2020

Clinical Factors That Influence Nurse Responsiveness in Activating Rapid Response Services

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Walden University
2020

Abstract

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Rapid Response Services

by

James Tormey

MSN, Walden University, 2015

BS, The Citadel, 1979

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Nursing Education

Walden University

October 2020

Abstract

This study advances the understanding of essential clinical knowledge skillsets that nurses need to identify and respond to early signs of patient deterioration. The identification of critical thinking and assessment skills that nurses require may support professional practice through improved nursing education curriculum or additions of necessary critical care skillsets. The purpose of this study, which was framed by Benner's novice-to-expert model, was to identify and measure critical thinking skills that influence a nurse's ability to detect deterioration in patients and call the rapid response system (RRS). The research questions addressed the relationship between a nurse's clinical or reasoning skill set and the decision to activate RRS, as measured by INSIGHT Health Professional clinical assessment tool. A multiple regression analysis was conducted to evaluate clinical nurses' critical thinking and clinical assessment skills. The study evaluated 37 nurses' expertise in clinical reasoning by measuring 8 indicators of reasoning skills. Among nurse participants in this study, 68% had the clinical ladder designation Clinical Nurse-2 (CN-2), and 16% were designated as Clinical Nurse-1 (CN-1). CN-2 participants were 10 times more likely to call RRS as compared to CN-1 participants, with an odds ratio = 10.83. The findings demonstrated that clinical ladder rank was significant for calling RRS ($p = 0.047$). The study helped to identify critical factors that affect early recognition of patient decompensation, thereby improving patient safety, and collegial respect and social change through improved nursing clinical skills.

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Dedication

I am dedicating this project to my family, who have sacrificed many hours to support me in my pursuit of my dissertation. Without them, I could not have attained this goal.

Acknowledgments

I would like to acknowledge and thank my dissertation committee members, Dr. Mary Verklan and Dr. Deborah Lewis, for their support, encouragement, and professionalism that allowed me to complete my dissertation journey successfully. Their guidance and respectful communication gave me the tools and confidence to complete this journey. I could not have asked for a more supportive team.

Secondly, I would like to acknowledge the care and support that I have received from my classmates, and in particular from Dr. Patricia Harris and Pam Spendiff. Both have supported me in my doctoral journey. Without them, I am fairly certain that I would not have completed this endeavor.

I would also like to thank the nurses who participated in the study. Without them, I could not have completed the research study or supplied the needed information to help close the research gap on ALF. Their contribution to improving the understanding of important clinical skills and critical thinking in recognizing early patient decompensation will help improve patient safety throughout the medical community.

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Chapter 1: Introduction to the Study

Introduction

This study advances the understanding of essential clinical knowledge skillsets that nurses need to identify and respond to early signs of patient deterioration. Identification of critical thinking and assessment skills can support professional practice through improved nursing education curriculum or additions of necessary critical care skillsets. Nurses who employ appropriate critical thinking and clinical decision making can improve their patients' safety by recognizing patient decline and summoning the rapid response team system (RRS) early in adverse events (Fero, Witsberger, Wesmiller, Zullo, & Hoffman, 2009). By providing information to increase awareness and knowledge in the nursing field of the effectiveness of higher level clinical education in identifying early patient deterioration, it may be possible to change cultural norms about nursing and support nurses' ability to identify deteriorating patients.

The study helped to identify critical factors that affect early recognition of patient decompensation, thereby supporting improved patient safety, higher levels of critical nursing care, and nurse retention due to job satisfaction, collegial respect, and better interprofessional collaboration. Findings from the study may be applied to support positive social change within professional cultures in hospital settings. Chapter 1 includes a background of the research literature related to the study topic, as well as a description of the gap in the literature related to nurses' clinical knowledge and critical thinking skills in identifying deterioration in patients and calling RRS. I describe the study problem statement, the purpose of the study, and the research questions.

Background

Research Summary

Many hospitals use an early warning system (EWS) to alert staff of patients'

deteriorating vital signs (Leach, Kagawa, Mayo, & Pugh, 2012). EWS is an automated

alert system that tabulates abnormal vital signs and produces a score to rank patients by

severity. The higher the number that the EWS displays, the higher the chance that the

patient is experiencing a serious life-threatening event. The RRS is composed of a team

of critically skilled physicians, nurses, respiratory therapists, and an EWS that brings

critical care skills to the bedside of a ward or non-intensive-care-unit (ICU) inpatient who

is deteriorating. Immediate, high-level clinical interventions are designed to help reverse

patients' deterioration with appropriate medical, nursing, and respiratory therapy (Leach

& Mayo, 2013).

When the RRS that has been developed to rescue patients has difficulty detecting

problems, a situation known as *afferent limb failure* (ALF) may result (DeVita &

Hillman, 2011). ALF is the result of a failure to activate RRS and is defined as a situation

where a documented RRS calling criterion is met, but no associated alert is placed to

RRS within 24 hours prior to the situation (Trinkle & Flabouris, 2011). The phenomenon

of failure to activate RRS services, or ALF, is described as a "failure to rescue or failure

to recognize patients who were deteriorating before the activation of RRS services"

(DeVita & Hillman, 2006, p. 67). Lack of early identification of ALF issues has delayed

the timely response of RRS critical care skills being deployed to the bedside

(Mohammad, Hayton, Clements, Smith, & Pyrtherch, 2009). Leach (2013) wrote that

RRS personnel and their environment pose unique clinical challenges and

inconsistencies. Two problems that have been identified in the literature related to ALF are a lack of critical thinking skills and clinical assessment strength in nursing staff when recognizing patient decompensation and calling RRS (Connell, Jackman, Kiprillis, Sparkes, & Cooper, 2016).

Gap in Knowledge

A review of the literature identified the ALF phenomenon as a significant problem in 20-80% of serious adverse events (Petersen, Rasmussen, & Rydahl-Hansen, 2017). A study of nurse clinicians working in critical care settings found that there was a perceived lack of theoretical knowledge in nursing staff, as well as inadequate critical clinical thinking skills and inadequate assessment for anticipating and responding to clinical deterioration (Curry, Allen, & Jones, 2017). Connell et al. (2016) conducted a systematic review of the literature that supported the effectiveness of education in recognizing the deterioration of patients and alerting RRS. Audet, Bourgault, and Rochefort (2018) provided a literature review that indicated that, despite having long-established RRS, nurses' knowledge and performance about RRS activation is lacking. Therefore, there is a need for further research to help in identifying the specific clinical nursing skills required to help detect early deterioration of patients.

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Problem Statement

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Research Problem

The effectiveness of the RRS has been attributed directly to the identification of ALF problems (Leach & Mayo, 2013). The study by Leach and Mayo (2013) provided significant support for the gap in existing literature noted in my problem statement, such that despite RRS protocols, there has been a need for further research to survey nurses

about clinical nursing assessment and critical thinking skills that they require to identify early deterioration in their patients. There has been a need for research to identify the specific critical thinking and assessment skills required to help nurses detect early deterioration of their patients. Connell et al. (2016) conducted a mixed-method systematic review that identified the effectiveness of education in helping nurses to recognize patient decline as well as improve outcomes. It was concluded that appropriate training enhanced clinical skills to recognize signs of patient deterioration.

Summarizing Current Evidence of Afferent Limb Failure

The problem of ALF related to a nurse's clinical skills and critical thinking is relevant to early detection of patient decline and the implementation of RSS (Audet et al., 2018). A nurse's clinical training and RRS activation barriers have been explored in recent literature. There was a significant correlation between ALF and failure to rescue as adverse patient events in factors associated with nursing clinical skills (Audet et al., 2018).

Padilla, Urden, and Stacy (2018) explored nurses' perceptions of barriers to RRS activation in the acute care inpatient setting. In a systematic review of literature published after 2007, Padilla et al. used six different search terms related to nurses' perceived barriers to RRS activation. They located 149 articles, reviewing 87 abstracts for inclusion in their literature review. The primary themes that emerged from the search included RRS activator-response interaction, physician influence, nurse education, and nurse experience. Several obstacles to RRS activation were explored; two of the most important variables in the activation of RRS to the bedside were nursing experience and education (Padilla et al., 2018). The systematic review showed that nurses provide frontline

surveillance for the detection of patient deterioration and that they perceive their education and clinical skills as vital to this task. Critical thinking and appropriate nursing clinical skills contribute to activating RRS early, thereby decreasing adverse patient outcomes (Padilla et al., 2018).

Halupa, Halupa, and Warren (2018) found that nurse job satisfaction was directly tied to the nursing workplace and nursing role, as well as whether contact was initiated by the ward or floor nurse, or whether RRS was formally activated during a consultation by RRS staff. Education of the staff and their experience were critical contributing factors in this study. The study supports the crucial role that nursing education and clinical skills have in identifying patient deterioration.

Connell et al. (2016) conducted a mixed-methods systematic review of the literature, examining studies from 2002-2014. They identified evidence that supported the effectiveness of nursing education in recognizing patient deterioration as well as measuring the outcomes of clinical efficacy. The authors demonstrated the value of clinical nursing education in the early recognition and management of deteriorating patients.

Audet et al. (2018) aimed to identify nursing knowledge and the association between nurses' education and experience in correlation with mortality and adverse events that occurred in acute care hospitals. The ability of nurses to identify the early onset of adverse events and call RRS were associated with decreased mortality. Additionally, the study showed the impact on hospital and patient safety of the Academy of Medicine's recommendation that 80% of registered nurses (RNs) should hold a baccalaureate degree by 2020 (Altman, Butler, & Shern, 2016). A significant, positive

correlation between incidents of failure to rescue and adverse patient events in hospital acute care settings and clinical nursing education was identified.

Framing the Afferent Limb Failure Problem That Builds on Previous Information

Building upon previous research concerning the problem of inadequate nursing education and clinical skills for identifying early deterioration in patients, the aim of this study was to identify and analyze the specific training and skills that nurses need to identify signs of patient deterioration and reduce incidents of ALF. An integrative review and synthesis of current literature revealed that it remained unclear how nurses' competencies and education affect the use of RRS in general hospital wards (Jensen, Skar, & Tveit, 2018). The relevance of clinical skills and nursing education when evaluating patient conditions and using RRS in the inpatient setting was unclear in recognizing patient deterioration and improving patient outcomes.

The meaningful gap in the current research literature involved the clinical skills and critical thinking needed to identify early deterioration in patients that results in the ALF phenomenon of RRS. In this study, I sought to identify and analyze the specific skills and education needed to identify early patient deterioration. The results of the study help to close the gap in existing literature on the skills that bedside nurses need to avoid failure to rescue and the ALF phenomenon.

Purpose of the Study

The purpose of this study was to identify and measure clinical nursing assessment and critical thinking skills that influence nurses' ability to detect deterioration in patients and call for RRS. The focus of the study was identifying which nursing assessment and critical thinking skills were most important in helping clinical nurses recognize unstable

or deteriorating patients. The study involved the analysis of critical thinking skills and nursing assessment of clinical floor or ward staff nurses in identifying and responding to patients with signs of clinical deterioration.

A quantitative cross-sectional approach was used to survey clinical bedside nurses who had experience with using electronic patient alert systems and calling RRS to respond to their patients. The INSIGHT Health Professional Nursing Assessment tool assessed nurses' self-reported ability to identify their patients who showed early signs of decompensation. A multiple regression analysis was conducted to evaluate clinical nurses' critical thinking and clinical assessment skills expertise and measure, analyze inference, and evaluate both inductive and deductive reasoning domains of health sciences professionals (Facione, Facione, & Winterhalter, 2010). The INSIGHT Health Professional Nursing Assessment tool was used to assess cognitive processes, level of critical thinking, and assessment skills related to evaluating patient deterioration.

Research Questions and Hypothesis

Research Questions

I had access to RRS and EWS data. Inpatient nurses who were involved in this study could activate RRS without restrictions or conditions. The research questions for this study were designed to assess clinical assessment and critical thinking and how these skills impact nurses' identification of early deterioration of patients as well as activation of RRS. The answers obtained from this study also address the reasons for delay in activating RRS. The research questions for this study were as follows:

RQ1.   What was the relationship between the nurses' clinical skill set and the decision to activate RRS, as measured by INSIGHT Health Professional Nursing Assessment tool?

RQ2.   What was the correlation between the failure to rescue and the level of competency of the clinical nurse as measured by the position on the nursing clinical ladder?

RQ3.   What was the relationship of a nurse's formal education in identifying a patient's early stages of decline using critical assessment skills as measured by the INSIGHT Health Professional Nursing Assessment tool?

RQ4.   What was the correlation between the number of years practicing as a clinical nurse with the nurse's ability to apply critical assessment in recognizing the early signs of decline of patients as measured by the INSIGHT Health Professional Nursing Assessment tool?

Null and Alternative Hypotheses

For this study, the null hypothesis was the following: A clinical nurse's education and clinical skills or critical thinking do not affect the recognition of patient deterioration and the early intervention of RRS. The alternative hypothesis for this study was as follows: A clinical nurse's education and clinical skills or critical thinking affect the recognition of patient deterioration and the early intervention of RRS.

This study was a prospective multiple regression quantitative study that used years of nursing practice and clinical nursing assessment and critical thinking skills as independent variables and the decision to activate the RRS for patients as a dependent variable. I used surveys and questionnaires to collect information on bedside nurses'

critical thinking skills. The source of the data was full-time clinical staff nurses who were practicing on general or progressive floors in the inpatient setting of a large southern academic-affiliated acute care hospital. The surveys included assessments of clinical nurses' critical thinking related to their ability to recognize and respond to patient deterioration.

I provided case study scenarios based on the RRS calls and assessed critical problem-solving skills and recognition of early signs of deterioration as well as the nurses' self-evaluation of their critical thinking skills and diagnostic reasoning. I used a well-established critical thinking assessment tool, the INSIGHT Health Professional Nursing Assessment. Participating nurses were asked to provide demographic information within the INSIGHT Health Professional Nursing Assessment tool about their practice years as a nurse, practice years on the floor, clinical ladder designation, age, gender, nursing educational level, and how many times they had called for the RRS.

Theoretical Framework

Benner's Novice-to-Expert Model

The framework that was used to support the study was Patricia Benner's (1984) novice-to-expert model. Benner's theory involves five levels of proficiency that nurses obtain through continued clinical practice: novice (no experience), advanced beginner (marginally acceptable performance), competent (moderate, specific expertise), proficient (moderate, broad expertise), and expert (extensive experience, initiative). Benner noted that the described levels of competency are a continuum where practice levels reflect clinical change based on three areas. The first area of nurse development shows a movement from reliance on abstract principles to the use of concrete experiences. The

next level of development involves the nurse being able to change thinking from the idea that all information in a situation is equally relevant to distinguishing different levels of relevance and importance. Finally, the last level of development involves the nurse moving from the role of detached observer to that of involved performer (Ulrich, 2011).

Additionally, Benner's model posits that a nurse's level of expertise may have been higher in one area of practice and lower in another. Benner believed that formal theoretical models and textbook descriptions were inadequate to explain practical situations and their complexities. She thought that both experience and mastery of skills were essential for higher level skills to be formed (English, 1993). A more detailed explanation of Benner's model is presented in Chapter 2.

Benner's Model and Its Relevance to This Study

In this study, I investigated nurses' perspectives on their clinical skill set and whether it affected their decision to activate RRS when their patients scored high on EWS. A high EWS score indicated that the patient had abnormal vital signs and might have shown signs of deterioration. A nurse's ability to identify these signs early could improve a patient's survival rate, if RRS is activated early (Leach et al., 2012). Benner's theory described the novice nurse as not having the ability to think outside of a linear 1-2-3 step process, whereas experienced nurses could leap over these steps because of their knowledge and expertise (Ulrich, 2011). Benner's Novice-to-Expert Theory was an excellent theoretical foundation because it provided a framework to identify nursing critical thinking and clinical assessment skills, as well as provided an objective scale of competency development among bedside nurses. The scale used in Benner's theory was

used to directly correlate nursing competencies and the activation of RRS to a patient's bedside.

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Nature of the Study

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Rationale for the Study's Design

The nature of the study was a prospective multiple regression quantitative study that used years of nursing practice and clinical nursing assessment and critical thinking skills as independent variables and the decision to activate RRS for patients as a dependent variable. Critical thinking skills were measured using the INSIGHT Health Professional Nursing Assessment tool. The study used a prospective multiple regression analysis to predict the clinical assessment skills that bedside nurses do not use, resulting in a failure to escalate deteriorating patients to RRS. The goal of this method of research was to either make accurate projections about an outcome or attempt to understand a phenomenon by examining the variable's correlation to it (Osborne, 2000).

The key study variables included years of nursing practice, clinical nursing assessment and critical thinking skills, and scope of nursing practice as independent variables and the decision to activate RRS services for patients as a dependent variable. Independent variables served as covariates as they were the characteristics of the participants that could be used to determine the nurse's recognition of patient deterioration and calling RRS (Warner, 2013).

Study Methodology

A multiple regression analysis was conducted evaluating clinical nurses' critical thinking and clinical assessment skills expertise by using the INSIGHT Health Professional nursing clinical assessment tool. The study evaluated nurse critical thinking

and assessment skills and their effectiveness in recognizing signs of early deterioration in patients. The nurses also completed a survey that included assessments of their critical thinking related to their ability to recognize and respond to patient deterioration. Demographic data included clinical ladder designation, years practicing as a nurse, years practicing as a nurse in their current location, level of nursing education, age, and gender.

The INSIGHT Health Professional Nursing Assessment tool, designed to assess the critical thinking skills of bedside nurses, measured reasoning and the decision-making process using a multiple-choice test. The participants applied their clinical skills in a variety of scenarios with the test assessing the nurse's ability to make inferences, as well as interpret and analyze clinical information (Waltz & Jenkins, 2001) The INSIGHT Health Professional Nursing Assessment tool also included requests for demographic information about the participant's clinical ladder designation, age, gender, years of practice, and years working in their unit, along with indications of whether the participant was educationally prepared with an Associate's Degree in Nursing (ADN), Nursing Diploma, Bachelor of Science in Nursing (BSN), or Master of Science in Nursing (MSN), and the number times that the RRS was called to a patient's bedside. The study required approval from the Walden Institutional Review Board (IRB) as well as the study site's IRB.

Definitions

Concise definitions of the independent and dependent variables are listed for clarification.

Independent Variables

Clinical nursing assessment skills: Clinical nursing assessment is a focused, detailed assessment of a specific body system or systems that is related to a presenting problem or current concern of the patient. This assessment includes gathering information on a patient's physiological, psychological, sociological, and spiritual needs. The data that are collected are both subjective and objective (Toney-Butler & Unison-Pace, 2019).

Critical thinking skills: Critical thinking skills are skills that provide the ability to recognize problems, raise questions, gather evidence that supports answers and solutions, analyze and evaluate alternative solutions, and communicate with others to implement appropriate solutions for the best possible patient outcomes (Papathanasiou, Kleislaris, Frendelos, Kakou, & Kourkouta, 2014).

Years of nursing experience on the current unit: Years of nursing experience were defined as the number of years an individual had worked as an RN on their current unit of employment.

Dependent Variable

Activation of the rapid response system (RRS): System criteria for alerting and activating the RRS. Triggers include negative changes in vital signs, clinician concern, or family concern. Additionally, the clinical setting may use an early warning system that may make negative changes in vital sign trigger criterion or an aggregate or weighted EWS score. The events that lead up to the activation are also known as the *afferent limb* (Winters et al., 2013).

Assumptions

The assumptions of this study were considered true based on the study population, research design, and administration. Assumptions were based on the characteristics of data, participant distribution, variable type, and correlational trends (Mesel, 2012). The assumptions for the study were provided to ensure that the study was independent and free of my influence as the researcher.

Quantitative Methods Assumptions

The first assumption with the quantitative research method is that the results of a study are independent of the researcher and are studied objectively, regardless of the researcher's bias or values. As the researcher, I remained independent from the participants and subject matter of the study. My personal experiences, judgements, or values were not used in the study.

The second assumption was that the research for the study was based on deductive reasoning and logic. The hypotheses of the study were tested based on a cause-and-effect relationship of nurse's clinical judgement, critical thinking skills, and education with generalizations used to predict and understand the ALF phenomenon. The cause-and-effect relationship helped ensure the validity of the research.

The third assumption was that the study's theoretical framework used the assumptions of Benner's Novice-to-Expert Theory (Benner, 1984). Benner's assumptions applied to all levels of nursing care. One of the tenets of Benner's model is that knowledge is a prerequisite for expertise and that being involved in similar incidents builds confidence, expertise, and skills (Benner, 1984). Benner's model was applied

equally to all of the nurses in the study and was assumed to be equally valid for all participants.

Participant Assumptions

The first participant assumption was that participants would participate in the study willingly, honestly, and candidly. The study was conducted confidentially and with anonymity, with the participants being volunteers. The participants could withdraw from the study at any time, without ramifications, penalties, or repercussions from me or the institution.

