value that our graduates bring to patient care and the healthcare system as a whole. NCSBN (2009) estimated that there are about 150,000 new graduate nurses entering the U.S. healthcare system each year. Nurse educators realize their important role in teaching nursing students to develop sound clinical judgment in order to provide safe patient care.

However, in order to promote the development of an acceptable level of clinical judgment in nursing students, measurement of their skill and progress is crucial. A valid and reliable instrument is necessary. Such an instrument could measure clinical judgment in nursing students and determine areas needing improvement, further development, or remediation, and in turn would ultimately lead to the prevention of patient complications and may contribute to keeping healthcare costs down.

CHAPTER 2

REVIEW OF LITERATURE

The concept of clinical judgment is of particular interest to multidisciplinary experts in psychology, medicine, and nursing because of its impact on clinical practice as well as education. Since early 1950, clinical judgment has been widely examined regarding clinical vs. statistical/actuarial judgments (Dawes, 1989; Grove, 2000; Meehl, 1954), the use of information to improve clinician's judgments (Redelmeier, Shafir, & Aujla, 2001; Duncan & Evens, 2009), as well as improvement for quality of patient care outcomes (Burritt, Wallace, Steckel, & Hunter, 2007; Holmboe, 2008).

Despite numerous interests, no unanimous definition of clinical judgment exists. In medicine as well as in psychology, clinical judgment, clinical decision-making, and informed clinical opinion are often used synonymously. In nursing the terms clinical judgment, critical thinking, decision-making, clinical reasoning, problem-solving, and nursing process are frequently used interchangeably. With a tendency for each discipline to use a variety of terms for the concept of clinical judgment, the measurement of clinical judgment remains a significant challenge, especially for the nurse educator.

This chapter addresses the definition, attributes, and process of clinical judgment. A discussion of clinical judgment in medicine precedes the discussion of clinical judgment in nursing practice and nursing education. The review of literature concludes with a discussion of measuring clinical judgment in nursing and a summary.

Definition of Clinical Judgment

Beginning with the ancient Greeks, Aristotle in the *Nicomachean Ethics* described *phronesis*, "the virtue of prudence," or "practical wisdom," as the key to enabling human

beings to determine the right course of action to take when knowledge depends on uncertainty (Gutek, 2006). Although nursing scholars have tried to define clinical judgment over the past four decades, a common agreement on the definition of clinical judgment has not yet occurred (Hansten, 2002).

For the purpose of this study, it is necessary to thoroughly examine the concept of clinical judgment in order to understand its meaning and to establish content validity for the proposed instrument, which is especially crucial in item development. Because there is no unanimous dictionary definition of "clinical judgment," the two words need to be defined independently. By defining each of the words independently, it is possible to facilitate a comparison with the available definitions to provide a clear and concise meaning to the intention of the definition of "clinical judgment" used in this study.

The *Webster's New World Medical Dictionary* (2003) defines clinical as "having to do with examination and treatment of patients" and "applicable to patients." The *Online Dictionary* (2005) defines clinical as "pertaining to clinic or to the bedside" and "pertaining to or founded on actual observation and treatment of patients, as distinguished from theoretical or basis sciences."

From a search on the World Net (2006), available definitions of judgment are "an opinion formed by judging something," "the act of judging or assessing a person or situation or event," "the cognitive process of reaching a decision or drawing conclusions," "the capacity to assess situations or circumstances shrewdly and to draw sound conclusions," and "sagacity: the mental ability to understand and discriminate between relations." MSN Encarta defines judgment as "an opinion formed or a decision reached in the case of a disputed, controversial, or doubtful matter," "the ability to form

sound opinions and make sensible decisions or reliable guesses," and "an opinion formed or given after consideration." Merriam-Webster Online Dictionary defines judgment as "the process of forming an opinion or evaluation by discerning and comparing" and "an opinion or estimate so formed."

Several points of view on clinical judgment in medicine indicate the use of imperfect/insufficient information as an underpinning of the concept of clinical judgment that enables clinicians to determine the best course of action to take when caring for clients. As Cole (2002) discussed, clinical judgment is a form of knowledge so called "practical wisdom," and is gained from experience and consultation with experienced practitioners. Wigton (2008), who discussed the theories of Egon Brunswik in medical education, described clinical judgment as a decision reached after processing multiple forms of available clinical information. In psychology, Redelmeier, Ferris, Tu, Hux, and Schull (2001) defined clinical judgment as the practice of clinical reasoning when caring for clients under uncertainty (imperfect/insufficient information). Most recently, Mosby's Medical Dictionary (2009) defined clinical judgment as "the application of information based on actual observation of a patient combined with subjective and objective data that lead to a conclusion."

Lastly, in the nursing literature, "clinical judgment" has been used interchangeably with "critical thinking," "problem-solving," "decision-making," "clinical reasoning," and "nursing process." Although similarity in meaning exists among these terms, the ultimate outcome of the present study may be to develop an instrument that accurately measures clinical judgment, using the defining attributes identified by the researcher.

Defining the Attributes of Clinical Judgment

To gain the broadest insight into the concept of clinical judgment, the student researcher conducted a thorough literature review and identified the defining attributes that are most frequently associated with the concept of clinical judgment. These attributes are 1) information gathering which based on knowledge and observation skill, 2) interpretation, 3) prioritization, and 4) intuition. As previously discussed in chapter 1, it is not within the scope of this study to measure intuition.

Information Gathering

Information gathering requires the use of knowledge and observation skill. In all uses of the concept it is well accepted that sound clinical judgment will occur only when nurses apply their knowledge. Nursing knowledge is considered a prerequisite for informed nursing action (Lavin, 2005). The National Council of State Boards of Nursing (NCSBN) defined clinical judgment (CJ) as "the application of the nurse's knowledge and experience in making decisions about client care" (NCSBN, 2005, p. 2). In addition, as an important first step in the scientific method, Nightingale (1859/1992) emphasized observation as "the most important practical lesson" for every nurse. As discussed in her book, *Notes on Nursing*, Nightingale (1859/1992) put forward the idea that student nurses need not only see what he/she knows, but also what he/she needs to know. Observing can be both objective and subjective.

Interpretation

Interpretation involves clarifying meaning, i.e., determining the significance of medical history, diagnostic tests, laboratory values, vital signs, prescribed medications, and physical assessment findings. It also includes understanding the meaning of a

patient's responses to the nursing action. Tanner (2006) used the term "clinical judgment" to mean "an interpretation or conclusion about a patient's needs, concerns, or health problems, and/or the decision to take action (or not), use or modify standard approaches, or improvise new ones as deemed appropriate by the patient's response" (p. 204). Hardin and Kaplow (2005), who discussed the American Association of Critical-Care Nurses (AACN) synergy model for patient care, identified clinical judgment as "the use of clinical reasoning including decision-making, critical thinking, and the global grasp of a situation, coupled with nursing skills acquired through a process of integrating education, experimental knowledge, and evidenced-based guidelines" (p. 59).

Prioritization

Being able to identify and appropriately prioritize nursing diagnoses for a client at a particular moment in time is a most valuable nursing skill. Although students are often taught to base their priorities using Maslow's Hierarchy of Human Needs, this approach may not always be applicable. An introduction of the "concept map as a plan of care" offers students another decision-making guide for setting priorities and developing clinical judgment. Step three of the concept map construction process requires students to identify a holistic view of the client by linking nursing diagnoses to determine their interrelatedness, and priorities as a consequence (Schuster, 2007). Prioritization has been cited as one of the most difficult steps to develop in nursing judgment, particularly for those with limited experience (Benner & Tanner, 1987; McNiesh, 2007).

An increased interest in the concept of clinical judgment in nursing education as well as nursing practice results in confusion in understanding and using the concept. For instance, Tanner (2006), concerned with the term "clinical judgment" being used

synonymously with the term "nursing process," perceived "nursing process" as seemingly appropriate for use by inexperienced nurses but not sufficient to ensure positive outcome of care when the situation is more complex and requires higher level of judgment. The terms "clinical reasoning," "clinical judgment," and "clinical decision-making" are often cited by nurse scholars to have the same meaning, though they do not, in part due to the fact that these processes are unconscious and occur almost simultaneously (Thompson & Dowding, 2004).

As described by Doona (1992), one must first be able to assess and understand the situation to arrive at a sound judgment. Secondly, they must use reasoning to confirm that understanding or perception of the situation before one can decide which actions to take. This definition corresponds with the North American Nursing Diagnosis Association's (NANDA, 2008) definition of nursing diagnosis which is "a clinical judgment about individual, family or community responses to actual or potential problems or life processes which provides the basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable" (p. 277).

Clinical Judgment: The Process

Perhaps the most succinct clinical judgment process is the one identified by Newell, Lagnado, and Shanks (2007) with the initial step being to "decide what to look at" or "discovering information" followed by the second step of "acquiring information" or "knowing how to add." Once information is gathered, one must know what to do with the available information, which comprises the third step of "combining information." The final step identified is how to use "feedback" to help improve judgment, or how does one learn from experience?

In medical and psychological practice, the clinical judgment process is described as "an array of activities that includes the gathering, sorting, integrating, and interpreting of data" (Ridley & Shaw-Ridley, 2009, p. 403). Similarly, Dowding and Thompson (2004) described judgment as a process that "involves integrating different aspects of information (which may be about a person, object or situation) to arrive at an overall evaluation" (p. 42).

For this study, an additional step, "prioritization," following the "combining information" step, will be considered. Based on Benner and Tanner's discussion (1987), a "sense of salience" was identified as one of the six key aspects of intuition judgment. The authors commented that in real-world practice not every observation or task is equally important. When assessing the circumstances, nurses need to be able to distinguish the more important pieces of information from the less important ones. The ability to recognize which client's health problems require the highest or immediate attention is of utmost importance for nurses who care for clients when scant resources are available (Lipe & Beasley, 2003).

In summary, for the purpose of this study, the theoretical definition of clinical judgment will be defined as a process used by student nurses when planning care for a client that involves the identification of multiple cues, the acquisition and search for additional information, the combination and interpretation of the available information, and prioritization of the patient's needs using prior knowledge and experience. In this process, nurses use knowledge, skills (observation, interpretation, and prioritization), and intuition to arrive at a clinical judgment.

Clinical Judgment in Medicine

Studies of clinical judgment in medicine have generally been based upon one of three theoretical perspectives: 1) information processing (Adelman, Tolcott, & Bresnick, 1993; Chapman, Bergus, Gjerde, & Elstein, 1993; Edwards, 1968; Feinstein, 1967; Sober, 1979), 2) social judgment (Hammond & Stewart, 2001), and 3) behavioral decision-making (Carter, Butler, Rogers, & Holloway, 1993; Christensen-Szalanski, 1986). While information-processing theorists often utilize computer models to assist with an understanding of the clinical judgment process, social judgment theorists focus on statistical regression models to describe the process. Related to information processing and use of a social judgment framework, behavioral decision-making theory (applying the Bayes' Theorem) emphasizes the development of methods to improve the accuracy of judgment and, in turn, offers strategies for choosing the *best* decision model.

The process of clinical judgment was introduced to medicine when Hammond proposed that Brunswik's Lens Model could be applied to the study of clinical judgment (Hammond & Stewart, 2001). Kenneth Hammond used cognitive psychology as a basis to explore how human beings reason, form judgments, and make a decision. Hammond extended Brunswik's Lens Model and later developed the Social Judgment and Cognitive Continuum Theory.

An interest in improving the clinical judgment of healthcare providers has escalated since the Institute of Medicine (IOM) published their report, *To Err is Human: Building a Safer Health System* (2000). This report addresses the identification of medical errors, many of which can be prevented, and urges for change in the healthcare system to provide better quality of care. Improving patient safety, a critical component of quality

identified by the IOM, requires a comprehensive approach. In the IOM report, safety is defined as being free from accidental injury. Human error is identified as one of the greatest contributors to negative incidents in the healthcare industry (Kohn, Corrigan, & Donaldson, 2000). Error is defined as “the failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim” (Kohn, Corrigan, & Donaldson, 2000, p. 4). The former can be identified as “an error of execution” and the latter can be identified as “an error of planning.” Both type of errors can be prevented and are largely dependent upon the competence of the healthcare provider.

In medical education, Coles (2002) identified explicit knowledge and tacit knowledge as fundamental elements of clinical judgment. Coles further described explicit knowledge as a form of knowledge that is taught formally, whereas tacit knowledge is usually learned from experience (during observation and practice). The two most important contributions of clinical judgment to medicine are the study of variation in physician's judgments about diagnosis and treatment, and the use of the model to measure a clinician's judgment accuracy (Wigton, 2008).

Concerns about the variation in physician's judgments in diagnosis and treatment have resulted in recommendations for the use of practice guidelines, or so called medical algorithms, for patient care as a performance measurement for the physician in an attempt to improve healthcare quality (Wigton, 2008). Despite successes, or so-claimed, of performance measurement, several concerns have been raised about the use of practice guidelines due to the existence of nonlinearity in medicine.

Furthermore, in an effort to understand the underlying process of clinical judgment, and not just the outcomes, Hammond and colleagues created a formula to relate the linear

models of physicians and the actual health status of clients to the accuracy of the judgments (Dhami & Harries, 2001; Hammond & Stewart, 2001; Wigton, 2008). The technique, using multiple regressions to capture the relationship between cues and judgments, is called clinical judgment analysis. Clinical judgment analysis is a method used to measure judgment accuracy based on assumptions that judgments involve assessment of information from multiple cues and that each cue is related to an individual's judgment through the relative important weighting of that cue (Denig, Wahlstrom, de Saintonge, & Haaijer-Ruskamp, 2002; Wigton, 2008). As Kirwan (1986) discussed in his study of rheumatologists' past judgments using a linear model, clinical judgment analysis is proven to be a much better predictor of a physician's future judgment. Furthermore, Hammond and others believe that to significantly improve judgment accuracy is to understand the structure of the task and the cue weights using clinical judgment analysis, and that is the most effective way to learn complex judgment in medicine (Wigton, 2008).

Rock, Bransford, Maisto, and Morey (1987), in their study of ecological validity of clinical judgment, discussed four factors that influence judgment accuracy in psychology including the characteristic of the therapist (i.e., skills, knowledge, and attitudes), availability of information-processing strategies, defined criterial tasks, and the nature of clinical material (the type of information used). These factors, once identified, lead to an understanding of different contexts from which judgments are made. These factors are crucial implications for clinical training and practice.

In essence, the practice of medicine demands that the clinician's judgment involve a synergy of logical and creative-thinking skills (Feinstein, 1994; Lemonick, 1993; Werner

& Asch, 2007). For this reason, clinical judgment in medicine, like in other healthcare disciplines, has been difficult to define and, thus, far more difficult to measure. However, application of the concept of clinical judgment to medical education is needed more than ever to ensure improvement in medical education and ultimately better medical care.

Clinical Judgment in Nursing

In nursing, studies on clinical judgment have been conducted with focuses on two theoretical frameworks: the "rationalistic" and the "phenomenological" perspectives (Fitzpatrick & Wallace, 2005). Whereas the rationalism is based on scientific inquiry, the phenomenological refers to the study of experience or consciousness. Rationalistic research on the clinical judgment of nurses involves information processing, diagnostic reasoning (Kuiper & Pesut, 2004; Murphy, 2004; Simmons, Lanuza, Fonteyn, Hicks, & Holm, 2003), and decision making (Dalton, 2003; Girot, 2000; Higuchi & Donald, 2002; Offredy, Kendall, & Goodman, 2008; Rashotte & Carnevale, 2004). One of the most respected and well-known phenomenological studies on clinical judgment in nursing is that of Benner et al. in the *Novice to Expert* Model (Benner & Tanner, 1987; Benner, Tanner, & Chesla, 1996).

In nursing, Benner and Tanner (1987) believe that intuitive judgment is what distinguishes experts from novice nurses. The authors discussed the concept of intuition as an “essential aspect of clinical judgment” and defined intuition as “understanding without a rationale” (p. 23). In an attempt to understand the role of intuition in clinical judgment made by expert nurses, Benner and Tanner conducted a pilot study by interviewing and observing 21 expert nurses. Six key aspects of intuitive judgment were identified including pattern recognition, similarity recognition, commonsense

understanding, skilled know-how, sense of salience, and deliberative rationality. The authors argued that clinical judgment is not merely a rational calculation which can be derived from simple analysis of the situation. Conversely, they are not proposing that clinical judgment has to be either intuitive knowledge or analytic reasoning; in fact, the authors emphasize the dual application of both intuitive knowledge and analytic reasoning in the clinical judgment process.

Although Benner's work has offered valuable insight into the nature of expert clinical judgments, Dowding and Thompson (2004) argue that it fails to elaborate the relationship between the process of cue or information utilization and clinical judgment accuracy. Dowding and Thompson point out the weaknesses of Benner's observation method because an observer cannot identify information processing strategies merely by observing, and use of a self-report is not reliable because nurses may not understand how they arrived at their clinical judgments. Dowding and Thompson also identified the disadvantage of using the critical incident as a method to study clinical judgment because individual nurses may be asked to identify only successful circumstances and the researcher may not be exposed to a full exploration of issues underlying the nurse's judgment accuracy.

In 2006, Tanner reviewed nearly 200 studies on clinical judgment in nursing and drew five conclusions for the model of clinical judgment in nursing which are described as follows. First, the various types of knowledge that a nurse possesses is more influential than available information. Second, "knowing the patient" and the patient's response patterns will enable the nurse to judge the condition of the patient as an individual. Third, the culture of the environment can influence the judgment of the nurse. Fourth, a variety

of reasoning patterns may be employed by the nurse. Finally, reflection or feedback can enhance clinical knowledge and, in turn, improve clinical judgment accuracy.

Kathleen Bowles (2000) conducted a study to examine the relationship of critical thinking and critical judgment in senior baccalaureate nursing students. The participants were 65 senior nursing students from two baccalaureate nursing programs in northern California. The California Critical Thinking Skills Test (CCTST) was used to measure the critical thinking ability of the students and the Clinical Decision-Making in Nursing Scale (CDMNS) was used to assess clinical judgment. The results indicated a significant positive relationship between critical thinking and clinical judgment. The author challenges nurse educators to develop an innovative teaching model and effective teaching strategies to facilitate the development of critical thinking and clinical judgment in nursing students.

In addition, Beckie, Lowry, and Barnett (2001) conducted a longitudinal study to examine the attainment of critical thinking skills, using the California Critical Thinking Skills Test (CCTST), before and after the revision of a baccalaureate nursing program curriculum. The participants were three cohorts of students, cohort 1 (n = 55) was the class before the curriculum change, and cohorts 2 (n = 55) and 3 (n = 73) were the first two classes using the new curriculum. The results indicated significant improvement on cohort 2 scores when compared to cohort 1. However, cohort 3 failed to demonstrate improved scores on critical thinking over time. The findings were discussed and contributing factors (motivation and incentive in particular) identified. The authors concluded that CCTST, a standardized tool, should be used as a supplement with other

evaluation methods to assess critical thinking in students to better capture students' true critical thinking skills.

In nursing education, several innovative teaching strategies have been initiated in efforts to develop, evaluate, and improve the clinical judgment of nursing students. Examples of studies using teaching methodologies include the work of Nielsen, Stragnell, and Jester (2007) who used reflection to facilitate learning. Lasater (2007) developed clinical judgment rubrics for faculty to use as a guide to evaluate and communicate student learning progress. Lasater also discussed the use of high-fidelity simulation to develop students' clinical judgment. Lasater and Nielsen (2009) also discussed the use of reflective journaling in order to gain understanding of a student's clinical judgment.

Over the past decades, the nursing process has been used by nursing educators to teach a scientific approach to nursing care and is believed to assist students in their development of clinical judgment. However, The North American Nursing Diagnosis Association (NANDA) has been challenged with the issue of the nursing process being a linear process. The nursing process uses a hypothetical deductive model of clinical judgment (a linear model), but it is employed to handle non-linear health problems of the client.

Gordon, Murphy, Candee, and Hiltunen (1994) proposed an integrated model of clinical judgment using two domains of clinical judgment, diagnostic-therapeutic and ethical, as a non-linear process of the nursing process. Though the model is presented as a linear process, the steps in the process will allow nurses to restructure and reevaluate the data and view patient conditions as an integrated perspective. Gordon et al. (1994) further identified three types of clinical judgments most useful in identifying nursing diagnoses.

These judgments are "perceptual judgments" used during the data gathering step, "inferential judgments" used during the interpretation and prioritization of the data, and "diagnostic judgments" used to arrive at nursing diagnoses based on available information.

Measuring Clinical Judgment in Nursing

Measuring clinical judgment in nursing practice is crucial, because nursing decisions direct when to intervene and what courses of action are to be taken. Dowding and Thompson (2003) did an extensive review of theoretical and research issues regarding clinical judgment measures and discussed measurement of the quality of judgment and decision making in nursing practice. The authors focused their discussions on the application of “basic logic” through social judgment approaches or probabilistic methods, and “inter-judge comparisons” approaches to measuring the quality of judgments.

Based on the Lens Model, the social judgment approach measures the relationship between the cues and the actual state of the client's health status, weighted against the criterion through the use of linear models. Probabilistic methods (based on the Bayes’ theory), on the other hand, compare the calculated conditional probability (based on sets of available information) against judgments made by the nurses. Both approaches have consistently demonstrated judgment accuracy of healthcare providers, physicians and nurses alike, though inter-judge approaches may be vulnerable for systematic measurement errors since there is no independent standard.

Dowding and Thompson (2004) pointed out a weakness of the available studies of nursing judgment to be the measurement of judgment accuracy. The authors further

concluded the article by emphasizing the importance of knowledge in nursing judgment so that improvement will be possible.

Recently a judgment analysis, a statistical model using multiple regression equations to model clinician judgments after they have been made with an aim to understand both clinician judgments and the judgment task and context, has gained more attention in measuring clinical judgment in nursing practice. The most common interest in judgment analysis studies in nursing has been to identify how nurses use clinical information in their judgment processes (Beckstead & Stamp, 2007; Thompson, et. al., 2007; Thompson, et. al., 2008). The studies found considerably variation in nurses' judgments, in spite of similar information provided, and such variations were explained by the authors as a result of cue utilization strategies. These results have proven to be valuable to quality care improvement, particularly the use of cognitive feedback as educational interventions to ensure better or more accurate judgment.

As healthcare systems in our country cope with the increasing demand for high quality outcomes of patient care, the nursing profession must first be able to ensure the competency of our nurses through quality education including clinical experience (Clarke, 2004). There is a demand for nurse educators who can develop effective teaching strategies to ensure an acceptable level of clinical judgment of graduate nurses. Most recently, intermediate and high-fidelity patient simulations have gained more attention from nurse educators as useful for the development and evaluation of clinical judgment, and are regarded as a unique learning strategy in a safe environment for students (Alinier, Hunt, Gordon, & Harwood, 2006; Bambini, Washburn, & Perkins, 2009; Gassert, 2006; Lasater, 2007; Thompson & Bonnel, 2008).

Chapter Summary

Nursing research measuring clinical judgment in senior nursing students is lacking. The challenge faced by nurse educators to improve clinical judgment warrants the need for innovative strategies to identify the best teaching model in the development of clinical judgment as senior nursing students enter into real-world practice. Several studies and innovative teaching strategies have been initiated in nursing education programs nationwide to enhance the development of clinical judgment in nursing students. Yet clinical judgment remains complicated and difficult to measure. For this study, the clarification of the term “clinical judgment” is of utmost concern in the instrument development process. Development and testing of this instrument will allow this researcher to capture the key characteristics and process of clinical judgment in students. Ultimately, a valid and reliable instrument could effectively measure and enhance the development clinical judgment in nursing students, for without good judgment, clinician practice is nothing more than a technical, task oriented exercise (Coles, 2002).

CHAPTER 3

CONCEPTUAL FRAMEWORK

This chapter presents the conceptual framework for the present study, which is based upon the Lens Model of Egon Brunswik (first introduced in 1935). Following discussion of the evolution of the Brunswik's model, application of the model is suggested as a framework to explain the formation and validation of clinical judgment in nursing students. The chapter concludes with a literature review related to the Lens Model.

The Lens Model

Most clinical judgments are characterized by uncertainty and probabilistic thought. Human judgment was initially researched in the field of psychology based on a theory of visual/human perception introduced by Egon Brunswik, an Austrian psychologist who came to Berkeley in the 1930s. Brunswik is recognized as a pioneer of cognitive psychology who believed that an organism, living in an uncertain environment, must learn to rely on uncertain information about the environment. To survive in a "probabilistic world," Brunswik suggested that an organism needs to adopt a "probabilistic functionalism" (Hammond & Stewart, 2001). Brunswik later became interested in "perceptual constancy" on the basis of "probabilistic functionalism." A theoretical basis for the study of an organism's adaptation to an uncertain and probabilistic environment is Brunswik's probabilistic functionalism. Therefore, to understand how one makes a judgment requires both understanding the individual's ability to recognize the environment for judgment and understanding what the individual is trying to accomplish or how to survive within that environment.

Brunswik believed that the focus of psychology should be placed on the characteristics of the environment in which an organism lives as much as how the environment impacts the organism. Based on Brunswik cognitive psychology work, his “probabilistic functionalism” proposed that the organism must learn to identify the most "functional aspects” of a stimulus (cue) in order to respond appropriately to the environment (that is uncertain and probabilistic). Brunswik became interested in visual perception, redefined his work and came up with a basic theoretical framework, the Lens Model (See Figure 1).

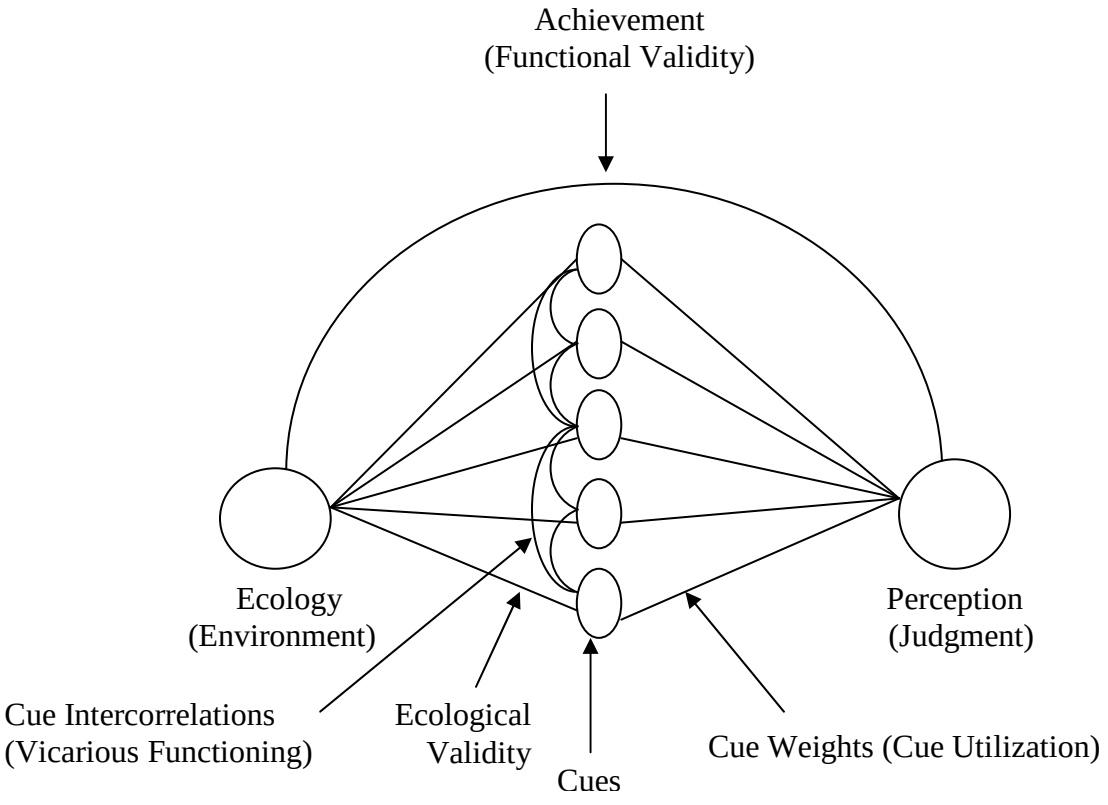


Figure 1. Brunswik’s Lens Model (modified). From Brunswik, E. (1952). *The conceptual framework of psychology*. Chicago: The University of Chicago Press.

The key principle of the Brunswikian approach to perception, the Lens Model, as described by Newell, Lagnado, & Shanks (2007) is that a distal variable (or an object in the environment) generates multiple cues through the stimulation of the judge's perception (judgment). Since the probabilistic nature of the relationships between the cues and the environment are imperfect (meaning they may not reflect the true state of the environment), these cues may be "fallible." Therefore, the judge's perception (judgment) is a process based on interpretations and inferences drawn from imperfect and uncertain information.

To understand the Lens Model is to understand the key assumptions, as Wigton (2008) described, that include: (1) perception is probabilistic, (2) error is inevitable, and (3) the environment contains many redundant cues. Furthermore, as Wolf (2005) emphasized, the three concepts considered as the foundations of the model include ecological validity, vicarious functioning, and functional validity (See Appendix B).

Ecological validity is the term introduced by Brunswik to indicate the degree of correlation between each cue and the true state of the environment to which it is related (Brunswik, 1956). Ecological validity can be referred to as the extent to which cues are valid reflections of the true state of the environment, whereas "cue utilization" can be referred to as probabilistic relations between each cue and the perception (judgment) made by a judge (Hammond & Stewart, 2001). For instance, expert nurses may wish to compare the ecological validity of the cue "medical history of hypertension" with the cue "medical history of uncontrolled diabetes" as indicators of a client’s risk for infection, and find the cue "medical history of uncontrolled diabetes" to be more valid. The difference between the ecological validity of a cue and its actual utilization by a judge (or

so called cue utilization/weight) provides valuable insights for understanding the effective utilization of cue/information by that judge (Hammond, 1998).

Vicarious functioning, according to Brunswik, requires correlated cues. The concepts of "substitute" and "mutual" are, for Brunswik, the foundations of the meaning of vicarious functioning (Wolf, 1999). The concept of vicarious functioning, as Wigton (2008) discussed, is that multiple cues in the environment are often intercorrelated and may provide similar information. For example, different types of clinical information (cues) may provide information about the client's condition. For instance, an infected wound might present with several cues: a temperature greater than 101°, white blood cell (WBC) counts greater than 20,000/mm^3, an incision that appears red with tenderness, swelling and purulent drainage, and a prescribed daily antibiotic. The potential for vicarious functioning can influence judgment accuracy (Hammond & Stewart, 2001). In some circumstances, experienced providers can achieve a high level of clinical judgment accuracy by using different patterns of cue utilization from others who also achieve a high level of clinical judgment accuracy.

Functional validity is determined by the extent to which judgment is a valid reflection of the true state of the environment (criterion) and can be estimated by correlating one's judgment with the true state of the environment (criterion). For instance, a nursing student may utilize the cues of a temperature greater than 101°, white blood cell (WBC) counts greater than 20,000/mm^3, a red swollen incision with tenderness and purulent drainage, and prescribed daily antibiotic daily, to arrive at a judgment about a client's condition (nursing diagnosis) as being "Ineffective Protection" that is the same as an expert nurse's judgment (criterion). In this case an accurate judgment is made by the

student nurse. According to Brunswik, in order to respond correctly to the environment, to be able to survive, an organism needs to be able to identify the most useful or "functional aspects" of a stimulus (Brunswik, 1957). In 1940, Brunswik added to his theory correlation statistics to the measurement of functional validity to represent the extent to which the judge achieves the goal of judgment accuracy about the environment (Doherty & Kurz, 1996).

Though Brunswik valued the cognitive competence of human beings and other organisms and obviously recognized the power of "intuitive perception," Brunswik viewed intuition as a "probability-geared" strategy that is relatively instantaneous, covert, happening with little effort, and mostly imperfect reasoning. Brunswik further discussed the difference between intuition and analysis by characterizing intuition as that which is relatively primitive, automatic, and without logically defensible processes behind it, whereas analysis is characterized by a logical, step-by-step process (Brunswik, 1937).

In 1950, Brunswik added a new metaphor, the "intuitive statistician," to his Lens Model to describe an organism as an active processor of its uncertain, probabilistic environment. Brunswik proposed that an organism can adapt to changing relationships, and perception (judgment) depends on the predictive value of imperfect/insufficient cues. Both Brunswik and Hammond share the same idea regarding intuition and analysis. Hammond later introduced the Cognitive Continuum Theory, a theory so named because Hammond believed that judgment is performed on a continuum, not a dichotomy, anchored at one side by intuition and at the other by analysis (Hammond & Stewart, 2001).

In 1955 Hammond proposed that Brunswik's theory of visual perception, the Lens Model, could be applied to the study of clinical judgment. Based on the analogy of this model, clinical judgment can be modeled as a conclusion drawn by processing multiple fallible cues. For more than 50 years, although the Lens Model has been adapted for use in studies of judgment in many disciplines including nursing, evidence has shown the rate of citation has declined (Hammond & Stewart, 2001). Three possible reasons identified were lack of awareness, difficulty in calculating the Lens Model equation (LME), and in many studies, lacking the criterion data (Hammond & Stewart, 2001).

Present Application of the Lens Model to Nursing Education

In this study, the Lens Model is adapted and used as a theoretical framework which will provide a conceptualization of the clinical judgment process in nursing students. Furthermore, the term "clinical judgment" will be used interchangeably with the term "nursing diagnosis." The reason is that "a nursing diagnosis is defined as a clinical judgment about individual, family or community responses to actual or potential health problems or life processes which provide the basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable" (NANDA, 2009).

Application of the Lens Model to nursing students (See Figure 2) suggests that a nursing student, using knowledge and observation, will perceive multiple available cues as being important or not important (cue utilization) to his/her plan of care. The student is using interpretative skill to establish meaning of the information (cues) to arrive at the best judgment about the patient's responses to his/her health problem (i.e., formation of nursing diagnoses). With limited resources, time and human resources in particular, the student is expected to use prioritization skill to identify the most important nursing

diagnosis, or the nursing diagnosis that is at the highest priority, so that nursing care can be delivered accordingly.

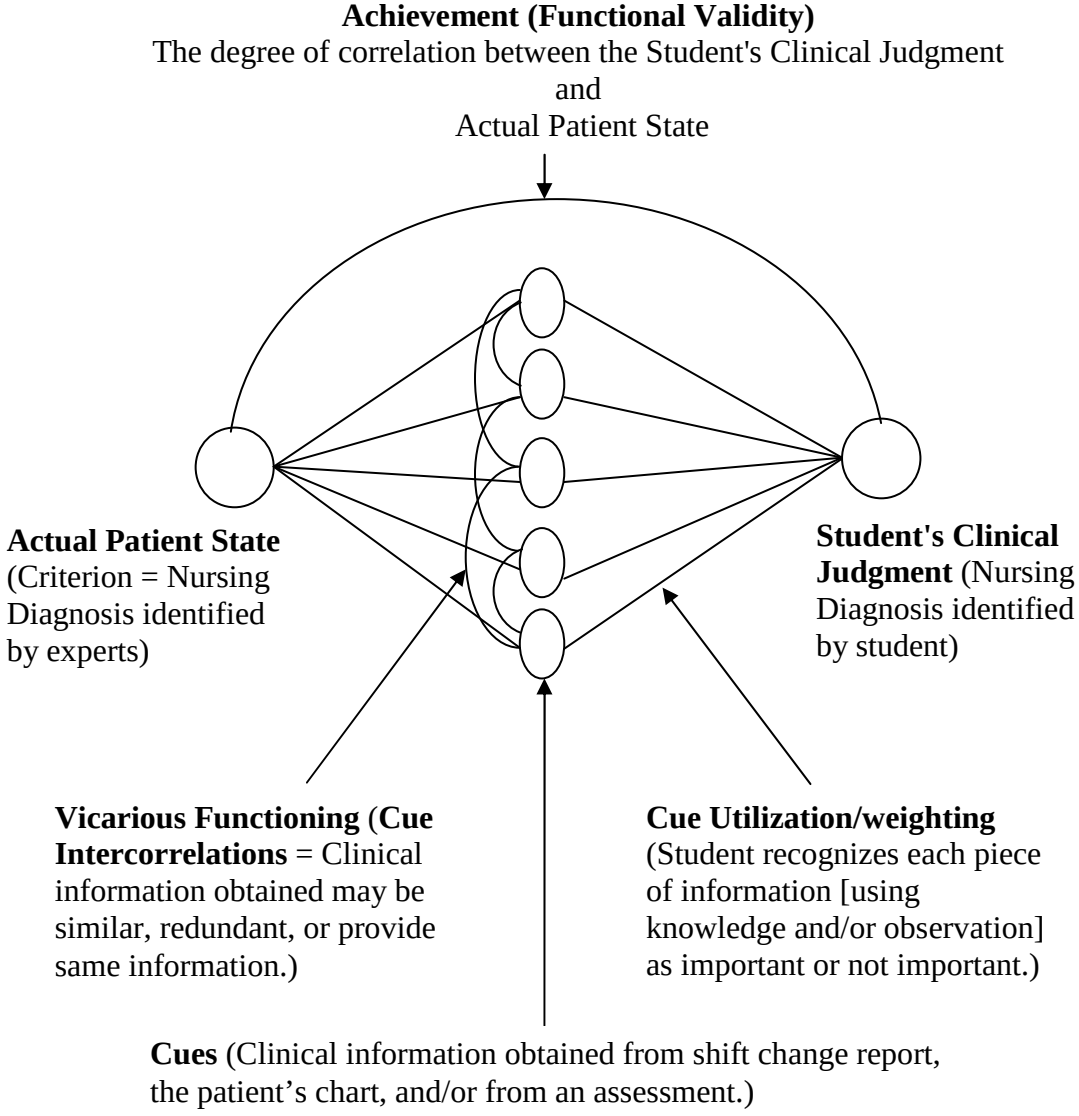


Figure 2. Application of the Modified Lens Model to Student Clinical Judgment (SCJ), by T. Pongmarutai, 2009

In the context of this modified model for application to nursing students, the "true" state of the environment (Ecology) is represented by the "actual patient state" or nursing diagnosis identified by experts (criterion). The cues represent available clinical information about the patient. The nursing student, prior to identifying a nursing diagnosis, pays attention to multiple clinical information (cues) obtained from shift change report and/or a patient's chart including, but not limited to, the patient's chief complaints, medical diagnosis, past medical history, surgical procedure(s), diagnostic test results, laboratory test results, prescribed medications, prescribed physiotherapeutic treatment(s), physical assessment findings, and psychosocial and spiritual assessment findings. These different types of information (cues) may present the same meaning (vicarious functioning or cue intercorrelations). The achievement of judgment accuracy is indicated by the degree of correlation between the student's clinical judgment (nursing diagnoses identified by student) and the actual patient state (i.e., the criterion, or nursing diagnoses as identified by nurse experts).

In modeling the formation of clinical judgment in nursing students, the right side of the lens represents the judgments made by the nursing student (nursing diagnoses identified by the student). Cues, shown in the center of the lens, represent information on which the judgment is based. The left side of the lens represents the true state of patient condition (the criterion being nursing diagnoses identified by nurse experts). Though it is not within the scope of this current study, the use of a linear model, by regressing information cues onto the criterion, can represent the predictability of achievement (judgment accuracy) in term of consistency of the judgments (Wigton, 2008).

Literature Review

Although it was Brunswik who developed the Lens Model, the initiative of Kenneth Hammond, at the University of Colorado, has led and proven the value of the Lens Model for studying clinical judgment (Beckstead & Stamp, 2007; Dowding & Thompson, 2003; Wigton, 2008). In 1955, Hammond published a paper entitled "Probabilistic Functionalism and the Clinical Method," proposing multiple regression statistics as a method to analyze the subject (the right) and object (the left) side of the Lens Model. It was not until 1964 that the original Lens Model equation (LME) was initially introduced by Hursch, Hammond, and Hurch (1964) as a quantitative representation of Brunswik's Lens Model to be used to analyze the subject performance utilizing multiple cues in probabilistic environments and to analyze the relations between judgments based on the different set of cues (Hammond & Stewart, 2001).

The LME have been used extensively to study human judgment and decision making by many researchers in many disciplines since it was introduced because it offers an organized methodological approach by using multiple regression statistics. As a result, studies based on the LME can illuminate issues (judgment in particular) which would otherwise remain unclear.

For example, Hoffman (1960), studying a judge's predictions using a linear model derivation of the Lens Model, sought to examine the mental process in clinical judgment with information as the starting point and judgment as the end result. Using the linear model, Hoffman (1960) was searching for a prediction mechanism, equating modeling of the mental process with information available. Hoffman (1960) concluded that the linear regression model can accurately predict clinicians' judgments as well as any other

complex models and that to completely understand human beings is to accurately understand his/her mental processes.

Hammond (1965) later proposed interpersonal conflict (IPC) theory, based on the LME, to examine the nature, source, and resolution of cognitive conflict. Hammond (1965) suggested analyzing the nature and extent of conflict between parties; identifying the efforts to agree; and examining the nature and extent of compromise/resolution and changes in the cognitive systems of the conflicting parties to be able to identify strategies, using the LME, for conflict resolution. Lee and Yates (1992) studied how quantity judgment changes as the number of cues increases and concluded with a surprising claim that the variability in human judgments tends to decrease with additional cues, due in part to bias.

In education, an application of Brunswik's Lens Model in the domain of "learning under uncertainty" was initiated at almost the same time as it was being applied to clinical judgment. Research on learning within the framework of the Lens Model became known as "multiple cue probability learning" (MCPL) where an individual, to survive (learn) within a probabilistic environment (criterion), utilizes one or more fallible cues (Brunswik & Herma, 1951). In MCPL experiments an individual make judgments based on probabilistic cues over a series of trials. Multiple regression statistics are used to interpret the results (Hursch, Hammond, & Hursch, 1964).

In the medical profession, the Lens Model has been used to measure the accuracy of physicians' judgments and provides insights as to why the judgment accuracy is high or low (Kirwan et al., 1983; Poses et al., 1993). The model has been used in studies to compare the pattern of cue utilization in physicians, and to compare judgment variations

among groups of physicians in different clinical settings (Denig et al., 2002; Wigton, Hoellerich, & Patil, 1986; Wigton et al., 2008). In medical education, studies have investigated how physicians, using clinical information available, judge conditions of a client. Results from these studies emphasize the importance of cognitive feedback in educational interventions to assist physicians realize how they use information in the process of making clinical judgments and how they can improve the accuracy of their judgments (Tape *et al.*, 1992; Wigton *et al*., 1990).

The Canadian Institutes of Health Research (2007) funded a study using the Lens Model to identify how physicians arrive at their judgments, how these judgments influence their treatment decisions and major contributors to inappropriate treatment, (Brehaut *et al.*, 2007). The study focuses on two clinical treatment decisions including a prescription of antibiotic for sore throat and initiation of anticoagulation agent for patients with atrial fibrillation. The findings are expected to be of great value to the nation healthcare system, financially as well as for the quality of patient care.

In psychology most recently, Karelaia and Hogarth (2008) conducted a meta-analysis of the Lens Model studies by analyzing statistics of the LME associated with 249 different task environments obtained from 86 articles. The authors found that people were capable of achieving similar levels of cognitive performance in certain environments provided they had the appropriate type and number of cues, cue intercorrelations, and experience with the task. Detail analysis of learning studies indicated that the most effective form of feedback was information about the task.

In nursing practice, the Lens Model was initially introduced by Hammond and his associates in 1966. A series of studies were conducted by applying the Lens Model to

nursing practice. The first study aimed at identifying cognitive tasks representative of nursing problems and cue characteristics involved (Hammond *et al*., 1966a); 47 nurses were ask to record situations where a clinical judgment was required. The result indicated a large number of situations that require nursing judgment. The second study focused on the information used in making a diagnostic inference (Hammond *et al*., 1966b). Nurses working in 30 hospitals were surveyed. The result indicated that no significant relationship existed between any particular cue and the judgment made by the nurses. The third study aimed at identifying the information seeking strategies used for making a diagnostic inference (Hammond *et al*., 1966). This study involved an intensive study of six nurses and also found that the nurses seemed to make inferences (almost intuitively) from a sense of the patient's condition upon which the cues were based.

In nursing education, Sylvia Hepworth (1991) proposed the use of the Lens Model as a theoretical framework for her study of the clinical assessment of student nurses. The model proposed by Hepworth identified the student's true competence state to be on the left side of the lens and assessor's judgment on the right side of the lens with the student's behavior/performance (observed by assessor) as cues.

More recently, the Lens Model has been used in a variety of clinical judgment studies in nursing practice, centering on judgment analysis in particular. Clinical judgment analysis, as a statistical model of clinical judgment, computes models that reveal the differential importance of the clinical information which are determinants of clinical judgment. These models can provide a valuable lesson or educational interventions to students and novice nurses in order to accelerate their learning of diagnostic skills. Several studied focused on how experienced nurses used information when making

judgment about patients' conditions (Beckstead & Stamp, 2007; Thompson, Foster, Cole, & Dowding, 2005; Thompson *et al.,* 2007; Thompson *et al.,* 2008). The common recommendation from these studies is to make nurses aware that decisions being made (or so called cognitive feedback) will be beneficial when nurses are expected to make quality choices.

Despite substantial evidence of valuable results of an application of the Lens Model to measure clinical judgment, measures of clinical judgment in nursing students are lacking. For the past 50 years, the Lens Model has gained prominence in research on human judgment and decision making. As Stewart discussed, by the end of the 20th century the original Lens Model and the equation (LME) were cited in more than 140 papers (Hammond & Stewart, 2001), despite the complexity of the model and the equation. Studies focusing on nursing students' clinical judgment are needed to identify teaching strategies to facilitate students learning and ensure the positive learning outcomes.

CHAPTER 4

METHODOLOGY

In the preceding chapters, the rationale, conceptual framework, and review of literature for the current study regarding application of the Lens Model toward measurement of clinical judgment were presented. The review of literature supports the need for an instrument that measures senior nursing students' clinical judgment.

The discussion of instrument development in this chapter includes (1) the instrument design, (2) the establishment of content validity and reliability, (3) scaling and scoring of the instrument, and (4) pilot testing. Administration of the instrument addresses the study setting and participants, ethical considerations, and procedure for recruitment and data collection. The chapter concludes with a description of the data analyses used in this study. The stages of instrument development outlined by Waltz, Strickland, and Lenz (2005) guided the development of this proposed instrument.

The Instrument Design

The instrument, entitled the Clinical Judgment Assessment (CJA) Tool, was based on the adapted Lens Model, and proposes to measure clinical judgment of senior nursing students. Two clinical case vignettes, one medical (Ischemic Stroke) and one surgical (status post amputation with co-morbidity of diabetes and hypertension), were created with items related to each case. The vignettes and items were derived from authentic patient situations and coupled with information gained from informal interviews among a group of nurse educators and experienced nurses (having more than 10 years of clinical nursing practice) who served as subject matter experts. Items were generated with regard for content validity and an acceptable number of items. The experts were asked to review

clinical information relevant to the cases as well as to complete the assessment using the initially designed instrument to establish a criterion for the measure.

As generally discussed (Nunnally, 1976; Pett, Lackey, & Sullivan, 2003; Roznowski, 1989), too few a number of items in an instrument may result in a lack of content and construct validity and internal consistency; in contrast, too many items, though ensuring stronger reliability, may result in respondent fatigue or response biases. Neill (2009) recommended using 4 to 10 items per variable factor as a "reasonable" ratio based on the "law of diminishing returns." Furthermore, it was suggested that the number of items developed initially should be one and a half to two times the desired final instrument length (Nunnally, 1976). At this stage of the study, it was expected that some items would be eliminated after content review and the pilot testing process. The number of items were developed using a ratio of at least 20 items to 1 defining attribute of clinical judgment. With four defining attributes of clinical judgment identified previously, a set of 95 items was initially developed for each case.

The construction of the instrument was based on the process of clinical judgment, as reflected by the conceptual framework and the defining attributes of clinical judgment. The first and second sections of the proposed instrument addressed the defining attribute of information gathering. The first section presented students with multiple pieces of clinical information (cues) as would, in reality, be presented during a shift change report. The second section of the instrument presented an additional set of clinical information (cues) as would be available on the clinical record (client's chart) as well as those that students would acquire based on their assessment findings. For these two sections of the instrument, the presented list of clinical information (cues) was a combination of

information based on factual understanding (knowledge) of the client's health problem and clinical information that students had to take into account (observation) considering the client's health problem. The instructions were for students to review and rate each piece of clinical information, using “1” as “important” or “0” as “not important” to the plan of care today.

The third section of the instrument addressed the ability of a student to interpret the available information and form a clinical judgment. A list of nursing diagnoses was provided. The instructions were for students to first identify the appropriate nursing diagnoses for each patient by selecting from a list of designated nursing diagnoses they believed would be the most appropriate when planning care for the client based on the clinical information gathered prior to this section. Secondly, students were instructed to identify five items of clinical information that they had indicated as "important to plan the care today," from sections one and two to indicate what they believed to be the most supportive information for each identified nursing diagnosis. The instruction also indicated that they could use the same clinical information to support more than one nursing diagnosis, as deemed appropriate.

In the fourth section, students were instructed to prioritize their clinical judgment by ranking those identified nursing diagnoses from section three (for example, 1 = highest priority). This stage addressed the defining attribute of prioritization.

Lastly, in section five, students were instructed to rate the degree of confidence they had in making their judgment for the case. A Likert scale from 0 to 10 (where 0 indicated no confidence at all and 10 indicated total confidence), were used to indicate their level of confidence in clinical judgment. Although the students’ confidence in making clinical

judgment may not always represent their level of competence, the degree of confidence would serve as a way to measure their self-efficacy in their clinical judgment process as well as the outcomes.

Validity and Reliability

To determine psychometric validation of a measure, as indicated in the Standard of Education and Psychological Testing (1985), a measure must achieve the purpose for which it is intended. Establishment of content validity in the development of the CJA Tool was reflected through the use of concept analysis, expert opinion and the content validity index.

Content Validity based on Concept Analysis

A focus of content validity was to determine whether the items included in an instrument adequately represent the domain of content addressed by the instrument. In this study, the proposed CJA Tool is to measure senior nursing students' ability to recognize and interpret relevant clinical information about a client in order to arrive at an accurate clinical judgment. The conceptual definition of clinical judgment emerged from a concept analysis previously conducted by this researcher. For the purpose of this instrument development, clinical judgment is conceptualized as a process, used by nursing students when planning care for a client, which involves identification of multiple cues, the acquisition and search for additional information, the combination and interpretation of the available information, prioritization, and use of prior knowledge and experience. In this process, nursing students primarily would use knowledge and skills (observation, interpretation, and prioritization), to arrive at an accurate clinical judgment.

As discussed in Chapter 1, intuition is viewed as implicit knowledge developed and enriched during years of clinical experience. Measurement of intuition is not within the scope of interest for this instrument because nursing students are not expected to have extensive clinical background experience. Thus, the concept of intuition was not being measured in the proposed CJA Tool.

Content validity of the proposed instrument was reflected by the relationship between the defining attributes of clinical judgment and the associated items on the CJA Tool. The 4 major concepts, measured, were 1) information gathering (using knowledge and observation), 2) clinical judgment accuracy, 3) interpretation, and 4) prioritization. The final measurement (composite score), clinical judgment, was a calculation of scores from the first four concepts (Please refer to Appendix E for theoretical and operational definitions of the concepts and their alignment to the conceptual framework and respective sections of the CJA Tool).

Content Validity established by Content Experts

The use of subject matter experts is invaluable for the establishment of content validity in a new instrument. For development of items to be included in the CJA Tool, content validity was assessed using a two-stage process, development and judgment-quantification (Lynn, 1986).