Secondly, the inclusion criteria of the study were the same for all participants and were objective and free of researcher bias. It was assumed that all participants had experienced the same ALF phenomenon and RRS activation information. The inclusion criteria were appropriate and understandable to the participants.

Finally, there were no other motives in the study for the participants other than an interest in supplying their unique experiences with the ALF phenomenon, their clinical skills, critical thinking, and education in summoning RRS. There were no incentives such as pay increase, gifts, or monetary stipends. The participation guidelines were explained verbally and in written form to the participants, who were advised that there would be no adverse consequences for declining participation in the study, from either my or the organization.

Reasons for Study Assumptions

Assumptions for the research study provided a basis for theories and applications. Study assumptions foster the development and application of the research process. Assumptions involve a realistic expectation that something is true when there is

insufficient evidence or verification to support this expectation (Barnham, 2015). The reasons for the project's assumptions were that the individuals and the study had commonalities that all shared in the test environment.

The use of assumptions about nurses' reality, perception, experience, and situations involving ALF and RRS could be measurable and independent of personal bias (Gall, Gall, & Borg, 2003). Assumptions were also important in this research because once established, the violation of these assumptions could lead to invalid results in determining the clinical skills, critical thinking, and education that nurses need in order to recognize signs of patient deterioration. The research inferences could be accurately identified based on correctly addressing these quantitative research assumptions.

Scope and Delimitations

Study Scope

For this study, the participants were full-time clinical nurses who worked on general and progressive inpatient floors at a large academic-affiliated acute care hospital in the South. There were more than 2,000 nurses on these floors with whom I had worked in my role as an RRS nurse. The scope of the research project involved the identification of clinical skills and critical care thinking to identify signs of patient deterioration by using questionnaires and surveys to gather data from bedside nurses. The scope of the study included an in-depth literature review for gaps on the ALF phenomenon and the nurses' failure to use clinical skills, critical thinking skills, and education. The surveys and questionnaires used a well-established critical thinking assessment tool called the INSIGHT Health Professional nursing assessment tool. Obtaining IRB approval helped

in providing ethical and privacy safeguards to research participants (Stryjewski, Kalish, & Silverman, 2015).

Study Delimitations

The study addressed the influence of nurses' clinical skills, critical thinking, and education in detecting early deterioration in adult patients with subsequent activation of RRS. The population included the nursing staff caring for inpatients outside of the intensive care setting who were practicing on inpatient floors. Intensive care, pediatric, and clinic patients were not seen by the RRS, and the nurses caring for these populations were excluded from this study. Advanced practice nurses (APNs) and other advanced practice providers were not part of this study.

The study included surveys using a closed-ended Likert scale rather than open-ended questions. These questions were used to determine participants' clinical and critical thinking skills based on Benner's novice-to-expert model (Benner,1984). The results of the surveys and questionnaires were used to answer the research questions posed for this study. These surveys were conducted using the INSIGHT Health Professional nursing assessment tool.

The results of this study and its conclusions may be applied to acute care hospital settings that employ similar bedside nurses who can activate the RRS. The sample size of the study was determined by a power analysis. Generalizations or inferences can be drawn from results and observations to the more general population (Kukull & Ganguli, 2012). The results and applicability of this study can represent the results that would be obtained from the entire nurse population of the university hospital.

Limitations

Design and/or Methodological Weakness

The design and procedures of the study provided internal validity by ruling out alternative explanations for the findings; however, there were some limitations. Due to the many variables that influence nurses' clinical assessment and critical thinking skills, the cause and effect of the variables needed to satisfy three basic criteria. These were that the clinical skills precede the recognition of patient deterioration, that the clinical skills and the recognition of patient deterioration vary together, and that there were no other explanations for the relationships of clinical skills or critical thinking and the recognition of early deterioration in patients (Patino & Ferreira, 2018).

Construct validity demonstrates relationships between the variables in a study and the theoretical framework that is used (Roberts, Priest, & Traynor, 2006). Construct validity was not a limitation because the clinical skills tested were determined by the nursing scope and practice that nurses were deemed competent to perform and permitted to practice within their licensure (Brewer, 2014). Professional skills and conduct were defined by the Board of Nursing and institutional practice guidelines as well as nursing practice outlined in Benner's model (Benner, 1984).

The influence of confounder variables could have been a limitation of the study. Outside influences such as nursing culture, institutional barriers, environmental constraints, or information technology could have influenced the effects of clinical decision making and when to call the RRS. The test was limited to clinical skills and critical thinking and did not address other potential barriers that might inhibit recognition

of patient deterioration such as hospital culture, inpatient guidelines, or problematic monitoring technology.

Biases

My challenge was to understand the biases related to the clinical nurse's failure to recognize patient decompensation and activate the RRS. I needed to remain objective and use the INSIGHT Health Professional nursing assessment tool to gather appropriate clinical decision-making data. Institutional data already supported the ALF phenomenon; therefore, this study helped to identify the gap in nursing clinical decision making and critical thinking skills that promoted ALF events, which caused nurses to miss signs of patient deterioration.

To avoid interpretive bias, statistical software was used to help analyze the data. Finally, the results were interpreted to infer what the information meant and determine its relevance, with a focus on how clinical skills and critical thinking can be evaluated based on the theoretical foundations of the research, Benner's novice-to-expert model (Benner, 1984). The inferential phase is also used to make judgments about the dependability of a study (Trochim, 2006). With each of these phases, objective data were used with as little personal bias as possible.

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Significance

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Potential Contributions

The contributions provided by the study improved patient safety by identifying the clinical skills and critical thinking that were needed by nurses to detect early deterioration in patients. The study helped to close the gap in the knowledge of the ALF phenomenon and identify areas of nursing education that could be used to improve

clinical assessment skills and critical thinking. The RRS could be activated earlier when patient deterioration is detected, resulting in early clinical interventions and improved patient outcomes.

Contributions to Nursing Practice and Policy

The study helped to identify areas for improvement in clinical assessment for nurses that were used to identify gaps related to the ALF phenomenon. Areas for clinical improvement were identified and addressed through educational initiatives. Nursing policies could be improved to provide clinical nurses with appropriate parameters for activating RRS to bring appropriate critical teams to the bedside for early interventions.

Positive Social Change

Social change is described as a significant alteration over time in behavior patterns and cultural values and norms. The adjustment of mechanisms within a social structure is characterized by changes in cultural symbols, rules of behavior, social organizations, or value systems (Form & Wilterdink, 2019). The hospital environment is an organization of professional health care providers who depend on each other to deliver quality care. Professional cultures can contribute to effective interprofessional teamwork and collaboration (Hall, 2009). Providing information that increased nursing awareness and knowledge of the effectiveness of higher level clinical education in identifying early patient deterioration assisted in changing cultural norms about nursing and the ability to identify deteriorating patients. The study helped to identify critical factors that affect early recognition of patient decompensation, thereby improving patient safety, supporting higher levels of critical nursing care, and promoting nurse retention through improvements in job satisfaction, collegial respect, and interprofessional collaboration.

Findings from the study may create social change within professional cultures in hospital settings.

Summary

The purpose of this study was to identify and measure the clinical nursing assessment and critical thinking skills that influence nurses' ability to identify deterioration in patients and call for RRS. The study used the INSIGHT Health Professional nursing assessment tool to assess the nurses' ability to use clinical assessments to identify their patients who were showing early signs of deterioration. The theoretical framework for this study was Benner's novice-to-expert model (Benner, 1984). The independent variables for this study were clinical nursing assessment skills, critical thinking skills, years of nursing experience, and scope of nursing practice. The dependent variable was the activation of the RRS. The participants were clinical nurses who worked on general and progressive inpatient floors at a large academic-affiliated acute care hospital in the South.

This study may contribute to improvements in patient safety as well as nursing practice and policy. Findings from this study may help to create social change within professional cultures in hospital settings by identifying critical factors affecting early recognition of patient decompensation, thereby improving patient safety, supporting higher levels of critical nursing care, and promoting nurse retention through improvements in job satisfaction, collegial respect, and interprofessional collaboration.

Chapter 2 provides a synopsis of the current literature and establishes the relevance of the ALF problem and the need for appropriate clinical assessment and critical thinking skills. I provide a detailed account of the literature search strategy and a

review of the theoretical foundations for the study. Included in the literature review are

key variables, concepts, and synthesis of studies related to the research questions.

Chapter 2: Review of the Literature

Introduction

The effectiveness of the RRS is attributed directly to the identification of ALF problems (Leach & Mayo, 2013). This study addressed a gap in the research literature reflected in the problem statement, which indicated that despite the existence of RRS protocols, further research needs to be conducted to survey nurses about clinical nursing assessment and critical thinking skills that they need to identify early deterioration in their patients. Additional research needs to be conducted to identify the specific critical thinking and assessment skills required to help detect early deterioration of patients. Connell et al. (2016) conducted a mixed-method systematic review that identified the effectiveness of education in supporting recognition of patient decline as well as outcomes. It was concluded that appropriate training enhanced clinical skills to recognize signs of patient deterioration.

The purpose of this study was to identify and measure clinical nursing assessment and critical thinking skills that influence nurses' ability to detect deterioration in patients and to call for RRS. The focus of the study was identifying which nursing assessment and critical thinking skills were most important in helping clinical nurses recognize unstable or deteriorating patients. The study involved an analysis of critical thinking skills and nursing assessment of clinical floor or ward staff nurses in identifying and responding to patients with signs of clinical deterioration.

Synopsis of the Current Literature

The current literature has revealed a problem with the identification of patient deterioration and a nurse's clinical skills and critical thinking that results in the activation of RRS (Audet et al., 2018). The phenomenon of ALF significantly correlates with a lack of clinical assessment and critical thinking skills (Audet et al., 2018). A systematic review of the current literature showed that frontline clinical nurses perceived that two of the most important variables in patient deterioration recognition and activation of RRS were nursing experience and nursing education (Padilla et al., 2018). The results of the literature search indicated that nursing education and clinical skills were vital to recognizing patient deterioration and alerting RRS early, thereby decreasing adverse patient outcomes (Padilla et al., 2018).

A second mixed-methods systematic literature review identified nursing education as key in the early recognition of patient deterioration, as well as in the improvement of clinical efficacy (Connell et al., 2016). The review of literature also showed that the early activation of RRS was associated with decreased mortality in acute care settings. Nursing satisfaction also increased with the successful identification of factors contributing to early patient deterioration and nurses' ability to call RRS. Superior nursing clinical skills and critical thinking were critical in job satisfaction (Halupa et al., 2018).

The gap in the current literature involves the identification of the clinical and critical thinking skills that bedside nurses need to identify patients who exhibit early deterioration and the ALF phenomenon of RRS. Current research has revealed that clinical skills related to the effective use of RRS in patient deterioration incidents were

unclear (Jensen, Skar, & Tveit, 2018). The results of this study close the identified gap with analysis of specific clinical skills needed to avoid patient failure to rescue issues and ALF problems.

Chapter Preview

The major sections of this chapter address the literature search strategy, the theoretical foundations of the research problem, key concepts and variables related to the literature research, and a summary of the major themes in the literature. The section on the literature search strategy includes a list of the search terms and library databases used. Current research and review articles are described, along with sources of seminal literature. Where there was little current research available, or the research included other dissertations or conference material, appropriate strategies for future research initiatives are discussed.

The section on the theoretical foundations of the study includes a review of Benner's Novice-to-Expert Model (Benner, 1982) and a discussion of its origin, major theological propositions, and assumptions. The rationale for using Benner's theory in this study is discussed. Additionally, the research questions for this study are applied to the theoretical framework of the study. Benner's theory is analyzed for its relevance to the study and how the research questions relate to, challenge, or build upon the existing theory. Chapter 2 also incorporates a literature- and research-based analysis of the applicable literature and how the current literature has been applied to the study.

The literature review related to key variables and concepts describes studies involving the clinical skills and critical thinking needed to identify patient deterioration

and the activation of RRS. The literature review section reviews the ways that researchers have approached or addressed the ALF phenomenon and the strengths or weaknesses in their approaches. I justify the study using a rationale from the selected literature, and I present a synthesis of literature related to the independent and dependent variables of the study. Previous findings of the researchers are discussed, including mixed findings of researchers and ALF topics that remain to be studied.

The final section of Chapter 2 provides a summary and conclusion of the major themes of the literature. In the conclusion, I discuss what is known and not known about clinical assessment skills and critical thinking related to identifying patient decompensation and alerting the RRS. This final section also identifies a gap in the literature related to ALF, clinical assessment, and failure to rescue. Chapter 2 concludes with a transition into the research design and rationale sections of Chapter 3.

Literature Search Strategy

Library Databases and Search Engines Used in the Study

A computerized search was conducted using the Cumulative Index in Nursing & Allied Health (CINAHL), Medline, ProQuest Nursing & Allied Health Source, and PubMed. The search was conducted using the Walden library databases as well as Google Scholar. Additionally, web browser search engines such as Google, Bing, DuckDuckGo, and SlideShare were used to identify literature not identified in the research databases. Care was taken to ensure that the literature was peer reviewed through reputable, research-based organizations.

Key Search Terms

The keywords that were used included *RRT/RRS, rapid response team, rapid response systems, patient deterioration, early warning system, EWS*, and *emergency response*. Additionally, *Benner, Patricia Benner*, *Hubert Dreyfus, Dreyfus*, and *novice to expert* were used. The asterisk function was used to allow multiple forms of the keywords and different combinations of the parenthetical functions to condense the search function. I retrieved 136 research articles, of which 66 were used for the literature review. Mendeley reference management software was used to categorize, organize, and find relevant research articles to support this study (Elsevier, 2019).

Themes used in identifying appropriate articles included the following: delayed rapid response team activation, factors that influence a nurse's assessment, nurse's perception of a hospital rapid response team, using early warning scores in nursing practice, nursing education as a factor in identifying patient deterioration, and critical and clinical skills required to identify patient decompensation. Once the themes had been identified, the research literature was placed in chronological order in order to see how information about nursing clinical skills and identifying patient deterioration advanced through time. The objective in delineating themes was to focus on research identifying appropriate clinical and critical skills needed to identify deteriorating patients prior to RRS activation.

In case the literature search resulted in scant documentation of current research related to nursing clinical skills or critical thinking in recognizing patient deterioration, the most current information was used, and the gap in research was either addressed in

the study or expressed for future research on the ALF phenomenon. Any gaps in the literature review are highlighted and reviewed, along with their impact on this study. Implications of the lack of current research are also discussed to add to possible future research implications or methodologies.

Theoretical Foundation

Benner's Novice-to-Expert Model

The theoretical foundation for the study was Benner's novice-to-expert model (Benner, 1982). Benner's theory addresses the five levels of proficiency that nurses attain through continued clinical practice at the novice (no experience), advanced beginner (marginally acceptable performance), competent (moderate, specific expertise), proficient (moderate, broad expertise), and expert (extensive experience, initiative) levels. Benner (1982) noted that the described levels of competency occur on a continuum where practice levels reflect clinical change based on three areas.

Theoretical Propositions

Benner's theoretical propositions are described in three areas of clinical competency. The first area of nurse development shows movement from reliance on abstract principles to the use of concrete experiences. The next level of development involves the nurse being able to change thinking from the idea that all information in a situation is equally relevant to distinguishing different levels of relevance and importance. Finally, the last level of development involves the nurse moving from the role of a detached observer to that of an involved performer (Benner, 1982).

Additionally, Benner's model indicates that a nurse's level of expertise may be higher in one area of practice and lower in another. Benner contended that formal theoretical models and textbook descriptions are inadequate to explain practical situations and their complexities. She claimed that both experience and mastery of skills were essential for higher level skills to be formed (English, 1993).

Benner's Theory Applied to Previous Studies

Benner's Novice-to-Expert Model has been used to measure the clinical competency of nurses in many hospitals and medical centers. Adapted from the Dreyfus model of clinical problem-solving skills acquisition (Dreyfus & Dreyfus, 1980), Benner's model has been accepted as a framework for explaining the progression of acquiring and developing clinical skills (Pena, 2010). While both Dreyfus's and Benner's models address increasing levels of clinical competency attainment through the acquisition of clinical skills, researchers who have used these models as theoretical frameworks for their studies have had a difficult time explaining the acquisition of these skills (Pena, 2010).

Clinical problem solving requires a complex mixture of clinical experience, astute clinical judgements, formal and informal education, and mentoring by peers and leaders who have direct experience with complex clinical events (Cote & Burwell, 2019; Haag-Heitman, 1999). Benner's novice-to-expert model involves seven domains that describe clinical nursing practice within five stages of nursing development (Benner, 1982). Benner's model has been used to develop nursing clinical advancement programs in many health care institutions (Cote & Burwell, 2007; Haag-Heitman, 1999). While

Benner's model requires nurses to practice at the level described in the model, a more comprehensive explanation of clinical assessment skills and critical thinking were not explained.

Benner's model does not specifically address the use of clinical assessment and critical thinking for the recognition of early patient deterioration and the subsequent activation of RRS. Previous studies have applied the Novice-to-Expert Model to the development of clinical skills that identify the clinical practice level of the nurse (Alber, Augustus, & Hahn, 2009; Haig-Heitman, 1999). The findings provided by the study may contribute to the clinical skills needed to identify early deterioration in patients by nurses classified according to Benner's novice-to-expert model.

The Rationale for Using Benner's Novice-to-Expert Model

Benner's Novice-to-Expert Model is used in many health settings as a framework for assessing nurses' clinical skills as they grow professionally through different stages of experience, knowledge, and education (Haig-Heitman, 1999; Payne, 2015). The Dreyfus model of clinical problem-solving skills acquisition, from which Benner adapted her model for nursing, indicates that learning is experiential and occurs through situation-based experiences (Dreyfus & Dreyfus, 1980). Benner (1982) contended that nurses develop skills while involved in clinical situations and that these skills can be expressed in five stages of learning that begin at novice and end at expert (Benner, 1982).

Benner's novice-to-expert model was an excellent choice to use for the study because clinical assessment skills and critical thinking could be correlated with the clinical competencies and skill levels identified by the participating nurses (Payne, 2015).

The assessment skills that were identified as important to understanding patient deterioration and the activation of RRS can be added to Benner's situation-based experiences. In health care institutions that use a nursing advancement program based on Benner's model, essential nursing assessment skills could be added to Benner's model in developing the appropriate clinical skills to identify early deterioration in patients and summoning the appropriate RRS resources to provide important clinical interventions.

How Benner's Model Relates to the Research Questions and This Study

Benner's Novice-to-Expert Model was an excellent theoretical foundation because it established a framework that identified nursing critical thinking and clinical assessment skills, in addition to providing an objective scale of competency development for bedside nurses. The research questions that were developed for the study directly correlated with Benner's model by inquiring as to the relationship of a nurse's level of competency, clinical assessment skills, formal education, and years of experience in recognizing patient deterioration and summoning RRS. A nurse's clinical assessment skills and critical thinking are related to Benner's model by directly correlating Benner's theoretical foundation to nursing competencies, clinical assessment skills, and the activation of RRS to a patient's bedside during the early recognition of patient deterioration.

Conceptual Framework

Identification and Definition of Afferent Limb Failure

The detection of patient deterioration and the activation of RRS for a patient population is known as the *afferent limb* of the RRS (Devita & Hillman, 2011). The

purpose of the afferent limb of the RRS is early recognition of emergent patient needs that are unmet. Unmet needs are mismatches between the care that patients receive and what their immediate needs require (Moore, Hravnak, & Pinsky, 2012). ALF is defined as occurring when the defined RRS calling criteria are met but no associated call is made in 24 hours prior to an event (Trinkle & Flabouris, 2011). A delay in identifying deteriorating patients, initiating RRS, and delaying the transfer of patients needing ICU care is associated with increased hospital stay and higher mortality (Phua, Ngerng, & Lim, 2010). A failure of the afferent limb of RRS can be used as a predicting performance measure of nursing education, deficiencies in RRS education, documentation of vital signs, or a failure to call RRS (Trinkle & Flabouris, 2011). When the RRS is never activated, ALF can be considered an absolute phenomenon (Sundararajan, Flabouris, & Thompson, 2016).

Afferent Limb Failure and Clinical or Critical Assessment Skills

The phenomenon of ALF and early identification of deteriorating patients has been well documented in research. The theoretical framework of the clinical deterioration theory (CDT) is based on the belief that the critical-thinking skills that are necessary for identifying patient deterioration are best acquired through education and experience (Lisko & O'Dell, 2010). The CDT uses five components as its underpinnings: developing core knowledge, assessment or learning stimulus, simulation, reflective review, and performance feedback (Buykx et al., 2011). The development of the CDT was based on experiential learning theory (Kolb & Kolb, 2005).The identification of the educational requirements of nurses who were involved in the RRS were paramount; however, there

was no current standardized criteria competencies or nursing scope of practice identified for clinical nurses in health care facilities or in the literature (Topple et al., 2016). DeVita et al. (2010) reported on a consensus conference of international experts in RRS, safety, nursing education, and technology who discussed optimal clinical monitoring. The major findings of the conference included that the characteristics of appropriate patient monitoring were identifiable but that there was no consensus on the best way to detect patient deterioration (DeVita et al., 2010).

Despite the use of an EWS to identify patients who were deteriorating, nursing confidence from past experiences, and clinical assessment skills impact the rate of ALF throughout health care systems (Wood, Chaboyer, & Carr, 2019). Clinical assessment and critical thinking involved clear protocols, past experience, clinical and interprofessional training as well as continuous quality improvement (Olson, Soreide & Hansen, 2019). The lack of escalation is multifactorial and complex; however, lack of the appropriate clinical assessment skills and critical thinking were a major barrier to identifying deteriorating patients (Kashiouris, Pedram, Tormey, Lubin, & Sessler, 2015).

Key Statements and Definitions in the Framework

The conceptual framework of ALF involved the beliefs that were held about the failures of identification or activation of the RRS during the period of decompensation in patients. An effective afferent limb was crucial to the proper functioning of the RRS (DeVita & Hillman, 2011). When there is an inability to identify the warning signs of early patient deterioration because of the lack of clinical assessment skills or critical thinking, early activation of the RRS and summoning of needed resources is missed.

The conceptual framework was based upon the nurse's clinical assessment skills and critical thinking based on their education as outlined by Benner's novice-to-expert model (Benner, 1982; Cote, & Burwell, 2007). Clinical assessment and critical thinking skills was analyzed using the INSIGHT Health Professional nursing assessment tool to determine which skills were important in recognizing early deterioration in patients and activating the RRS. The use of Benner's model to explain the competency levels of nurses' clinical assessment skills was the conceptual framework that provided the analysis needed for this study.

Afferent Limb Failure in Previous Research

The phenomenon of ALF has been extensively researched in the literature. Trinkle and Flabouris (2011) noted that the RRS ALF is a useful measure of performance for an established RRS and is key to unanticipated ICU admissions and hospital mortality. Literature reviews and studies have been conducted on the effectiveness of the RRS while minimizing ALF (Wood, Chaboyer, & Carr, 2019; Phua, Ngerng, & Lim, 2010). There is a gap in the literature that identifies the necessary clinical assessment skills and critical thinking needed to decrease the ALF phenomenon along with the identification of patient deterioration and activating the RRS. The study identified crucial clinical assessment skills and critical thinking that could be applied to further research on ALF.

Literature Review Related to Key Variables and Concepts

Studies Related to Early Warning System, Rapid Response System, and the Scope of the Study

The effectiveness of clinical skills and nursing education in the recognition of early patient deterioration and the activation of the RRS was well documented in the literature (Difonzo, 2019; Veiga & Rojas, 2019). While the survival rate of in-hospital cardiac arrests has been low, the use of a physiological parameter system called the early warning systems (EWS) and the RRS were used to help identify patients who show signs of early deterioration (Connell et al., 2016). Systematic review of the research has shown that educational programs on the use of clinical skills to identify signs of early patient deterioration, interpretation of the EWS, and the activation of the RRS can improve the early recognition, treatment, and management of patient decompensation (Connell et al., 2016).

Many hospitals provided a quantitative score using the EWS systems along with training to help clinical nurses identify abnormal vital signs and monitor patients who were at risk of deterioration. However, nurses need clinical assessment skills, judgement, and protocol adherence in order to interpret the meaning of EWS scores and ramifications to the patient (Foley & Dowling, 2019). The literature showed the need for ongoing education and clinical training on recognition, management, protocol awareness, and team communication about deteriorating patients (Foley & Dowling, 2019).

Merriel et al. (2016) demonstrated the effectiveness of multidisciplinary team training to improve the recognition of deteriorating patients. While using the EWS

scoring and clinical team training, they found that increased training using real-life scenarios improved the effectiveness of nursing, medical, and allied staff in identifying deteriorating patients (Merriel et al., 2016). While the use of the multidisciplinary team training improved the recognition of deteriorating patients among the participants, individual clinical skills were vital to the success of the training.

A literature review and synthesis were conducted on the impact of using the EWS and RRS on nursing competence (Jensen, Skar, & Tveit, 2017). The analysis of the literature review revealed that RRSs and EWSs impacted nursing competency in three areas: the nurse's ability to assess and sense patient decompensation, development of their skills and knowledge, and deciding on when to summon help (Jensen, et al., 2017). The relevance of this literature search to clinical practice is that a better understanding of the nurse's development of competence in identifying deteriorating patients will improve practice and patient safety (Jensen et. al, 2017).

While nurses were crucial in being the initial health care team member to identify the signs of early deterioration of patients and summoning the appropriate resources to intervene, the complexities of identifying the clinical analysis and critical thinking skills needed can be difficult to identify. Experience, intuitiveness, knowing individual patients, and nursing education were all important in developing clinical and critical thinking skills (Dalton et al., 2018). Dalton et al. (2018) investigated factors that influenced a nurse's assessment of patient acuity and their response to acute deterioration in patients. It was found that the interpretation of physiological changes is crucial in distinguishing between suboptimal care and the escalation of patients needing critical care interventions (Dalton

et al., 2018). The ability of nurses to identify deterioration in their assessments was exacerbated by gaps in their knowledge of patient deterioration signs (Dalton et al., 2018). While many nurses relied on the numerical values provided by the EWS, many also tended to accept peer assessments rather than their own assessment (Dalton et al., 2018). Additionally, nurses tended to rely on a higher EWS score than their own assessment of the patient. While intuitive assumptions and experiential knowledge is the ideology of practical nursing, Dalton et al. (2018) noted that there is a significant gap in the literature that identified the nursing assessment skills needed to identify deterioration in their assessments and on nursing clinical assessment skills and reasoning which warrants further investigation.

How Researchers Have Approached Clinical Assessment Skills and Patient Deterioration Resulting in the Activation of Rapid Response System

Researchers have studied the clinical assessment skills of nurses in identifying deteriorating patients using quantitative and qualitative studies. Dalton et al., (2018) concluded that a nurse's clinical assessment skills were multiple confounding factors that influences the way a patient's acuity is assessed. Training, education, and experience form the basis for accurate patient assessment skills (Simmons, 2009). Research over the past 30 years has tried to determine clear explanations about clinical assessment skills by showing that clinical reasoning is a multifaceted process of intuition, cognition, experience, and education (Simmons, 2009). Literature reviews have concluded that research is still needed to identify variables that have impact on clinical assessment and reasoning (Simmons, 2009).

Odell (2014) studied the ALF phenomenon of the RRS with an in-depth analysis of nursing and their role in detecting and managing deteriorating inpatients. A retrospective study of cardiac arrests as markers of deterioration showed that the reliance on the RRS was a simplified solution to a more complex problem (Odell, 2014). By improving suboptimal practice and providing strategies for education and training, nurses can be more informed and health care teams can develop and implement multi-tiered approaches to managing patients.

Clinical assessment skills were also researched by evaluating the factors that RNs use to decide if the RRS should be called. Jackson and Penphrase (2016) completed a study on factors that influenced a RNs decision to activate RRS when patients were deteriorating. Three factors that were identified were rapid response team (RRT) barriers, RRT positive intent to activate, and patient management beliefs. Key conclusions of the study were that clinical assessment skills and the influence of years of experience were factors in the decision to activate the RRS for deteriorating patients (Jackson & Penphrase, 2016).

While there was literature with respect to the activation of the RRS as well as clinical assessment skills and critical thinking of nurses, there were no specific articles located that identified the assessment skills needed to identify early deterioration in patients, resulting in RRS activation could be located. Researchers found that additional investigation of the factors that improved nursing clinical assessment skills that identified signs of a deteriorating patient resulting in the activation of RRS should be investigated (Daltonet al., 2018; Audet et al., 2018). Massey et al., (2017) acknowledged that while

recognizing patient deterioration included patient assessment, patient familiarity, nursing education, and environmental factors, the recognition and response to a patient's clinical deterioration is a complex set of behaviors, education, and experience. In a meta-analysis of seventeen studies, it was concluded that patient safety relied on the timely assessment skills and follow-on actions of the nurse (Massey et al., 2017). No aspect of the review correlated timely nursing assessment skills with the activation of the RRS.

Rationale for Selection of Clinical Assessment Skills in Recognizing Patient Deterioration Resulting in the Activation of Rapid Response System

Throughout the literature search on nursing assessment and critical thinking skills that were needed to recognize patient deterioration and correlating of activation of the RRS is scant. The literature review revealed the nurse's ability to assess and sense patient decompensation as well as the development of their skills and knowledge, and deciding on when to summon help was complex and based on experience, education, and ability to quickly assess the clinical picture (Jensen, Skar, & Tveit, 2017). The impact of the RRS on nursing competence has been discussed (Jensen et al., 2017), however. The effect of nursing clinical assessment skill competence and critical thinking is not well documented. There is a gap in the literature that discusses the clinical skills needed to identify early deterioration in patients and activate the RRS, summoning needed critical care resources to the bedside. Even in the presence of a robust EWS, there is a need for ongoing training, cultural shifts, and improved clinical compliance with RRS (Foley & Dowling, 2018). The rationale for selecting the topic was to identify essential clinical assessment skills needed to determine early decompensation in patients and call RRS to the bedside

for immediate critical interventions. Nurses' development of critical thinking and clinical assessment as well as communication to health care teams and early management of deteriorating patients were vital to patients' safety and rescue (Foley & Dowling, 2018).

Review and Synthesis of Studies Related to Clinical Nursing Assessment Skills, Critical Thinking Skills, and Activation of the Rapid Response System

The independent variables for this study included clinical nursing assessment skills, critical thinking skills, years of nursing experience, and the scope of nursing practice. The dependent variable for the study is the activation of the RRS. Examples of clinical nursing assessment skill analysis involved web-based simulation programs or analyzing clinical nursing assessment skills in new nursing graduates (Chung et al., 2018; Liaw, et al., 2017). Articles also discussed the use of clinical reasoning evaluation tools (CREST), the Health Sciences Reasoning Test (HSRT), the California Critical Thinking Skills Test or the INSIGHT Health Professional simulated clinical assessment to assess nurses' abilities to apply their clinical skills in a variety of scenarios while assessing the nurse's ability to make inferences, interpret and analyze clinical information (Waltz & Jenkins, 2001).

Literature searches that highlighted years of nursing experience related to clinical thinking skills and critical thinking primarily dealt with undergraduate nursing students and new graduate nurses and their preparation for recognizing and preventing of patient deterioration (Stayt et al., 2015; Herron, 2018). Topics reviewed included the contribution of reflective debriefing on student nursing clinical judgement and the effectiveness of a structured curriculum that focused on the recognition of early patient

deterioration in a BSN program (Lavole et al., 2017; Hart et al., 2014). Years of nursing experience was not addressed in the literature except for the emphasis on nursing students and newly graduated nurses.

The scope of nursing practice referred to the professional nursing activities as defined by state law. The Nurse Practice Act (NPA) was determined by each state and provided a guide that allowed the nurse to practice safely and provide care within the laws of the state (American Nurses Association, 2015). Articles related to clinical skills that identify early deterioration of patients were occasionally focused on nurses who practiced within a specialized field such as pediatric medicine and nephrology. Each specialized area has unique scope of practice frameworks in nursing decision-making (American Nurses Association, 2015b). While the scope of nursing practice was defined by state law and the state's nursing board, each health care specialty used a varied approach based on their unique patient population (American Nurses Association, 2015a). Therefore, a nurse's scope of practice related to clinical assessment skills and critical thinking is not clearly defined in the literature search.

The literature searches and review related to nursing clinical skills or critical thinking in recognizing patient deterioration has identified the need for further study on the identification of clinical assessment skills that were needed to avoid ALF and provide early mobilization of the RRS (Jensen et al., 2017). While meta-analysis of the literature concluded that early detection of clinical decline through nursing clinical assessment skills was crucial, there was no correlation between early accurate clinical assessment and the activation of the RRS (Massey et al., 2017). There is a gap in the research related

to accurate clinical assessment skills, the early identification of patient deterioration, and the activation of the RRS.

Review and Synthesis of Studies Related to the Research Questions

The research questions for this study were:

RQ1.   What is the relationship between the nurses' clinical skill set and the decision to activate RRS, as measured by INSIGHT Health Professional Nursing Assessment tool?

RQ2.   What is the correlation between the failure to rescue and the level of competency of the clinical nurse as measured by the position on the nursing clinical ladder?

RQ3.   What is the relationship of a nurse's formal education in identifying a patient's early stages of decline using critical assessment skills as measured by the INSIGHT Health Professional Nursing Assessment tool?

RQ4.   What is the correlation between the number of years practicing as a clinical nurse with the nurse's ability to apply critical assessment in recognizing the early signs of decline of patients as measured by INSIGHT Health Professional Nursing Assessment tool?

The review of current literature did not address my research questions as they related to the analysis of nurses 'clinical assessment skills and critical thinking in recognizing early deterioration in patients and early activation of RRS services. The use of the INSIGHT Health Professional Nursing Assessment tool has not been highlighted in the literature and has not been used to help answer the research questions. A gap in the

literature had demonstrated that the research questions and problem stated were unique and need to be addressed with the study.

Summary and Conclusions

Summary of Major Themes in the Literature

The major themes that were identified in the current literature revealed a problem in the identification of patient deterioration related to nurses' clinical assessment skills and critical thinking that results in the ALF phenomenon (Audet et al., 2018). Nursing education was identified as a critical component to early RRS activation and decreasing adverse patient outcomes (Padilla et al., 2018). The Clinical Deterioration Theory (CDT) was discussed in the literature as a significant theoretical framework that emphasizes critical thinking skills were essential in identifying patient deterioration. Critical thinking skills and clinical assessment skills were best developed through education and experience (Lasko & O'Dell, 2010). The literature also discussed the use of the EWS, which is automated and provides objective, numerical scoring to identify decompensating patients. Olson et al. (2019) showed that in addition to using EWS, clear protocols, past experiences, and clinical assessment skills impact the rate of ALF and the early interventions of the RRS.

The theoretical propositions of Benner's novice-to-expert model described nurses' development of clinical competency through experience (Benner, 1982). Benner's model is frequently used in hospitals to measure the clinical competency of nurses and is a framework for describing the levels of clinical expertise based on the progressive acquisition and development of clinical skills (Pena, 2010). The use of Benner's model in

the literature provided an accurate description of nurses clinical problem-solving skills within five stages of nursing development and can be an objective scale to identify the stage of clinical competency of the bedside nurse (Haag-Heitman, 1999).

The literature showed that nurses' clinical assessment skills and critical thinking were essential to recognition of early deterioration and the activation of the RRS. Nursing education and experience were vital components of developing clinical assessment skills (Lasko & O'Dell, 2010). The literature showed that the actual clinical skills that were needed to develop early recognition were difficult to identify and define (Jensen et al., 2017). The literature also showed that the identification of early detection of clinical decline in patients was crucial, studies have not shown correlation between early, accurate clinical assessment and activation of the RRS (Massey et al., 2017).

How the Study Fills the Gap in the Literature and Extends the Knowledge of Clinical Assessments to Decrease the Afferent Limb Failure Phenomenon

The identified gap in the literature was the identification of clinical skills and necessary critical thinking of the bedside nurse to identify early deterioration in patients and requesting the RRS to the bedside for appropriate critical care interventions. Research has revealed that the clinical assessment skills related to the ALF phenomenon as well as dispatching the RRS is unclear (Jensen et al., 2018). This study analyzed specific clinical skills needed to address ALF and close the gap of identifying the appropriate clinical assessment skills needed to identify early deterioration in patients. The results of closing the ALF and clinical skills gap helped avoid patient failure to rescue episodes related to the ALF phenomenon.

Connecting the Gap in the Literature to the Research Methodology

I analyzed the clinical skills assessment gap in the ALF phenomenon by using the data provided by the INSIGHT Health Professional Nursing Assessment tool and performed a multiple regression analysis. INSIGHT Health Professional Nursing Assessment tool measured and evaluated clinical reasoning and decision-making using a multiple-choice test. The participants applied their clinical skills to written scenarios where their ability to make inferences, interpret, and analyze clinical information was scored (Walz & Jenkins, 2001). The nurses who participated in the study provided answers to the INSIGHT Health Professional Nursing Assessment tool on their critical thinking and assessment skills and an analysis of the results were provided by the INSIGHT Health Professional evaluation. The identification of important clinical assessment skills that help identify early deterioration in patients helped close the gap in the literature on failure to rescue and the ALF phenomenon.

Chapter 3: Research Design and Methodology

Introduction

The purpose of this study was to identify and measure clinical nursing assessment and critical thinking skills that influenced nurses' ability to detect deterioration in patients and to call for the RRS. The focus of the study was identifying which nursing assessment and critical thinking skills were most important in helping clinical nurses recognize unstable or deteriorating patients. The study analyzed critical thinking skills and nursing assessment of clinical floor or ward staff nurses in identifying and responding to patients with signs of clinical deterioration.

A quantitative cross-sectional approach was used to survey clinical bedside nurses who had experience with using electronic patient alert systems and calling the RRS to respond to their patients. The INSIGHT Health Professional Nursing Assessment tool assessed their self-reported ability to identify their patients who showed early signs of decompensation. A multiple regression analysis was conducted to evaluate the clinical nurses' critical thinking and clinical assessment skills expertise, as well as to measure and evaluate both inductive and deductive reasoning of health sciences professionals (Facione et al., 2010). The INSIGHT Health Professional Nursing Assessment tool was used to assess cognitive processes, level of critical thinking, and assessment skills related to evaluating patient deterioration.

Chapter 3 Section Preview

In the first section of Chapter 3, I discuss the research study design and rationale. The dependent and independent variables are reviewed, along with the research design as

it relates to the research questions. Resource and time constraints are explored and correlated with the research design choice. The design choice is explained and compared to the research design needed to advance the research questions.

The second section begins with a discussion of the methodology by defining the target population and size. Sampling and sampling procedures are outlined to include identification of the sampling strategy and explanation of the procedure for sampling. The inclusion and exclusion criteria of the sample population are discussed.

A power analysis was conducted to determine the appropriate sample size for the study. My power analysis was developed using the statistical clinical sample size tool ClinCalc Sample Size Calculator (Clincalc, 2020) and Creative Research Systems' Sample Size Calculator (Creative Research Systems, 2020). The study group design was one study cohort of nurses compared to the known values published in previous studies or literature. The sample size of the known population of 150 nurses was 35 nurses. The primary endpoint was an average and not dichotomous. Included in the power analysis was a justification for the effect size, alpha level, and power level chosen.

Procedures for recruitment, participation, and data collection are discussed. A thorough description of the recruiting procedures as well as the demographic information is presented. The procedures used for obtaining informed consent are described, along with how the data were collected.

The use of the INSIGHT Health Professional Nursing Assessment tool is analyzed, addressing the basis for the development of the tool for the study. The INSIGHT tool is also analyzed to show the instrument's evidence of reliability and

evidence of validity. The study methodology established the sufficiency of instrumentation of the INSIGHT tool to answer the research questions.

For each variable in the study, its variable term is defined. The units of measurement for the variables are addressed, along with what the scores represent and how the scores were calculated. Examples of the variables are described.

The data analysis plan used a multiple regression analysis of the activation of the RRS as a dependent variable based on the values of the nurses' clinical assessment skills, critical thinking skills, and years or nursing practice in their current unit, which were the study's independent variables. The multiple regression study predicted the activation of the RRT based on the clinical assessment skills, critical thinking skills, and years of practice in current units of the nurse participants. The INSIGHT Health Professional Nursing Assessment tools gathered data from the online evaluations and evaluated the answers provided by the participants. The INSIGHT evaluation was used to test the study hypothesis.

The third section of Chapter 3 addresses threats to validity. Threats to external validity include interaction of variables, specificity of variables, and multiple treatment inferences. Threats to internal validity are also discussed. The threat assessment includes threats such as testing instrumentation, statistical regression, and experimental mortality. Additionally, threats to the statistical conclusions are addressed.

Finally, ethical procedures and considerations of the study are described and addressed. The ethical considerations included conflicts of interest, power differentials, and justifications for using or not using incentives. Included in the ethical procedures was

an analysis of the treatment of the data, who had access to it, and when the data would be destroyed. The treatment of the study data and data confidentiality were reviewed by myself, my committee, and the IRBs involved in the study site.

<div align="center">**Research Design and Rationale**</div>

Study Dependent and Independent Variables

The key study variables included nurses' years of nursing practice on their current unit, clinical nursing assessment, and critical thinking skills as independent variables and the decision to activate the RRS services for patients as a dependent variable. Independent variables also served as covariates as they were the characteristics of the participants, which could be used to determine the nurses' recognition of patient deterioration and calling the RRS (Warner, 2013). There were no moderating variables in this study.