Nurse experts assessed the validity of selected content to be used in the CJA Tool immediately after items had been developed. This process occurred in the judgment-quantification stage. Although a minimum number of five experts should be a sufficient level of control for chance agreement (Lynn, 1986), in this study a panel of seven experts were utilized. Seven nurse educators with at least 10 years of clinical nursing experience

and teaching of undergraduate nursing students for at least 3 years were invited to serve as a panel of experts to assess content validity of this instrument as well as establish a criterion for the measure.

The experts were provided with a set of specific instructions to identify the domain and content relevance of the items and the design of the entire instrument. The panel members were asked to judge how representative individual items were, as well as the clarity of item construction and wording. Furthermore, in judging the entire instrument, the experts were asked to evaluate the entire instrument for comprehensiveness. In addition, the experts were also asked to identify items that need to be added or removed to ensure completeness of the content domain. The instrument was revised and re-evaluated with an approval from the advisory committee members.

Content Validity using the Content Validity Index (CVI)

In this study, the content validity index (CVI) was utilized to quantify content validity. The content representativeness and clarity were assessed using 4-point ordinal rating scale. The minimum numbers of agreement for the items and total instrument to be assessed as having content validity were established using the proportion of experts agreeing on the content validity of an item and the entire instrument and the standard of error of those proportions (Lynn, 1986). The CVI for individual items were estimated by the proportion of items on an instrument that received a rating scale of 3 or 4 by the experts. The CVI for an instrument was also examined using the proportion of total items judged content valid. In this study, using seven experts, a CVI of 0.86 or above was considered acceptable (Lynn, 1986).

Reliability

It is the intention of this researcher to demonstrate that the CJA Tool is a reliable instrument. Reliability affords replicable results in future studies. In this study, the researcher applied two reliability estimation methods as follows:

Test-retest reliability. To assess stability of the proposed instrument over time, test-retest reliability was used to estimate the reliability of the instrument based on the correlation between two sets of scores calculated by using the responses from the two administrations of the same instrument. The same instrument was administered and re-administered to a single group of participants, under the same conditions, on two separate occasions. For this study, the time elapses between administering and re-administering the instrument were 2 weeks (Waltz, Strickland, & Lenz, 2005). A group of senior nursing students at one of the baccalaureate nursing programs was selected as a single group of participants for the procedure. This group of participants represented the group for which the instrument was designed. Data were analyzed, first, by using an overall percentage of agreement (at least 80% agreed). However, a percentage agreement approach did not take into account that participants were expected to agree with one another a certain percentage of the time simply by chance alone. Therefore, an unweighted Cohen's Kappa (Cohen, 1960) was calculated. By convention (Altman, 1991), a Kappa of equal to or greater than 0.6 is considered acceptable, and to be expected for this study, and equal to or greater than 0.8 is considered very good reliability. The percent agreement and Cohen's Kappa were calculated (Waltz, Strickland, & Lenz, 2005). The closer the Kappa value is to 1.00, the higher the degree of consistency of responses from the first administration to the second administration.

Internal consistency reliability. To evaluate the reliability of the proposed instrument by estimating how consistent the results were for the items that reflect the same construct within the measure, the researcher used Cronbach's alpha (α) to estimate consistency of items within the measure (Carmines & Zeller, 1979). Although some statisticians suggest the use of KR-20 coefficient, for dichotomous response, instead, Barrett (2007) proved otherwise. A Cronbach's alpha (α) should be at 0.70 or greater to reflect an acceptable level of reliability in a newly developed instrument (Nunnally & Bernstein, 1994). Because alpha (α) is dependent on not only the degree of inter-item correlations but also on the number of items in the instrument, careful considerations were made when alpha was too high (> 0.9).

Determination of Scaling and Scoring

With respect to item scaling for subsequent statistical analysis, it is crucial that the scale used in this study ensures sufficient variance among respondents. Scaling for the proposed instrument was a dichotomous scale for the first and second sections of the instrument, from 0 (information not important to the plan of care) to 1 (information important to the plan of care). Students' scores (for the sections one, two, and three of the instrument) were calculated in proportion to those criteria identified by experts.

Waltz, Strickland, and Lenz (2005) suggested that when interpreting results, one score should not reflect performance on different attributes. Because the aim of the study was to measure clinical judgment of senior nursing students, inclusive of the four defining attributes of clinical judgment, scores that measure each attribute were assessed separately. For the proposed instrument, a score for information gathering (the first and second sections of the instrument) was measured by calculating the students' responses

(correctly identified clinical information as important) in proportion to those criteria identified by experts. For the third section of the instrument represented as the score for clinical judgment accuracy, students' scores were calculated by using the accurate number of nursing diagnoses identified by the students in proportion to the number of accurate nursing diagnoses identified by the nurse experts. As a part of section three, scores for interpretation were calculated by using the accurate amount of clinical information identified by students as the most supportive clinical information being considered for the basis of their clinical judgment in proportion to those criteria identified by experts. In the fourth section of the instrument, students were asked to rank their identified nursing diagnoses (giving the most important nursing diagnosis the highest priority = 1). The scores for prioritization were calculated based upon the students' ranked nursing diagnoses when compared with those ranked by the experts.

To properly reflect on the four defining attributes of the clinical judgment used in this study, the score for each attribute was designed to be equally weighted at 25%. The final score of the instrument was calculated by taking into account the information gathering score (weight 25%), clinical judgment score (weight 25%), interpretation score (weight 25%) and prioritization score (weight 25%). The sum of the four weighted scores was used to determine the final score for the assessment (See Appendix H).

Pilot Testing

The instrument was pretested before administration to estimate the amount of time needed for completion of the instrument, to assess the clarity of the instructions, and to identify any inappropriate or unsuitable wording from the participants' perspective.

Moreover, open-ended questions, at the end of the instrument, provided an avenue for the participants to identify any concerns they had about the instrument.

Reliability and validity estimation of the instrument were obtained using data compiled from the pretest. Reliability was addressed by determining internal consistency through the calculation of a reliability coefficient score. A reliability of .70 would be considered acceptable for a newly developed instrument (Burns & Grove, 2005). Construct validity was addressed by comparing the composite CJA score of the students with those of the experts. A difference in scores was to be expected.

All aspects of information gained from the pilot study were carefully analyzed. Following a consultation with committee members, the researcher made revisions and modifications to the proposed instrument as determined necessary for improvement prior to its administration to the study sample.

The pilot study was conducted with participants selected from senior nursing students enrolled in one of the nursing programs located in Las Vegas, Nevada. These participants served as part of the same population from which the sample in the proposed study was selected and, therefore, pilot study participants were not included in the final study sample. The same procedure that was used in the proposed study was followed to enable the researcher to identify any issues relating to the instrument including its content, administration, and scoring.

In regard to a suitable number of subjects for the pretest sample, it was suggested that for pretesting of a newly developed instrument, a sample should be one tenth of the number of the sample proposed for the major study (Pett, Lackey, & Sullivan, 2003). Adopting the guideline recommended by Camrey and Lee (1992), a convenience sample

of 30 senior nursing students were recruited for pretesting and administration of the instrument because the study sample, as discussed in the following section, was estimated to be 200. Approval from the Institutional Review Boards (IRBs) of the University of Nevada, Las Vegas (UNLV) and the selected nursing program were obtained prior to conducting the pilot study.

Study Setting and Participants

Nursing programs approved by the Nevada State Board of Nursing and located in Southern Nevada were considered for the selection of participants for this study. These nursing programs grant degrees for the Bachelor of Science in nursing (BSN) and the associate of science as well as the associate of applied science in nursing (ADN). Initial contact was made via electronic mail (*e*-mail) to the nursing directors of these programs asking for permission to conduct the current study in their facility. Subsequently, after permission was granted, the names of nursing instructors responsible for teaching senior nursing students' classes were obtained. The nursing instructors were contacted and provided with an introduction to the study as well as the instrument, and the instructors were asked for their cooperation in administering the instrument to their students.

It was the aim of this present study to obtain an appropriate number of respondents to yield a meaningful interpretation of the results for the study. The techniques of statistical power analysis and sample size estimation were performed to allow the researcher to determine an adequate sample size to make most precise and reliable statistical judgments. Java Applets for power and sample size software (Lenth, 2006) were used to estimate a sample of 200 that, at .05 alpha (α) level, yields a power of .7086 for a test of one proportion.

The estimated population of senior nursing students in Southern Nevada was 475 (Nevada State Board of Nursing, 2008). Effort was made to recruit a convenience sample of approximately 200 senior nursing students who were, at the time of data collection period, enrolled in the last semester of their BS) or associate of science as well as ADN programs. Students from both BSN and ADN programs were included in order to create sample diversity, increase variety in background/work experience prior to entering nursing program, and were representative of the nursing student population. Furthermore, senior nursing students in both programs would have had completed at least 1 year of clinical experience involving direct patient care.

Ethical Considerations

The administration of the proposed instrument was conducted using a paper-pencil testing design accompanied with a cover letter to the student participants (see Appendix F) containing all required elements of informed consent as outlined by the Institutional Review Board of UNLV. Approval for conducting the study was obtained prior to any contact with Schools of Nursing or student participants (See Appendix F). The participants were informed of the purpose of the study and advantages to participating in this study. They were also informed that their participation was voluntary; they could withdraw from the study at any time, all information gathered in this study would be kept completely confidential, all materials would be treated anonymously throughout the research process, and that no reference would be made in written or oral materials that could link them to this study. The data obtained are securely stored in the principle investigator's office, BHS/414, for approximately 3 years for review/audit purposes.

Procedure for Recruitment and Data Collection

After obtaining names of instructors who taught senior level nursing courses in Southern Nevada nursing schools, a three-step schedule was followed to ensure effective communication and data collection procedure: (1) sending an introductory *e*-mail to instructors, (2) conducting face-to-face meeting with the instructors, and (3) meeting with the students to administer the instrument.

Sending an Introductory E-mail to the Instructors

During the beginning of the spring semester, the researcher sent a message (see Appendix G) via *e*-mail to those identified nursing instructors. The instructors were introduced to the proposed instrument and asked to assist in administering the instrument to their students, provided they were teaching the last semester nursing course in their programs. The instructors were assured that their names and courses would not be connected with student responses in any way, that the information gathered from this study would be confidential and would be treated anonymously throughout the research process, and that student responses would in no way adversely affect their performance with the institution. At the conclusion of this *e*-mail, an appointment for a face-to-face meeting with the instructor was requested.

Face-to-Face Meeting with the Instructors

Approximately 1 week following the initial introductory *e*-mail, according to the schedule permitted, the researcher met with those identified nursing instructors asking for their assistance in administering the instrument to their students. A brief message for students was discussed, including an introduction to the study along with the scheduled invitation time for students to participate in the study and incentive offered. The

instructors were asked for a convenient date and time to administer the instrument and a time to communicate with their students prior to the administration of the instrument.

Meeting with Students for Administration of Instrument

At the scheduled invitation time, students were introduced to the proposed study and the instrument, and informed consent was obtained after a clear introduction of the study and the instrument. Emphases were made to ensure the integrity of the instrument administration with regard to benefit and risk involved as well as the confidentiality of the information obtained from this study. Instructions to complete the assessment were provided, and questions were answered prior to the initiation of the assessment.

Incentive for High Response Rate

To accommodate the students' class schedules, lunch was provided on the scheduled date and time so students could complete the assessment prior to or soon after lunch. In addition, incentives to increase the response rate for each nursing program included raffle tickets for four $25 cash for the result of 100% response rate. Incentive for nursing instructors would be the results of the study.

Data Collection Period

Completion of the CJA Tool by the students from six out of seven approved nursing programs in Southern Nevada area was started at the end of March, 2010 and was completed at the end of April, 2010.

Treatment of Data

Participant responses were analyzed with the Statistical Package for the Social Sciences (SPSS™ Statistics 17 for Window®). The followings are statistical analysis techniques used in this study.

Descriptive Statistics

Descriptive statistics were used to organize and describe the sample and to summarize the measurements in the samples. Descriptive statistics used in this study include measures of central tendency such as mean, median, and mode; frequency distribution; and dispersion such as standard deviation, variance, and range. The demographic characteristics of the student participants were reported using descriptive statistics, and frequencies and percentages were used for nominal data. For interval and ratio data, means and standard deviations were applied.

Inferential Statistics

While descriptive statistics aim at examining a group of data by ways of organizing, summarizing, and presenting data, inferential statistics were used to make inferences from the observed sample to a broader population.

Chi-square

As a nonparametric technique, chi-square is the most commonly reported statistic. It is used to compare the relationship between two categorical variables. In this present study, chi-square was used to analyze the data from the pilot testing to determine if there is a relationship between experts and students responses (dichotomous) to each individual item presented in the instrument.

Z-test

Z-test is a statistical test of null hypothesis using normalized data to determine if differences in proportions between sets of data are large enough to be statistically significant (University of Cambridge, 2004). In the present study, as previously discussed, the experts' responses were used as criteria for the measure, and the data were

tested using the z-test to determine if there was a significant difference between responses from the experts and students, particularly those responses from sections one, two and three, and that the differences were large enough to be considered statistically significant. For this purpose only, with the null hypothesis of $P = .8$ and alternative hypothesis of $P \neq .8$, these hypotheses constitute a two-tailed test, with a predetermined alpha (α) level set at .05.

Mann-Whitney U Test

The Mann-Whitney *U* test, also known as the Wilcoxon ranks sum test, is the nonparametric analog of the unpaired sample *t*-test. The test is considered the most powerful of the nonparametric methods (Grove, 2007). As a nonparametric test, the Mann-Whitney *U* test does not assume any assumptions related to distribution. This statistical analysis technique was used to identify significant sub-scores (partscore1, 2, 3, and 4) difference between the two independence groups (experts vs. students).

t-test

The *t*-test, a parametric analysis technique, was used to identify significant differences in means between the sub-scores (partscore1, 2, 3, and 4) of BSN and ADN nursing students, and those with previous healthcare experience versus. those with no previous healthcare experience.

CHAPTER 5

FINDINGS OF THE STUDY

This chapter presents analysis of data and results of the current study. Results include the content validity index (CVI), pilot testing outcomes, a demographic description of the sample, and statistical analyses of the composite score of the Clinical Judgment Assessment (CJA) instrument. In addition, statistical analyses of the part scores differences between nursing programs (BSN vs. ADN), and healthcare experience (experience vs. no experience) are presented and reliability measures are addressed.

The SPSS version 17 for Windows was used to analyze the data. Statistical analysis included the use of the following descriptive statistics: Chi-Square, Z-test, Mann-Whitney *U* test, *t*-test, Cronbach's alpha (α), and Cohen's kappa.

Content Validity of the Clinical Judgment Assessment (CJA) Instrument

The original draft of the instrument, as designed by the student researcher, contained 80 items (clinical information) in section 1 and 2, 15 items (nursing diagnoses) in section 3, and 8 items (priority ranking) in section 4 for each the medical and surgical case vignettes (See Appendix G). Seven nursing educators experienced in clinical knowledge and nursing practice were used as an expert panel to establish a criterion for the CJA instrument. This was accomplished by computation of a CVI score for each item of the instrument. Experts reviewed each item and determined whether it was "important" to the plan of care for the patient. After the expert panel reviewed the first version of the instrument, individual items having a CVI score of at least 0.86 (as deemed an acceptable CVI by Lynn, 1986) were identified as validly important to serve as a criterion and were retained in the instrument.

Medical Case Vignette (Case 1)

In sections 1 and 2, there were 44 out of 80 items identified as "important" by the expert panel (CVI $\geq$ 0.86). In section 3, experts rated 5 out of 15 items with a CVI score of $\geq$ 0.86. As a subsequent part of section 3, at least 6 out of 7 experts (CVI of $\geq$ 0.86) identified 5 items from sections 1 and 2 as the most supportive items of clinical information for formation of a nursing judgment (the identified nursing diagnoses). See Appendix I for Table 21, 22, 23, 24, and 25 which presents CVI index scores for each item of the medical case vignette (case 1).

The remaining items of the original instrument draft were not identified as important and were retained in the instrument and served as the pool of distracters. The student researcher then randomly removed some of the "not important" items based on poor wording and/or lack of clarity. The revised CJA instrument for the medical case vignette contained 35 items in section 1, 35 items in section 2, 10 items in section 3, 5 items in section 4, and 1 item in section 5 for students to rate their level of confidence.

Surgical Case Vignette (Case 2)

In sections 1 and 2, there were 39 out of 80 items found to be "important." In section 3, there were 4 out of 15 items rated by the experts with a CVI score of $\geq$ 0.86. As a subsequent part of section 3, at least 6 out of the 7 experts identified 6 items, from section 1 and 2, as the most supportive clinical information for their clinical judgment (CVI of $\geq$ 0.86). See Appendix I for Tables 26, 27, 28, 29, and 30 which present CVI index scores for each item of the surgical case vignette (case 2).

The remaining items of the surgical case vignette not identified as important were used as a pool of distraction items. The student researcher randomly removed "not

important" items based on poor wording and/or lack of clarity. The revised CJA Instrument for the surgical case vignette contained 35 items in section 1, 35 items in section 2, 10 items in section 3, 5 items in section 4, and 1 additional item in section 5 for students to rate their level of confidence.

Revision of the Instrument

Following the analysis of items on the original draft of the instrument, by the expert panel and based upon the CVI scores, the CJA Instrument was adjusted by eliminating 18 items from the medical case vignette (case 1) and eliminating 18 items from the surgical case vignette (case 2). The adjusted instrument, with items validated by the experts, included 35 items in sections 1, 35 items in section 2, 10 items in section 3, 5 items in section 4, and 1 item in section 5. Section 5 of the instrument included one item to measure the students' self-efficacy by asking them how confident they were about their choice of nursing diagnoses by using a Likert scale of 0 (not at all) to 10 (very confident). Therefore, there were 86 items for each case study, with a total of 172 items for the adjusted CJA instrument (See Appendix J).

Pilot Testing

A group of 26 students from an associate degree program in Southern Nevada voluntarily participated in the pilot testing of the adjusted CJA instrument. Students experienced no difficulty with understanding the directions for completing the instrument. The time frame for students to complete the exam was 15 to 45 minutes with an average of 30 minutes. No changes were made to the instrument based upon results of the pilot study. However, not all pilot study participants completed the identification of supportive information as part of section 3. Reliability was estimated using a measure of

internal consistency, and Cronbach's alpha (α) reliability coefficients for the medical and surgical cases were .90 and .86, respectively.

In the medical case vignette, section one and two, at least 80% of the students rated 48 items as "important to plan the care today." Only 7 items were found to be significantly ($p < .05$) different from the experts (item #4, item #10, item #20, item #62, item #64, item #65, and item #68). In section 3, 4 items were rated by at least 80% of the students as "important to plan the care today." No significant difference between student and expert scores were found in section three.

For surgical case, section 1 and 2, at least 80% of the students rated 50 items as "important to plan the care today." Nine items were found to be significantly ($p < .05$) different from the experts (item #12, item #14, item #16, item #31, item #60, item #62, item #63, item #64, item #65). In section 3, 4 items were rated by at least 80% of the students as "important to plan the care today." Two items in section 3 were found to be significantly ($p < .05$) different (item #74, and item #75).

Sample and Response Rate

Following the pilot testing, data were collected from six of the seven nursing programs in the Southern Nevada area, with one nursing program declining to participate due to "corporate policy." The population consisted of 250 students who were in the last semester of their nursing program. The 26 students who participated in the pilot study were excluded from the study sample. The final sample number consisted of 205 students, representing 82% of all senior nursing students enrolled in their last semester during the Spring 2010 semester.

Sample Demographics

Demographic information was collected using a survey questionnaire format. Missing data ranged from 1% to 3% with the exception of age (6.8%). As illustrated in Table X, the majority of the sample was female (82.9%). Age distribution among the participants ranged from 20 to 55 years, with a mean age of 29 years. The median age was 26 years and the mode was 22 years. The majority (39%) ethnic group was Caucasian/White, and English was identified as the primary language by 85.4% of the students.

Most of students (69.8%) were enrolled in a baccalaureate degree nursing program and were full-time students (97.6%). Reported number of years graduated from high school ranged from 1 to 38 years with a mean of 10 years, median of 8 years, and mode of 4 years. The majority of the students (60.0%) had no previous healthcare experience, and most students (83.9%) were not currently working in healthcare.

Table 1

Demographics of the Student Sample (N=205)

Characteristic	Number of Students	Valid Percent
Gender		
Female	170	83.7%
Male	33	16.3%
Age		
20-24 yrs.	69	36.1%
25-29 yrs.	60	31.4%
30-34 yrs.	23	12.0%
35-39 yrs.	22	11.5%
40 and above	17	8.9%
Ethnicity		
Caucasian/White	80	39.2%
Black	19	9.3%
Latino	16	7.8%
Asian/Pacific Islander	77	37.8%
Other	12	5.9%
Primary language:		
English	175	86.6%
Spanish	3	1.5%
Other	24	11.9%
Student status		
Full time	200	98.0%
Part time	4	2.0%
Nursing program enrolling		
Baccalaureate (BSN)	143	69.8%
Associate (ADN)	62	30.2%
Number of year(s) graduated from high school		
1-5 yrs.	51	25.8%
6-10 yrs.	84	42.4%
11 and above	63	31.8%
Previous healthcare experience		
No	123	60.9%
Yes	79	39.1%
Currently working in healthcare		
No	172	84.3%
Yes	32	15.7%

Results of the Clinical Judgment Assessment Instrument

The revised instrument included two patient case vignettes (1 medical case and 1 surgical case), each with 86 items. Each case vignette had 4 sections (with one additional Likert-Scale item in section 5). The criterion for the instrument was based upon the responses of nurse experts.

Information Gathering (Sections 1 and 2 of CJA)

The panel of nurse experts identified 40 items of clinical information presented in sections 1 and 2 of the medical case study as “important to plan the care today.” Eighty percent of the student sample identified 39 items of clinical information as "important to plan the care today." However, 10 out of those 39 items identified by students as “important” were identified by the nurse experts as “not important.” (See Appendix K, Table 31 and 32).

For the surgical case, the experts reviewed and identified 40 items of clinical information as "important to plan the care today." Analysis of the students’ responses revealed 42 identified items of clinical information by at least 80% of the students as "important to plan the care today." However, 16 out of those 42 items of clinical information identified by students as "important" were identified by the experts as "not important to the plan of care today." (See Appendix K, Table 35 and 36).

A two-tailed z-test was used to determine if there was a statistically significant difference between responses of the experts and students. Based on the z-test results, 38 items of clinical information from the medical case and 32 items of clinical information from the surgical case were interpreted as having significant difference ($p < .05$) between responses from the experts and students. (See Appendix K, Table 31, 32, 35, and 36)

Using the experts' responses as criteria, the part score for this defining attribute (parts core 1) was calculated and analyzed. Table 2 presents descriptive statistic (experts vs. students) including minimum statistic, maximum statistic, mean statistic, and standard deviations of the part score 1 for medical (case 1) and surgical (case 2) case.

Table 2

Descriptive Statistic for Information Gathering Score (Part Score 1)

	Minimum	Maximum	Mean	Standard Deviation
Case 1: Student	23.00	55.00	44.3951	5.59893
Case 1: Expert	40.00	55.00	48.1429	5.58058
Case 2: Student	.00	56.00	45.4732	5.31235
Case 2: Expert	39.00	55.00	45.4286	5.34968

Figure 3 presents a histogram of partscore1 for the medical case and Figure 4 presents a histogram of part score 1 for the surgical case.

Figure 3. Histogram of Part Score 1 for Medical Case

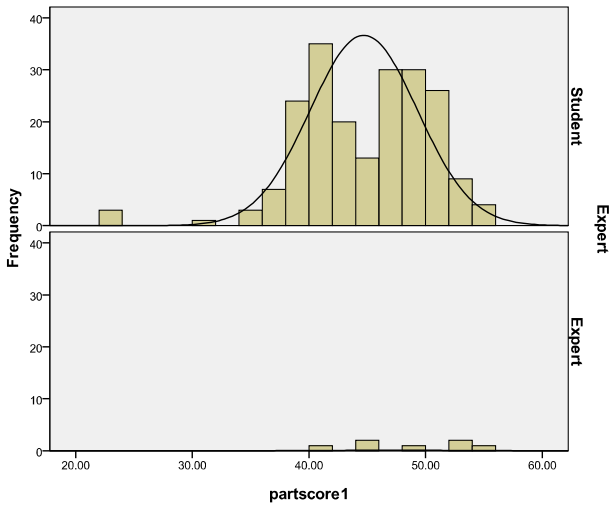
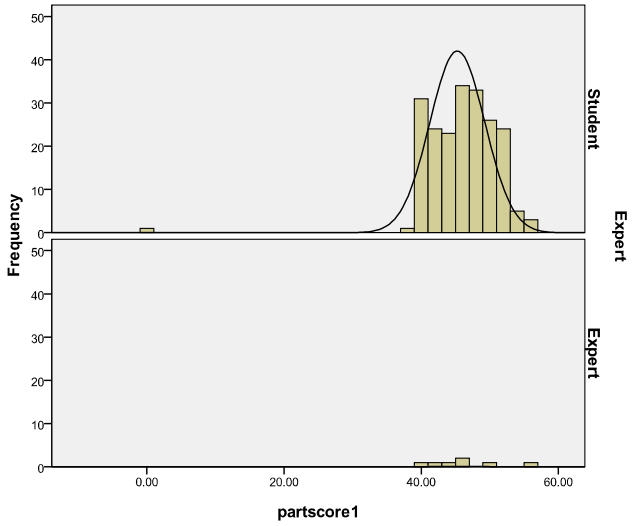


Figure 4. Histogram of Part Score 1 for Surgical Case



Furthermore, the part score 1 for this defining attributes, using the experts' responses as a criterion for the measure, were compared using the Mann-Whitney *U* test and yielded no significant difference between the experts and the students (medical case, p = .088 and surgical case, p = .744). Table 3 presents the Mann-Whitney *U* test calculated for each group (experts vs. students) and significant differences of part score 1.