Research Design and Connection to the Research Questions

A quantitative cross-sectional approach was used to survey clinical bedside nurses who had experience with using electronic patient alert systems and calling the RRS to respond to their patients. The INSIGHT Health Professional nursing assessment tool assessed nurses' self-reported ability to identify their patients who showed early signs of decompensation. A multiple regression analysis was conducted to evaluate clinical nurses' critical thinking and clinical assessment skills expertise and to measure, analyze, draw inferences regarding, and evaluate both inductive and deductive reasoning of health sciences professionals (Facione et al., 2010). The INSIGHT Health Professional nursing

assessment tool was used to assess cognitive processes, level of critical thinking, and assessment skills related to evaluating patient deterioration.

The design of the INSIGHT Health Professional Nursing Assessment tool provides two areas of clinical analysis testing for nurses: Health Professional Mindset and Health Professional Reasoning Skills. The Health Professional Mindset includes metrics on truth seeking, open mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity of judgement (Insight Assessment, 2017). The Health Professional Reasoning Skills section includes metrics on overall reasoning skills, with specific indicators that include analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy (Insight Assessment, 2017). The Health Professional Reasoning Skills section uses clinical-related scenarios to evaluate skills needed for analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy of clinical situations (Insight Assessment, 2017).

The INSIGHT Health Professional Nursing Assessment tool provided essential information to help answer the study research questions:

RQ1. What is the relationship between the nurses' clinical skill set and the decision to activate RRS, as measured by INSIGHT Health Professional Nursing Assessment tool?

RQ2. What is the correlation between the failure to rescue and the level of competency of the clinical nurse as measured by the position on the nursing clinical ladder?

RQ3. What is the relationship of a nurse's formal education in identifying a

patient's early stages of decline using critical assessment skills as

measured by the INSIGHT Health Professional Nursing Assessment tool?

RQ4. What is the correlation between the number of years practicing as a

clinical nurse with the nurse's ability to apply critical assessment in

recognizing the early signs of decline of patients as measured by the

INSIGHT Health Professional Nursing Assessment tool?

Research Time and Resource Constraints Related to the Research Design

The study research time was limited only to the completion of administration of

the INSIGHT Health Professional Nursing Assessment tool and completing the analysis

of the appropriate sample size. The INSIGHT Health Professional Nursing Assessment

tool was used to collect the data, and an analytical summary was prepared by the

INSIGHT Health Professional administrators (Insight Assessment, 2017). The

participants were also asked demographic information within the INSIGHT Health

Professional Nursing Assessment tool about their practice years as a nurse, practice years

on the floor, clinical ladder designation, specialty area, and confidence in identifying

deteriorating patients, as well as whether they had utilized the RRS during their

employment at the health care facility. The approval processes of the Walden University

and research site IRBs required time to be completed. Coordination between these two

institutions took time for the research project to be approved, and the collection of data

did not occur until the approval process had been completed. The time to administer and

analyze the results of the study was anticipated to be approximately 12 weeks.

The main resource constraint related to the research design was the cost of the INSIGHT Health Professional Nursing Assessment tool license. The cost per license required payment for both sections of the assessment as well, which I paid. The study required that any clinical assessment tool be a well-established and reliable instrument. The INSIGHT Health Professional Nursing Assessment tool has been used extensively to measure clinical assessment skills in health care professionals and was an excellent measurement tool to use for the study (Facione, 1988).

Enlisting the study participants did not pose a constraint on the study as there were many full-time nurses who were available. Providing a randomized participant sample did not pose a challenge, and there were many diverse units and nurses with varying levels of nursing experience, time working on current units, as well as a variety of experiences with using the RRS. Full-time inpatient nurses were used, and ICU nurses were excluded from the study. There were no other anticipated research time or resource constraints.

Design Choice and Advancement of Research Knowledge

In this study, a multiple regression analysis was conducted to evaluate clinical nurses' critical thinking and clinical assessment skills. The study evaluated the nurses' expertise in clinical reasoning and measured, analyze inferences, and evaluated both inductive and deductive reasoning (Facione et al., 2010). The key study variables included years of nursing practice, clinical nursing assessment, and critical thinking skills as independent variables and the decision to activate the RRS services for patients as a dependent variable. The multiple regression research design was a flexible statistical

method that analyzed associations between two or more independent variables and a single dependent variable. The multiple regression statistical strategy involved an assumption that there is a linear relationship between the independent and dependent variable (Osborne, 2000). The INSIGHT Health Professional Nursing Assessment tool was used to assess cognitive processes, level of critical thinking, and assessment skills related to evaluating patient deterioration. The design choice involved an analysis of the associations of each individual independent variable with the decision to activate the RRS. The results of this study add to the advancement of knowledge related to the clinical assessment skills needed to identify early deterioration in patients and activating the RRS.

Methodology

Population

The target population for this study was full-time registered clinical nurses who practiced on inpatient general and progressive floors. The majority of the clinical nurses held a BSN, with a minority holding an ADN. The clinical nurses were familiar with the RRS and the service that the RRS delivers to bedside nurses and their patients. The clinical nurses had varying degrees of nursing experience and were classified on the organization's nursing clinical ladder. ICU and advanced practice nurses were not included in the study population. A power analysis was conducted to determine the size of the study's target population.

Sampling and Sampling Procedures

The types of sampling for probability strategies include simple random sampling, systematic sampling, stratified random sampling, and cluster sampling. In probability sampling, members of the subject population have an equal opportunity to be selected as a representative sample. The types of nonprobability sampling include convenience sampling and quota sampling. Nonprobability sampling is a sampling method where it is not known which individual from the population is selected for the test sample (El-Masri, 2017b).

The sampling technique that was used for this study was the nonprobability sampling technique of convenience sampling. Convenience sampling involved recruiting nurses for the study based on their availability. Selection bias cannot be fully eliminated; however, bias can be minimized by ensuring that the sample shows the attributes of the overall population (El-Masri, 2017a).

Sample Size Power Analysis

My power analysis was developed using the statistical clinical sample size tool ClinCalc Sample Size Calculator (Clincalc, 2020) and Creative Research Systems' Sample Size Calculator (Creative Research Systems, 2020). The study group design involved one study cohort of nurses compared to the known values published in previous studies or literature. The primary endpoint was an average and not dichotomous. The sample size of the known population of 150 nurses was 35 nurses with an Alpha (α) or probability of type I error at 0.05 or 5% chance that a significant difference was due to chance and not a true difference (Clincalc, 2020). The Beta (β) or probability of a type II

was 0.2. Most medical studies use 0.2 or 20%, which indicates a 20% chance that a significant difference was missed. The power is 0.8 (1-β). The confidence interval (CI) for the study was 15.59 for a confidence level (CL) of 95% with the sample size of 35 from a study population of 250 clinical nurses.

Procedures for Recruitment, Participation, and Data Collection

The procedures for recruitment included using convenience sampling to recruit nurses from inpatient units including medicine, surgical, neurology, orthopedic, cardiology, and transplant floors. Recruitment was done from the available staff for the first 35 nurses who agreed to participate at the time of the study implementation. The staff who were conveniently available to participate in this study were given a briefing by me on the study's purpose, research questions, and hypothesis (El-Masri, 2017a). Prior to the administration of the INSIGHT Health Professional Nursing Assessment tool, each participant was briefed on the INSIGHT tool and the purpose of the assessment. A statement was also read that stated that the assessment was voluntary and that the results were confidential. Participation in the analysis did not affect any part of any nurse's evaluation or impact nurses' employment at the facility. The nursing clinical coordinator, clinician, or nurse manager was asked to randomly provide participant identification numbers to the clinical nurses after the nurses agreed to participate.

The participants were also be asked to complete the demographic information section within the INSIGHT Health Professional Nursing Assessment tool. The INSIGHT Health Professional Nursing Assessment Tool provided a section to place 10 demographic questions to obtain data from the participants (Insight Assessment, 2017).

The demographic section of the INSIGHT Health Professional Nursing Assessment tool had seven questions about the participants' clinical ladder designation, age, gender, years of practice, years working in their unit, educational level, and number of times that the RRS was called to a patient's bedside. The demographic questions were custom made for the participants of this study and were gathered at the beginning of the INSIGHT test.

The INSIGHT Health Professional Nursing Assessment tool was administered online using a license provided by the researcher. The participation number was part of the INSIGHT Health Profession Nursing Assessment tool identifier. The INSIGHT tool can then be correlated with the demographic data of each participant participating in the study. As noted earlier, the INSIGHT Health Professional Nursing Assessment tool provides two areas of clinical analysis testing for nurses: The Health Professional Mindset and the Health Professional Reasoning Skills. The Health Professional Mindset included metrics on truth seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity of judgement (Insight Assessment, 2017). The Health Professional Reasoning Skills section included metrics on overall reasoning skills with specific indicators that include analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy (Insight Assessment, 2017). The Health Professional Reasoning Skills section uses clinical related scenarios to evaluate skills needed for analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy of clinical situations (Insight Assessment, 2017).

The participant received written instructions on how to access the INSIGHT tool online and how to complete each section. The Health Professional Mindset took 30

minutes and is in an *agree-disagree* format and contains 75 items. The Health

Professional Reasoning Skills will take 55 minutes and was in a *scenario-based multiple-choice question* format that contains 38 items. The nurse completed the INSIGHT tool

which was automatically submitted electronically to the INSIGHT test administrators

upon completion. The INSIGHT tool was analyzed by the INSIGHT administrators with

the results being sent to myself. The reasoning skill metrics was reported in four

categories: Superior, Strong, Moderate, and Not Manifested. The results of the INSIGHT

tool were sent to the researcher through email (Insight Assessment, 2017).

INSIGHT analysists provided test results that included data analysis commentary

and graphs to me. The INSIGHT Health Professional Nursing Assessment tool test

results was compared and correlated with the demographic information to identify

clinical assessment skills that helped identify deteriorating patients and activating the

RRS. The study results were used to add to the literature gap identifying important

clinical assessment skills that help identify early deterioration in patients, the failure to

rescue, and the ALF phenomenon.

The study was approved by Walden University's IRB as well as the research

site's IRB. The description of the study was repeated as well as the steps involved in

participation, and additional information about anonymity, that participation was

voluntary, they may withdraw at any time, and that there was no impact to employment,

personal performance evaluations, or other work-related aspects. Additionally, the

participants were told that they will not share patient information. The participants were

also informed about the collection of the information and how the results were used.

Instrumentation and Operationalization of Constructs

The instrumentation used for assessing the clinical assessment skills of the participants was the INSIGHT Health Professional Nursing Assessment tool provided by Insight Assessment, San Jose, CA, for which I had permission to use (Appendix A). The design of the INSIGHT Health Professional Nursing Assessment tool provided two areas of clinical analysis testing for nurses: The Health Professional Mindset and the Health Professional Reasoning Skills (Appendix B). The Health Professional Mindset included metrics on truth seeking, open-mindedness, analyticity, systematicity, confidence in reasoning, inquisitiveness, and maturity of judgement (Insight Assessment, 2017). The Health Professional Reasoning Skills section included metrics on overall reasoning skills with specific indicators that include analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy (Insight Assessment, 2017). The Health Professional Reasoning Skills section used clinical related scenarios to evaluate skills needed for analysis, interpretation, inference, evaluation, explanation, induction, deduction, and numeracy of clinical situations (Insight Assessment, 2017). The INSIGHT Health Professional Nursing Assessment tool assessed nine key clinical reasoning skills of nurses through the Mindset and Reasoning Skills sections (Insight Assessment, 2017).

The use of the INSIGHT Health Professional Nursing Assessment tool required the purchase of a license for each test. There was no other permission that was needed for the use of the INSIGHT Health Professional Nursing Assessment tool. The researcher had purchased 35 licenses of the INSIGHT Health Professional Nursing Assessment tool to be used in the study.

The INSIGHT Health Professional Nursing Assessment tool was an updated analytical tool that is based on the Health Sciences Reasoning Test (HSRT) and the California Critical Thinking Disposition Inventory (CCTDI). The HSRT was used in health care institutions to assess an individual's reasoning skills in clinical and professional practice contexts (Facione, 1988). The CCTDI sought to define open-mindedness, analyticity, cognitive maturity, truth-seeking, systematicity, inquisitiveness, and self-confidence (Facione, Facione, & Sanchez, 1994). Wangensteen et al. (2010) examined critical thinking in nursing graduates using the CCTDI and HSRT tests. The results of the research showed that nurse leaders and nurse educators play a significant role in nurturing critical thinking skills and guiding nurses toward research (Wangensteen et al., 2010).

Huhn et al. (2011) studied the HSRT to determine if the test could discriminate between expert and novice critical thinking skills of physical therapists. Experts (n = 73) showed a higher HSRT score (mean 2406, SD 3.92), with a statistical significance t (148) – 2.67, p = 0.008. The HSRT total scores discriminated between expert and novice critical thinking skills performance (Huhn et al., 2011). The INSIGHT Health Professional Nursing Assessment tool also showed a strong internal validity with a minimum alpha of 0.80 for attribute measures and a minimum Kuder-Richardson (KR) - 20 of .72 for skills measures. The overall scores maintained the discrimination between expert and novice critical thinking skills of physical therapists in all samples of adequate variance (Insight Assessment, 2017).

Abrami et al. (2008) conducted a meta-analysis of 117 studies involving 20,298 participants on the positive impact of critical thinking. The results of the meta-analysis showed that critical thinking skills were not implicit expectations of a job or role but must be developed through effective training and development (Abrami et al., 2008). The meta-analysis had an average positive effect size of 0.341 and a standard deviation of 0.610 with critical thinking effect size fluctuations related to the type of instructional intervention and pedagogy applied (Abrami et al, 2008). The conceptualization of critical thinking used in the Abrami research was the same construct as the INSIGHT Health Professional Nursing Assessment tool as well as the INSIGHT assessments and measurements.

The INSIGHT Health Professional Nursing Assessment tool user manual had a resources section which lists recent and on-going studies on critical thinking skills and validation methods (Insight Assessment, 2017). Hunter, Pitt, Croce, and Roche (2013) investigated the critical thinking skills of undergraduate nurses to determine critical thinking predicting factors. Critical thinking data was collected using the HSRT which was the predecessor of the INSIGHT Health Professional Nursing Assessment tool. A linear regression analysis was performed on the collected data for a year. The results showed that nursing experience predicted higher scores (p< 0.001) and that age and gender were not predictors (Hunter et al., 2013).

Manipulation of the Independent Variable

The study used a multiple regression analysis of the activation of the RRS as a dependent variable and the nurses' clinical assessment skills, critical thinking skills and

years of practice on their current unit were the study's independent variables. The INSIGHT Health Professional Nursing Assessment tool was used to gather the independent variables through demographic data and the administration of the Health Professional Mindset and the Health Professionals Reasoning Skills tests (Insight Assessment 2017).

Insight Assessment was established by Dr. Peter Facione in 1986 when he demonstrated that a set of critical thinking skills tests could address an individual's reasoning skills to reflectively judge what the individual would believe or do in a problematic situation (Facione, 1988). The establishment of critical thinking skills test were established by Dr. Facione based on the Delphi Expert Consensus Definition of Critical Thinking (Facione, 1988). Senior research staff and associates at Insight Assessment have been engaged in ongoing empirical and conceptual analysis of reasoning for decades and have demonstrated that critical thinking can defined, learned, taught, and accurately measured (Huhn et al., 2011). The INSIGHT Health Professional Nursing Assessment tool was developed to provide researchers with the analytical tool needed to evaluate clinical reasoning and critical thinking of health care professionals. The INSIGHT Health Professional Nursing Assessment tool has been widely used individually and was the core component of the California Critical Thinking Skills Test (CCTST), California Critical Thinking Disposition Inventory (CCTDI) as well as the Health Science Reasoning Test (HSRT). Insight is a world leader in reasoning skills and mindset assessment with thousands of customers worldwide (Huhn et. al., 2011; Wangensteen et al., 2011; Waltz & Jenkins, 2001).

Data Analysis Plan

The software that was used for the study is the INSIGHT Health Professional Nursing Assessment tool. As discussed earlier, the Health Professional Mindset took about 30 minutes to complete and is in a *agree-disagree* format that contains 75 items. The Health Professional Reasoning Skills took about 50 minutes and was a *scenario-based multiple-choice question* format that contained 38 items. The participant completed the INSIGHT tool and submitted it to the INSIGHT test administrators as a part of the online INSIGHT test. The INSIGHT tool was analyzed by the INSIGHT administrators with the results being sent to me. The reasoning skill metrics was reported in four categories: Superior, Strong, Moderate, and Not Manifested. The results of the INSIGHT tool were sent to the researcher through email (Insight Assessment, 2017).

The INSIGHT Health Professional Nursing Assessment tool addressed the research questions and hypothesis for this study:

RQ1.   What is the relationship between the nurses' clinical skill set and the decision to activate RRS, as measured by INSIGHT Health Professional Nursing Assessment tool?

RQ2.   What is the correlation between the failure to rescue and the level of competency of the clinical nurse as measured by the position on the nursing clinical ladder?

RQ3.   What is the relationship of a nurse's formal education in identifying a patient's early stages of decline using critical assessment skills as measured by the INSIGHT Health Professional Nursing Assessment tool?

RQ4.   What is the correlation between the number of years practicing as a

clinical nurse with the nurse's ability to apply critical assessment in

recognizing the early signs of decline of patients as measured by the

INSIGHT Health Professional Nursing Assessment tool?

For this study, the null hypothesis was the following: A clinical nurse's education and clinical skills or critical thinking does not affect the recognition of patient deterioration and the early intervention of RRS. The alternative hypothesis for this study was as follows: A clinical nurse's education and clinical skills or critical thinking affect the recognition of patient deterioration and the early intervention of RRS.

The use of the INSIGHT Health Professional Nursing Assessment tool provided specific indicators of clinical assessment, critical thinking, and professional reasoning skills of nurses needed to make clinical decisions on the activation of the early activation of the RRS due to patient deterioration. The INSIGHT tool provided the specific indicators that analyze, interprets, evaluates, and explains the nurse participant's clinical assessment skills (Insight Assessment, 2017). The demographic section of the INSIGHT Health Professional Nursing Assessment tool had a demographic section provided information about the participant's clinical ladder designation, age, gender, years of practice, years working in their unit, if the participant is educationally prepared with a AND or BSN, and the number times that the RRS was called to a patient's bedside. The study's demographic data was correlated with the clinical assessment skills and critical thinking provided by the INSIGHT Health Professional Nursing Assessment tool to help

identify the clinical assessment skills and critical thinking needed to identify deteriorating patients and early activation of the RRS.

The data collected by the INSIGHT Health Professional Nursing Assessment tool was supplied to me and I analyzed the data. The independent variables of years of nursing practice, clinical nursing assessment and critical thinking skills was used to predict the dependent variable which was the decision to activate the RRS. Using multiple regression research, I analyzed the associations between my independent and dependent variable in order to answer my research questions and determine if my null hypothesis is supported or rejected.

Threats to Validity

Validity is the ability of the research or research instrument to accurately measure the study concept (Wood et al., 2006). The INSIGHT Health Professional Nursing Assessment tool as well as previous versions of the HSRT and the CCTST have been well utilized as a research tool in the analysis of clinical assessment skills (Huhn et. al., 2011; Wangensteen et al., 2011; Waltz & Jenkins, 2001). However, there were aspects of the study that threaten the external and internal validity of the research.

Threats to External Validity

External validity is the degree that the results of an investigation can be generalized across individuals, times, and settings. External validity threats sway the researcher's confidence in stating that the results of the study were applicable to other groups. External validity is divided into population and ecological validity (Kimberlin & Winterstein, 2008). The first threat to external validity is the interaction between the

participants. The participant composition is from various specialties such as medicine, surgery, neurology, or other inpatient health care workers. Also, there was different levels of experience, training, and other demographic factors. The participants were affected differently by the study based on their individual demographics and workplace situations.

The second threat to external validity in multiple treatment interference. The INSIGHT Health Professional Nursing Assessment tool had two parts: The Health Professional Mindset and the Health Professional Reasoning Skills (Insight Assessment, 2017). The multiple treatment inference threat was that as multiple treatments were given to the same subjects, it is difficult to control for the effects from the previous treatment (McGonigle, Rojahn, Dixon & Strain, 1987). The two parts of the INSIGHT Health Professional Nursing Assessment tool ask questions that were unrelated and do not repeat the same topics. Because the tests were incongruent, there were no multiple treatment inference.

The third threat to external validity is the interaction effects of selection bias. The participants were selected anonymously and through the non-probability sampling technique of convenience sampling. Convenience sampling involved recruiting nurses for the study based on their availability. Selection bias cannot be fully eliminated; however, bias can be minimized by ensuring the sample showed the attributes of the overall population (El-Masri, 2017a).

Threats to Internal Validity

Threats to internal validity compromise the researcher's confidence that a relationship existed between the dependent and independent variables (Kimberlin &

Winterstein, 2008). The study variables included the years of nursing practice on their current unit, clinical nursing assessment and critical thinking skills as independent variables and the decision to activate the RRS for their patients as a dependent variable. If there was a high degree of internal validity then there was strong evidence of causality or that a change in one variable may be associated with another variable because they were both affected by the same cause (Dawid, Musio, & Fienberg, 2016). Threats to internal validity produced uncertainty that a relationship exists between the independent and dependent variables.

The threat of maturation to internal validity is a possible concern due to the length of each portion of the online testing. The Health Professional Mindset took 30 minutes to complete and is in a *agree-disagree* format that contains 75 items. The Health Professional Reasoning Skills will take 55 minutes and is in a *scenario-based multiple-choice question* format that contains 38 items. The total time for both parts of the assessment was 55 minutes which might cause fatigue. Each portion of the online testing is individual but were required to be taken at one time. at one time. Instructions was given to the participants that they needed to complete the online testing in one sitting.

Another threat to internal validity was the threat of history. The threat of history occurred when an unanticipated event occurred during the administration of the test and that event affects the dependent variable (Dawid, Musio, & Fienberg, 2016). The online INSIGHT testing was not designed in an experimental format with a pre-test and post-test scenario. Unanticipated events did not affect the validity of the INSIGHT Health Professional Nursing Assessment tool.

Instrumentation and design contamination were additional threats to internal validity. Providing clear, standardized instructions about taking the INSIGHT Health Professional Nursing Assessment tool to all participants prior to taking the tests helped reduce the threat of instrumentation. Design contamination occurred when participants collaborate about the INSIGHT Health Professional Nursing Assessment tool design or assessment questions with other participants whom have not taken the assessment. The INSIGHT Health Professional Nursing Assessment tool was taken online and only once. Each question was answered individually by the participant based on their own personal experiences; therefore, design contamination was not be an internal validity threat.

Because the INSIGHT Health Professional Nursing Assessment tool was a well-established test of clinical assessment skills and based on the previous HSRT and CCTST (Huhn et. al., 2011; Wangensteen et al., 2011; Waltz & Jenkins, 2001), there was no threat to construct validity. The INSIGHT Health Professional Nursing Assessment tool was specific in its testing domains and methods (Appendix B). The test measured clinical assessment skill and nursing mindset.

The statistical conclusion validity of the INSIGHT Health Professional Nursing Assessment tool was high, based on the previous application of the tool in research (Huhn et. al., 2011; Wangensteen et al., 2011; Waltz & Jenkins, 2001). The HSRT, CCTST, and CCTDI have all been used to measure clinical mindset and assessment of clinical skills and critical thinking. The INSIGHT Health Professional Nursing Assessment tool was the most updated version of the clinical assessment tool used by INSIGHT Assessment. The conclusions about the relationship between the variables

based on the data received by the INSIGHT Health Professional Nursing Assessment tool were correct and answer the research questions asked in the study.

Ethical Procedures

The procedures for recruitment included using convenience sampling to recruit nurses from inpatient units including medicine, surgical, neurology, cardiology, orthopedics, and transplant floors. The test site IRB approved the study and the individual agreements for the participants was obtained by me. Recruitment was done from the available staff for the first 35 nurses who agree to participate at the time of the study implementation. The staff who were conveniently available to participate in this study was given a briefing by me on the study's purpose, research questions and hypothesis (El-Masri, 2017a). Prior to the administration of the INSIGHT Health Professional Nursing Assessment tool, each participant was briefed on the INSIGHT tool and the purpose of the assessment. A statement was also be read that the assessment was voluntary and that the results were confidential. The participation in the analysis was not be a part of any nurse's evaluation or impact their employment at the facility. The nursing clinical coordinator, clinician, or nurse manager was asked to randomly provide a participant identification number to the clinical nurses after the nurses agree to participate. Any participant could have refused to be a part of the study at any time. The participation involved completing the two portions if the INSIGHT Health Professional Nursing Assessment tool. Individuals who did not wish to complete the tool were removed from the study, and their data was removed from the study. The license for the

test was transferred to another participant. The data from the participant who has decided to not complete the tool was erased by the Insight administrators.

The Institutional Review Board (IRB) placed the study as an expedited research Category 7 which states: " *Research on individual or group characteristics or behavior (including but not limited to research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation or quality assurance methodologies*" (Office of Vice President for Research and Innovation website, 2020).   The IRB provides guidance on the treatment, screening and recruitment of study participants (VCU Integrity & Compliance Office-Policy Program website, 2017). The Research Data Ownership, Retention, Access, and Security policy is found in Appendix C. Included in the guidance was the confidentiality and availability requirements of the data, data custodianship, the role of the data custodian, and the policy specifics and procedures related to the acquisition of the research data (Appendix C). The identification of screening activities of human subjects is shown in Appendix D. The algorithm asks if the screening activity involves obtaining (accessing, using, studying, or analyzing) information about living individuals. As long as the information is not individually identifiable, the screening of the study is not research involving human subjects (VCU Human Research website, 2020).

IRB approvals from Walden University and VCU Health System was completed in about two months. INSIGHT administrators have previously worked with IRBs in health care institutions and were familiar with the policies and protections of participants.

INSIGHT administrators worked with me as well as the IRB representatives at both

Walden University and VCU Health System to assist in the approval of the study from

both institutions.

As stated earlier in this document, the procedures for recruitment included using

convenience sampling to recruit nurses from inpatient units including medicine, surgical,

neurology, cardiology, orthopedic, and transplant floors. Recruitment was done from the

available staff for the first 35 nurses who agree to participate at the time of the study

implementation. The staff who were conveniently available to participate in this study

was given a briefing by me on the study's purpose, research questions and hypothesis

(El-Masri, 2017a). Prior to the administration of the INSIGHT Health Professional

Nursing Assessment tool, each participant was briefed on the INSIGHT tool and the

purpose of the assessment. A statement was also read that the assessment was voluntary

and that the results were confidential. The participation in the analysis was not be a part

of any nurse's evaluation or impact their employment at the facility. The nursing clinical

coordinator, clinician, or nurse manager was asked to randomly provide a participant

packet to the clinical nurses after the nurses agree to participate.

Data collection was individual and anonymous. All participants submitted their

answers individually and online without providing identifying information other than a

participation number provided by the INSIGHT administrators. INSIGHT provided the

results of the INSIGHT Health Professional Nursing Assessment tool without providing

any identifiable information about the participants other than the demographic

information that asked for the participant's clinical ladder designation, age, gender, years

of practice, years working in their unit, the nurse's educational level, and the number times that the RRS was called to a patient's bedside. The results of the study were sent to me and I used the analysis to complete the study. No other outside individuals, institutions, or entities had access to this data. Since the data does not identify the participants, the protection of confidential information is not needed. The information was archived at the end of the study for review by future researchers who wish to expand on this study.

There was no other conflicts of interest or power differentials in this study. The participants received a small gift card in exchange for their time in completing this study. The gift card was presented after the INSIGHT Health Professional Nursing Assessment tool is completed by each individual. The gift card was given as a token of gratitude for taking the time to complete the INSIGHT Health Professional Nursing Assessment tool.

Summary

The design of the study was a multiple regression analysis that was conducted evaluating clinical nurses' critical thinking and clinical assessment skills. The study evaluated the nurse's expertise in clinical reasoning and also measured, analyze, and evaluated both clinical reasoning and mindset (Facione et al., 2010). The key study variables included the years of nursing practice, clinical nursing assessment and critical thinking skills, as independent variables and the decision to activate the RRS services for their patients as a dependent variable. The multiple regression research design was a flexible statistical method that analyzed associations between two or more independent variables and a single dependent variable. The INSIGHT Health Professional Nursing

Assessment tool was used to assess cognitive processes, level of critical thinking, and assessment skills related to evaluating patient deterioration. The design choice analyzed the associations of each individual independent variable with the decision to activate the RRS. The results of this study added to the advancement knowledge related to necessary clinical assessment skills needed to identify early deterioration in patients and activating the RRS.

The target population of the study were full-time registered clinical nurses who practice on inpatient general and progressive floors. The majority of the clinical nurses hold a Bachelor of Science in Nursing (BSN) with a minority holding an Associate degree in Nursing (AND) and Master of Science in Nursing (MSN). The clinical nurses were familiar with the RRS and the service that the RRS delivered to bedside nurses and their patients. The clinical nurses have varying degrees of nursing experience and were classified on the organization's nursing clinical ladder. ICU and advanced practice nurses were not included in the study population. A power analysis was conducted to determine the size of the study target population.

Chapter 4 described the data collection including baseline descriptives and demographic characteristics of the participants. The study treatment, challenges, implementation and interventions were described in detail. The results of the study were also be discussed. The statistical assumptions, analysis findings, and results related to the study research questions and the hypothesis. Tables and figures were presented to illustrate the results of the study.

Chapter 4: Results

Introduction

The purpose of the study was to identify and measure clinical nursing assessment and critical thinking skills that influence the nurse's ability to detect deterioration in patients and to call for the RRS. The focus of the study was identifying which nursing assessment and critical thinking skills were most important in helping clinical nurses recognize unstable or deteriorating patients. I analyzed the critical thinking skills and nursing assessment of clinical floor or ward staff nurses in identifying and responding to patients exhibiting signs of clinical deterioration.

The research questions for the study were the following:

RQ1. What is the relationship between the nurses' clinical skill set and the decision to activate RRS, as measured by INSIGHT Health Professional Nursing Assessment tool?

RQ2. What is the correlation between the failure to rescue and the level of competency of the clinical nurse as measured by the position on the nursing clinical ladder?

RQ3. What is the relationship of a nurse's formal education in identifying a patient's early stages of decline using critical assessment skills as measured by the INSIGHT Health Professional Nursing Assessment tool?

RQ4. What is the correlation between the number of years practicing as a clinical nurse with the nurse's ability to apply critical assessment in

recognizing the early signs of decline of patients as measured by the

INSIGHT Health Professional Nursing Assessment tool?

For this study, the null hypothesis was as follows: A clinical nurse's education and clinical skills or critical thinking do not affect the recognition of patient deterioration and the early intervention of RRS. The alternative hypothesis for this study was the following: A clinical nurse's education and clinical skills or critical thinking affect the recognition of patient deterioration and the early intervention of RRS.

Chapter 4 Section Preview

Chapter 4 begins with a description of the data collection time frame as well as the recruitment and response rates. Discrepancies in data collection from the study plan presented in Chapter 3 are highlighted. The baseline descriptive and demographic characteristics of the sample are discussed.

The representation of the sample is discussed as it compared to the larger population and how the inclusion of the covariates was used in the study. Challenges encountered during study implementation are discussed, along with problems encountered that prevented the planned implementation. Adverse events are discussed as they related to the implementation.

The results of the study are analyzed using descriptive statistics and statistical assumptions. The research questions are evaluated using the results of the study's statistical analysis using exact statistics and associated probability values. Included in the analysis are confidence intervals and effect sizes, along with the results of post hoc

analyses. Additional statistical tests that emerged from the analyses of the hypotheses are reported. Tables and figures are used to illustrate the results of the study.

Data Collection

Recruitment and Response

The data for the study were collected over a 2-week period. The survey packets were distributed by convenience sampling with a return date requested in the participant information letter (Appendix E). The sample size of 35 was not achieved by the desired date, so the time for data collection was extended by an additional week. Several additional packets were sent out to the participants to achieve my goal of 35 participants. The result was an increase of participants to 37. The only discrepancy that occurred was during the IRB review, where the role of Walden University needed to be specified as a contributing IRB because the study site would have the primary IRB. The IRB at Walden University required a statement on the application acknowledging that Walden University was not involved in the data collection but would be overseeing the data analysis phase. Once the role of the Walden University IRB had been clearly stated, both the site IRB and the Walden University IRB approved the application and supporting materials.

Descriptive and Demographic Characteristics of the Sample

Demographic characteristics for which data were gathered from the study population included age, gender, position on the nursing clinical ladder, years practicing as a nurse, years practicing on the current unit, current nursing educational level, and how many times the individual had called the RRS. Participants' names were not obtained, and only non identifying characteristics were used in the study demographics. Nurses

were recruited by their unit clinical coordinators on a volunteer basis. The units that were represented included medicine, neurology, cardiology, trauma/surgery, transplant, and oncology floors.

Sample Population and Its Proportion to the Larger Population

The sample used in the study was a cross-section of the general nursing staff found on inpatient floors of the study site. The demographic data provided the characteristics of the participants, which showed that there was a range of ages, classifications, experience, and education that represented the general population of nurses at the study facility. The demographic questions asked of participants were as follows:

1. What is your age?

2. What is your gender?

3. What is your clinical ladder designation?

4. How many years have you practiced as a nurse?

5. How many years have you worked on your unit?

6. What is your current nursing education level?

7. How many times have you called RRS?

Answers to the demographic questions provided a range of participant characteristics, allowing the inclusion of data on age, gender, experience, and education in the analysis of the mindset and clinical reasoning assessment surveys.

Treatment and/or Intervention Fidelity

The study was administered as planned. The only challenge that was encountered was the COVID-19 pandemic and the test site's change in research priorities that were directly related to IRB review and approval of research studies. The approval process was paused during the IRB approval phase while the test site reviewed all research applications. COVID-19 research studies were given first priority, and all other study requests were put on hold. The study took 2 months to be granted final approval from the host site. No other challenges occurred during the administration of the study, and there were not any adverse events related to the implementation of the study or the survey that was administered.

Results

Descriptive Statistics

The sample population included participants who were registered clinical nurses who practiced on inpatient floors. The majority of the clinical nurses held a BSN, with a minority holding an ADN. Several participants also held an MSN degree. The clinical nurses were familiar with the RRS and the service that the RRS delivers to bedside nurses and their patients. The clinical nurses had varying degrees of nursing experience and were classified on the organization's nursing clinical ladder. ICU and advanced practice nurses were not included in the study population.

The majority of the nurses were 20-30 years old. Only three nurses were older than 41 years of age (Table 1).

Table 1

Age

What is your age?	Freq.	Percent	Cum.
20-25	12	32.43	32.43
26-30	12	32.43	64.86
31-40	10	27.03	91.89
41-50	1	2.70	94.59
Over 50	2	5.41	100.00
Total	37	100.00	

The participants were predominantly female, with 8% of the sample being male

(Table 2)

Table 2

Gender

What is your gender?	Freq.	Percent	Cum.
Female	34	91.89	91.89
Male	3	8.11	100.00
Total	37	100.00	

The participants were predominantly classified as Clinical Nurse 1 (CN-1) or

Clinical Nurse 2 (CN-2), with 8% classified as either Clinical Nurse 3 (CN-3) or Clinical

Nurse 4 (CN-4; Table 3).

Table 3

Clinical Ladder Designation

What is your nursing clinical ladder designation?	Freq.	Percent	Cum.
CN-1	6	16.22	16.22
CN-2	19	51.35	67.57
CN-3	9	24.32	91.89
CN-4	2	5.41	97.30
Not classified on ladder	1	2.70	100.00
Total	37	100.00	

The majority of nurses had been practicing for 2-5 years or 6-10 years. There were only nine nurses who had been practicing less than a year or over 11 years (24%) (Table 4).

Table 4

Years Practicing as a Nurse

What are your years practicing as a nurse?	Freq.	Percent	Cum.
11-15 years	4	10.81	10.81
15-20 years	2	5.41	16.22
2-5 years	17	45.95	62.16
6-10 years	9	24.32	86.49
Less than 1 year	5	13.51	100.00
Total	37	100.00	

The majority of the nurses in the study had been practicing on the floor for 2-5 years. With an increase in the number of years worked on the floor, the number of nurses working in those years decreased (Table 5).

Table 5

Years Practicing on Unit

How many years have you practiced on your unit?	Freq.	Percent	Cum.
11-15 years	4	10.81	10.81
15-20 years	1	2.70	13.51
2-5 years	22	59.46	72.97
6-10 years	6	16.22	89.19
Less than 1 year	4	10.81	100.00
Total	37	100.00	

Seventy-five percent of participating nurses had BSN degrees. The remainder of the nurses held an associate's degree or MSN (Table 6).

Table 6

Current Nursing Education Level

What is your current nursing education level?	Freq.	Percent	Cum.
ADN	5	13.51	13.51
BSN	28	75.68	89.19
MSN	4	10.81	100.00
Total	37	100.00	

The majority of the participants had called RRS more than 10 times (70%). The remainder of the participants (29%) had called RRS fewer than 10 times (Table 7).

Table 7

Number of Times the RRT Services Were Called

What is the number of times that you have called RRT services?	Freq.	Percent	Cum.
1	1	2.70	2.70
2	2	5.41	8.11
3	2	5.41	13.51
5	4	10.81	24.32
8	2	5.41	29.73
More than 10	26	70.27	100.00
Total	37	100.00	

Statistical Analysis

For this study, the null hypothesis was the following: A clinical nurse's education and clinical skills or critical thinking do not affect the recognition of patient deterioration and the early intervention of RRS. The alternative hypothesis for this study was as follows: A clinical nurse's education and clinical skills or critical thinking affect the recognition of patient deterioration and the early intervention of RRS.

The first research question for the study was as follows:

RQ1. What is the relationship between the nurses' clinical skill set and the

decision to activate RRS, as measured by the INSIGHT Health

Professional Nursing Assessment tool?

Each of the nurses 'clinical reasoning skills score was analyzed with the number

of RRS activations. The outcome of the RRS activations was a binary choice: Did the

nurse call the RRS more than 10 times or fewer than 10 times? The data show that

participants called RRT services more than 10 times with more frequency (70.3%) than

the participants who stated that they called RRT services fewer than 10 times (29.7%;

Table 8).

Table 8

RRT Services Called

Called RRT	Freq.	Percent	Cum.
Called fewer than 10 times	11	29.73	29.73
Called more than 10 times	26	70.27	100.00
Total	37	100.00	

In response to RQ1, the difference in score points for each analytical skill, the *p*-

values, and the confidence intervals of the nurses who called RRT services more than 10

times were compared to those of nurses who called fewer than 10 times (Table 9). In the

linear regression model, the nurses who reported that they had activated RRT services

more than 10 times had an analytical score that was, on average, 4.85 points higher than

that of nurses who called RRT services fewer than 10 times. 15% of the availability of

the score can be explained by the ability to call RRT services ($R^2 = 0.1565$) This finding

was statistically significant with a $P = 0.015$ and confidence intervals of 0.99 to 8.73.

Table 9

Skill Scores Association With RRT Services Activation

Source	SS	df	MS		Number of obs	37
					F (1. 35)	6.49
Model	182.321017	1	182.321017		Prob > F	0.0154
Residual	982.597920	35	28.0742258		R-squared	0.1565
Total	1164.91892	36			Adj R-squared	0.1565
					Root MSE	5.2985

Analysis	Coef.	Std. Err.	t	P>t	(95% Conf. Interval)	
RRT More than 10						
Called more than 10 times	4.856643	1.905776	2.55	0.015	.99877134	8.725573
_cons	285.1818	1.597561	178.51	0.000	281.9386	228.425

RQ2.   What is the correlation between the failure to rescue and the level of
competency of the clinical nurse as measured by the position on the
nursing clinical ladder?

In response to RQ-2, Table 10 shows that CN-2 was 10 times more likely to call

RRT services as compared to a CN-1, with an odds ratio = 10.83. When calling RRT

services, 68% of the participants were designated as Clinical Nurse 2 (CN-2), and 16% of

the participants were Clinical Nurse 1 (CN-1). The number of Clinical Nurse 3 and

Clinical Nurse 4 participants were not sufficient for this study. The findings demonstrated

that ranking on the clinical ladder was significant for calling RRT Services (p=0.047).

Table 10

Clinical Ladder and RRT Calls

Logistic Regression

					Number of obs	=	25
LR chi2(1)	=	5.19
Prob > chi2	=	0.0227
Pseudo R2	=	0.1514

rrt_more10	Odds Ratio	Std. Err.	z	P>z	(95% Conf. Interval)	
clinical_ladder-cd						
CN-2	10.83333	13.01619	1.99	0.047	1.02813	114.15
CN-3	1	(empty)				
CN-4	1	(empty)				
Not classified on ladder	1	(empty)				
_cons	.2000001	.2190891	-1.47	0.142	.0233661	1.711885

Note: _cons estimates baseline odds

Adjusted predictions   Number of obs = 25
Model VCE: OIM

Expression: Pr (rrt_more10), predict ()

RQ3.   What is the relationship of a nurse's formal education in identifying a

patient's early stages of decline using critical assessment skills as

measured by the INSIGHT Health Professional Nursing Assessment tool?

In response to RQ3, participants with a BSN called RRT Services more often

(71%) than a participant who had an ADN level of education (40%; Table 11).