Table 3

Mann-Whitney U test on Information Gathering Score (Part Score 1)

	Mean Rank	Sum of Ranks	Mann-Whitney *U*	Z	Sig. (2-tailed)
Case 1: Student	105.17	21560.50			
Case 1: Expert	145.36	1017.50			
			445.500	-1.709	.088
Case 2: Student	106.75	21884.50			
Case 2: Expert	99.07	693.50			
			665.500	-.327	.744

Clinical Judgment (Section 3 of CJA)

Section three of the proposed instrument presents a list of nursing diagnoses and asked the students to identify the nursing diagnoses that they believed to be "important to the plan of care today." This section of the instrument was designed to measure the second defining attribute of clinical judgment, clinical judgment accuracy. For the medical case, at least six out of seven experts identified 5 nursing diagnoses and at least 80% of students identified 4 nursing diagnoses as "important to the plan of care today." For the surgical case, at least six out of seven experts identified 4 nursing diagnoses and at least 80% of students identified 5 nursing diagnoses as "important to the plan of care today." (See Appendix K, Table 33 and 37).

Based on the z-test results for both cases, there was a statistically significant difference (in 9 out of 10 nursing diagnoses) between the responses of the experts and the students ($p < .05$). Table 4 presents descriptive statistics (experts vs. students) including minimum statistic, maximum statistic, mean statistic, and standard deviations of the partscore2 for medical (case 1) and surgical (case 2) case. (See Appendix K, Table 33 and 37).

Table 4

Descriptive Statistic for Clinical Judgment Accuracy Score (Part Score 2)

	Minimum	Maximum	Mean	Standard Deviation
Case 1: Student	.00	10.00	6.6634	1.76537
Case 1: Expert	8.00	9.00	8.4286	.53452
Case 2: Student	.00	10.00	6.4732	2.07116
Case 2: Expert	5.00	8.00	6.7143	1.11270

Figure 5 presents histogram of parts core 2 for medical case and figure 6 presents histogram of part score 2 for surgical case.

Figure 5. Histogram of Part Score 2 for Medical Case

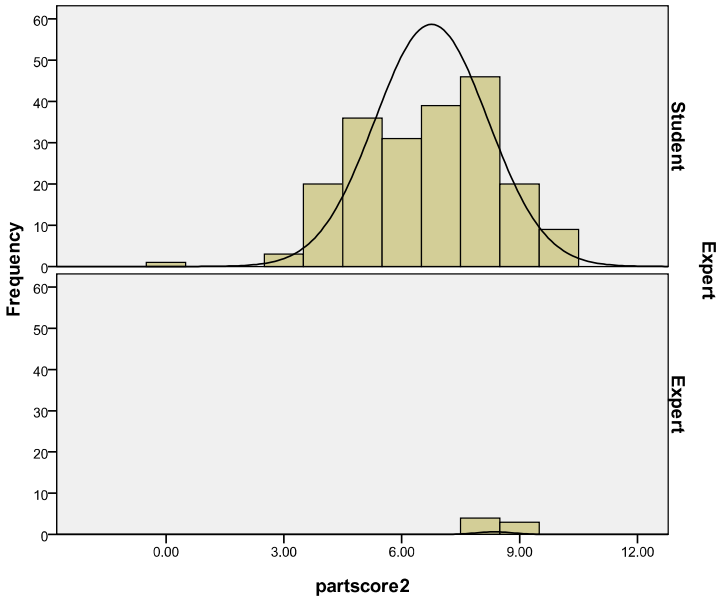
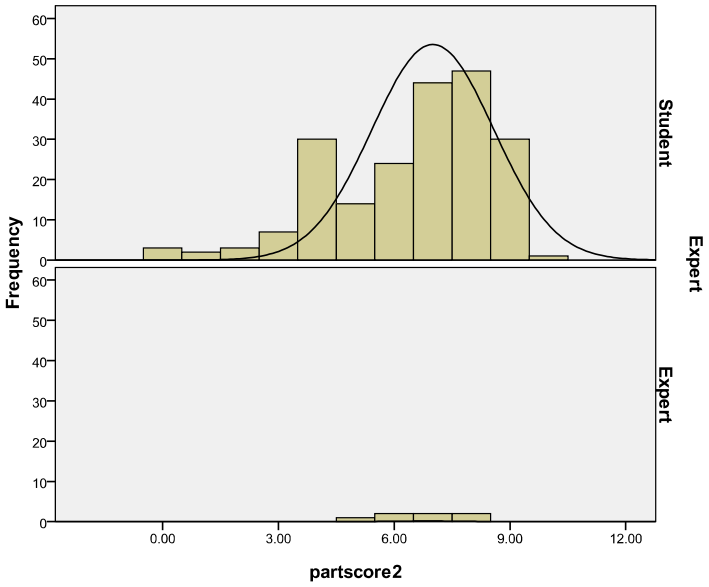


Figure 6. Histogram of Part Score 2 for Surgical Case



In addition, the part score 2 for these defining attributes were compared using the Mann-Whitney *U* test and yielded a significant difference between the experts and the students in the medical case ($p < .05$), but not in the surgical case. Table 5 presents the Mann-Whitney *U* test calculated for each group (experts vs. students) and significant differences of part score 2.

Table 5

Mann-Whitney U test on Clinical Judgment Accuracy Score (Part Score 2)

	Mean Rank	Sum of Ranks	Mann-Whitney *U*	Z	Sig. (2-tailed)
Case 1: Student	104.29	21380.00			
Case 1: Expert	171.14	1198.00			
			265.00	-2.878	.004
Case 2: Student	106.56	21845.00			
Case 2: Expert	104.71	733.00			
			665.500	-.080	.937

Interpretation (Section 3 CJA)

Section three further required student participants to identify the five most supportive items of clinical information that they considered to be the basis of their clinical judgment for each of their selected nursing diagnoses. This part of the instrument was designed to measure the third defining attribute of clinical judgment, interpretation. Instruction was provided that emphasized the possibility of using the same item of clinical information to support more than one nursing diagnosis.

For the medical case, 35 items of clinical information were identified as "the most supportive information" by the experts. However, only 6 clinical information items were

identified by at least six out of seven nurse experts, and 2 items were identified by at least 80% of students as "the most supportive clinical information" being considered as the basis of their judgment (for each nursing diagnosis). (See Appendix K, Table 34)

For the surgical case, 30 items of clinical information were identified as "the most supportive information" by the experts. Only 7 clinical information items were identified by at least six out of seven experts (CVI ≥ .86) and only 1 item was identified by at least 80% of students as "the most supportive clinical information" being considered as the basis of their judgment (for each nursing diagnosis). (See Appendix K, Table 38).

Based on the z-test results, 30 items of clinical information identified as "supportive information" from the medical case, and 23 items of clinical information identified as "supportive information" from the surgical case, were interpreted as having a statistically significant difference ($p < .05$) between student responses and expert responses. Table 6 presents descriptive statistics (experts vs. students) including minimum statistic, maximum statistic, mean statistic, and standard deviations of the part score 3 for medical (case 1) and surgical (case 2) case. (See Appendix K, Table 34 and 38).

Table 6

Descriptive Statistic for Interpretation Score (Part Score 3)

	Minimum	Maximum	Mean	Standard Deviation
Case 1: Student	00.00	31.00	21.3854	5.89223
Case 1: Expert	18.00	29.00	22.8571	4.01782
Case 2: Student	00.00	28.00	17.7610	5.18921
Case 2: Expert	16.00	22.00	19.2857	2.42997

Figure 7 presents histogram of part score 3 for medical case and figure 8 presents histogram of part score 3 for surgical case.

Figure 7. Histogram of Part Score 3 for Medical Case

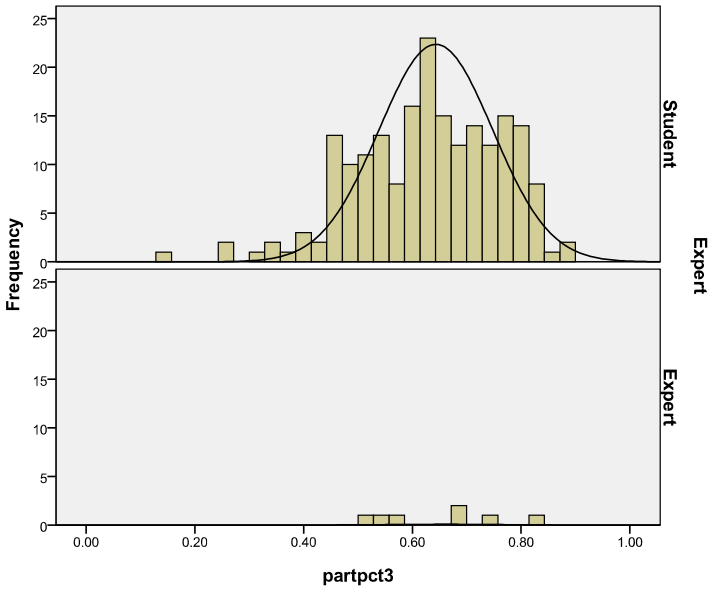
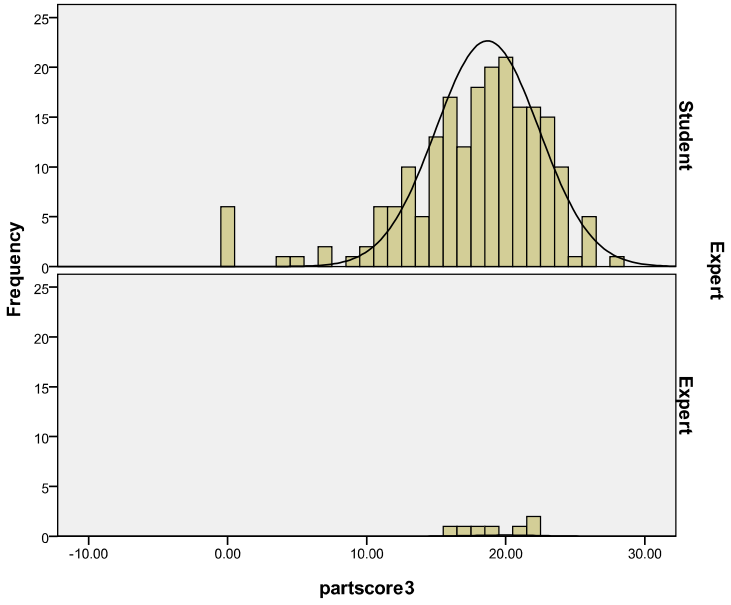


Figure 8. Histogram of Part Score 3 for Surgical Case



However, the part score3 for these defining attributes, using the experts' responses as criteria for the measure, were compared using the Mann-Whitney *U* test and yielded no significant difference ($p > .05$)between the experts and the students (medical case, $p = .618$ and surgical case, $p = .530$). Table 7 presents the Mann-Whitney *U* test calculated for each group (experts vs. students) and significant differences of the parts core 3.

Table 7

Mann-Whitney U test on Interpretation Score (Part Score 3)

	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	Sig. (2-tailed)
Case 1: Student	106.11	21753.00			
Case 1: Expert	117.86	825.00			
			638.000	-.499	.618
Case 2: Student	106.01	21732.50			
Case 2: Expert	120.79	845.50			
			617.500	-.628	.530

Prioritization (Section 4 of CJA)

Section four of the instrument asked the participants to rank the priority of the identified nursing diagnoses from section three. This section of the instrument was designed to measure the ability of students to prioritize the care needs of a client, and is the last defining attribute of clinical judgment for which the proposed instrument was designed. The criterion (ideal ranking) was based on the average ranking of the experts' responses, and calculated for the absolute value of 15 for medical case and 14 for the surgical case. For each student, the part score 4 for medical case and surgical case were

calculated by the absolute value of each item's ideal rank minus its actual rank, subtracting the sum of these values from 15 and 14, respectively. Table 8 presents descriptive statistic (experts vs. students) including minimum statistic, maximum statistic, mean statistic, and standard deviations of the part score 4 for medical (case 1) and surgical (case 2) case.

Table 8

Descriptive Statistic for Prioritization Score (Part Score 4)

	Minimum	Maximum	Mean	Standard Deviation
Case 1: Student	.00	15.00	9.1854	2.70163
Case 1: Expert	7.00	15.00	11.2857	3.19970
Case 2: Student	.00	14.00	8.2829	2.61930
Case 2: Expert	5.00	11.00	8.4286	2.634674

Figure 9 presents the histogram of part score 4 for the medical case and Figure 10 presents the histogram of part score 4 for the surgical case.

Figure 9. Histogram of Part Score 4 for Medical Case

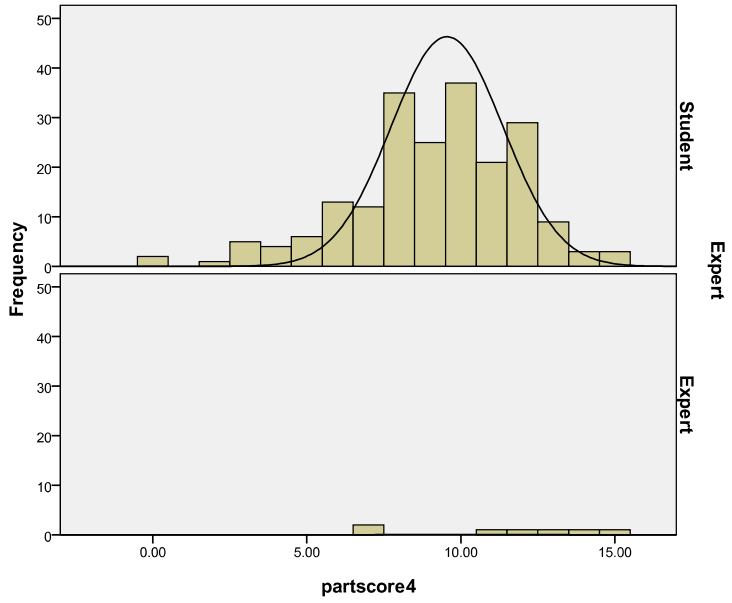
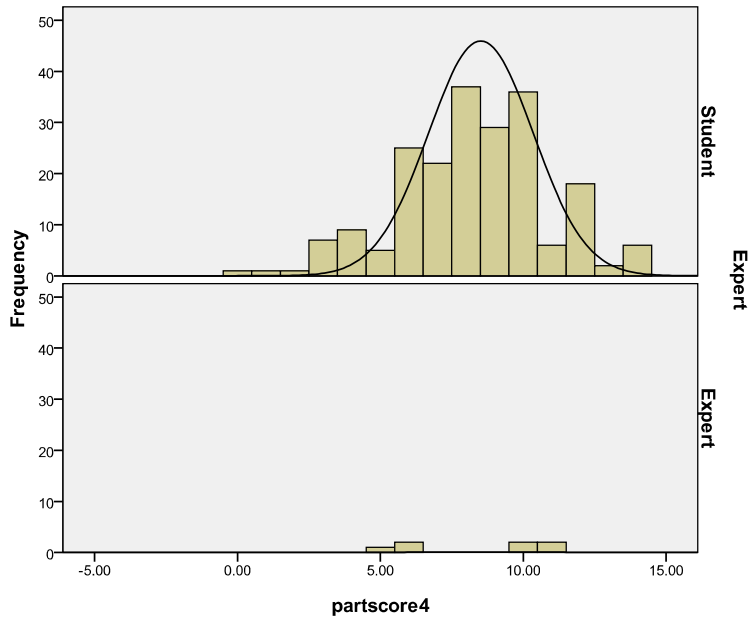


Figure 10. Histogram of Part Score 4 for Surgical Case



The part score 4 for these defining attributes, using the experts' responses as a criterion for the measure, were compared using the Mann-Whitney *U* test that yielded no significant difference ($p > .05$) between the experts and the students (medical case, $p = .076$ and surgical case, $p = .805$). Table 9 presents the Mann-Whitney *U* test calculated for each group (experts vs. students) and the significant differences of part score 4.

Table 9

Mann-Whitney U test on Prioritization Score (Part Score 4)

	Mean Rank	Sum of Ranks	Mann-Whitney U	Z	Sig. (2-tailed)
Case 1: Student	105.13	21551.50			
Case 1: Expert	146.64	1026.50			
			436.500	-.499	.618
Case 2: Student	106.31	21793.50			
Case 2: Expert	112.07	784.50			
			678.500	-.247	.805

Student and Expert Mean Composite CJA Scores

Mean composite score of the CJA were analyzed to compare the composite score of the students vs. experts for each case. The results found that the mean composite score of the experts were slightly higher than those of the students'. Table 10 presents the mean composite score differences, calculated by using the formula proposed by the student researcher specifically for this present study. In addition, the average students' composite score of both cases (CJA score) and the average experts' composite score of both cases (CJA score) were analyzed to determine whether the means CJA scores of the students

and experts are statistically different from each other. Table 11 presents the results of the *t*-test analysis indicating the statistically significant difference ($p < .05$) between the means CJA scores of experts from the students.

Table 10

The Comparison of Mean Composite Scores (Students vs. Experts) for Medical and Surgical Cases

		Medical Case			Surgical Case		
		Score Calculation			Score Calculation		
		Mean Score	Weight	Weighted Score	Mean Score	Weight	Weighted Score
Students	Information Gathering	0.63	25%	0.16	0.65	25%	0.16
	Clinical Judgment Accuracy	0.67	25%	0.17	0.65	25%	0.16
	Interpretation	0.61	25%	0.15	0.59	25%	0.15
	Prioritization	0.61	25%	0.15	0.59	25%	0.15
		Composite Score		0.63	Composite Score		0.62
		Medical Case			Surgical Case		
		Score Calculation			Score Calculation		
		Mean Score	Weight	Weighted Score	Mean Score	Weight	Weighted Score
Experts	Information Gathering	0.69	25%	0.17	0.65	25%	0.16
	Clinical Judgment Accuracy	0.84	25%	0.21	0.67	25%	0.17
	Interpretation	0.65	25%	0.16	0.64	25%	0.16
	Prioritization	0.75	25%	0.19	0.6	25%	0.15
		Composite Score		0.73	Composite Score		0.64

Table 11

Differences (t-test) Between Students and Experts CJA Scores

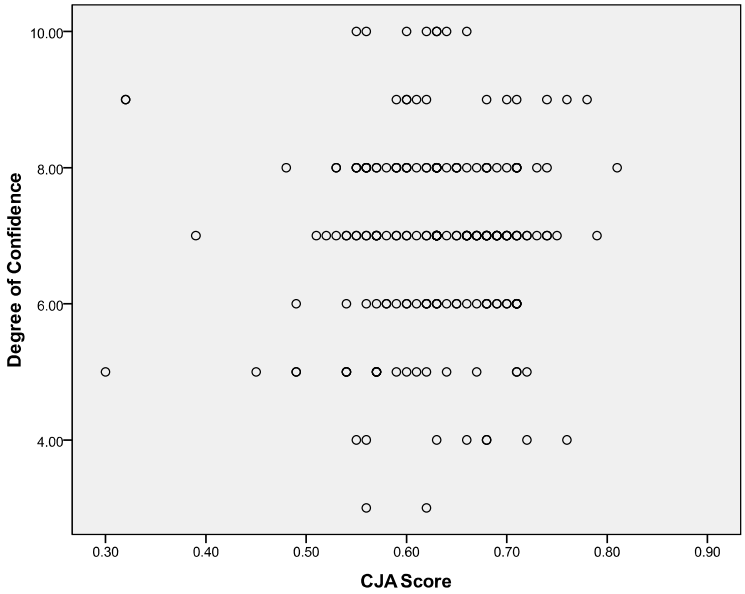
	Groups				
	Students	Experts	*t*	*df*	Sig. (2-tailed)
CJA Score	.62 (.079)	.69 (.065)	-2.068*	210	.040

Note. * = $p \leq .05$. Standard Deviations appear in parentheses below means.

Student Degree of Confidence

In section five, students were asked to rate their degree of confidence in making judgment about the two cases. Descriptive statistics revealed that students indicated they had almost the same degree of confidence for the medical case ($M = 6.76$, $SD = 1.481$) as they did for the surgical case ($M = 6.87$, $SD = 1.471$). When analyzing the data (using *t*-test) to compare CJA score differences among those who rated their degree of confidence at different level, significant differences ($p < .05$) were found in part score1 for medical case ($p = .030$), and part score 1 and 2 for surgical case ($p = .024$ and $p = .014$, respectively). However, the scatter plot indicates no relationship between the degree of confidence and the CJA score. Figure 11 presents a lack of predictability in determining CJA score from a given level of confidence.

Figure 11. Scatter Plot of the Students' Level of Confidence and Their CJA Score



Group Comparisons

The present study further analyzed the data, using the *t*-test, to determine whether the means of the part score 1, 2, 3, and 4, of the groups (BSN vs. ADN; and previous healthcare experience vs. no experience) were statistically different from each other.

The part scores from the two nursing programs, BSN and ADN, were also analyzed to determine whether the means of the part score 1, 2, 3, and 4 of the BSN and ADN nursing students were statistically different from each other. No significant differences were indicated, in either the medical nor surgical case, between the part scores 1, 2, 3, and 4 of BSN and ADN nursing students. Table 12 presents part scores' means, from medical case, for BSN and ADN nursing students.

Table 12

Case 1 Part Scores Means for BSN and ADN

	Groups			
	BSN	ADN	*t*	*df*
Partscore1	44.45 (5.96)	44.18 (4.67)	.319	203
Partscore2	6.65 (1.79)	6.70 (1.73)	-.201	203
Partscore3	21.88 (5.50)	20.16 (6.65)	1.915	203
Partscore4	9.17 (2.79)	9.24 (2.53)	-.188	203

Note. * = $p \leq .05$. Standard Deviations appear in parentheses below means.

Table 13 presents part scores' means, from the surgical case, for BSN and ADN nursing students.

Table 13

Case 2 Part Scores Means for BSN and ADN

	Groups			
	BSN	ADN	*t*	*df*
Partscore1	45.40 (5.79)	45.63 (4.02)	-.28	203
Partscore2	6.59 (2.06)	6.19 (2.09)	1.27	203
Partscore3	18.05 (5.00)	17.08 (5.57)	1.24	203
Partscore4	8.38 (2.73)	8.06 (2.36)	.78	203

Note. * = $p \leq .05$. Standard Deviations appear in parentheses below means.

Lastly, the study analyzed the part scores means between students who had previous healthcare experience and those who had no previous healthcare experience. There were no significant differences indicated between part scores 1, 2, 3, and 4 of the students who had previous healthcare experience and those who had no previous healthcare experience. Table 14 presents part scores means, from medical case, of the student who had previous healthcare experience and those who had no previous healthcare experience.

Table 14

Case 1 Part Scores Means for Previous Healthcare Experience and No Previous Experience

	Groups			
	No Previous Healthcare Experience	Previous Healthcare Experience	*t*	*df*
Partscore1	44.52 (5.78)	44.21 (5.34)	.38	203
Partscore2	6.61 (1.75)	6.74 (1.79)	-.51	203
Partscore3	21.28 (5.38)	21.54 (6.63)	-.31	203
Partscore4	9.18 (2.71)	9.20 (2.70)	-.05	203

Note. * = $p \leq .05$. Standard Deviations appear in parentheses below means.

For the surgical case, *t*-test results indicated that those with no previous healthcare experience had significantly higher partscore3 (interpretation) than students who had previous healthcare experience, $t\ (203) = 2.67$, $p < .05$. However, no significant

differences were indicated between their part scores 1, 2, and 4. Table 15 presents part scores means for the student who had previous healthcare experience and those who had no previous healthcare experience.

Table 15

Case 2 Part Scores Means for Previous Healthcare Experience and No Previous Experience

	Groups			
	No Previous Healthcare Experience	Previous Healthcare Experience	*t*	*df*
Partscore1	45.10 (5.82)	46.05 (4.39)	-1.26	203
Partscore2	6.46 (2.01)	6.49 (2.17)	-1.11	203
Partscore3	18.53 (4.54)	16.58 (5.89)	2.67*	203
Partscore4	8.32 (2.67)	8.22 (2.55)	.27	203

Note. * = $p \leq .05$. Standard Deviations appear in parentheses below means.

Reliability of the CJA

Reliability of the CJA instrument was estimated by using a test-retest procedure, as well as a measure for internal consistency, Cronbach's alpha (α). For the test-retest procedure, a group of students from one baccalaureate nursing program was used. Forty-four students voluntarily participated. Using the experts' responses as criteria for the measure, the students' responses, individual item from section one, two and three, were

analyzed using the power of ≥ .8 (at least 80% of the students agreed to be "important to plan the care today"). The scores from the test and the retest were calculated using Cohen's Kappa and found the statistical significance of Kappa ($p < .001$) at .750 for the medical case and .799 for the surgical case. Table 16 presents the value of Kappa calculated for both cases.

Table 16

Measure of Agreement (Cohen's Kappa)

		Value	Asymp. Std. Error[a]	Approx. T[b]	Approx. Sig.
Case 1:	Kappa	.750	.074	6.707	.000
Case 2:	Kappa	.799	.066	7.294	.000

Furthermore, reliability for the main study was also estimated using a measure of internal consistency, Cronbach's alpha (α). A reliability coefficient (α) of .879 and .892 were found for medical and surgical case, respectively.

CHAPTER 6

SUMMARY, CONCLUSIONS, AND RECOMMENDATION

This chapter presents a summary of the study and interpretation of study findings, followed by the limitation of the study and implications for practice. Proposals for future development and utilization of a new design instrument conclude the chapter.

Summary of the Study

The purpose of this study was to investigate the feasibility of using Brunswik's Lens Model in the development of a quantitative instrument to measure clinical judgment in senior level nursing students. The key principle of the Lens Model is based upon the notion of understanding how an individual makes a judgment, based on one's perception of the environment and understanding what the individual is trying to accomplish within that environment. The design of the instrument, using paper-pencil format, was based on the process of judgment, identified by Newell, Lagnado, and Shanks (2007), to reflect the conceptual framework and the defining attributes of clinical judgment.