Table 11

Nursing Education—Associate Degree in Nursing Versus Bachelor of Science in Nursing and Rapid Response Team Activation

	Margin	Delta-method Std. Err.	z	P>z	(95% Conf. Interval)	
years_edu_level__cd						
ADN	.4	.219089	1.83	0.068	-0294066	.8294066
BSN	.7142857	.0853735	8.37	0.000	.5469568	.8816146

The participant's years practicing as a nurse and the relationship to its association with calling RRT services shows that the 2-5-year group and the 6-10-year group were the two groups most likely to have called RRT Services more than 10 times. The 2-5-year group having a 9.6 times greater chance that RRT Services was called greater than 10 times and the 6-10-year group calling chance was 14 times. Because the finding was not significant (p= 0.188). Therefore, nursing education level was not considered a factor in calling RRT Services.

Table 12

Nursing Education and RRT Services Activation

Logistic Regression				Number of obs	=	33

Log likelihood = 20.116607

LR chi2(1) = 1.78
Prob > chi2 = 0.1826
Pseudo R2 = 0.0423

rrt_more10	Odds Ratio	Std. Err.	z	P>z	(95% Conf. Interval)	
rn_edu_level_cd						
BSN	3.74999	3.765592	1.32	0.188	.5239506	26.83935
MSN	1	(empty)				
_cons	.6666668	.6085807	-1.44	0.657	.1113965	3.989752

Note: _cons estimates baseline odds

RQ4.   What is the correlation between the number of years practicing as a

clinical nurse with the nurse's ability to apply critical assessment in

recognizing the early signs of decline of patients as measured by the

INSIGHT Health Professional Nursing Assessment tool?

In response to RQ-4, it was found that as age in years of the participants increased

there was an increase in the number of calls for RRT Services. The increase in age of the

participants showed an increase that they would call for RRT services (2-5 years OR=9.6,

6-10 years OR=14) (Table 13). However, the age demographic was not significant.

(p=0.055).

Table 13

Nursing Age and Activation of Rapid Response Team Services

Logistic Regression							
			Number of obs	=	331		
			LR chi2(1)	=	5.19		
			Prob > chi2	=	0.0747		
Log likelihood = -17.567925			Pseudo R2	=	0.1287		
rrt_more10	Odds Ratio	Std. Err.	z	P>z		(95% Conf. Interval)	
years_as_rn_cd							
11-15 years	1	(empty)					
15-20 years	1	(empty)					
2-5 years	9.6	11.88747	1.83	0.068		.847709	108.7166
6-10 years	14	19.26136	1.92	0.55		.9441374	207.5969
Less than 1 year	1	(omitted)					
_cons	.25	.2795085	-1.24	0.215		.0279427	2.236723

Note: _cons estimates baseline odds

Adjusted predictions   Number of obs = 31
Model VCE : OIM

The other demographic data that included gender, nursing education, and years on the unit or floor where they worked were not significant. The demographic variables that were significant in the study were clinical ladder designation and calling RRT Services more than 10 times. Age of the participant was not significant in the study.

The INSIGHT Health Professional Nursing Assessment tool divided the clinical assessment study into two parts: Thinking Mindset Assessments and Reasoning Skills (Insight Assessment, 2017). The Mindset portion of the assessment was conducted in an *agree-disagree* response format where the participant would affirm or disavow a presented statement. The numerical score represented the extent that the participant manifested the particular Mindset attribute. Three levels were achieved from this assessment: Not Manifested (1-25), in which the participant did not manifest the attribute, Positive (26-31), where the participant manifested the attribute in a positive but not

strong manner, and Strong Positive (32-40), in which the participant manifested positive

attribute on the assessment (Insight Assessment, 2017). The maximum score for the

Mindset attributes was 40. It is important to note that not displaying the attribute did not

mean that they displayed the opposite attribute.

Clinical Assessment Scoring

The INSIGHT Health Professional Reasoning Skills (Appendix B) measured

professional reasoning skills that included interpretation, analysis, inference, evaluation,

explanation, induction, deduction, and numeracy (Insight Assessment, 2017). The

Reasoning Skills Assessment measured the participant's clinical assessment skills and

their skills on drawing reasonable conclusions and logical inferences from the scenarios

presented. The Reasoning Skills Assessment assessed the participant's ability to engage

in the presented questions in a focused, systematic, thoughtful, and sustained manner

(Insight Assessment, 2017). The results of the assessment were placed in the categories

of Not Manifested (265-272), Moderate (286-292), Strong (286-292), and Superior (293-

300). The maximum score was 300. The tables below showed the results of the

Reasoning Skills Assessment.

Interpretation skills were used to determine the significance and precise meaning

of the information presented (Figure 1). Interpretation requires an understanding of the

data, its purpose and its significance. Each column represents the number of participants

who achieved a specific score. The x-axis is the score that was achieved by the

participants and the y-axis is the number of participants who achieved the score. The

color of the column represents the categories of achievement. Of the participants (N=37)

4 showed a superior skill, 13 showed strong skills, 10 showed moderate skills, and 10 did

not manifest the attribute (Insight Assessment, 2017). The results showed a wide range of

scores with the median score (median= 284.0). There were 27.03% scoring between 273-

278 or 10 participants not manifesting the Interpretation skill and another peak of 21.61%

scoring between 286-292 showing that 13 participants showed strong Interpretation skills

(Insight Assessment, 2017).

Descriptive Information: Interpretation

N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
37	284.6	284.0	7.5	1.2	273	300	277.0	290.0
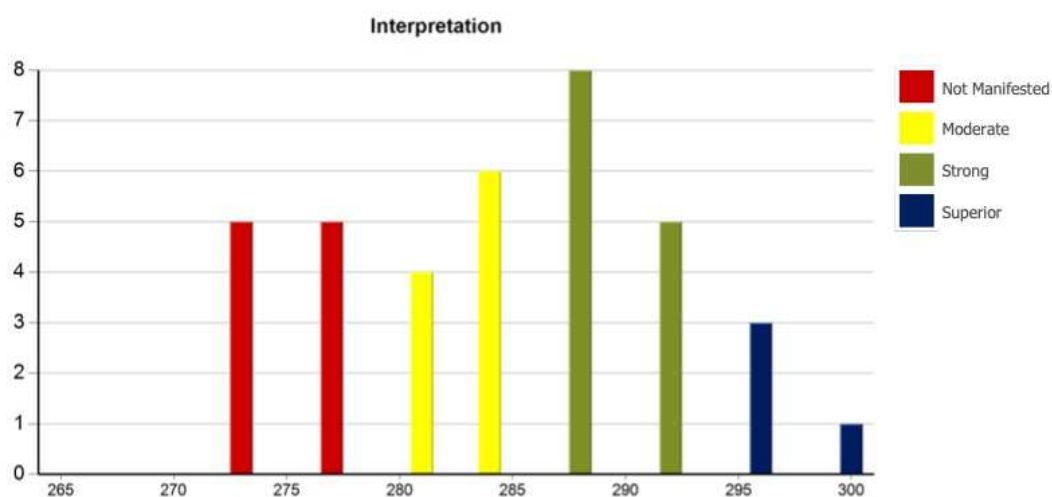
Figure 1. Reasoning skills—Interpretation.

The graphical representation of the interpretation skill showed the Interpretation

Skills score on the x-axis and the participant percentage of the score on the y-axis (Figure

2). 27% of the participants scored 277 on the interpretation skill (Not Manifested), 11%

scored 280 (Moderate), 38% scored between 282-291 (Strong), and 24% scored 294-300

(Superior). The top of the black curved line shows the mean of the distribution (mean=

24% scoring 285). There were a higher percentage of participants who scored less than the mean than in the other categories of the Interpretation skill.
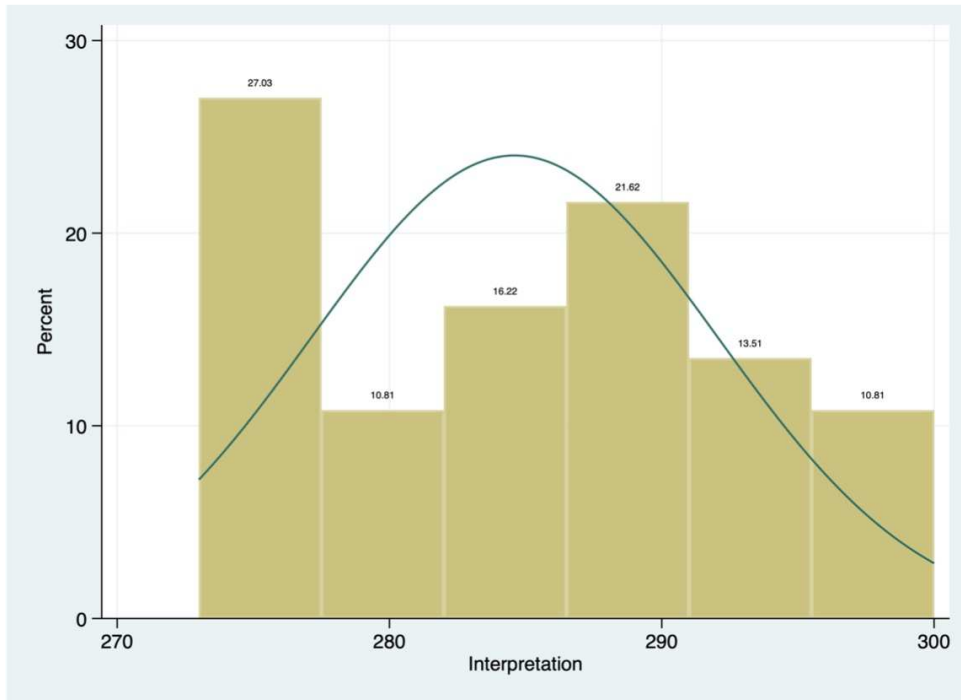
Figure 2. Interpretation skills.

The analysis attribute showed that the participant demonstrated the ability to identify assumptions interact in the formation of arguments, identify critical elements of a situation and how to interact with them. Of the participants (N=37) 11 showed a superior skill, 13 showed strong skills, 12 showed moderate skills, and 1 did not manifest the attribute (Figure 3). The analysis reasoning skill was strongly demonstrated by the majority of the participants showing that the participants have well developed skills in identifying critical incidents and deciding on the appropriate interactions.

Descriptive Information: Analysis

N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
37	288.6	287.0	5.7	0.9	278	300	284.0	294.0
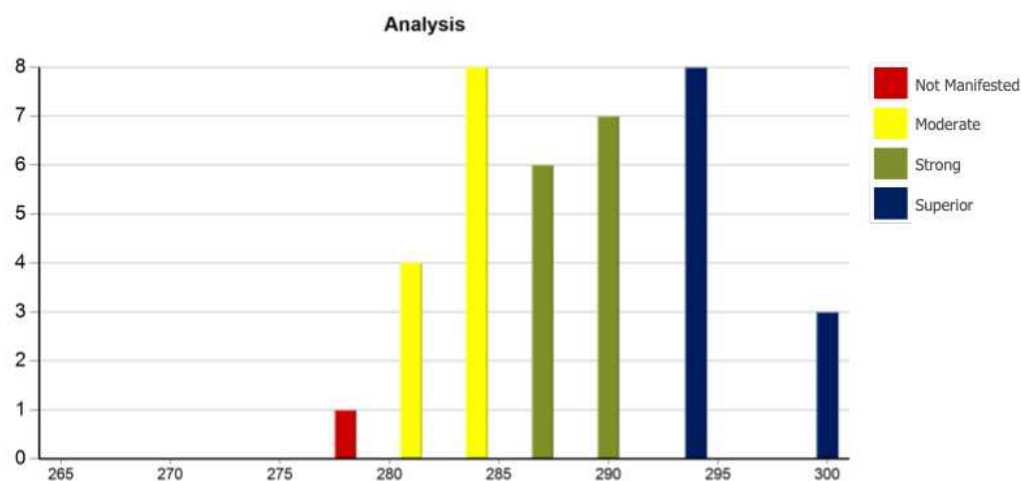
Figure 3. Reasoning skills—Analysis.

The graphical interpretation of interpretation skill scores illustrated that the scores for the analysis skills were strong or superior in most of the participants. The graph showed two peaks of 21.62% between 283-286 and 293-296 (Insight Assessment, 2017). The graphical representation of the Analysis skill showed the Analysis Skills score on the x-axis and the participant percentage of the score on the y-axis (Figure 2). 14% of the participants scored 276-282 on the Analysis skill (Not Manifested), 22% scored 280-286 (Moderate), 35% scored between 286-293 (Strong), and 30% scored 294-300 (Superior). The top of the black curved line shows the mean of the distribution (mean= 26% scoring 289).
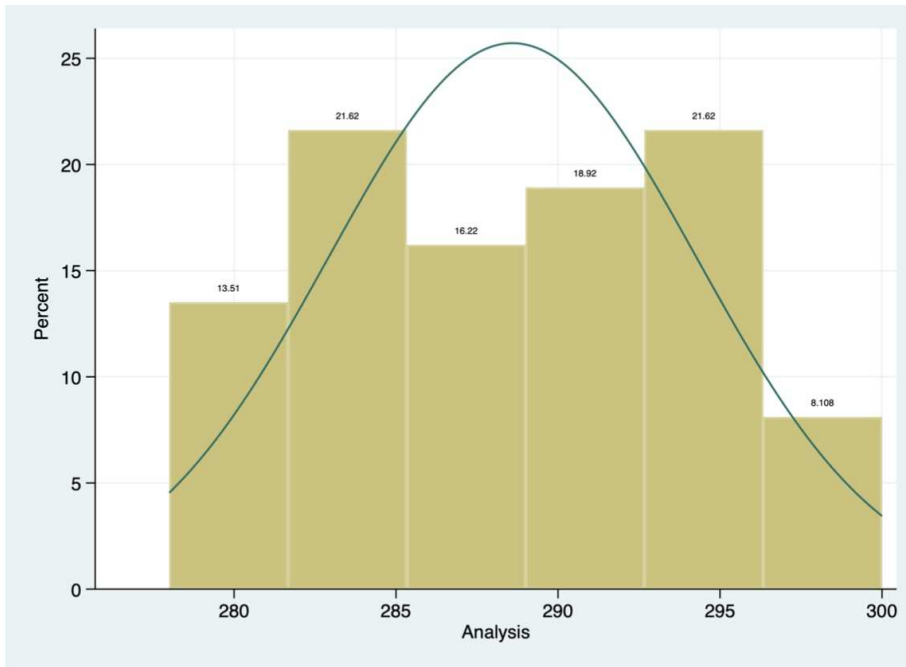
Figure 4. Analysis skills.

  The inference skill was a measure of how well the participant could draw conclusions from reasoning and evidence. The inference skill gives the participant the ability to determine the probable consequences from a given set of facts and conditions. Of the participants (N=37) 7 showed a superior skill, 18 showed strong skills, 10 showed moderate skills, and 2 did not manifest the attribute (Figure 5). The scores for the inference skill followed a bell-curve distribution with the majority of the participants showing moderate or strong inference reasoning. The majority of the participants scored higher than the mean illustrated by the curve.

Descriptive Information: Inference

| N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
37	288.0	287.0	4.9	0.8	276	300	285.0	291.0
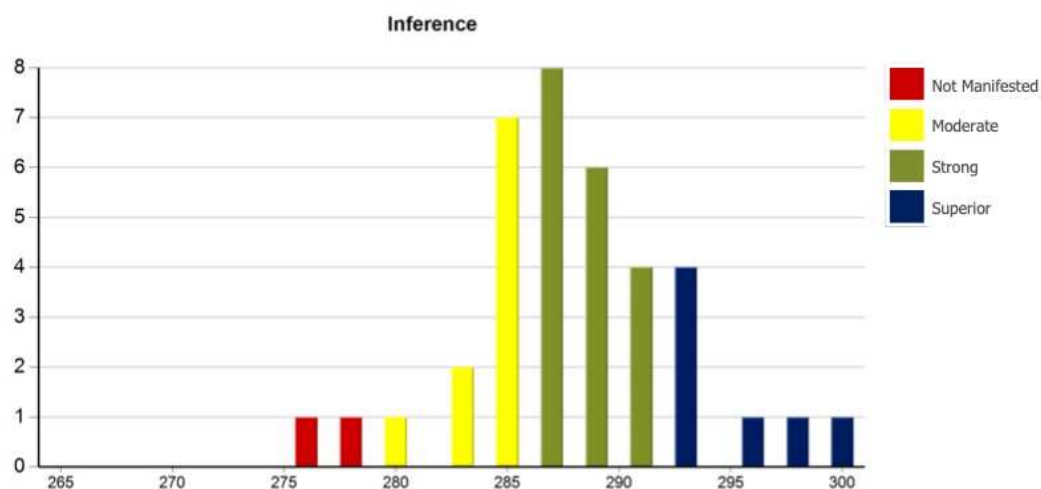
Figure 5. Reasoning skills—Inference.

The graphical interpretation of inference skill scores which showed that the scores for the analysis skills were strong or superior in most of the participants (Figure 6). The inference skill was the strongest predictor for activating RRT services in the study. There was a substantial peak of 40.54% between the scores of 284-288 and 27.03% between 288-293 (Insight Assessment, 2017). 6% of the participants scored 277-278 on the inference skill (Not Manifested), 49% scored 287 (Moderate), 27% scored between 289-293 (Strong), and 19% scored 292-300 (Superior). The top of the black curved line shows the mean of the distribution (mean= 32% scoring 288). The bell-shaped curve depicts a normal probability distribution of scored within the participants.
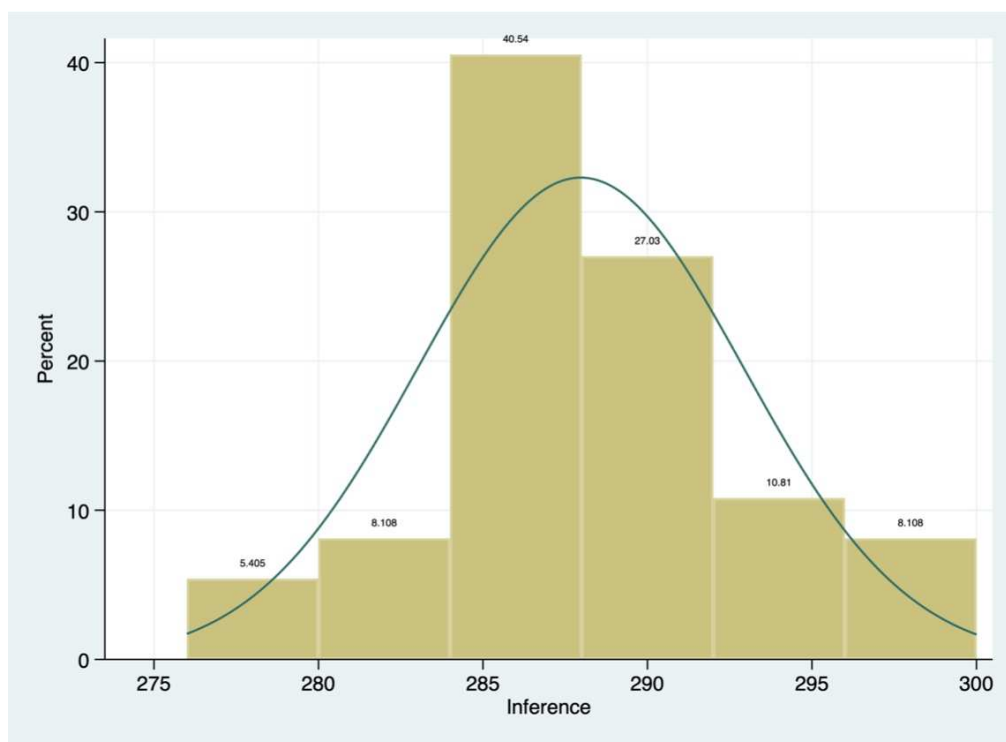
Figure 6. Inference skills.

The evaluation skill showed that the participant could assess the credibility of sources of information and as well as determine the strengths and weaknesses of arguments. Superior or strong evaluation skills allowed the participant to judge the quality of analyses, interpretations, inferences, opinions and decisions. The evaluation attribute was shown as a much weaker attribute of the participants (Figure 7). Of the participants (N=37) 0 showed a superior skill, 4 showed strong skills, 18 showed moderate skills, and 15 did not manifest the attribute. Social media has played a large role in critical evaluation of diverse arguments or information. The ability to evaluate the credibility of claims or opposing information has been dampened by sharing like opinions and information through social media. Critically evaluating opposing information has

become less common, therefore evaluation of critical opposing information has been a skill that is not as strong (Hocevar et al., 2014).