The theoretical definition of clinical judgment was defined as a process, used by nurses when planning care for a client, that involves identification of multiple cues, the acquisition and search for additional information, combination and interpretation of the available information, and prioritization of the patient's needs using prior knowledge and experience. In this process, nurses use knowledge, skills (observation, interpretation, and prioritization), and intuition to arrive at a clinical judgment. The four defining attributes of clinical judgment addressed in the instrument included information gathering, clinical judgment, interpretation, and prioritization.

Seven subject matter experts were used to review the newly developed instrument and establish a criterion for the measure. The measure of these attributes were then analyzed as a part of instrument development using experts' responses as criteria for the measure used in this present study.

The psychometric quality of the instrument with regard to validity and reliability was secured using several different methods. Content validity of this present study was supported by the use of concept analysis, content experts, and content validity index (CVI). Construct validity was evaluated by using the contrasted groups approach. Prior to administering the main study, reliability was also pilot-tested using the responses from a group of 26 senior nursing students in Southern Nevada. *Cronbach's alpha* (α) was calculated for each of the defining attributes of clinical judgment during the pilot testing to estimate the reliability of the newly developed instrument.

The main study was conducted using a convenience sample of 205 nursing students from six out of seven nursing programs in Southern Nevada. The nursing program participated in this study included four baccalaureate (BSN) programs and two associate (ADN) programs. Data collection began in March 2010 and was completed in April 2010. The data was analyzed using SPSS™ Statistics 17 for Windows®. Descriptive statistics used in this study included measures of central tendency, such as mean, median, and mode; frequency distribution; and dispersion such as standard deviation, variance, and range. Inferential statistics used in this study included chi-square, z-test, Mann-Whitney *U* test, and *t*-test.

Discussion of the Findings

This section presents the interpretations and discussions of the results found in the current study. With the use of a newly developed instrument, an interpretation and discussion of the content validity by means of content validity index (CVI) will lead this section followed by the discussion of the pilot testing results. For the main study, the description of participants will be discussed, followed by the discussion of student responses to each section of the CJA instrument as well as the comparison of the mean composite scores (*t*-test) between experts and students. A discussion of the comparison between nursing programs (BSN vs. ADN) and the comparison between experience (previous healthcare experience vs. no experience) will conclude this section.

Content Validity Index (CVI)

The instrument was designed on the basis of real-world nursing practice. The two case vignettes used in this newly designed instrument were based on actual patient cases to provide as real-life description as possible to secure the validity of the instrument. The two case vignettes were two of the many core measurements required by the Joint Commission on Accreditation of Healthcare Organization (JCAHO) to ensure patient care quality and consistency among participating healthcare facilities in the U.S.

Seven experts were invited to serve on the panel to review the original draft of the instrument and their responses were used as criteria for the measure. The current study found that experts did not have unanimous consensus in their use of clinical information nor did they have unanimous consensus on the clinical information (supportive information) used as a basis of their clinical judgment. This finding was very similar to many previous studies of clinical judgment, within the conceptual framework of

Brunswik's Lens Model, using the traditional judgment analysis (multiple regression and binary logistic regression) method. As early as 1966, when Brunswik's Lens Model was first introduced to nursing practice by Kenneth R. Hammond, the first study found that nurses used a large number of clinical information facts which could not be identified as clusters and analyzed (Hammond, Kelly, Schneider, & Vancini, 1966).

Beckstead and Stamp's (2007) study showed that there was considerable variation among nurse practitioners in how clinical information was used in estimating patient risk of coronary heart disease. Thompson, Spilsbury, Dowding, Pattenden, and Brownlow's (2008) study also revealed that specialist heart failure nurses varied in their judgment and cue weighting assigned to clinical information.

This finding can be explained using Brunswik's concept of vicarious functioning. According to Brunswik, the foundation of the meaning of vicarious functioning are the concept of "substitute" and "mutual." In other words, because much clinical information is redundant, nurses may attend to clinical information that is not necessarily that considered by their peers', despite being provided with the same clinical information.

Pilot Testing Results

Though student participants responded to most sections of the instrument and no one indicated it to be too difficult, when asked to identify the 5 most supportive information as the basis of their clinical judgment (identified nursing diagnoses) not all students did complete this part of the instrument. As a result, the only adjustment made in the main study was to emphasize the importance of completing this section to ensure the quality of the data obtained. Incentive also used to ensure the high degree of the response rate.

Although the homogeneity of the instrument was acceptable with Cronbach's alpha (α) > .8, it is important to realize that the instrument was specifically designed for the purpose of this present study and that the pilot testing was conducted with a small group of senior nursing students in an associate degree nursing program.

The Description of Participants

The student participants used in this study were a convenience sample from one geographical region and may not be representative of senior nursing students from other locations in the nation. All participants in the sample were 18 years and older. They were recruited by their instructors. Most of the participants were enrolled in a baccalaureate degree nursing (BSN) program and most of them had no previous healthcare experience. The proportion of the BSN nursing students in this study represents the same estimated nursing workforce in 2010, forecasted by the National Advisory Council on Nursing Education and Practice (NACNEP, 2005).

Student Responses

Student responses varied considerably in their use of clinical information (section 1&2, information gathering), indicated no statistically significant difference between student's and the experts' score. This result may be explained by the scoring of the instrument designed for this study. In this present study, one point is given for each correctly matched, with the criteria set by the experts (CVI ≥ .86), item. There was no penalty for wrong choices (those not matched with the criteria). Perhaps with a score set up, to assess student responses, by subtracting a point for every item that was not correctly matched with the criteria, the result may reveal statistically significant difference from the experts. In addition, since the study was anticipating the score of the

experts to be higher than those of the students, one-tailed probability should have been considered since one-tailed probability is exactly half that value of the two-tailed probability. Furthermore, with a larger sample size the result may reveal statistically significant difference in this study since sample size is one of the many factors that increase statistical power (Gall, Gall, & Borg, 2007).

Although the judgment accuracy of students was similar to those of the experts, there was considerable variation among students in their use of clinical information as the most supportive information being considered as the basis of their judgment (for each nursing diagnosis). For the medical case, 80% of the students identified four nursing diagnoses: impaired swallowing; impaired physical mobility; impaired verbal communication; and risk for aspiration. However, only two pieces of clinical information ("Aspiration precaution" and "Patient slurs but can be understood with some difficulty") were identified by the students as the most supportive information as the basis of their judgment (the 4 identified nursing diagnoses). The nurse experts (at least 6 out of 7, CVI ≥ .86) identified 3 additional sources of clinical information in support of their clinical judgment: "Repeat bedside swallow evaluation by speech pathologist today," "His wife often has to interpret his words for staff," and "Flaccid paralysis is present in his right arm and right leg."

For the surgical case, 80% of the students identified 5 nursing diagnoses (acute pain; disturbed body image; impaired physical mobility; ineffective tissue perfusion; and risk for infection). However, only 1 piece of clinical information ("Continuously complaint of constant sharp pain at the surgical site 10/10 on pain scale") was identified by the students as the most supportive information being considered as the basis of their

judgment (for the 5 identified nursing diagnoses). In comparison, the nurse experts (at least 6 out of 7, CVI ≥ .86) identified 4 additional clinical information items ("Surgical procedure - 'left below knee amputation;' "PCA Morphine [1mg/ml] maintenance dose 1mg lockout 8 min;" "Oxygen Saturation this morning was 90%;" and "At 5 am today WBC 22.7 [Range 5,000-10,000/mm3]").

However, the students identified nursing diagnoses (clinical judgment) that were very similar to those identified by the experts, but seemed to make very little conscious distinctions of particular clinical information supporting their judgment. This finding is similar to Thompson, Foster, Cole, and Dowding's (2005) study, although using different research methodology, that showed nursing students' information use was not linear when comparing pre-test with post-test (after a lecture) and that the utility for clinical judgment derived from clinical information was not "distributed equally." The study further suggested that some of the clinical information was not well perceived and incorporated into clinical judgment and that ecological validity needed to be well established for the analysis to be effective.

For the overall student responses, the newly designed instrument used in this current study is not a standardized tool, and the histograms of partscore1, 2, 3, and 4 of both medical and surgical cases shown in Chapter 5 resembled a near normal distribution (bell-shaped curve) which is the most commonly observed probability distribution of measurement.

In the last section of the instrument, student confidence levels indicated no relationship to their CJA scores. This finding does not correspond with the concept of

"self-efficacy" as described by Albert Bandura (1998) in that human accomplishment will be enhanced with a strong sense of efficacy.

The Comparison

When the students' mean sub-scores for each defining attribute were compared with the experts' sub-scores, there was only one case of significant difference indicating clinical judgment accuracy in the medical case ($p < .05$). However, when comparing the average composite scores (CJA score), a significant difference between students' and experts' CJA scores was reflected ($p < .05$). This finding gives support to the validity of the CJA instrument.

The mean scores' difference between students in baccalaureate degree and associate degree nursing programs indicated no significant difference. The mean scores of students without previous healthcare experience reflected significant difference from those with experience only in regard to use of supportive information in the surgical case. This finding is not unexpected because the majority of those reported to have previous healthcare experience were in certified nursing assistance (CNA) positions.

Limitations of the Study

There were some limitations that need to be acknowledged and addressed regarding the present study as a means for improvement or potential strategies for further study. As previously stated this study is at most an investigation into the use of the Lens Model to measure clinical judgment of senior nursing students, utilizing a newly designed, one-of-a-kind, instrument. Specific limitations exist in the literature review as well as the conceptual framework. The first limitation concerns a criterion for the measure. A concern expressed in the literature review was that clinical judgment, by virtue of itself,

is not clearly defined and therefore very complex to measure. Furthermore, in nursing education, clinical judgment is not getting enough attention as critical thinking.

The Lens Model, as a conceptual framework for this study, was introduced to nursing practice in 1966 (following introduction to medical practice in 1955), and only recently regained attention by several British nursing scholars. Nevertheless, due to the complexity of the model and complicated equation required to analyze the judgment, clinical judgment analysis has mostly been used in medicine to learn how physicians use cues to make judgment. There is no instrument that has the same design as the one used in this study. Therefore, during the development of this instrument, a criterion for the measure was identified based on a very limited number of experts.

Consequently, due to the fact that there was a limited number of nurse experts who were not always unanimous in their consensus, the failure to detect significant differences in the sub-scores suggests that criteria for the measure needs to be further validated. This would increase the generalizability of the study.

Paper-pencil format is the last limitation of the study. In this present study, the students were required to go back to review previously provided clinical information (70 items) on the previous two pages. This limitation is perhaps the most likely cause of missing or inaccurately identified clinical information as the most supportive clinical information being considered, on the basis of their judgments (those identified nursing diagnoses). Furthermore, time requires entering the data for analysis can be efficiently managed using web-based design to deliver the assessment.

Implications for Practice

This study focused on the measure of clinical judgment of senior nursing students, particularly how the students identified and interpreted clinical information to arrive at the best clinical judgment and further able to prioritize those judgments when providing care. Despite the limitations discussed in the previous section, this study served as an important first step toward a better understanding of nursing clinical judgment, the definition as well as the process. With a much simpler designed instrument and a much less complicated scoring method, as being introduced and used in this study, the results can be quite significant for nursing students, practicing nurses, as well as nurse educators.

Nursing students, learning and practicing in the information era, need to be aware of the most important clinical information they attend to and those that influenced their clinical judgments. To enhance learning strategies and ensure successful learning outcomes, nursing students need a well-structured, predefined format of cases to aid the students make judgments and consequently decide appropriate nursing interventions. An assessment using this instrument identifies area(s) that students need to improve on their learning.

This instrument provides a prototype, or template, for nurse educators. Nurse educators could construct and analyze a variety of case vignettes using the format of the CJA. The cases used in nursing education can be a representative sample of actual cases, vignettes based on actual cases or a series of hypothetical case vignettes. As used in this study, case vignettes allow for a well-controlled comparison between individuals, although they lack visual cues and nurse-patient interaction. The results from analyzing

students' responses to these cases will have some implications for teaching modification and result in a more positive learning outcome.

Recommendations for Further Study

As previously discussed under the limitations of the study, a valid and reliable criterion for the CJA instrument is essential. It is recommended that the instrument be administered to a large number of nursing education experts, as well as practicing medical/surgical nurses, to ensure the validity of the criterion for the CJA.

Rather than a paper and pencil test, administration of the instrument should be delivered using a web-based program designed to ensure an efficient use of time and minimize errors during data entry. Web-based programs can be designed to yield a higher response rate for section three, the identification of clinical information items that are most supportive of the nursing diagnoses. The new web-based design instrument could deliver clinical information, followed by a list of nursing diagnoses that would appear only if that particular clinical information is identified by students as important. Students would then select nursing diagnoses for which they believe such clinical information would be supportive clinical information.

Following a study involving a large number of nurse experts to further validate the criterion for the CJA, and after revising the instrument to be an electronic format, it is recommended that the CJA be administered to a large population of senior nursing students in various geographical regions of the United States.

For the construction of subsequent case vignettes for use in other versions of the CJA, it is recommended that pre-existing commercially prepared learning materials be used. Several textbooks focusing on nursing critical thinking, clinical judgment, decision

making, and clinical reasoning should be considered as references to ensure the theoretical aspect of the instrument.

Conclusion

This study sought to investigate the feasibility of using the Brunswik's Lens Model in the development of a quantitative instrument to measure clinical judgment in senior level nursing students. To support the goal of this study, a newly designed instrument was used and the responses were analyzed with an aim to identify the level of clinical judgment of senior nursing students. The approach to measurement of clinical judgment, using this new instrument, was based on the concept of clinical judgment analyzed and defined by the researcher.

Results of the study provide an initial understanding of the measurement of clinical judgment in senior nursing students using a much simpler approach, although several responses were found to have no statistical significance. As a newly developed approach to the measurement of clinical judgment, the instrument was limited to specifically standardized criteria to yield a better result. The instrument can be improved to capture specific defining attributes of clinical judgment that relate to a practical, real world, approach. With the web-based format, it is highly feasible for the use of the Lens model as a framework to measure clinical judgment in senior nursing students. It is the opinion of the student researcher that without measurement of clinical judgment of our senior nursing students, improvement in nursing education cannot be effectively initiated; and, logically, without improving the measurement of clinical judgment the overall improvement in the quality of nursing education is limited, difficult, or impossible.

APPENDIX A

CONCEPTUAL AND OPERATIONAL DEFINITIONS

Table 17

Conceptual and Operational Definitions

Terms	Conceptual Definition	Operational Definition
Information Gathering	The ability to identify relevant information requires student nurses to use both knowledge and observation skill. Theoretically, as described by Chinn & Kramer (2004), knowledge "represents what is collectively taken to be a reasonably accurate understanding of the world as it is known by the members of the discipline" (p. 2). Observation is theoretically defined as an act of collecting information about a client that can be perceived by one or more purposeful use of senses to yield both objective and subjective information about a client	The score of items that measure a student ability to identify relevant information (using knowledge and observation) on the CJA Instrument is the student's raw score (counting the number of accurately identified clinical information by nursing students based on those clinical information identified by experts, one point was given for each correctly matched item), divided by the maximum possible score (70).
Clinical Judgment	A process, used by nursing students when planning care for a client that involves identification of multiple cues, the acquisition and search for additional information, combining and interpreting the available information, prioritizing and use of prior knowledge and experience. In this process, the students use knowledge, skills (observation, interpretation, and prioritization), and intuition to arrive at a clinical judgment.	The clinical judgment score is the nursing students' raw score (counting the number of accurate nursing diagnoses identified by nursing students based on those nursing diagnoses identified by experts, one point was given for each correctly matched item), divided by the maximum score (10).
Interpretation	The act of establishment of meaning of information about client's condition for diagnostic purposes (drawing a conclusion).	The interpretation score is the number of accurate clinical information identified by students as the most supportive information for each identified nursing diagnosis based on those identified by the experts, one point was given for each correctly matched item) divided by the maximum possible score (35 for medical case and 30 for surgical case).
Prioritization	An act of evaluating a group of items and arranging them in order of importance or urgency to the welfare of a client at a given time.	The score for prioritization is calculated based on the students' ranked nursing diagnoses when compared with those ranked by the experts (ideal rank).

APPENDIX B

COMPARISON OF TERMS

Table 18

Comparison of Terms

Lens Model Terms (Figure 1)	Also Known As	Definition	Application of Lens Model to Student Clinical Judgment Terms (Figure 2)	Example (Nursing)
Ecology	• Environment • Distal Environment • Distal Variable	True state or actual state of the environment	Actual Patient State (Criterion = Nursing Diagnosis identified by experts)	"Ineffective Protection" is identified by experts as one of the accurate Nursing Diagnoses for this client
Cues	• Lens • Proximal Cues • Proximal variables • Stimuli	Stimuli to which the true state of the environment is related. These stimuli are identified and interpreted as relevant to perception or judgment	Cues (Clinical information obtained from shift change report, the patient's chart, and/or from an assessment.)	A 78 year old female Chief complaint: right hip pain, admitting diagnosis: right hip osteoarthritis surgical procedure: Right Total Hip Arthroplasty, 2nd day post operation; Temperature >101°, WBC counts > 20,000/mm^3, incision appears redness, swelling, tenderness, with purulent drainage noted, prescribed Synercid 500mg IV every 8 hr. Misc. information : retired school teacher, has a long history of uncontrolled diabetes and hypertension, etc.
Perception	• Judgment	A process of identifying the most useful information in order to react appropriately to the environment.	Student's Clinical Judgment (Nursing Diagnoses identified by student)	Nursing student identified one nursing diagnosis for this client as "Ineffective Protection."

Vicarious Functioning	• Cue Inter-correlations	When multiple cues present, each cue provides the same meaning.	Vicarious Functioning (Cue Intercorrelations = Clinical information obtained may be similar, redundant, or provide the same information.)	Temperature >101°, WBC counts > 20,000/mm^3, incision appears redness, swelling, tenderness, with purulent drainage noted, prescribed Synercid 500mg IV every 8 hours.
Ecological Validity		The correlation of each cue with the true state of the environment (criterion)	Ecological validity (expert nurses identified each piece of clinical information as important or not important).	Experts identified a history of uncontrolled DM as having a stronger correlation with the nursing diagnosis “Ineffective Protection” than a history of HTN. Also, experts identified WBC counts, characteristics of the incision, and prescribed antibiotic as having stronger correlation with the nursing diagnosis “Ineffective Protection” than an elevated temperature.
Cue Weights	• Cue Weighting • Cue Utilization	The correlation of each cue with the perception or judgment made by the judge.	Cue Utilization/ weighting (Student recognizes each piece of information [using knowledge and/or observation] as important or not important).	The nursing student identified a history of uncontrolled DM, WBC counts, characteristics of the incision, and prescribed Synercid as important information upon which his/her judgment is based.
Achievement	• Probabilistic Stabilization • Functional Validity • The Index of Success • The Degree of Perfection	The correct judgment (when the perception or judgment made by the judge corresponds to the actual state of the environment.)	Achievement = The degree of correlation between Student's Clinical Judgment [Nursing Diagnosis identified by student] and Actual Patient State [Criterion = Nursing Diagnosis identified by experts].	In this case a student uses knowledge and observations to interpret and arrive at the same nursing diagnosis as identified by the experts. The student’s judgment is accurate. Cues are being used accurately, therefore achievement is high (cue utilization matches ecological validity = correct judgment).

APPENDIX C

PRESENTATION OF THE CONCEPTS WITH THEIR ALIGNMENT TO THE CONCEPTUAL FRAMEWORK AND THE CJA TOOL

Table 19

Presentation of the Concepts with Their Alignment to the Conceptual Framework and

Defining attributes of clinical judgment	Terms as associated with the student clinical judgment (SCJ) model	Terms as operationalized using clinical judgment assessment (CJA) tool	Statistical analysis test
Information Gathering is the ability to identify relevant information that requires student nurses to use both knowledge and observation skill. Knowledge "represents what is collectively taken to be a reasonably accurate understanding of the world as it is known by the members of the discipline" (Chinn & Kramer, 2004, p. 2). Observation is an act of collecting information about a client that can be perceived by one or more purposeful use of senses to yield both objective and subjective information about a client.	Cues utilization (identified cues that are related to factual understanding of client's conditions and cues that require attentive notice or taking into account).	Measured by number of clinical information (knowledge and observation type of information, from the first and second sections of the instrument) accurately identified by a student based on the experts' responses. The score is calculated using student's raw score (number of clinical information accurately identified by a student), divided by the maximum possible score (70)	Descriptive, Z-test, Mann-Whitney *U* test, and *t*-test.
Clinical judgment is a process, used by students when planning care for a client that involves identification of multiple cues, the acquisition and search for additional information, combing and interpreting the available information, prioritizing and use of prior knowledge and experience. In this process, students use knowledge and skills (observation, interpretation, and prioritization) to arrive at a clinical judgment.	Achievement or a relationship between a student's clinical judgment (nursing diagnoses as identified by student) and the actual patient state (nursing diagnoses as identified by expert nurses).	Measured by number of nursing diagnoses accurately identified by a student (based on those identified by expert nurses). A clinical judgment accuracy score is calculated using student's raw score (number of nursing diagnoses accurately identified by student), divided by the maximum possible raw score (10).	Descriptive, Z-test, Mann-Whitney *U* test, and *t*-test.

Interpretation is an act of establishment of meaning of information about a client's condition for diagnostic purposes (drawing a conclusion).	A relationship between cues (knowledge and observation) utilization and clinical judgment (nursing diagnoses as identified by student).	Measured by number of clinical information accurately identified by a student as the most supportive information for each identified nursing diagnosis (based on those identified by expert nurses). Interpretation score is calculated using student's raw score (number of clinical information identified accurately identified by student as supportive information), divided by the maximum possible raw score (35 for medical case and 30 for surgical case).	Descriptive, Z-test, Mann-Whitney *U* test, and *t*-test.
Prioritization is an act of evaluating a group of items and arranging them in order of importance or urgency to the welfare of a client at a given time.	Placing clinical judgment (nursing diagnoses as identified by student) in order of most important to least important.	Calculated by using the absolute value of each nursing diagnosis identified by experts (ideal rank) minus the ranked nursing diagnosis (by students) and subtract the sum of all the values from the ideal ranked.	Descriptive, Mann-Whitney *U* test and *t*-test.

APPENDIX D

COVER LETTER TO NURSE EXPERT PANEL

Dear Content Expert Panel Members,

Thank you ever so much for agreeing to serve on the content expert panel. In partial fulfillment of the requirements for the doctoral program in nursing at UNLV, I am investigating the feasibility of developing of a quantitative instrument to measure clinical judgment in senior level nursing students. Content validity is considered a significant factor in the development and application of the newly developed instrument. As the public demand safer and higher quality care from our new graduate, the need for reliable and valid measures of our senior nursing students have greater significance for nursing education.

You are asked to serve as a content expert because of your superior knowledge and experience in quality nursing care. Your participation in the instrument review process is valuable as a preliminary step to future studies that could investigate teaching strategies to ensure the competency of our graduates.

The instrument was designed and developed based on the Brunswik's Lens Model. The basic assumption of the model is that one recognizes and interprets different pieces of information about a person, object, or situation to arrive at a perception or judgment. In nursing practice, the North American Nursing Diagnosis Association (NANDA) defined a nursing diagnosis as "a clinical judgment about individual, family, or community experience/responses to actual or potential health problems/life processes. Nursing diagnoses provide the basis for selection of nursing interventions to achieve outcomes for which the nurse is accountable."

The instrument is designed to correspond with the defining attributes of clinical judgment which include information gathering, interpretation, judgment, and prioritization. It is intended to measure the ability of senior nursing students to recognize and interpret available clinical information to arrive at sound clinical judgment (nursing diagnoses) and prioritize the importance of the identified nursing diagnoses so that the students can provide effective and efficient care to a client.

This instrument consists of two case vignettes (medical and surgical patients). Each case vignette is presented, in an itemized fashion, with clinical information about a hypothetical patient. For section 1 & 2, information gathering, clinical information is presented as it would be in the real world practice, first from the shift change report and then additional clinical information can be obtained from the chart as well as an actual observation/assessment. Section 3 represent interpretation and judgment and section 4 represent prioritization of the judgment made. Please follow specific instruction for each section as indicated.

Thank you again for your kind assistance in this matter. If you should have any question, concern, or advice, please feel free to call me at my office (702) 651-5985 or contact me at tiwaporn.pongmarutai@csn.edu

Sincerely,

Tiwaporn Pongmarutai, RN, MS, MSN, FNP, BC
Nursing Professor, School of Health Sciences
College of Southern Nevada,
6375 West Charleston Boulevard,
Las Vegas, NV 89146-1164

APPENDIX E

DRAFT OF THE CJA INSTRUMENT

The following page (section 1) presents you with a case vignette 1. The patient is an acute ischemic stroke. The first section provides you with clinical information as it would be presented during a shift change report and asks you to rate each item based on how you perceive it as relevant/important to your plan of care for this patient today.

***Relevant* to plan the care for this patient today:**

Rating Scale: **1**= irrelevant ⟷ **4** = extremely relevant

Furthermore, to ensure the item clarity, you are asked to rate each item (the way it is written) as you would consider *a good item* (unambiguous to the point that its meaning is comprehended by senior nursing students in the same fashion).

Item *Clarity*:

Rating Scale: **1**= unclear/need revision ⟷ **4** = crystal clear

Section 1:

Item (clinical Information obtained from shift change report)	Relevant				Clarity			
1. Room 560								
2. Mr. Adams								
3. 53-year-old								
4. African American								
5. Male								
6. BMI 29.6								
7. Admitted 2 days ago								
8. Admitted from ER to Intermediate Care Unit (IMC)								
9. Attending physician is Dr. Jacob (Internal Medicine)								
10. Chief complaint: Sudden Rt. side weakness and slurred speech								
11. Admitting Diagnosis: Acute Ischemic Stroke								
12. Neurology consult is Dr. Vaughn (Neurologist)								
13. Patient was transferred from IMC to the floor this morning								
14. Past medical history of Hypertension (HTN)								
15. Past medical history of Hypercholesterolemia								
16. Past medical history of Type 2 Diabetes Mellitus (DM)								
17. NPO								
18. Aspiration Precautions								
19. Repeat bedside swallow evaluation by speech pathologist today								
20. Advance diet as recommended by speech therapy								
21. Allergic to Sulfa								
22. Full code (Class I)								
23. Activity: Out of bed to chair TID with PT								
24. Turn every 2 hours while in bed with 2 assists last night								
25. Head of the bed elevated 30°								
26. IV on left forearm, no sign of inflammation noted at the site								
27. Main IV is 0.9% Normal Saline								
28. IV infusing at 125 ml/hr.								
29. May convert IV to saline lock when tolerating PO								
30. Vital signs every 4 hours								
31. Neuro. checks every 4 hours								
32. O_2 to keep $SpO_2 > 94\%$								
33. Last night $SpO_2 > 94\%$, no O_2 required								
34. Consult case management for possible Rehab. Transfer								
35. Blood pressure this morning was 150/70 mm Hg.								
36. Patient slurs but can be understood with some difficulty								
37. His wife often have to interpret his words for staff								
38. Mild facial palsy								
39. Flaccid paralysis is present in his right. arm and right. leg								
40. No family member present this morning								

Additional information may be needed after the shift change report. The following page (section 2) presents you with additional information as it would be acquired from the patient's chart as well as an actual observation/assessment. The second section asks you to rate each item based on how you perceive it as relevant/important to your plan of care for this patient today.

***Relevant* to plan the care for this patient today:**

Rating Scale: **1**= irrelevant ⟷ **4** = extremely relevant

Again, to ensure the item clarity, you are asked to rate each item (the way it is written) as you would consider *a good item* (unambiguous to the point that its meaning is comprehended by senior nursing students in the same fashion).

Item *Clarity*:

Rating Scale: **1**= unclear/need revision ⟷ **4** = crystal clear

Section 2:

Item (clinical Information acquired from the chart as well as an actual observation/assessment)	Relevant				Clarity			
41. Physical Therapy to evaluate and treat altered gross motor development/function								
42. Occupational Therapy to evaluate and treat altered fine motor development/function, ADLs, and cognitive development								
43. Functional Independence Measure (FIM) score is 85/126								
44. Mini-Mental State Examination (MMSE) score is 22/30								
45. Only orientate to person not place nor time								
46. A smoking history of 35 pack-years								
47. Patient has been married for 32 years								
48. On admission, Stroke Scale (NIHSS) score was 8								
49. CT brain without contrast on admission was negative								
50. CT brain without contrast repeated day 1 after admission shows a hyperdense left middle cerebral artery (MCA)								
51. Carotid duplex ultrasonography shows 60% stenosis left ICA								
52. On admission WBC 9,800 (Range 5,000-10,000/mm^3)								
53. On admission RBC 4.9 (Range 3.8-5.5x10^6/µL)								
54. On admission Hg. 12.5 (Range 11.7-16.1g/dL)								
55. On admission Hct. 38 (Range 37%-47%)								
56. On admission Platelet 355,000 (Range 150,000-400,000mm^3)								
57. On admission Na. 142 (Range 136-145 mmol/L)								
58. On admission K 4.5 (Range 3.5-5.0 mmol/L)								
59. On admission Cl 102 (Range 98-106 mmol/L)								
60. On admission CO_2 27 (Range 23-31 mmol/L)								
61. On admission BUN 13 (Range 8-23 mmol/L)								
62. On admission Cr. 0.9 (Range 0.6-1.2 mg/dL)								
63. On admission Mg 2.0 (Range 1.7-2.2 mg/dL)								
64. On admission PO^4 2.8 (Range 2.4-4.1 mg/dL)								
65. At 5 am today PT 25 (Range 11-12.5 sec)								
66. At 5 am today INR 2.9 (Range 0.7-1.8)								
67. At 5 am today aPTT 58 (Range 30-40 sec)								
68. Capillary blood glucose at 0600 hr today was 148 mg/dL								
69. Insulin Sliding Scale: less than 150 = 0 unit								
70. Amlodipine (Norvasc®) 10 mg PO daily								
71. Enteric Coated ASA 325 mg PO daily								
72. Warfarin (Coumadin®) 5 mg. PO daily								
73. Nicotine Patch (14mg) daily								
74. Acetaminophen 650 mg. PO every 6 hours prn. Temp. >100°F								
75. Call M.D. if temp > 100.5° F								
76. Enoxaparin (Lovenox®) 40 mg. SQ daily								
77. Docusate Sodium (Colace®) 100 mg. PO. every 12 hours								
78. Lorazepam (Ativan®) 1 mg PO/IV every 8 hours prn anxiety								
79. Appears unaware of positioning of neglected side.								
80. Able to brush his teeth with his left hand								

Section 3: After reviewing clinical information from section 1 & 2,

1. Rate the nursing diagnoses listed below.

   Rating scale: 1 = Nursing Diagnosis is irrelevant to plan appropriate care for this patient today, and

   4 = Nursing Diagnosis is extremely relevant to plan appropriate care for this patient today.

2. For each nursing diagnosis rated as "relevant" (a rating of 3 or 4) to your plan of care today, identify the 5 most supportive clinical information (item # from section 1 & 2) for which you are considering.

Nursing Diagnosis	Relevant				Clinical Information (item #) being considered				
81. Impaired Memory					#	#	#	#	#
82. Acute Pain					#	#	#	#	#
83. Excess Fluid volume					#	#	#	#	#
84. Impaired Swallowing					#	#	#	#	#
85. Defensive Coping					#	#	#	#	#
86. Impaired physical Mobility					#	#	#	#	#
87. Impaired verbal Communication					#	#	#	#	#
88. Risk for Disuse syndrome					#	#	#	#	#
89. Disturbed Energy field					#	#	#	#	#
90. Chronic Sorrow					#	#	#	#	#
91. Unilateral Neglect					#	#	#	#	#
92. Disabled family Coping					#	#	#	#	#
93. Risk for Aspiration					#	#	#	#	#
94. Self-care deficit					#	#	#	#	#
95. Noncompliance					#	#	#	#	#

Section 4: Base on nursing diagnoses rated as "relevant" (a rating of 3 or 4) from section 3, rank them in order of importance to your plan of care today.

Rank priority	Nursing Diagnoses #
1	
2	
3	
4	
5	
6	
7	
8	

Please proceed to the case vignette 2

The following page (section 1) presents you with a case vignette 2. The patient is an amputee with diabetes. The first section provides you with clinical information as it would be presented during a shift change report and asks you to rate each item based on how you perceive it as relevant/important to your plan of care for this patient today.

***Relevant* to plan the care for this patient today:**

Rating Scale: **1**= irrelevant ⟷ **4** = extremely relevant

Furthermore, to ensure the item clarity, you are asked to rate each item (the way it is written) as you would consider *a good item* (unambiguous to the point that its meaning is comprehended by senior nursing students in the same fashion).

Item *Clarity*:

Rating Scale: **1**= unclear/need revision ⟷ **4** = crystal clear

Section 1:

Item (clinical Information obtained from shift change report)	Relevant				Clarity			
1. Room 561								
2. Mrs. Smith								
3. 70-year-old								
4. Hispanic								
5. Female								
6. BMI 39.8								
7. She is a retired school teacher								
8. Admitted yesterday morning								
9. Attending physician is Dr. Smith (Internal Medicine)								
10. Chief complaint: Severe left foot pain								
11. Admitting Diagnosis: Left foot gangrene								
12. Orthopaedic consultant is Dr. Grey (Orthopaedic Surgeon)								
13. Patient had surgery yesterday								
14. Surgical procedure - "Left Below Knee Amputation"								
15. Past medical history of GERD								
16. Past medical history of Hypertension (HTN)								
17. Past medical history of Type 2 Diabetes Mellitus (DM)								
18. Past medical history of Peripheral Vascular Disease (PVD)								
19. 1800 ADA diet								
20. To be out of bed to chair with Physical therapy today								
21. No Know Allergy								
22. Full code status (Class I)								
23. IV on right forearm, no sign of inflammation noted at the site								
24. Main IV is 0.9% Normal Saline								
25. IV infusing at 125 ml/hr.								
26. Vancomycin 1000 mg IVPB every 12 hours started at 1800 hr last evening.								
27. Peak and Trough Vancomycin level on the 3rd. dose								
28. C/O constant sharp pain at the surgical site 10/10 on pain scale								
29. PCA Morphine (1mg/ml) maintenance dose 1mg lockout 8 min								
30. Loading dose of Morphine 4mg every 4 hours last night								
31. Refuse to move the left residual limb for positioning								
32. Left below knee dressing with Ace® bandage								
33. Dry bloody drainage ~ 5cm in diameter noted on the dressing								
34. Left residual limb is to be elevated on pillows today								
35. Foley catheter drain 1500 ml for the night shift								
36. Capillary blood glucose (CBG) at 6 am today was 148 mg/dL.								
37. Temperature this morning: 99.3°F								
38. Blood pressure this morning: 138/80 mmHg.								
39. Husband and daughter stay with the patient last night								
40. Patient otherwise was very quiet last night								

Additional information may be needed after the shift change report. The following page (section 2) presents you with additional information as it would be acquired from the patient's chart as well as an actual observation/assessment. The second section asks you to rate each item based on how you perceive it as relevant/important to your plan of care for this patient today.

***Relevant* to plan the care for this patient today:**

Rating Scale: **1**= irrelevant ⟷ **4** = extremely relevant

Again, to ensure the item clarity, you are asked to rate each item (the way it is written) as you would consider *a good item* (unambiguous to the point that its meaning is comprehended by senior nursing students in the same fashion).

Item *Clarity*:

Rating Scale: **1**= unclear/need revision ⟷ **4** = crystal clear

Section 2:

Item (clinical Information acquired from the chart as well as an actual observation/assessment)	Relevant				Clarity			
41. Pre-op Chest X-ray - Normal CXR, no acute abnormalities.								
42. Pre-op Arteriography showed a superficial femoral artery with stenoses but a normal profunda artery								
43. H&P: "a normal left femoral pulse but absence of popliteal and tibial pulses."								
44. Past surgical history of Total Hysterectomy 30 years ago								
45. 30 pack years smoking history								
46. Missed follow-up appointments for the last 6 months								
47. Live with husband in a two story house								
48. Very active in church and local arts and crafts group								
49. Visit grandchildren 2 to 3 times a week.								
50. Oxygen Saturation this morning was 90%								
51. Anesthesia Record: Estimate blood loss (EBL) 450 ml								
52. At 5 am today WBC 22.7 (Range 5,000-10,000/mm^3)								
53. At 5 am today RBC 3.25 (Range 3.8-5.5x10^6/µL)								
54. At 5 am today Hg. 9.2 (Range 11.7-16.1g/dL)								
55. At 5 am today Hct. 27.5 (Range 37%-47%)								
56. At 5 am today Platelet 153,000 (Range 150,000-400,000mm^3)								
57. At 5 am today Na. 138 (Range 136-145 mmol/L)								
58. At 5 am today K 4.1 (Range 3.5-5.0 mmol/L)								
59. At 5 am today Cl 103 (Range 98-106 mmol/L)								
60. At 5 am today CO_2 28 (Range 23-31 mmol/L)								
61. At 5 am today BUN 15 (Range 8-23 mmol/L)								
62. At 5 am today Cr. 0.7 (Range 0.6-1.2 mg/dL)								
63. Pre-operative lab. Total Protein 7.4 (Range 5.5-9.0 g/dL)								
64. Pre-operative lab. Albumin 3.8 (Range 3.1-4.6 g/dL)								
65. Pre-operative lab. PT 12 (Range 11-12.5 sec)								
66. Pre-operative lab. INR 1 (Range 0.7-1.8)								
67. Pre-operative lab. aPTT 36 (Range 30-40 sec)								
68. PT consult today for ambulation and muscle strengthening								
69. Repeat CBC tomorrow morning								
70. Capillary blood glucose at 2100hr last night was 170 mg/dL								
71. Regular insulin 3 unit SQ given at 2100 hr last night								
72. Insulin Sliding Scale: less than 150 = 0 unit								
73. Levaquin 500mg IVPB daily								
74. Protonix 40 mg PO Daily								
75. Lovenox 40 mg SQ BID								
76. Ferrous Sulfate 324 mg PO TID with meal								
77. Neurontin (Gabapentin) 600mg PO daily								
78. Norvasc 10 mg PO daily								
79. Paxil 20 mg PO Q HS.								
80. Flexeril 10 mg PO PRN Q6 hr.								

Section 3: After reviewing clinical information from section 1 & 2,

1. Rate the nursing diagnoses listed below.

   Rating scale: 1 = Nursing Diagnosis is irrelevant to plan appropriate care for this patient today, and
   4 = Nursing Diagnosis is extremely relevant to plan appropriate care for this patient today.

2. For each nursing diagnosis rated as "relevant" (a rating of 3 or 4) to your plan of care today, identify the 5 most supportive clinical information (item # from section 1 & 2) for which you are considering.

Nursing Diagnosis	Relevant				Clinical Information (item #) being considered				
81. Impaired Gas exchanged					#	#	#	#	#
82. Decreased Cardiac output					#	#	#	#	#
83. Risk for deficient Fluid volume					#	#	#	#	#
84. Acute Pain					#	#	#	#	#
85. Defensive Coping					#	#	#	#	#
86. Disturbed Body image					#	#	#	#	#
87. Impaired physical Mobility					#	#	#	#	#
88. Grieving					#	#	#	#	#
89. Ineffective Tissue perfusion					#	#	#	#	#
90. Chronic Sorrow					#	#	#	#	#
91. Unilateral Neglect					#	#	#	#	#
92. Disabled family Coping					#	#	#	#	#
93. Risk for Aspiration					#	#	#	#	#
94. Imbalanced Nutrition: less than body requirements					#	#	#	#	#
95. Risk for Infection					#	#	#	#	#

Section 4: Base on nursing diagnoses rated as "relevant" (a rating of 3 or 4) from section 3, rank them in order of importance to your plan of care today.

Rank priority	Nursing Diagnoses #
1	
2	
3	
4	
5	
6	
7	
8	

Additional suggestions for overall improvement of this instrument:

Thank you ever so much.

APPENDIX F

UNLV IRB APPROVAL AND INFORMED CONSENT

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

UNLV IRB Approved MAR 22 2010 Expires DEC 15 2010

Biomedical IRB – Expedited Review
Modification Approved

NOTICE TO ALL RESEARCHERS:
Please be aware that a protocol violation (e.g., failure to submit a modification for any change) of an IRB approved protocol may result in mandatory remedial education, additional audits, re-consenting subjects, researcher probation suspension of any research protocol at issue, suspension of additional existing research protocols, invalidation of all research conducted under the research protocol at issue, and further appropriate consequences as determined by the IRB and the Institutional Officer.

DATE: March 23, 2010

TO: **Dr. Susan Kowalski**, Nursing

FROM: Office of Research Integrity – Human Subjects

RE: Notification of IRB Action by Dr. John Mercer, Chair
Protocol Title: **Application of a Judgment Model Toward Measurement of Clinical Judgment in Senior Nursing Students**
Protocol #: 0910-3268M

The modification of the protocol named above has been reviewed and approved.

Modifications reviewed for this action include:
- The amount of participation time is increased from 20 to 30 minutes. This is reflected in the Informed Consent and the Protocol Proposal form.

This IRB action will not reset your expiration date for this protocol. The current expiration date for this protocol is December 15, 2010.

PLEASE NOTE:
Attached to this approval notice is the **official Informed Consent/Assent (IC/IA) Form** for this study. The IC/IA contains an official approval stamp. Only copies of this official IC/IA form may be used when obtaining consent. Please keep the original for your records.

Should there be *any* change to the protocol, it will be necessary to submit a **Modification Form** through ORI – Human Subjects. No changes may be made to the existing protocol until modifications have been approved by the IRB.

Should the use of human subjects described in this protocol continue beyond December 15, 2010, it would be necessary to submit a **Continuing Review Request Form** *60 days* before the expiration date.

If you have questions or require any assistance, please contact the Office of Research Integrity - Human Subjects at IRB@unlv.edu or call 895-2794.

Office of Research Integrity – Human Subjects
4505 Maryland Parkway • Box 451047 • Las Vegas, Nevada 89154-1047

RECEIVED
MAR 12 2010

UNLV
UNIVERSITY OF NEVADA LAS VEGAS

UNLV IRB
Approved
MAR 22 2010
Expires
DEC 15 2010

INFORMED CONSENT

School of Nursing

TITLE OF STUDY: APPLICATION OF A JUDGMENT MODEL TOWARD MEASUREMENT OF CLINICAL JUDGMENT IN SENIOR NURSING STUDENTS

INVESTIGATOR(S): **Susan Kowalski, RN, PhD – Principal Investigator**

Tiwaporn Pongmarutai, RN, MS, MSN, FNP, BC – Student Investigator.

CONTACT PHONE NUMBER: **Dr. Susan Kowalski (PI): 702-895-3404 and**
Tiwaporn Pongmarutai (SI): 702-651-5985

Purpose of the Study

You are invited to participate in a research study on measurement of clinical judgment. The purpose of this study is to develop an instrument to measure clinical judgment in senior level nursing students, both in baccalaureate and associate degree programs.

Participants

You are being asked to participate in the study because you, as a senior nursing student who are between 18-55 years of age, are currently enrolled in your last semester of an associate degree or a baccalaureate degree nursing program.

Procedures

If you volunteer to participate in this study, you will be asked to do the following: first to complete some demographic information and then complete an assessment tool. The assessment tool includes 2 case vignettes designed based on a real-life nursing practice in an acute care setting. The instruction will be specified at the beginning of each step.

Benefits of Participation

Though, there are no direct benefits for you, participating in this study may serve as a challenge to your competence in a non-threatening manner. The findings from this study will enhance nurse educators' understanding of how nursing students arrive at sound clinical judgment when planning care for clients. The results will enable nurse educators to better facilitate students' learning and hence improve their learning outcomes.

Risks of Participation

Though, there are no anticipated risks for participating in this study, you might experience varying degree of discomfort during the process. Since participating in this study is voluntary and do not relate to your learning progress record, the probability of any risk associated with participating in this study is not likely. You can withdraw from the study at any time you wish and that there are no negative consequences in doing so.

Participant Initials _____

RECEIVED
MAR 12 2010

UNLV IRB
Approved
MAR 22 2010
Expires
DEC 15 2010

TITLE OF STUDY: APPLICATION OF A JUDGMENT MODEL TOWARD MEASUREMENT OF CLINICAL JUDGMENT IN SENIOR NURSING STUDENTS

Cost /Compensation

There will not be financial cost to you to participate in this study. The study will take about 30 minutes of our time. After every class of nursing students completes their instrument, a drawing will be conducted for 4 cash prizes of $25.00 for all who participated in the study. The cash prizes will be given to the student directly if they are present, or will be left at the school secretary's desk for pick-up. Winners will be notified by e-mail that they have won if they are not present for the drawing. There are usually between 20-50 students in each nursing class, so your chances of being a winner are between 8-20%.

Contact Information

If you have any questions or concerns about the study, you may contact Dr. Susan Kowalski (Principal Investigator) at 702-895-3404 and/or Tiwaporn Pongmarutai (Student Investigator) at 702-651-5985. For questions regarding the rights of research subjects, any complaints or comments regarding the manner in which the study is being conducted you may contact **the UNLV Office for the Protection of Research Subjects at 702-895-2794.**

Voluntary Participation

Your participation in this study is voluntary. You may refuse to participate in this study or in any part of this study. You may withdraw at any time without prejudice to your relations with the university. You are encouraged to ask questions about this study at the beginning or any time during the research study.

Confidentiality

All information gathered in this study will be kept completely confidential. No reference will be made in written or oral materials that could link you to this study. All records will be stored in a locked facility at UNLV for a minimum of 3 years after completion of the study. After the storage time the information gathered will be destroyed.

Participant Consent:

I have read the above information and agree to participate in this study. I am at least 18 years of age. A copy of this form has been given to me.

_____ _____

Signature of Participant Date

_____

Participant Name (Please Print)

Participant Note: Please do not sign this document if the Approval Stamp is missing or is expired.

Participant Initials ____

APPENDIX G

LETTER TO NURSING SCHOOLS

Dear.....

My name is Tiwaporn Pongmarutai. I am a nursing professor at the College of Southern Nevada (CSN) and a PhD student at UNLV. The focus of my dissertation is measuring clinical judgment of senior nursing students (applying the Brunswik Lens model). I am planning to conduct a study in Spring 2010 and would like to ask permission to do so with your senior nursing students. The IRB requires the "Facility Authorization" form (please see attached) to be signed on the letterhead of the institution. Please let me how I should go about with this request.

Thank you ever so much for your kind consideration and assistance in this matter.

Tiwaporn Pongmarutai, RN, MS, MSN, FNP, BC
Nursing Professor
School of Health Sciences
College of Southern Nevada
6375 West Charleston Blvd., W4K
Las Vegas, Nevada 89146-1164
(O) 651-5985
(F) 651-5501

APPENDIX H

CALCULATION FOR CJA COMPOSITE SCORE

Table 20

Calculation for CJA Composite score

Measures	Description	Score	Weight	Weighted Score
Information Gathering	Measured by number of clinical information accurately (based on those identified by experts) identified by a student* and divided by the maximum possible point (70).	0.76**	25%	0.19
Clinical Judgment Accuracy	Measured by number of nursing diagnoses accurately (based on those identified by experts) identified by a student* and divided by the maximum possible point (10).	0.8**	25%	0.20
Interpretation	Measured by the number of clinical information accurately identified by students* as the most supportive clinical information for the identified nursing diagnoses correctly when compare with those identified by the experts and divided by the maximum possible point (35 for medical case and 30 for surgical case).	0.75**	25%	0.19
Prioritization	Calculated by using the absolute value of each nursing diagnosis identified by experts (ideal rank) minus the ranked nursing diagnosis (by students) and subtract the sum of all the values from the ideal ranked.	0.8**	25%	0.20
Composite/final score	Composite/final score = sum of the weighted scores			0.78

* Note: one point is given for each correctly matched (with the criteria set by the experts) item.

**These scores are hypothetical to demonstrate an example of the calculation of the final score for the CJA instrument.

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 21

Content Validity Index for Case 1 (Medical): Section 1 of the Instrument (40Items)

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	Item CVI
1	1	1	4	4	2	1	2	2	.29
2	2	1	4	4	4	3	2	4	.57
3	2	3	2	4	4	3	3	5	.71
4	4	3	2	4	4	3	3	6	.86
5	3	3	2	4	4	3	3	6	.86
6	4	4	2	3	3	4	3	6	.86
7	4	1	2	4	4	2	4	4	.57
8	1	2	2	3	2	2	2	1	.14
9	1	1	4	4	2	2	2	2	.29
10	4	4	3	4	4	4	4	7	1.00
11	4	4	4	4	4	4	4	7	1.00
12	1	1	4	4	2	2	2	2	.29
13	3	2	4	3	3	3	3	6	.86
14	4	4	4	4	3	4	4	7	1.00
15	4	4	4	4	3	4	4	7	1.00
16	4	4	4	4	3	4	4	7	1.00
17	2	4	4	4	2	4	4	5	.71
18	4	4	4	4	4	4	4	7	1.00
19	2	4	3	4	3	3	4	6	.86
20	2	4	3	4	2		3	4	.57
21	4	4	4	4	4	4	4	7	1.00
22	4	4	4	4	4	4	4	6	.86
23	2	3	3	4	3	3	3	6	.86
24	4	4	3	4	1	3		5	.83
25	4	4	3	4	4	4	4	7	1.00
26	2	4	3	4	3	3	3	6	.86
27	2	3	3	4	3	3	3	6	.86
28	2	4	3	4	3	3	3	6	.86
29	2	3	4	4	3	2	4	5	.71
30	4	4	4	4	2	3	3	6	.86
31	3	4	4	4	2	3	4	6	.86
32	3	4	4	4	2	4	4	6	.86
33	3	3	3	3	3	4	3	7	1.00
34	3	4	3	3	4	2	2	5	.71
35	3	3	3	4	4	4	4	7	1.00
36	4	3	3	4	4	4		6	1.00
37	4	3	2	3	4	2	4	5	.71
38	4	4	3	4	3	4	3	7	1.00
39	4	4	3	4	4	4	3	7	1.00
40	4	2	1	3	2	2	3	3	.43
Proportion relevant	.65	.80	.80	1.0	.72	.77	.84	Average CVI Section 1	.8

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 22

Content Validity Index for Case 1 (Medical): Section 2 of the Instrument (40Items)

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	Item CVI
41	3	4		3	2	2	3	4	.67
42	3	4		3	3	2	3	5	.83
43	4	3	4	4	4	4	3	7	1.00
44	4	3	4	4	4	4	2	6	.86
45	4	4	4	4	4	4	4	7	1.00
46	4	3	2	3	2	4	2	4	.57
47	3	2	1	3	3	2	2	3	.43
48	4	3	4	3	4	4	2	6	.86
49	3	3	4	4	4	3	3	7	1.00
50	4	3	4	4	4	4	4	7	1.00
51	4	3	4	4	3	4	4	7	1.00
52	2	2	3	4	2	2	2	2	.29
53	2	2	3	4	2	4	2	3	.43
54	2	2	3	4	2	4	2	3	.43
55	2	2	3	4	2	4	2	3	.43
56	4	2	3	4	2	4	2	4	.57
57	2	2	3	4	2	3	2	3	.43
58	4	2	3	4	2	3	2	4	.57
59	2	2	3	4	2	3	2	3	.43
60	2	2	3	4	2	3	2	3	.43
61	4	2	3	4	2	3	2	4	.57
62	4	2	3	4	2	3	2	4	.57
63	3	2	3	4	2	3	2	4	.57
64	3	2	3	4	2	3	2	4	.57
65	4	4	4	4	4	3	4	7	1.00
66	4	4	4	4	4	3	4	7	1.00
67	4	4	4	4	4	3	4	7	1.00
68	4	4	3	3	3	3	4	7	1.00
69	3	4	3	3	3	1	3	6	.86
70	4	4	3	4	4	4	3	7	1.00
71	4	4	3	4	4	4	2	6	.86
72	4	4	4	4	4	4	4	7	1.00
73	4	4	3	4	3	2	2	5	.71
74	3	4	2	4	1	2	3	4	.57
75	3	4	3	4	1	3	4	6	.86
76	4	4	4	4	4	4	3	7	1.00
77	4	4	2	4	4	4	2	5	.71
78	4	4	2	4	2	2	3	4	.57
79	4	4	4	4	4	4	4	7	1.00
80	4	3	3	3	4	2	2	5	.71
Proportion relevant	.82	.65	.82	1.0	.55	.77	.47	Average CVI Section 2	.73