Descriptive Information: Evaluation

|	N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
	37	279.9	281.0	5.0	0.8	269	292	277.0	283.0
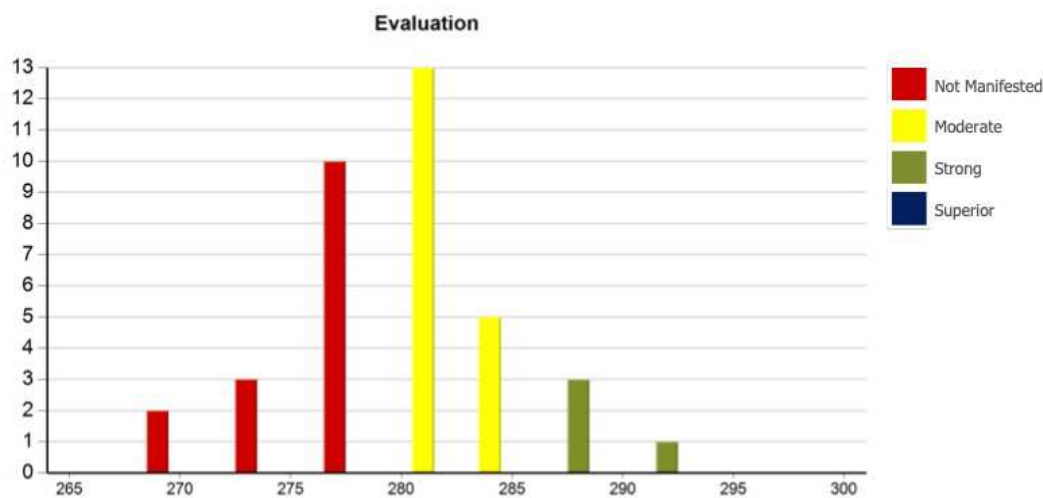
Figure 7. Reasoning skills—Evaluation.

The graphical interpretation of the evaluation skill scores showed that the scores for the analysis skills were strong in most of the participants (Figure 8). 14% of the participants scored 268-277 on the evaluation skill (Not Manifested), 76% scored 278-283 (Moderate), 38% scored between 284-293 (Strong). There were no Superior ratings. The top of the black curved line shows the mean of the distribution (mean= 30% scoring 280).
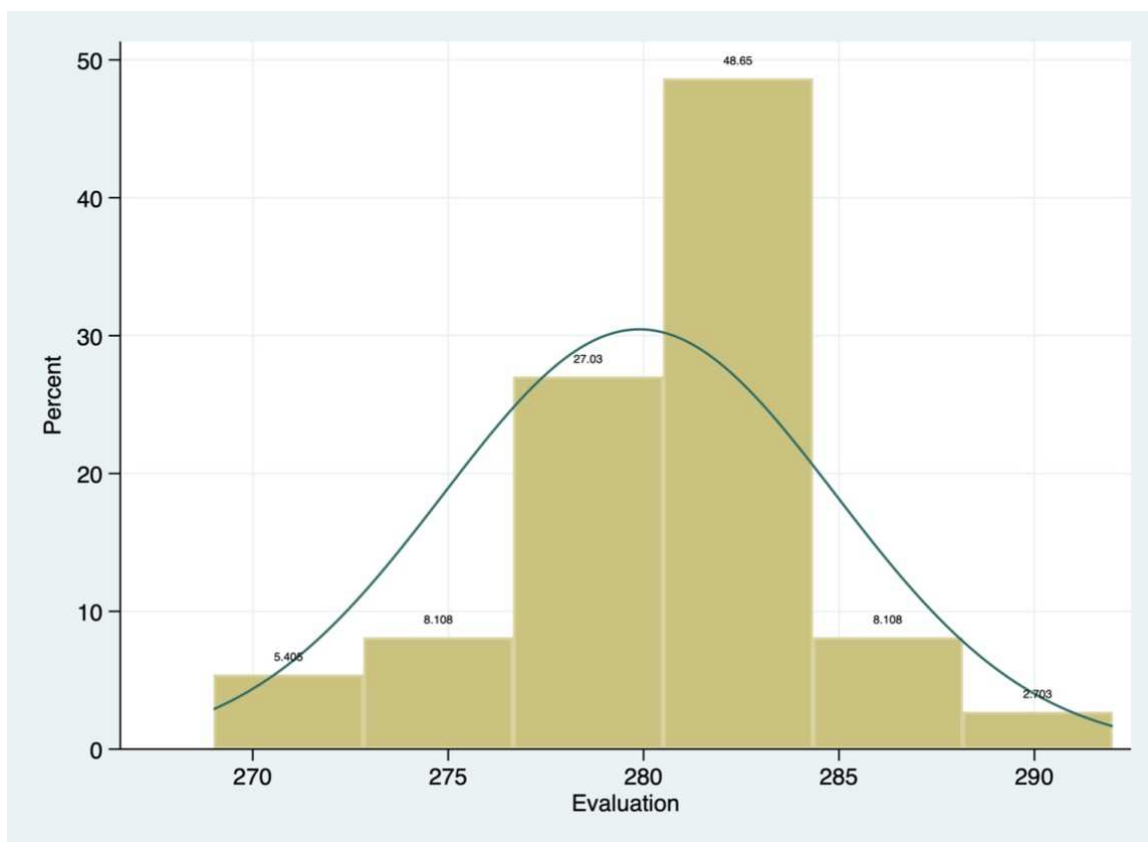
Figure 8. Evaluation skills.

The explanation skill enabled the participant to describe the evidence and reasons behind an event. Explanatory skills enabled the participants to articulate the reasons behind decisions, actions, events, and beliefs. Of the participants (N=37) 16 showed a superior skill, 15 showed strong skills, 4 showed moderate skills, and 2 did not manifest the attribute (Figure 9). The majority of the study participants demonstrated strong and superior explanation skills meaning that they could articulate the reasoning behind events or scenarios. The explanation skill was important in recognizing the reasons behind patient deterioration as well as the reasoning behind activating RRT Services early.

Descriptive Information: Explanation

N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
37	290.7	290.0	6.2	1.0	271	300	287.0	296.0
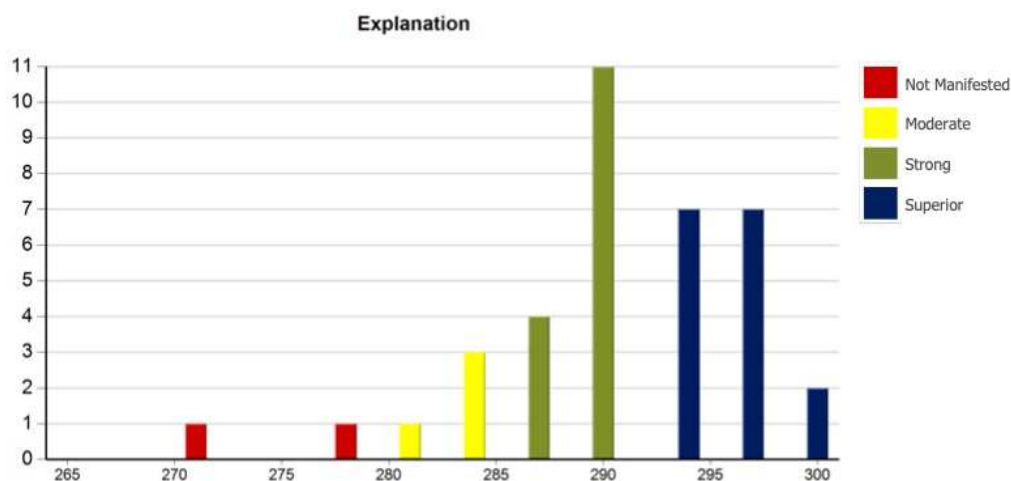
Figure 9. Reasoning skills—Explanation.

The graphical interpretation of explanation skill scores showed that the scores for the explanation skills were strong or superior in most of the participants (Figure 10). 40.54% of the participants scored between 285-291 (Insight Assessment, 2017). 5% of the participants scored 272-281 on the Interpretation Skill (Not Manifested), 11% scored 281-284 (Moderate), 59% scored between 286-290 (Strong), and 24% scored 294-300 (Superior). The top of the black curved line shows the mean of the distribution (mean= 31% scoring 290). The bell-curve was skewed to the right, which showed that the mean score was higher among the participant group than the normal probability distribution.
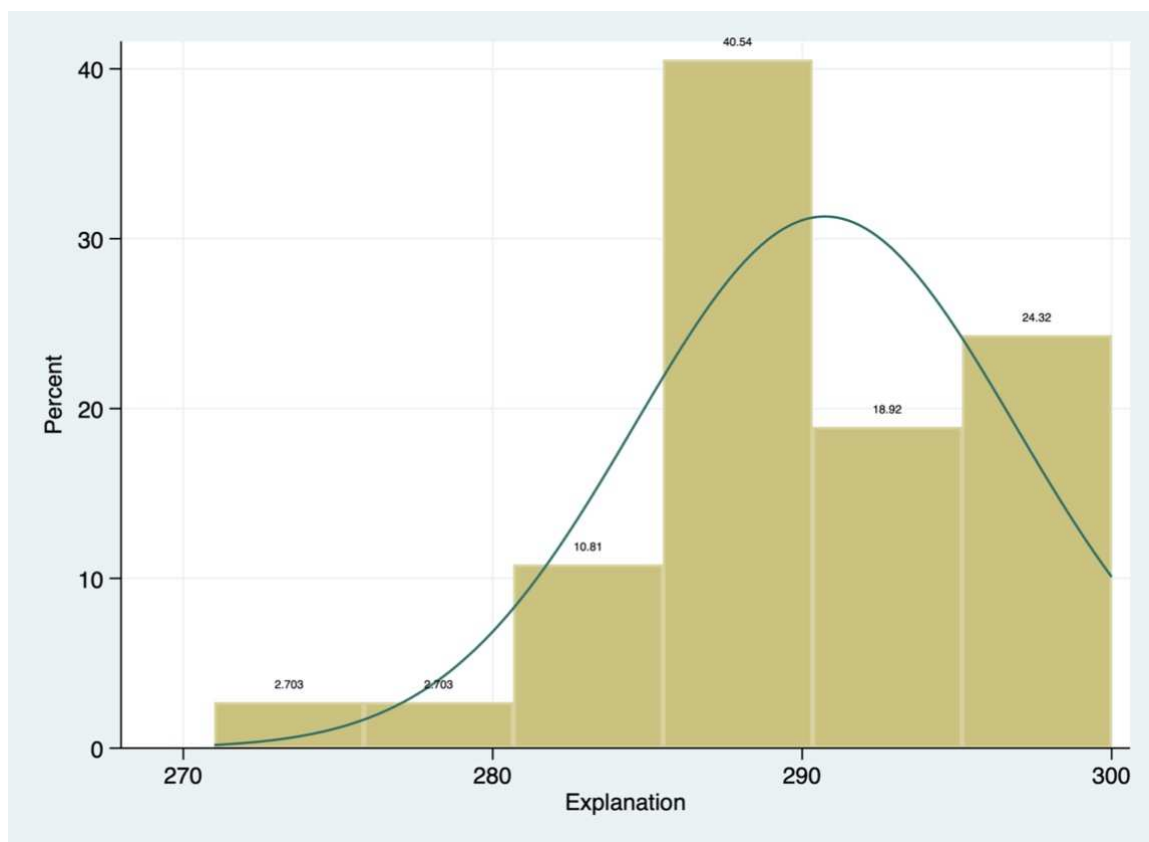
Figure 10. Explanation skills.

The induction attribute is also called inductive reasoning, where the participant demonstrated decision-making based on inferences from prior experiences, hypothetical situations, case studies, events, experiences and behaviors. Inductive reasoning is a skill that derives conclusions based on what the participant thought through prior experiences. The induction skill was demonstrated to be a very strong skill among the participants (Figure 11). Developing decisions based on past experiences, events, and situations was critical to identifying early deterioration in patients. Of the participants (N=37) 11 showed a superior skill, 19 showed strong skills, 7 showed moderate skills, and 0 did not manifest the attribute (Insight Assessment, 2017).

Descriptive Information: Induction

|	N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
	37	290.8	292.0	4.0	0.7	279	298	288.0	294.0
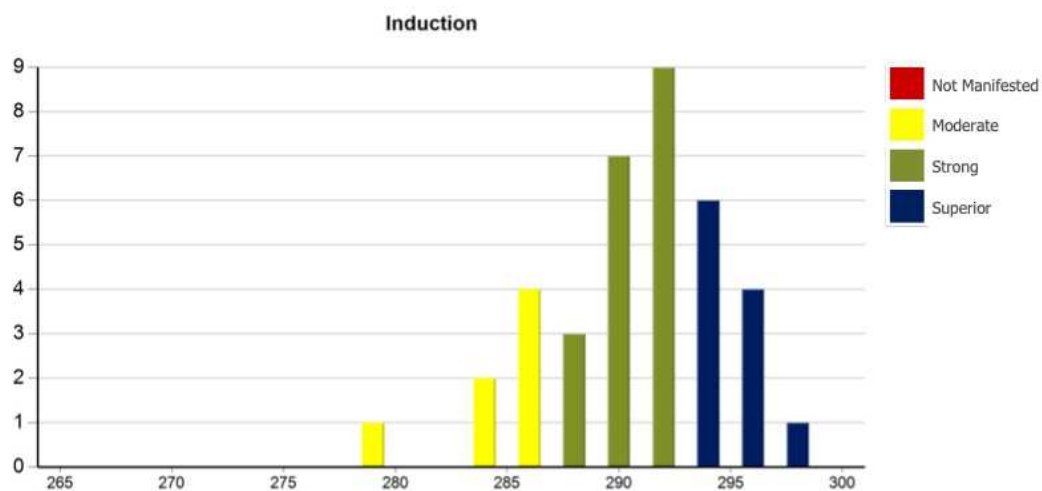
Figure 11. Reasoning skills—Induction.

The graphical interpretation of the induction skill scores showed that the scores for the induction skills were strong or superior in most of the participants (Figure 12). 40.54% scored 292-295, 27% scored between 278-286 (Moderate), and 78% scored 287-294 (Strong) and 14% scored 295-289 (Superior) (Insight Assessment, 2017). The top of the black curved line shows the mean of the distribution (mean= 31% scoring 292). The bell-shaped curve shows that many of the participant scores were higher than the mean.
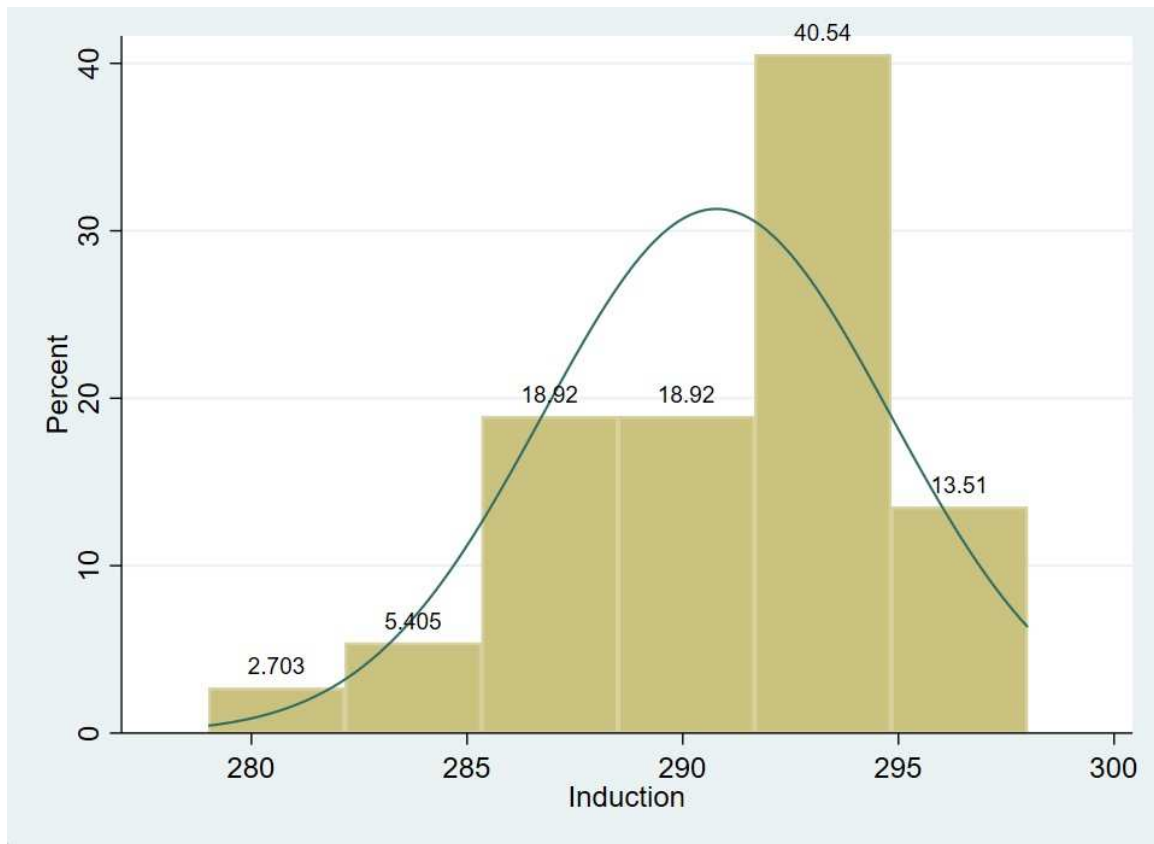
Figure 12. Induction skills.

The deduction skill is when the participant demonstrates decision-making based on rules, core beliefs, policies, principles, procedures, rules, and operating conditions. Deductive reasoning is logical and clear-cut and leaves no room for uncertainty. Of the participants (N=37) 5 showed a superior skill, 12 showed strong skills, 15 showed moderate skills, and 5 did not manifest the attribute (Figure 13). The deduction skill concludes with one right answer based on the evaluation of specific rules or conditions. The participants showed a bell-curved distribution of scores on the deduction skill.

Descriptive Information: Deduction

N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
37	285.5	285.0	6.2	1.0	272	298	282.0	290.0
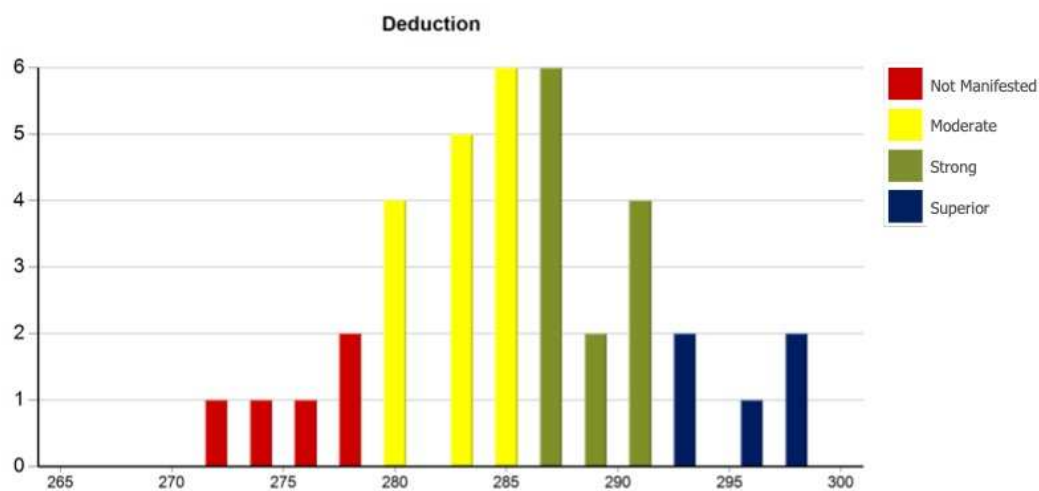
Figure 13. Reasoning skills—Deduction.