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 23

Content Validity Index for Case 1 (Medical): Section 3 of the Instrument (15Items)

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	Item CVI
81	2	4	2	4	4	4	3	5	.71
82	2	1	2	2	1	1	2	0	0
83	1	2	4	1	1	1	1	1	.14
84	4	4	4	4	4	4	3	7	1.00
85	2	1	2	2	1	1	1	0	0
86	4	4	3	4	4	4	3	7	1.00
87	4	4	3	4	4	4	4	7	1.00
88	3	2	3	4	4	1	2	4	.57
89	2	1	1	2	2	1	1	0	0
90	2	2	2	2	1	1	1	0	0
91	4	4	3	4	4	1	3	6	.86
92	2	2	2	2	1		1	0	0
93	4	4	4	4	4	4	4	7	1.00
94	4	4	2	4	4	1	2	4	.57
95	2	1	1	2	1	1	1	0	0
Proportion relevant	.47	.47	.47	.53	.53	.36	.4	Average CVI Section3	.46

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 24

Content Validity Index for Case 1 (Medical): Supportive Information for the Identified Nursing Diagnoses

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	CVI
Supportive Information for Nursing Diagnosis # 84	10			10		10		.43
	11			11	11			.43
	17	17	17	17		17		.71
	18	18	18	18	18	18		.86
			19	19	19		19	.57
	20		20					.29
					25			.14
						37		.14
			38			38	38	.43
							39	.14
Supportive Information for Nursing Diagnosis # 86		10	10	10		10		.57
	11			11				.29
					23		23	.29
			24	24	24		24	.57
	39	39	39	39	39	39	39	1.00
		41	41		41	41	41	.71
		42						.14
	43	43			43		43	.57
				79				.14
	80		80					.29
Supportive Information for Nursing Diagnosis # 87	10		10	10	10	10		.71
	11		11	11				.43
						20		.14
	36	36	36	36	36	36	36	1.00
	37	37	37	37	37	37	37	1.00
	38		38	38	38	38		.71
							50	.14
Supportive Information for Nursing Diagnosis # 91	10		10	10				.43
	11			11				.29
			24					.14
	39	39	39	39				.57
	43							.14
			48					.14
							50	.14
			79	79	79		79	.57
	80							.14
Supportive Information for Nursing Diagnosis # 93	10					10		.29
	11							.14
			17	17	17	17		.57
	18	18	18	18	18	18	18	1.00
	19	19	19	19	19		19	.86
	20		20		20		20	.57
		25		25	25		25	.57
						37		.14
			38			38		.29

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 25

Content Validity Index for Case 1 (Medical): Section 4 of the Instrument

Rank Priority	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7
1	93	84	84	86	93	93	93
2	84	86	93	84	84	84	84
3	86	87	83	93	86	86	87
4	87	94	91	87	94	87	86
5	82	81	88	81	81	81	94
6	91	91	86	94	87		81
7	94	93	94	91	91		91
8	90		82	88	88		

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 26

Content Validity Index for Case 2 (Surgical): Section 1 of the Instrument (40Items)

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	Item CVI
1	2	1	2	4	2	1	1	1	.14
2	2	1	2	4	4	3	1	3	.43
3	3	3	2	4	4	3	3	5	.71
4	3	3	2	4	4	3	2	5	.71
5	3	3	2	4	4	1	3	5	.71
6	4	4	2	3	3		4	5	.83
7	3	3	1	3	2	1		3	.5
8	2	1	2	3	3	1	3	3	.43
9	2	1	4	4	2	1	2	2	.29
10	4	4	3	4	3	4	3	7	1.00
11	4	4	4	4	3	4	4	7	1.00
12	2	2	4	4	2	3	2	3	.43
13	3	3	4	4	4	4	4	7	1.00
14	4	4	4	4	4	4	4	7	1.00
15	3	1	4	4	3	2	2	4	.57
16	3	4	4	4	3	3	3	7	1.00
17	3	4	4	4	3	4	4	7	1.00
18	3	4	4	4	3	4	4	7	1.00
19	4	4	4	4	2	3	2	6	.86
20	3	4	3	4	4	3	3	7	1.00
21	4	4	4	4	4	4	2	6	.86
22	4	4	4	4	4	4	3	7	1.00
23	3	4	3	4	2	3	2	5	.71
24	2	4	3	4	3	3	2	5	.71
25	2	4	3	4	3	3	2	5	.71
26	3	4	3	4	4	4	3	7	1.00
27	4	4	4	4	4	4	3	7	1.00
28	4	4	4	4	4	3	4	7	1.00
29	3	4	4	4	4	3	4	7	1.00
30	3	4	4	4	4	3	3	7	1.00
31	4	4	3	4	4	3	4	7	1.00
32	3	4	3	4	3	4	3	7	1.00
33	3	4	4	4	4	3	3	7	1.00
34	4	4	4	4	4	3	3	7	1.00
35	2	4	3	4	3	3	3	6	.86
36	3	4	4	4	3	3	3	7	1.00
37	3	4	4	4	3	4	3	7	1.00
38	3	3	4	4	2	3	3	6	.86
39	2	2	1	3	2	2	2	1	.14
40	3	2	2	3	2	2	2	2	.29
Proportion relevant	.78	.8	.75	1.00	.78	.8	.69	Average CVI Section 1	.8

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 27

Content Validity Index for Case 2 (Surgical): Section 2 of the Instrument (40Items)

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	Item CVI
41	2	4	3	3	4	2	2	4	.57
42	3	2	3	4	3	4	2	5	.71
43	4	3	4	4	3	4	3	7	1.00
44	2	1	2	3	1	1	1	1	.14
45	4	4	3	4	2	4	3	6	.86
46	4	3	2	4	3	2	3	5	.71
47	3	4	2	4	3	4	4	6	.86
48	3	2	1	3	4	4	2	4	.57
49	3	2	1	3	4	4	2	4	.57
50	3	4	4	4	4	4	4	7	1.00
51	2	3	3	4	2	3	3	5	.71
52	4	4	4	4	4	4	4	7	1.00
53	4	4	4	4	3	4	3	7	1.00
54	4	4	4	4	4	4	3	7	1.00
55	4	4	4	4	4	4	3	7	1.00
56	3	4	4	4	2	4	3	6	.86
57	3	3	3	4	2	2	2	4	.57
58	3	3	3	4	2	2	2	4	.57
59	3	3	3	4	2	2	2	4	.57
60	3	3	3	4	2	2	2	4	.57
61	4	3	3	4	2	2	2	4	.57
62	4	3	3	4	2	2	2	4	.57
63	3	2	3	4	2	2	2	3	.43
64	3	2	3	4	2	2	2	3	.43
65	3	2	4	4	1	2	2	3	.43
66	3	2	4	4	1	2	2	3	.43
67	3	2	4	4	1	2	2	3	.43
68	3	4	3	4	4	2	3	6	.86
69	2	3	4	4	2	3	2	4	.57
70	2	3	3	3	4	4	2	5	.71
71	2	3	3	3	4	2	2	4	.57
72	2	4	3	4	3	2	2	4	.57
73	2	4	4	4	4	3	3	6	.86
74	2	4	3	4	4	2	2	4	.57
75	3	4	4	4	4	3	3	7	1.00
76	2	4	3	4	4	3	3	6	.86
77	2	4	2	4	3	3	4	5	.71
78	2	4	3	4	4	3	4	6	.86
79	2	4	2	4	3	2	3	4	.57
80	3	4	2	4	4	3	3	6	.86
Proportion relevant	.68	.78	.8	1.00	.6	.52	.48	Average CVI Section 2	.7

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 28

Content Validity Index for Case 2 (Surgical): Section 3 of the Instrument (15Items)

Item #	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	Experts in agreement	Item CVI
81	2	3	4	3	4	3	3	6	.86
82	2	1	4	2	1	1	1	1	.14
83	2	1	4	4	2	1	2	2	.29
84	4	4	4	4	4	4	4	7	1.00
85		2	1	2	1		2	0	0
86	4	4	1	4	2			3	.43
87	4	4	2	4	4	4	4	6	.86
88	3	3	1	2	3	3		4	.57
89		4	4	4	2	4	4	5	.71
90	2	2	1	2	1			0	0
91	3	1	2	2	1		1	1	.14
92	2	2	1	2	1		2	0	0
93	2	1	4	2	1	1	1	1	.14
94	2	1	3	2	1	1	1	1	.14
95	4	4	4	4	4	4	4	7	1.00
Proportion relevant	.46	.47	.53	.47	.33	.6	.38	Average CVI Section 3	.42

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 29

Content Validity Index for Case 2 (Surgical): Supportive Information for the Identified

	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7	CVI
			41		41			.29
Supportive Information for Nursing Diagnosis # 81		45	45	45	45			.57
		50	50	50	50	50	50	.86
		53	53					.29
		54					54	.29
		55						.14
			69					.14
		10						.14
	13			13	13		13	.57
				14	14	14	14	.57
Supportive Information for Nursing Diagnosis # 84	28	28	28	28	28		28	.86
		29	29	29	29	29	29	.86
		30	30		30	30	30	.71
	31	31	31			31		.57
						40		.14
			77					.14
	6							.14
		10						.14
		11						.14
				13				.14
	14	14		14	14	14	14	.86
Supportive Information for Nursing Diagnosis # 87		20			20		20	.43
				28	28			.29
	30							.14
				31	31		31	.43
						46		.14
	47					47	47	.43
						48		.14
						49		.14
	68			68			68	.43
		11						.14
				14		14	14	.43
				17		17		.29
		18		18		18	18	.57
							32	.14
							34	.14
Supportive Information for Nursing Diagnosis # 89			35					.14
			42			42		.29
			43			43		.29
		50	50					.29
			53					.14
		54						.14
		55						.14
							77	.14

					3			.14
						4		.14
					6			.14
	11							.14
				13		13		.29
			14	14		14		.43
	17	17	17				17	.57
Supportive Information for Nursing Diagnosis # 95	18							.14
		26	26		26			.43
		27					27	.29
				28				.14
						31		.14
		37		37		37	37	.57
							48	.14
	52	52	52	52	52	52	52	1.00
			70		70			.29
	77							.14

APPENDIX I

CONTENT VALIDITY INDEX (CVI) TABLES

Table 30

Content Validity Index for Case 2 (Surgical): Section 4 of the Instrument

Rank Priority	Expert 1	Expert 2	Expert 3	Expert 4	Expert 5	Expert 6	Expert 7
1	84	89	81	89	81	89	84
2	87	81	95	83	95	95	95
3	95	84	82	84	84	81	89
4	86	87	89	81	87	84	87
5	91	86	83	95	88	88	81
6	88	88	95	87			
7		95	84	86			
8			87				

APPENDIX J

THE ADJUSTED CJA INSTRUMENT

Demographic Information
of
Senior Nursing Students

The following questions allow the researcher to identify demographic factors that may contribute to clinical judgment being measured. Please mark or write as appropriate.

1. **Gender:** ☐ Female ☐ Male **Age:** _____years old
2. **Ethnicity:** ☐ Caucasian/White ☐ Black ☐ Latino
   ☐ Asian/Pacific Islander ☐ Other: (please specify)_____
3. **Primary language:** ☐ English ☐ Spanish ☐ Other (please specify)_____
4. **Student status:** ☐ Full time ☐ Part time
5. **Nursing program enrolling:** ☐ Baccalaureate (BSN) ☐ Associate degree (ADN)
6. **Geological location of your school:**
   ☐ Northeast ☐ Midwest ☐ South ☐ West
7. **Number of year(s) graduated from high school:** _____**years**
8. **Previous healthcare experience:** ☐ Yes ☐ No
   If Yes, please specify (i.e., CNA, EMT, etc.)_____
9. **Currently working in healthcare:** ☐ Yes ☐ No
   If Yes, please specify (i.e., CNA, EMT, etc.)_____
10. **Degree(s) prior to entering nursing program:** ☐ Yes ☐ No
    If Yes, please specify_____

Clinical Setting: Med/Surg. Unit, Acute Care Hospital **Day & Time**: Monday at 0645 AM
Your Role: You are a full-time nurse (RN), who just came back from a 2-week vacation, receiving a shift change report, from a night nurse, to plan your care for your two clients

Case # 1:
Section 1:
Instructions: Your first client is J.J., 53-year-old, who was transferred to your unit from Intermediate Care Unit (IMC) this morning.

- Please rate each piece of information about J.J. based on the importance to your plan of care today

Rating scale: 0 = not important to my plan of care today ("I can plan the care without it")

1 = important to my plan of care today ("a must have information")

Information about J.J. obtained from shift change report	Rating	
	0	1
1. African American	☐	☐
2. Male	☐	☐
3. BMI 29.6	☐	☐
4. Admitted 2 days ago from ER to IMC unit	☐	☐
5. Chief complaint: Sudden Rt. side weakness and slurred speech	☐	☐
6. Admitting Diagnosis: Acute Ischemic Stroke	☐	☐
7. Past medical history of Hypertension (HTN)	☐	☐
8. Past medical history of Hypercholesterolemia	☐	☐
9. Past medical history of Type 2 Diabetes Mellitus (DM)	☐	☐
10. NPO	☐	☐
11. Aspiration Precautions	☐	☐
12. Repeat bedside swallow evaluation by speech pathologist today	☐	☐
13. Advance diet as recommended by speech therapy	☐	☐
14. Allergic to Sulfa	☐	☐
15. Full code (Class I)	☐	☐
16. Activity: Out of bed to chair TID with PT	☐	☐
17. Turn every 2 hours while in bed with 2 assists last night	☐	☐
18. IV on left forearm, no sign of inflammation noted at the site	☐	☐
19. Main IV is 0.9% Normal Saline	☐	☐
20. IV infusing at 125 ml/hr.	☐	☐
21. Urine output was 1600 ml for the night shift	☐	☐
22. Vital signs every 4 hours	☐	☐
23. This morning, Temperature 98.4°F	☐	☐
24. This morning, Pulse 78 bpm	☐	☐
25. This morning, Respiration 22 bpm	☐	☐
26. This morning, Blood pressure 150/70 mm Hg.	☐	☐
27. Last night, pain was 2/10 on a self report 0 to 10 pain rating scale.	☐	☐
28. O_2 to keep $SpO_2 > 94\%$	☐	☐
29. Last night $SpO_2 > 94\%$, no O_2 required	☐	☐
30. Neuro. checks every 4 hours	☐	☐
31. Patient slurs but can be understood with some difficulty	☐	☐
32. His wife often have to interpret his words for staff	☐	☐
33. Mild facial palsy	☐	☐
34. Flaccid paralysis is present in his right arm and right leg	☐	☐
35. No family member present this morning	☐	☐

If you need more information, please proceed to section 2,
If you do not need any more information please proceed to section 3

***Section 2*:**

Instructions:

- The following are additional information about J.J. you obtained from his chart
- Please rate each piece of additional information below about J.J. based on the importance to your plan of care today, using the same rating scale as section 1.

Rating scale: 0 = not important to my plan of care today ("I can plan the care without it")

↓

1 = important to my plan of care today ("a must have information")

Additional Information obtained from J.J.'s chart as well as your actual observation/assessment	Rating 0	Rating 1
36. Physical Therapy to evaluate and treat altered gross motor development/function	☐	☐
37. Occupational Therapy to evaluate and treat altered fine motor development/function, ADLs, and cognitive development	☐	☐
38. Functional Independence Measure (FIM) score is 85/126	☐	☐
39. Mini-Mental State Examination (MMSE) score is 22/30	☐	☐
40. Only orientate to person not place nor time	☐	☐
41. A smoking history of 35 pack-years	☐	☐
42. Patient has been married for 32 years	☐	☐
43. On admission, Stroke Scale (NIHSS) score was 8	☐	☐
44. CT brain without contrast on admission was negative	☐	☐
45. CT brain without contrast repeated day 1 after admission shows a hyperdense left middle cerebral artery (MCA)	☐	☐
46. Carotid duplex ultrasonography shows 60% stenosis left ICA	☐	☐
47. On admission, WBC 9,800 (Range 5,000-10,000/mm^3)	☐	☐
48. On admission, RBC 4.9 (Range 3.8-5.5x10^6/µL	☐	☐
49. On admission Hg. 12.5 (Range 11.7-16.1g/dL)	☐	☐
50. On admission Hct. 38 (Range 37%-47%)	☐	☐
51. On admission Platelet 355,000 (Range 150,000-400,000/mm^3)	☐	☐
52. On admission Na. 142 (Range 136-145 mmol/L)	☐	☐
53. On admission K 4.5 (Range 3.5-5.0 mmol/L)	☐	☐
54. On admission Cl 102 (Range 98-106 mmol/L)	☐	☐
55. On admission CO_2 27 (Range 23-31 mmol/L)	☐	☐
56. At 5 am today PT 25 (Range 11-12.5 sec)	☐	☐
57. At 5 am today INR 2.9 (Range 0.7-1.8)	☐	☐
58. At 5 am today aPTT 58 (Range 30-40 sec)	☐	☐
59. Capillary blood glucose at 0600 hr today was 148 mg/dL	☐	☐
60. Insulin Sliding Scale: per protocol	☐	☐
61. Amlodipine (Norvasc®) 10 mg daily	☐	☐
62. Enteric Coated ASA 325 mg daily	☐	☐
63. Warfarin (Coumadin®) 5 mg. daily	☐	☐
64. Nicotine Patch (14mg) daily	☐	☐
65. Call M.D. if temp > 100.5° F	☐	☐
66. Enoxaparin (Lovenox®) 40 mg. SQ daily	☐	☐
67. Acetaminophen 650 mg. every 6 hours PRN Temp. >100°F	☐	☐
68. Lorazepam (Ativan®) 1 mg every 8 hours PRN anxiety	☐	☐
69. Appears unaware of positioning of neglected side.	☐	☐
70. Able to brush his teeth with his left hand	☐	☐

Please identify additional clinical information you believe to be important to plan the care for this patient *that are not already provided for you*_____

Please proceed to section 3

Section 3:

Instructions: Based on information about J.J. you have obtained (from section 1 and 2),

- Please rate the following nursing diagnoses based on the importance to your plan of care today, using the same rating scale as section 1.

Rating scale: 0 = not important to my plan of care today ("I can plan the care without it")

1 = important to my plan of care today ("a must have information")

- With each nursing diagnosis rated as "important" to your plan of care today, identify the 5 most supportive clinical information (item # from section 1 & 2) you are considering (*The same clinical information may be use to support more than one nursing diagnosis*).

Nursing diagnosis	**Rating**		Clinical Information (item # from section 1 & 2) being considered				
	0	**1**					
71. Impaired Memory	☐	☐	#	#	#	#	#
72. Risk for Excess Fluid Volume	☐	☐	#	#	#	#	#
73. Impaired Swallowing	☐	☐	#	#	#	#	#
74. Defensive Coping	☐	☐	#	#	#	#	#
75. Impaired Physical Mobility	☐	☐	#	#	#	#	#
76. Risk for Disuse Syndrome	☐	☐	#	#	#	#	#
77. Impaired Verbal Communication	☐	☐	#	#	#	#	#
78. Risk for Aspiration	☐	☐	#	#	#	#	#
79. Unilateral Neglect	☐	☐	#	#	#	#	#
80. Acute Pain	☐	☐	#	#	#	#	#

Section 4:

Instruction: Based on nursing diagnoses rated as "important" to your plan of care today (from section 3), rank according to priority of important.

Rank priority	Nursing Diagnoses #
1	
2	
3	
4	
5	

Section 5:

Instruction: Please rate the degree of confidence that you have in your judgment for this case (**circle the degree of confidence**)

Not at all — Very confident

0 1 2 3 4 5 6 7 8 9 10

Please proceed to the second case.

Case # 2:
Section 1:

Instructions: Your second client is S.B., female patient, who underwent amputation
- Please rate each piece of information about S.B. based on the importance to your plan of care today

Rating scale: 0 = not important to my plan of care today ("I can plan the care without it")

1 = important to my plan of care today ("a must have information")

Information about S.B. obtained from shift change report	Rating	
	0	1
1. 70-year-old	☐	☐
2. Hispanic	☐	☐
3. BMI 39.8	☐	☐
4. Chief complaint: Severe left foot pain	☐	☐
5. Admitting Diagnosis: Left foot gangrene	☐	☐
6. Patient had surgery yesterday morning	☐	☐
7. Surgical procedure - "Left Below Knee Amputation"	☐	☐
8. Past medical history of GERD	☐	☐
9. Past medical history of Hypertension (HTN)	☐	☐
10. Past medical history of Type 2 Diabetes Mellitus (DM)	☐	☐
11. Past medical history of Peripheral Vascular Disease (PVD)	☐	☐
12. 1800 ADA diet	☐	☐
13. To be out of bed to chair with Physical therapy today	☐	☐
14. No Known Allergy	☐	☐
15. Full code status (Class I)	☐	☐
16. Main IV is 0.9% Normal Saline infusing at 125ml/hr	☐	☐
17. Vancomycin 1000 mg IVPB every 12 hours started at 1800 hr last evening.	☐	☐
18. Peak and Trough Vancomycin level on the 3rd. dose	☐	☐
19. Continuously complaint of constant sharp pain at the surgical site 10/10 on pain scale	☐	☐
20. PCA Morphine (1mg/ml) maintenance dose 1mg lockout 8 min	☐	☐
21. Bolus dose of Morphine 4mg every 4 hours last night	☐	☐
22. Refuse to move the left residual limb for positioning	☐	☐
23. Left below knee dressing with Ace® bandage	☐	☐
24. Dry bloody drainage ~ 5cm in diameter noted on the dressing	☐	☐
25. Left residual limb is to be elevated on pillows today	☐	☐
26. Foley catheter drain 1500 ml for the night shift	☐	☐
27. Capillary blood glucose (CBG) at 6 am today was 148 mg/dL.	☐	☐
28. This morning, Temperature: 99.3°F	☐	☐
29. This morning, Pulse 78 bpm	☐	☐
30. This morning, Respiration 20 bpm	☐	☐
31. This morning, Blood pressure 138/80 mmHg.	☐	☐
32. Right popliteal, tibial, and dorsalis pedis pulses present, 1+	☐	☐
33. Left femoral pulse present, 2+	☐	☐
34. Patient otherwise was very quiet last night	☐	☐
35. Consume 50% of dinner yesterday	☐	☐

If you need more information, please proceed to section 2,
If you do not need any more information please proceed to section 3.

***Section 2*:**

Instructions:

- The following are additional information about S.B. you obtained from his chart
- Please rate each piece of additional information below about S.B. based on the importance to your plan of care today, using the same rating scale as section 1.

Rating scale: 0 = not important to my plan of care today ("I can plan the care without it")

↓

1 = important to my plan of care today ("a must have information")

Additional Information obtained from S.B.'s chart as well as your actual observation/assessment	Rating	
	0	1
36. Pre-op Chest X-ray - Normal CXR, no acute abnormalities.	☐	☐
37. Pre-op Arteriography showed a superficial femoral artery with stenoses but a normal profunda artery	☐	☐
38. H&P: "a normal left femoral pulse but absence of popliteal and tibial pulses."	☐	☐
39. 30 pack years smoking history	☐	☐
40. Missed follow-up appointments for the last 6 months	☐	☐
41. Lives with husband in a two story house	☐	☐
42. Very active in church and local arts and crafts group	☐	☐
43. Visits grandchildren 2 to 3 times a week.	☐	☐
44. Oxygen Saturation this morning was 90%	☐	☐
45. Anesthesia Record: Estimated blood loss (EBL) 450 ml	☐	☐
46. At 5 am today WBC 22.7 (Range 5,000-10,000/mm^3)	☐	☐
47. At 5 am today RBC 3.25 (Range 3.8-5.5x10^6/µL)	☐	☐
48. At 5 am today Hg. 9.2 (Range 11.7-16.1g/dL)	☐	☐
49. At 5 am today Hct. 27.5 (Range 37%-47%)	☐	☐
50. At 5 am today Platelet 153,000 (Range 150,000-400,000mm^3)	☐	☐
51. At 5 am today Na. 138 (Range 136-145 mmol/L)	☐	☐
52. At 5 am today K 4.1 (Range 3.5-5.0 mmol/L)	☐	☐
53. At 5 am today Cl 103 (Range 98-106 mmol/L)	☐	☐
54. At 5 am today CO_2 28 (Range 23-31 mmol/L)	☐	☐
55. Pre-operative lab. Total Protein 7.4 (Range 5.5-9.0 g/dL)	☐	☐
56. Pre-operative lab. Albumin 3.8 (Range 3.1-4.6 g/dL)	☐	☐
57. Repeat CBC tomorrow morning	☐	☐
58. PT consult today for ambulation and muscle strengthening	☐	☐
59. Capillary blood glucose at 2100hr last night was 170 mg/dL	☐	☐
60. Levaquin 500mg IVPB daily	☐	☐
61. Lovenox 40 mg SQ BID	☐	☐
62. Ferrous Sulfate 324 mg TID with meal	☐	☐
63. Neurontin (Gabapentin) 600mg daily	☐	☐
64. Norvasc 10 mg daily	☐	☐
65. Flexeril 10 mg PRN Q6 hr.	☐	☐
66. Nicotine Patch (14mg) daily	☐	☐
67. Glucophage XR 500 mg BID	☐	☐
68. Acetaminophen 650 mg. every 6 hours PRN Temp. >100°F	☐	☐
69. Upon initial assessment, patient pulled a blanket to cover her lower extremities	☐	☐
70. Upon initial assessment, patient asked "how can I get up and about?"	☐	☐

Please identify additional clinical information you believe to be important to plan the care for this patient *that are not already provided for you*_____

Please proceed to section 3

Section 3:

Instructions: Based on information about S.B. you have obtained (from section 1 and 2),

- Please rate the following nursing diagnoses based on the importance to your plan of care today, using the same rating scale as section 1.

Rating scale: 0 = not important to my plan of care today ("I can plan the care without it")

1 = important to my plan of care today ("a must have information")

- With each nursing diagnosis rated as "important" to your plan of care today, identify the 5 most supportive clinical information (item # from section 1 & 2) you are considering (*The same clinical information may be use to support more than one nursing diagnosis*).

Nursing diagnosis	**Rating**		Clinical Information (item # from step 1 & 2) being considered				
	0	**1**					
71. Dysfunctional Family Processes	☐	☐	#	#	#	#	#
72. Risk for Deficient Fluid Volume	☐	☐	#	#	#	#	#
73. Acute Pain	☐	☐	#	#	#	#	#
74. Defensive Coping	☐	☐	#	#	#	#	#
75. Disturbed Body Image	☐	☐	#	#	#	#	#
76. Impaired Physical Mobility	☐	☐	#	#	#	#	#
77. Disturbed Thought Process	☐	☐	#	#	#	#	#
78. Ineffective Tissue Perfusion	☐	☐	#	#	#	#	#
79. Decreased Cardiac Output	☐	☐	#	#	#	#	#
80. Risk for Infection	☐	☐	#	#	#	#	#

Section 4:

Instruction: Based on nursing diagnoses rated as "important" to your plan of care today (from section 3), rank according to priority of important.

Rank priority	Nursing Diagnoses #
1	
2	
3	
4	
5	

Section 5:

Instruction: Please rate the degree of confidence that you have in your judgment for this case (**circle the degree of confidence**)

Not at all — Very confident

0 1 2 3 4 5 6 7 8 9 10

Thank you ever so much for your participation in this study.

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 31

Scores for Section 1 (Information Gathering) of Case 1

Item #	Not important Row N %	Important Row N %	Total Count	Experts	Null Value	Z Score	*p*-values Two-Tailed	Upper	Lower
1	49.76%	50.24%	205	important	0.8	-10.651	0.000	1.000	0.000
2	35.61%	64.39%	205	important	0.8	-5.587	0.000	1.000	0.000
3	39.90%	60.10%	203	important	0.8	-7.089	0.000	1.000	0.000
4	20.59%	79.41%	204	not important	0.8	-0.210	0.834	0.583	0.417
5	0.98%	99.02%	205	important	0.8	6.810	0.000	0.000	1.000
6	0.49%	99.51%	205	important	0.8	6.984	0.000	0.000	1.000
7	4.39%	95.61%	205	important	0.8	5.587	0.000	0.000	1.000
8	9.76%	90.24%	205	important	0.8	3.667	0.000	0.000	1.000
9	1.46%	98.54%	205	not important	0.8	6.635	0.000	0.000	1.000
10	1.95%	98.05%	205	not important	0.8	6.460	0.000	0.000	1.000
11	1.47%	98.53%	204	important	0.8	6.616	0.000	0.000	1.000
12	22.44%	77.56%	205	important	0.8	-0.873	0.383	0.809	0.191
13	17.07%	82.93%	205	not important	0.8	1.048	0.295	0.147	0.853
14	1.95%	98.05%	205	important	0.8	6.460	0.000	0.000	1.000
15	11.71%	88.29%	205	important	0.8	2.968	0.003	0.001	0.999
16	18.05%	81.95%	205	important	0.8	0.698	0.485	0.242	0.758
17	22.44%	77.56%	205	important	0.8	-0.873	0.383	0.809	0.191
18	16.59%	83.41%	205	important	0.8	1.222	0.222	0.111	0.889
19	8.29%	91.71%	205	important	0.8	4.191	0.000	0.000	1.000
20	6.83%	93.17%	205	important	0.8	4.714	0.000	0.000	1.000
21	18.54%	81.46%	205	not important	0.8	0.524	0.600	0.300	0.700
22	26.96%	73.04%	204	important	0.8	-2.485	0.013	0.994	0.006
23	29.76%	70.24%	205	not important	0.8	-3.492	0.000	1.000	0.000
24	29.27%	70.73%	205	not important	0.8	-3.318	0.001	1.000	0.000
25	14.63%	85.37%	205	not important	0.8	1.921	0.055	0.027	0.973
26	5.85%	94.15%	205	important	0.8	5.064	0.000	0.000	1.000
27	36.59%	63.41%	205	not important	0.8	-5.937	0.000	1.000	0.000
28	10.73%	89.27%	205	important	0.8	3.318	0.001	0.000	1.000
29	29.76%	70.24%	205	important	0.8	-3.492	0.000	1.000	0.000
30	11.22%	88.78%	205	important	0.8	3.143	0.002	0.001	0.999
31	20.98%	79.02%	205	important	0.8	-0.349	0.727	0.637	0.363
32	28.78%	71.22%	205	not important	0.8	-3.143	0.002	0.999	0.001
33	20.00%	80.00%	205	important	0.8	0.000	1.000	0.500	0.500
34	6.34%	93.66%	205	important	0.8	4.889	0.000	0.000	1.000
35	72.55%	27.45%	204	not important	0.8	-18.764	0.000	1.000	0.000

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 32

Scores for Section 2 (Information Gathering) of Case 1

	Not important	Important					*p*-values		
Item #	Row N %	Row N %	Total Count	Experts	Null Value	Z Score	Two-Tailed	Upper	Lower
36	38.92%	61.08%	203	not important	0.8	-6.738	0.000	1.000	0.000
37	40.89%	59.11%	203	important	0.8	-7.440	0.000	1.000	0.000
38	37.62%	62.38%	202	important	0.8	-6.262	0.000	1.000	0.000
39	30.20%	69.80%	202	not important	0.8	-3.624	0.000	1.000	0.000
40	7.92%	92.08%	202	important	0.8	4.292	0.000	0.000	1.000
41	23.38%	76.62%	201	not important	0.8	-1.199	0.230	0.885	0.115
42	88.61%	11.39%	202	not important	0.8	-24.380	0.000	1.000	0.000
43	14.85%	85.15%	202	not important	0.8	1.829	0.067	0.034	0.966
44	34.83%	65.17%	201	important	0.8	-5.255	0.000	1.000	0.000
45	11.88%	88.12%	202	important	0.8	2.885	0.004	0.002	0.998
46	15.35%	84.65%	202	not important	0.8	1.653	0.098	0.049	0.951
47	52.74%	47.26%	201	not important	0.8	-11.603	0.000	1.000	0.000
48	55.72%	44.28%	201	not important	0.8	-12.661	0.000	1.000	0.000
49	55.22%	44.78%	201	not important	0.8	-12.485	0.000	1.000	0.000
50	54.73%	45.27%	201	not important	0.8	-12.308	0.000	1.000	0.000
51	54.23%	45.77%	201	not important	0.8	-12.132	0.000	1.000	0.000
52	54.73%	45.27%	201	not important	0.8	-12.308	0.000	1.000	0.000
53	52.48%	47.52%	202	not important	0.8	-11.539	0.000	1.000	0.000
54	58.71%	41.29%	201	not important	0.8	-13.719	0.000	1.000	0.000
55	54.23%	45.77%	201	not important	0.8	-12.132	0.000	1.000	0.000
56	3.47%	96.53%	202	important	0.8	5.875	0.000	0.000	1.000
57	0.99%	99.01%	202	important	0.8	6.755	0.000	0.000	1.000
58	1.49%	98.51%	202	important	0.8	6.579	0.000	0.000	1.000
59	5.45%	94.55%	202	important	0.8	5.171	0.000	0.000	1.000
60	7.43%	92.57%	202	important	0.8	4.468	0.000	0.000	1.000
61	6.44%	93.56%	202	important	0.8	4.820	0.000	0.000	1.000
62	7.43%	92.57%	202	important	0.8	4.468	0.000	0.000	1.000
63	5.94%	94.06%	202	important	0.8	4.996	0.000	0.000	1.000
64	10.89%	89.11%	202	not important	0.8	3.237	0.001	0.001	0.999
65	12.38%	87.62%	202	important	0.8	2.709	0.007	0.003	0.997
66	7.46%	92.54%	201	important	0.8	4.444	0.000	0.000	1.000
67	17.33%	82.67%	202	not important	0.8	0.950	0.342	0.171	0.829
68	16.34%	83.66%	202	not important	0.8	1.302	0.193	0.097	0.903
69	12.38%	87.62%	202	important	0.8	2.709	0.007	0.003	0.997
70	42.57%	57.43%	202	not important	0.8	-8.021	0.000	1.000	0.000

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 33

Scores for Section 3 (Clinical Judgment Accuracy) of Case 1

Item #	Not important	Important					p-values		
	Row N %	Row N %	Total Count	Experts	Null Value	Z Score	Two-Tailed	Upper	Lower
71	37.70%	62.30%	191	not important	0.8	-6.114	0.000	1.000	0.000
72	49.74%	50.26%	189	not important	0.8	-10.220	0.000	1.000	0.000
73	2.48%	97.52%	202	important	0.8	6.227	0.000	0.000	1.000
74	78.45%	21.55%	181	not important	0.8	-19.660	0.000	1.000	0.000
75	4.46%	95.54%	202	important	0.8	5.523	0.000	0.000	1.000
76	43.62%	56.38%	188	not important	0.8	-8.096	0.000	1.000	0.000
77	14.07%	85.93%	199	important	0.8	2.091	0.037	0.018	0.982
78	0.99%	99.01%	203	important	0.8	6.773	0.000	0.000	1.000
79	33.33%	66.67%	189	important	0.8	-4.583	0.000	1.000	0.000
80	45.83%	54.17%	192	not important	0.8	-8.949	0.000	1.000	0.000

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 34

Scores for Section 3 (Supportive Information) of Case 1

Supporting information	Not important Row N %	Important Row N %	Total Count	Experts	Null Value	Z Score	*p*-values Two-Tailed	Upper	Lower
Nrsgdx.73 item #5	81.6%	18.4%	190	not important	0.8	-21.220	0.000	1.000	0.000
Nrsgdx.73 item #6	78.9%	21.1%	190	not important	0.8	-20.313	0.000	1.000	0.000
Nrsgdx.73 item #10	66.8%	33.2%	190	not important	0.8	-16.142	0.000	1.000	0.000
Nrsgdx.73 item #11	28.9%	71.1%	190	important	0.8	-3.083	0.002	0.999	0.001
Nrsgdx.73 item #12	25.3%	74.7%	190	not important	0.8	-1.814	0.070	0.965	0.035
Nrsgdx.73 item #13	58.9%	41.1%	190	not important	0.8	-13.421	0.000	1.000	0.000
Nrsgdx.73 item #31	81.1%	18.9%	190	not important	0.8	-21.039	0.000	1.000	0.000
Nrsgdx.73 item #33	66.3%	33.7%	190	not important	0.8	-15.960	0.000	1.000	0.000
Nrsgdx.75 item #5	62.6%	37.4%	190	not important	0.8	-14.691	0.000	1.000	0.000
Nrsgdx.75 item #6	80.0%	20.0%	190	not important	0.8	-20.676	0.000	1.000	0.000
Nrsgdx.75 item #16	60.0%	40.0%	190	not important	0.8	-13.784	0.000	1.000	0.000
Nrsgdx.75 item #17	61.6%	38.4%	190	not important	0.8	-14.328	0.000	1.000	0.000
Nrsgdx.75 item #34	32.1%	67.9%	190	important	0.8	-4.171	0.000	1.000	0.000
Nrsgdx.75 item #36	50.5%	49.5%	190	not important	0.8	-10.519	0.000	1.000	0.000
Nrsgdx.75 item #37	70.0%	30.0%	190	not important	0.8	-17.230	0.000	1.000	0.000
Nrsgdx.75 item #38	68.9%	31.1%	190	not important	0.8	-16.867	0.000	1.000	0.000
Nrsgdx.75 item #43	94.2%	5.8%	190	not important	0.8	-25.573	0.000	1.000	0.000
Nrsgdx.75 item #69	70.5%	29.5%	190	not important	0.8	-17.411	0.000	1.000	0.000
Nrsgdx.75 item #70	91.6%	8.4%	190	not important	0.8	-24.666	0.000	1.000	0.000
Nrsgdx.77 item #5	64.2%	35.8%	179	not important	0.8	-14.799	0.000	1.000	0.000

Nrsgdx.77 item #6	80.3%	19.7%	178	not important	0.8	-20.125	0.000	1.000	0.000
Nrsgdx.77 item #31	11.2%	88.8%	178	important	0.8	2.923	0.003	0.002	0.998
Nrsgdx.77 item #32	26.4%	73.6%	178	important	0.8	-2.136	0.033	0.984	0.016
Nrsgdx.77 item #33	46.1%	53.9%	178	not important	0.8	-8.695	0.000	1.000	0.000
Nrsgdx.78 item #5	77.0%	23.0%	191	not important	0.8	-19.681	0.000	1.000	0.000
Nrsgdx.78 item #6	71.7%	28.3%	191	not important	0.8	-17.872	0.000	1.000	0.000
Nrsgdx.78 item #10	71.2%	28.8%	191	not important	0.8	-17.691	0.000	1.000	0.000
Nrsgdx.78 item #11	14.1%	85.9%	191	important	0.8	2.026	0.043	0.021	0.979
Nrsgdx.78 item #12	42.9%	57.1%	191	important	0.8	-7.923	0.000	1.000	0.000
Nrsgdx.78 item #13	67.0%	33.0%	191	not important	0.8	-16.244	0.000	1.000	0.000
Nrsgdx.78 item #33	67.5%	32.5%	191	not important	0.8	-16.425	0.000	1.000	0.000
Nrsgdx.79 item #5	74.6%	25.4%	142	not important	0.8	-16.280	0.000	1.000	0.000
Nrsgdx.79 item #34	45.8%	54.2%	142	not important	0.8	-7.679	0.000	1.000	0.000
Nrsgdx.79 item #69	28.9%	71.1%	142	not important	0.8	-2.643	0.008	0.996	0.004
Nrsgdx.79 item #70	76.1%	23.9%	142	not important	0.8	-16.700	0.000	1.000	0.000

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 35

Scores for Section 1 (Information Gathering) of Case 2

Item #	Not important Row N %	Important Row N %	Total Count	Experts	Null Value	Z Score	*p*-values Two-Tailed	Upper	Lower
1	15.76%	84.24%	203	important	0.8	1.509	0.131	0.066	0.934
2	50.00%	50.00%	202	important	0.8	-10.659	0.000	1.000	0.000
3	27.45%	72.55%	204	important	0.8	-2.660	0.008	0.996	0.004
4	2.94%	97.06%	204	not important	0.8	6.091	0.000	0.000	1.000
5	0.98%	99.02%	204	important	0.8	6.791	0.000	0.000	1.000
6	3.43%	96.57%	204	important	0.8	5.916	0.000	0.000	1.000
7	2.94%	97.06%	204	important	0.8	6.091	0.000	0.000	1.000
8	25.98%	74.02%	204	important	0.8	-2.135	0.033	0.984	0.016
9	8.82%	91.18%	204	not important	0.8	3.991	0.000	0.000	1.000
10	2.45%	97.55%	204	not important	0.8	6.266	0.000	0.000	1.000
11	2.94%	97.06%	204	important	0.8	6.091	0.000	0.000	1.000
12	11.27%	88.73%	204	important	0.8	3.116	0.002	0.001	0.999
13	20.59%	79.41%	204	not important	0.8	-0.210	0.834	0.583	0.417
14	11.27%	88.73%	204	important	0.8	3.116	0.002	0.001	0.999
15	12.25%	87.75%	204	important	0.8	2.765	0.006	0.003	0.997
16	7.84%	92.16%	204	important	0.8	4.341	0.000	0.000	1.000
17	0.98%	99.02%	204	important	0.8	6.791	0.000	0.000	1.000
18	2.45%	97.55%	204	important	0.8	6.266	0.000	0.000	1.000
19		100.00%	204	important	0.8	7.141	0.000	0.000	1.000
20	1.96%	98.04%	204	important	0.8	6.441	0.000	0.000	1.000
21	7.84%	92.16%	204	not important	0.8	4.341	0.000	0.000	1.000
22	8.33%	91.67%	204	important	0.8	4.166	0.000	0.000	1.000
23	15.69%	84.31%	204	not important	0.8	1.540	0.123	0.062	0.938
24	7.84%	92.16%	204	not important	0.8	4.341	0.000	0.000	1.000
25	8.82%	91.18%	204	not important	0.8	3.991	0.000	0.000	1.000
26	16.67%	83.33%	204	important	0.8	1.190	0.234	0.117	0.883
27	6.37%	93.63%	204	not important	0.8	4.866	0.000	0.000	1.000
28	14.22%	85.78%	204	important	0.8	2.065	0.039	0.019	0.981
29	31.86%	68.14%	204	important	0.8	-4.236	0.000	1.000	0.000
30	31.86%	68.14%	204	important	0.8	-4.236	0.000	1.000	0.000
31	17.16%	82.84%	204	important	0.8	1.015	0.310	0.155	0.845
32	14.71%	85.29%	204	not important	0.8	1.890	0.059	0.029	0.971
33	16.18%	83.82%	204	important	0.8	1.365	0.172	0.086	0.914
34	61.76%	38.24%	204	important	0.8	-14.913	0.000	1.000	0.000
35	48.53%	51.47%	204	not important	0.8	-10.187	0.000	1.000	0.000

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 36

Scores for Section 2 (Information Gathering) of Case 2

Item #	Not Important Row N %	Important Row N %	Total Count	Experts	Null Value	Z Score	*p*-values Two-	Upper	Lower
36	51.72%	48.28%	203	not important	0.8	-11.300	0.000	1.000	0.000
37	31.53%	68.47%	203	important	0.8	-4.106	0.000	1.000	0.000
38	18.63%	81.37%	204	important	0.8	0.4906	0.624	0.312	0.688
39	27.45%	72.55%	204	not important	0.8	-2.661	0.008	0.996	0.004
40	42.65%	57.35%	204	important	0.8	-8.087	0.000	1.000	0.000
41	50.98%	49.02%	204	not important	0.8	-11.062	0.000	1.000	0.000
42	70.59%	29.41%	204	not important	0.8	-18.064	0.000	1.000	0.000
43	78.92%	21.08%	204	not important	0.8	-21.039	0.000	1.000	0.000
44	3.92%	96.08%	204	important	0.8	5.741	0.000	0.000	1.000
45	21.57%	78.43%	204	important	0.8	-0.560	0.575	0.712	0.288
46	1.96%	98.04%	204	not important	0.8	6.441	0.000	0.000	1.000
47	9.80%	90.20%	204	not important	0.8	3.641	0.000	0.000	1.000
48	3.92%	96.08%	204	not important	0.8	5.741	0.000	0.000	1.000
49	3.43%	96.57%	204	not important	0.8	5.916	0.000	0.000	1.000
50	29.90%	70.10%	204	not important	0.8	-3.536	0.000	1.000	0.000
51	40.20%	59.80%	204	not important	0.8	-7.211	0.000	1.000	0.000
52	38.24%	61.76%	204	not important	0.8	-6.511	0.000	1.000	0.000
53	44.61%	55.39%	204	not important	0.8	-8.787	0.000	1.000	0.000
54	44.61%	55.39%	204	not important	0.8	-8.787	0.000	1.000	0.000
55	57.14%	42.86%	203	not important	0.8	-13.230	0.000	1.000	0.000
56	57.64%	42.36%	203	important	0.8	-13.405	0.000	1.000	0.000
57	42.65%	57.35%	204	important	0.8	-8.087	0.000	1.000	0.000
58	21.08%	78.92%	204	important	0.8	-0.385	0.700	0.650	0.350
59	24.02%	75.98%	204	important	0.8	-1.435	0.151	0.924	0.076
60	5.88%	94.12%	204	important	0.8	5.041	0.000	0.000	1.000
61	5.88%	94.12%	204	important	0.8	5.041	0.000	0.000	1.000
62	6.37%	93.63%	204	important	0.8	4.866	0.000	0.000	1.000
63	8.33%	91.67%	204	important	0.8	4.166	0.000	0.000	1.000
64	8.33%	91.67%	204	not important	0.8	4.166	0.000	0.000	1.000
65	11.76%	88.24%	204	important	0.8	2.941	0.003	0.002	0.998
66	11.76%	88.24%	204	important	0.8	2.941	0.003	0.002	0.998
67	6.86%	93.14%	204	not important	0.8	4.691	0.000	0.000	1.000
68	10.78%	89.22%	204	not important	0.8	3.291	0.001	0.000	1.000
69	37.25%	62.75%	204	important	0.8	-6.161	0.000	1.000	0.000
70	42.57%	75.00%	204	not important	0.8	-1.785	0.074	0.963	0.037

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 37

Scores for Section 3 (Clinical Judgment Accuracy) of Case2

	Not important	Important					p-values		
Item #	Row N %	Row N %	Total Count	Experts	Null Value	Z Score	Two-Tailed	Upper	Lower
71	83.71%	16.29%	178	not important	0.8	-21.249	0.000	1.000	0.000
72	53.63%	46.37%	179	not important	0.8	-11.249	0.000	1.000	0.000
73	1.52%	98.48%	198	important	0.8	6.503	0.000	0.000	1.000
74	57.95%	42.05%	176	not important	0.8	-12.588	0.000	1.000	0.000
75	15.66%	84.34%	198	not important	0.8	1.528	0.127	0.063	0.937
76	5.08%	94.92%	197	important	0.8	5.237	0.000	0.000	1.000
77	72.47%	27.53%	178	not important	0.8	-17.502	0.000	1.000	0.000
78	13.99%	86.01%	193	important	0.8	2.087	0.037	0.018	0.982
79	45.81%	54.19%	179	not important	0.8	-8.633	0.000	1.000	0.000
80	4.04%	95.96%	198	important	0.8	5.614	0.000	0.000	1.000

APPENDIX K

STUDENT CJA RESPONSE TABLES

Table 38

Scores for Section 3 (Supportive Information) of Case 2

	Not important	Important					*p*-values		
Supporting information	Row N %	Row N %	Total Count	Experts	Null Value	Z Score	Two-Tailed	Upper	Lower
Nrsgdx.73 item # 4	51.60%	48.40%	188	not important	0.8	-10.830	0.000	1.000	0.000
Nrsgdx.73 item # 6	72.87%	27.13%	188	not important	0.8	-18.124	0.000	1.000	0.000
Nrsgdx.73 item # 7	62.77%	37.23%	188	not important	0.8	-14.659	0.000	1.000	0.000
Nrsgdx.73 item # 19	15.43%	84.57%	188	important	0.8	1.568	0.117	0.058	0.942
Nrsgdx.73 item # 20	42.02%	57.98%	188	important	0.8	-7.549	0.000	1.000	0.000
Nrsgdx.73 item # 21	59.57%	40.43%	188	not important	0.8	-13.565	0.000	1.000	0.000
Nrsgdx.73 item # 22	76.06%	23.94%	188	not important	0.8	-19.218	0.000	1.000	0.000
Nrsgdx.75 item # 7	52.60%	47.40%	173	not important	0.8	-10.720	0.000	1.000	0.000
Nrsgdx.75 item # 22	63.01%	36.99%	173	not important	0.8	-14.141	0.000	1.000	0.000
Nrsgdx.75 item # 69	24.86%	75.14%	173	important	0.8	-1.597	0.110	0.945	0.055
Nrsgdx.75 item # 70	68.79%	31.21%	173	important	0.8	-16.042	0.000	1.000	0.000
Nrsgdx.76 item # 7	27.87%	72.13%	183	important	0.8	-2.661	0.008	0.996	0.004
Nrsgdx.76 item # 13	60.44%	39.56%	182	not important	0.8	-13.639	0.000	1.000	0.000
Nrsgdx.76 item # 19	80.87%	19.13%	183	not important	0.8	-20.587	0.000	1.000	0.000
Nrsgdx.76 item # 22	68.31%	31.69%	183	not important	0.8	-16.337	0.000	1.000	0.000
Nrsgdx.76 item # 41	91.21%	8.79%	182	not important	0.8	-24.016	0.000	1.000	0.000
Nrsgdx.76 item # 58	66.12%	33.88%	183	not important	0.8	-15.598	0.000	1.000	0.000
Nrsgdx.76 item # 70	66.12%	33.88%	183	not important	0.8	-15.598	0.000	1.000	0.000

Nrsgdx.78 item # 5	84.34%	15.66%	166	not important	0.8	-20.723	0.000	1.000	0.000
Nrsgdx.78 item # 7	83.83%	16.17%	167	not important	0.8	-20.622	0.000	1.000	0.000
Nrsgdx.78 item # 10	78.31%	21.69%	166	not important	0.8	-18.783	0.000	1.000	0.000
Nrsgdx.78 item # 11	57.83%	42.17%	166	not important	0.8	-12.186	0.000	1.000	0.000
Nrsgdx.78 item # 32	67.47%	32.53%	166	not important	0.8	-15.290	0.000	1.000	0.000
Nrsgdx.78 item # 39	89.82%	10.18%	167	not important	0.8	-22.557	0.000	1.000	0.000
Nrsgdx.78 item # 44	71.26%	28.74%	167	important	0.8	-16.560	0.000	1.000	0.000
Nrsgdx.80 item # 7	57.22%	42.78%	187	not important	0.8	-12.724	0.000	1.000	0.000
Nrsgdx.80 item # 10	80.75%	19.25%	187	not important	0.8	-20.768	0.000	1.000	0.000
Nrsgdx.80 item # 17	64.71%	35.29%	187	not important	0.8	-15.284	0.000	1.000	0.000
Nrsgdx.80 item # 28	83.42%	16.58%	187	not important	0.8	-21.682	0.000	1.000	0.000
Nrsgdx.80 item # 46	42.25%	57.75%	187	important	0.8	-7.605	0.000	1.000	0.000

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