The graphical interpretation of the deduction skill showed a normal probability distribution (Figure 14). 24% of the participants scored 271-279 on the Interpretation Skill (Not Manifested), 14% scored 280-285 (Moderate), 38% scored between 286-290 (Strong), and 24% scored 294-298 (Superior). The top of the black curved line shows the mean of the distribution (mean= 28% scoring 286) and a bell-curved distribution.
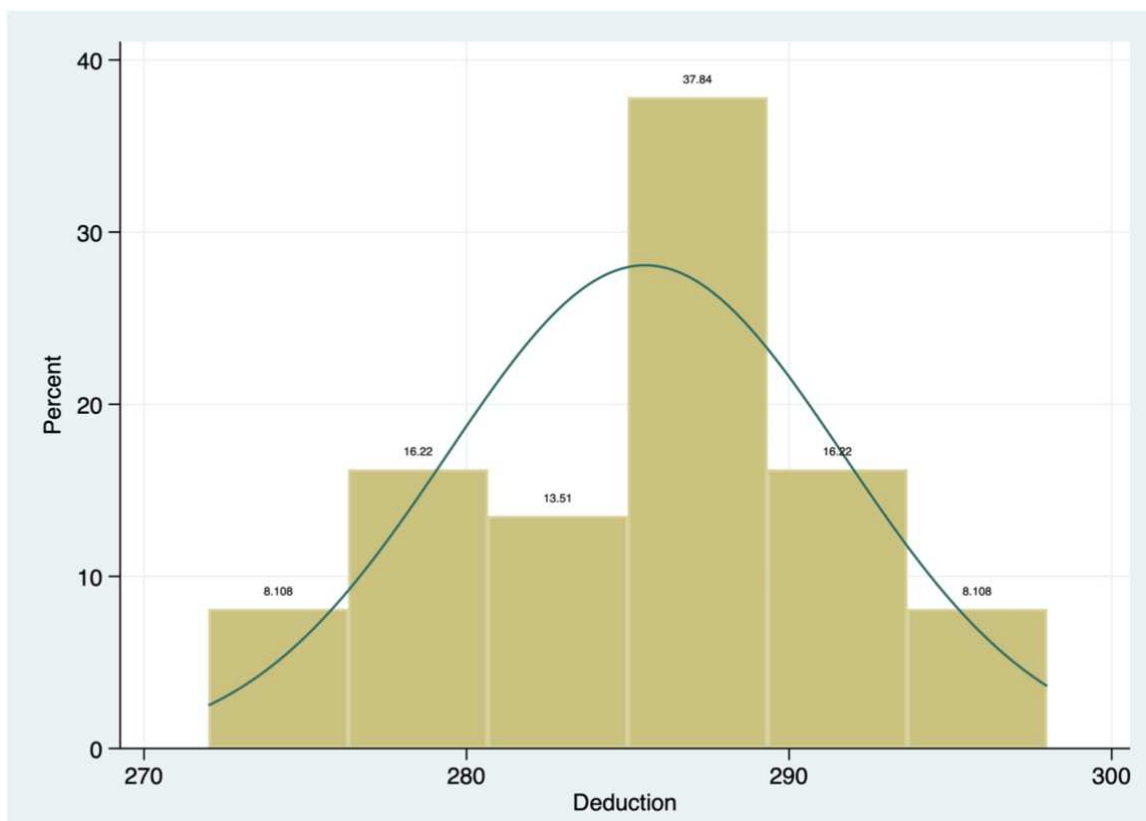
Figure 14. Deduction skills.

The numeracy attribute required the participant to use measurements, numbers, arithmetic, and mathematical techniques to interpret or evaluate information. The participant needed the ability to solve quantitative reasoning problems or make judgements using quantitative reasoning in different contexts. The graphical interpretation of the numeracy skill showed that of the participants (N=37), 2 showed a superior skill, 13 showed strong skills, 13 showed moderate skills, and 9 did not manifest the attribute (Figure 15).

Descriptive Information: Numeracy

N	Mean	Median	Standard Deviation	SE Mean	Minimum	Maximum	Quartile 1	Quartile 3
37	283.5	285.0	6.5	1.1	271	297	279.0	288.0
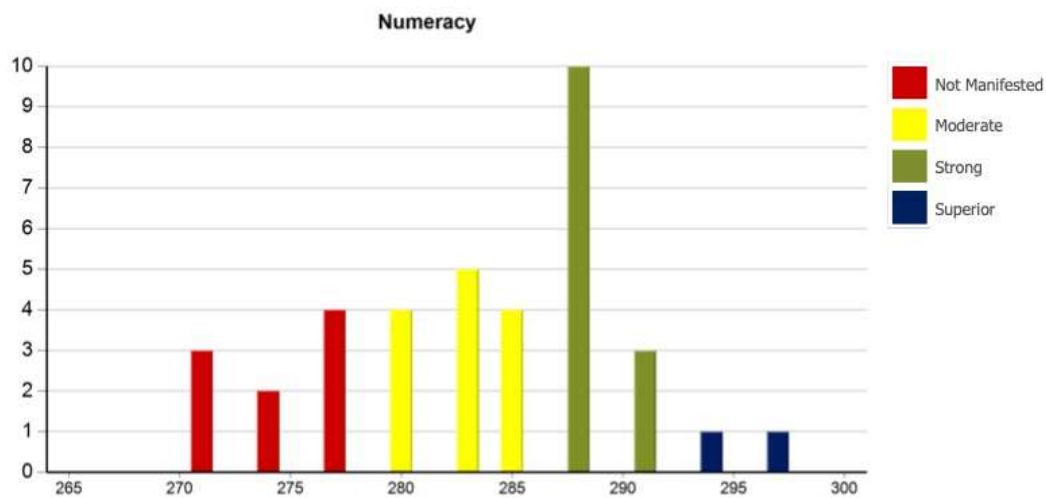
Figure 15. Reasoning skills—Numeracy.

The graphical interpretation of the numeracy skill scores showed evenly distributed scores among the participants. 27% of the participants scored 271-277, 24% scored between 280-286 (Moderate), and 46% scored 287-292 (Strong) and 14% scored 294-296 (Superior) (Figure 16). The top of the black curved line shows the mean of the distribution (mean= 28% scoring 284). The bell-shaped curve depicted a normal probability distribution of the scores of the participants.
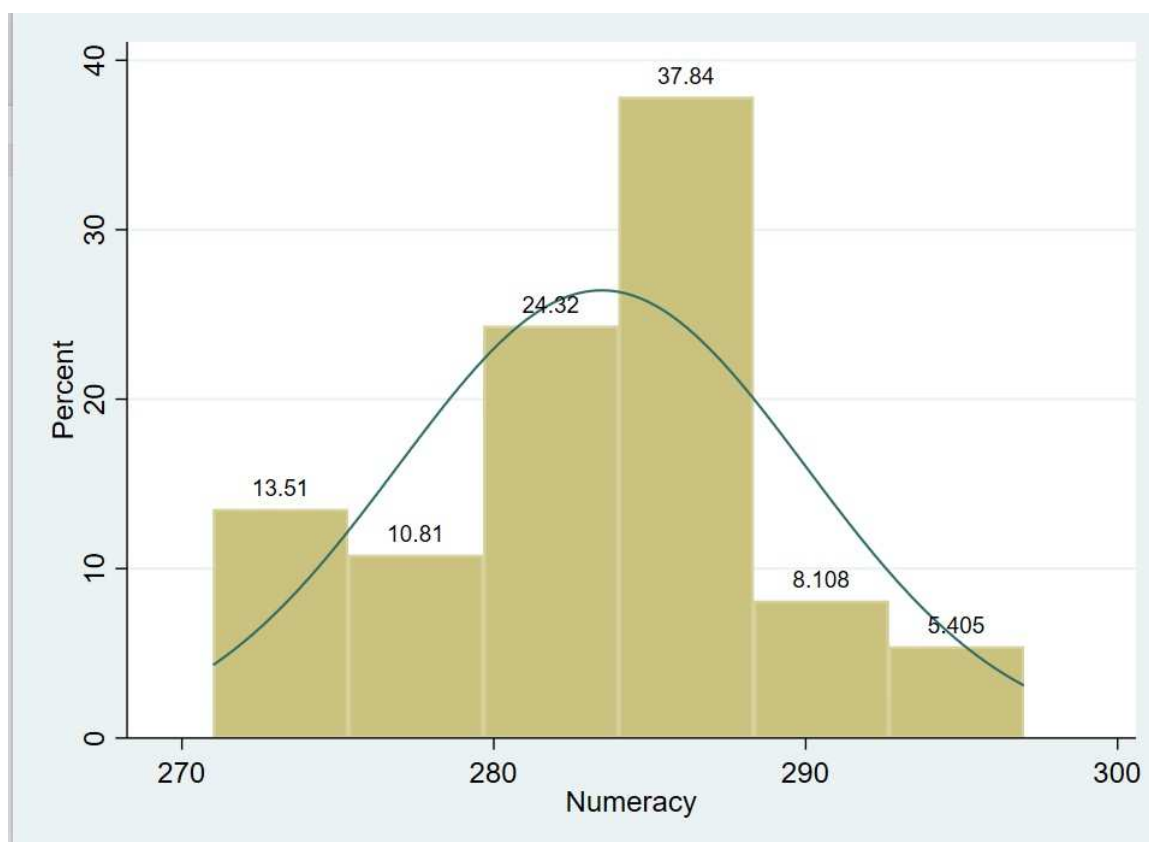
Figure 16. Numeracy skills.

The reasoning skill that were most highly scored in the study was Induction (N= 37, Mean= 290.8, Median= 292, SD= 4.0) (Table 14). Participants scored highly when they demonstrated decision-making based on inferences from prior experiences, hypothetical situations, case studies, events, experiences and behaviors. Participants successfully analyzed scenarios that required skills that arrived at conclusions based on the participant's prior experiences. Participants needed the induction skill to make important inferences on patient deterioration from previous patient experiences and situations. Induction is also based on the time required to build past experiences and

events. Participants with the demographic of more years as a RN showed to be significant in this study (Insight Assessment, 2017).

Table 14

Reasoning Skills—Overview of Reasoning Skills Total Statistics

Skill/Attribute Name	N	Mean	Median	Standard Deviation	SE Mean
OVERALL	37	287.9	288	4.4	0.7
Analysis	37	288.6	287	5.7	0.9
Interpretation	37	284.6	284	7.5	1.2
Inference	37	288.0	287	4.9	0.8
Evaluation	37	279.9	281	5.0	0.8
Explanation	37	290.7	290	6.2	1
Induction	37	290.8	292	4.0	0.7
Deduction	37	285.5	285	6.2	1
Numeracy	37	283.5	285	6.5	1.1
Skill/Attribute Name	Minimum		Maximum	Quartile 1	Quartile 3
OVERALL	276		297	286	290
Analysis	278		300	284	294
Interpretation	273		300	277	290
Inference	276		300	285	291
Evaluation	269		300	277	283
Explanation	271		300	287	296
Induction	279		298	288	294
Deduction	272		298	282	290
Numeracy	271		297	279	288

The second most highly scored skill by the study participants was explanation (N= 37, Mean= 290.7, Median= 290, SD= 6.2) (Table 14). The participants used the explanation skill to describe the evidence and reasons behind an event. Explanation skills enabled the participants to articulate the reasons behind decisions, actions, events, and beliefs. The explanation skill is important in explaining actions related to identifying early deterioration in patients and when to summon RRT services. The explanation skill is also important in educating newer staff on the decisions used in determining early deterioration and calling for critical care assistance with RRT services.

The lowest scoring skill was Numeracy (N=37, Mean= 283.5, Median= 285) (Table 14). The participants were required to use measurements, numbers, arithmetic, and mathematical techniques to interpret or evaluate information. The participant needed the ability to solve quantitative reasoning problems or make judgements using quantitative reasoning in different contexts. The score distribution of the numeracy skill was a bell-shaped curve which showed that the skill followed an average scoring curve (Figure 15).

A correlation of reasoning skills was conducted to determine if the skills are linked together or assumed to be linear. A value of 1 indicates perfect correlation while a 0 indicates no correlation between skills. The highest correlation was between numeracy and interpretation (0.8734) (Table 15). The value of the numeracy skill had a strong relationship with the value of the interpretation skill. The participant who had the ability to solve quantitative reasoning problems or make judgements using quantitative reasoning in different contexts also showed the ability to understand the data, its purpose and its significance. Similarly, the skill inference is highly correlated with the skill interpretation (0.8230). The participant who had the ability to understanding of the data, its purpose and its significance could also assess the credibility of sources of information and as well as determine the strengths and weaknesses of arguments. The lowest skill correlation is interpretation with analysis (0.4157) (Table 15).

Table 15

Correlation of Reasoning Skills

	analysis	interp-n	infere-e	evalua-n	explan-n	induct-n	deduct-n	numeracy
analysis	1.0000							
interpreta-n	0.4157	1.0000						
inference	0.5985	0.8230	1.0000					
evaluation	0.5051	0.6194	0.7041	1.0000				
explanation	0.6153	0.5977	0.5411	0.5111	1.0000			
induction	0.4172	0.5563	0.6586	0.6665	0.6995	1.0000		
deduction	0.7082	0.8159	0.8559	0.6793	0.6244	0.5246	1.0000	
numeracy	0.6089	0.8734	0.8175	0.6095	0.6574	0.5604	0.8458	1.0000

Summary

The first research question for the study was the following:

RQ1.   What is the relationship between the nurses' clinical skill set and the

decision to activate RRS, as measured by INSIGHT Health Professional

Nursing Assessment tool?

In response to the RQ-1, the difference in score points for each analytical skill, the

p-values, and the confidence intervals of the nurses who called RRT services more than

10 times were compared to the nurses who called less than 10 times. In the linear

regression model, the nurses who reported that they activated RRT services more than 10

times had an average 4.85 points higher analytical score than the nurses who called RRT

services less than 10 times. 15% of the availability of the score can be explained by the

ability to call RRT services (R^2=0.1565) The finding of the nurses who called RRT

services more than 10 times having a higher analytical score was statistically significant

with a p= 0.015 and confidence intervals of 0.99 to 8.73.

RQ2.   What is the correlation between the failure to rescue and the level of

competency of the clinical nurse as measured by the position on the

nursing clinical ladder?

In response to RQ-2, Clinical Nurse 2 (CN-2) participants were 10 times more

likely to call RRT Services as compared to a Clinical Nurse 1 (CN-1), with an odds ratio

= 10.83. When calling RRT services, 68% of the participants were designated as Clinical

Nurse 2 (CN-2), and 16% of the participants were Clinical Nurse 1 (CN-1). The number

of Clinical Nurse 3 and Clinical Nurse 4 participants were not sufficient for this study.

The findings demonstrated that ranking on the clinical ladder was significant for calling

RRT Services (p=0.047).

RQ3.   What is the relationship of a nurse's formal education in identifying a

patient's early stages of decline using critical assessment skills as

measured by the INSIGHT Health Professional Nursing Assessment tool?

The participant's years practicing as a nurse and the relationship to its association

with calling RRT services showed that the 2-5-year group and the 6-10-year group were

the two groups most likely to have called RRT Services more than 10 times. The 2-5-

year group having a 9.6 times greater chance that RRT Services was called greater than

10 times and the 6-10-year group calling chance was 14 times. Because the finding was

not significant (p= 0.188), nursing education level was not considered a factor in calling

RRT Services.

RQ4.   What is the correlation between the number of years practicing as a

clinical nurse with the nurse's ability to apply critical assessment in

recognizing the early signs of decline of patients as measured by the

INSIGHT Health Professional Nursing Assessment tool?

In response to RQ-4, the findings showed that as age in years of the participants

increased there was an increase in the number of calls for RRT Services. As the age of

the participants increased, they would call more frequently for RRT services (2-5 years

OR=9.6, 6-10 years OR=14. However, the age demographic was not significant

(p=0.055).

Chapter 5 will interpret the findings of the study as it relates to the information

found in the literature about ALF and RRT Services. Additionally, the findings will be

discussed in the context of the theoretical framework of Benner's Novice to Expert

Model (Benner, 1984). The limitations of the study will be presented as well as the

generalizability, trustworthiness, validity, and reliability of the findings.

Chapter 5 will also explore further recommendations for furthering the research in

ALF and clinical assessment skills to identify early deterioration in patients. The

strengths and weaknesses of the study will be discussed and grounded in the current

literature review. The implications of the study will be discussed as it impacts positive

social change. Methodological, theoretical and empirical implications will be addressed

from the results of the study.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to identify and measure clinical nursing assessment and critical thinking skills that influence a nurse's ability to detect deterioration in patients and call for RRS. The focus of the study was identifying which nursing assessment and critical thinking skills were most important in helping clinical nurses recognize unstable or deteriorating patients. The study involved analysis of critical thinking skills and nursing assessment of clinical floor or ward staff nurses in identifying and responding to patients with signs of clinical deterioration. A multiple regression analysis was conducted to evaluate the clinical nurses' critical thinking and clinical assessment skills expertise, and to measure and evaluate both inductive and deductive reasoning of health sciences professionals (Facione et al., 2010).

The findings for RQ1 showed the difference in score points for each analytical skill, the *p*-values, and the confidence intervals of the nurses who called RRT services more than 10 times as compared to nurses who called less than 10 times. In the linear regression model, the nurses who reported that they activated RRT services more than 10 times had analytical scores that were an average of 4.85 points higher than those of nurses who called RRT services fewer than 10 times. 15% of the availability of the score can be explained by the ability to call RRT services ($R^2 = 0.1565$). The finding of the nurses who called RRT services more than 10 times having a higher analytical score was statistically significant with a $p = 0.015$ and confidence intervals of 0.99 to 8.73 (Insight Assessment, 2017).

The findings for RQ2 showed that CN-2 participants were 10 times more likely to call RRT Services as compared to CN-1, with an odds ratio = 10.83. When calling RRT services, 68% of the participants were designated as CN-2, and 16% of the participants were CN-1. The numbers of Clinical Nurse 3 and Clinical Nurse 4 participants were not sufficient for this study. The findings demonstrated that ranking on the clinical ladder was significant for calling RRT Services (p=0.047; Insight Assessment, 2017).

The findings for RQ3 on participants' years of practicing as a nurse and the relationship to its association with calling RRT services showed that the 2- to 5-year group and the 6- to 10-year group were the two groups most likely to have called RRT services more than 10 times. The 2- to 5-year group had a 9.6 times greater chance that RRT services had been called more than 10 times, and the 6-10-year group's chance of calling was 14 times. Because the finding was not significant (p= 0.188), nursing education level was not considered a factor in calling RRT services (Insight Assessment, 2017).

The findings for RQ4 showed that as the age in years of the participants increased, there was an increase in the number of calls for RRT services. As the age of the participants increased, they would call more frequently for RRT services (2-5 years OR = 9.6, 6-10 years OR = 14. However, the age demographic was not significant (p = 0.055; Insight Assessment, 2017).

Interpretation of the Findings

The identified gap in the literature was the identification of clinical skills and necessary critical thinking of the bedside nurse to identify early deterioration in patients

and request the RRS to the bedside for appropriate critical care interventions. Research has revealed that clinical assessment skills related to the ALF phenomenon as well as dispatching the RRS are unclear (Jensen, Skar, & Tveit, 2018).

Literature has shown that nurses' clinical assessment skills and critical thinking are essential to recognition of early deterioration and the activation of the RRS. Nursing education and experience are vital to the development of clinical assessment skills (Lasko & O'Dell, 2010). The literature has also shown that the actual clinical skills that are needed to develop early recognition are difficult to identify and define (Jensen et al., 2017). This study specifically showed that induction and explanation skills are important in the early recognition of patient deterioration (Insight Assessment, 2017).

This study analyzed specific clinical skills needed to address ALF and identify early deterioration in patients. I analyzed the clinical skills assessment gap related to the ALF phenomenon by identifying demographic information and clinical assessment skills needed to identify early deterioration in patients and call RRT services. The study showed that participants with over 10 years of clinical experience were more likely to call RRT services than participants with fewer than 10 years of experience (Insight Assessment, 2017).

The theoretical framework that was used for the study was Benner's (1982) novice-to-expert model. The theoretical propositions of Benner's novice-to-expert model address nurses' development of clinical competency through experience (Benner, 1982). Benner's model is frequently used in hospitals to measure the clinical competency of nurses and is a framework for describing levels of clinical expertise based on the

progressive acquisition and development of clinical skills (Pena, 2010). The use of

Benner's model in the literature provided an accurate description of nurses' clinical

problem-solving skills within five stages of nursing development and can be an objective

scale to identify the stage of clinical competency of the bedside nurse (Haag-Heitman,

1999).

The participants' health care institution used Benner's novice-to-expert model to

classify clinical expertise. Levels CN-1 through CN-5 correspond with the levels of

proficiency found in Benner's (1982) model. CN-2 participants were 10 times more

likely to call RRT services as compared to CN-1 participants, with an odds ratio = 10.83

(Table 10). When calling RRT services, 68% of the participants were designated as CN-

2, and 16% of the participants were designated CN-1. The numbers of CN-3 and CN-4

participants were not sufficient for this study. The findings demonstrated that ranking on

the clinical ladder was significant for calling RRT services ($p = 0.047$; Insight

Assessment, 2017). Benner's model was appropriate for use in this study.

Limitations of the Study

The study design and procedures of the study were internally validated through

ruling out alternative explanations. The relationship of the variables to Benner's

theoretical model was not a limiting factor of construct validity, as the tested clinical

skills correlated with the levels outlined in the novice-to-expert model (Benner, 1982).

Professional and clinical nursing skills were defined by the Board of Nursing and

institutional nursing practice guidelines.

Cofounding variables could have been a limitation of the study. The outside influence of technology could have been a factor due to the participants using an online testing environment to complete the assessment. The assessment was limited by the participants' comfort level with and experience using computer-based testing. There were no other institutional, environmental, or cultural constraints.

Bias was not a limiting factor because the Insight assessment was an analytical computer-based analysis of the participants' responses. Statistical software was used to analyze the data. Statistical software was used to infer what the information meant, its relevance, and how the participants' clinical skills and critical thinking were evaluated based on demographic and clinical assessment skills. The data that were collected were objective and were not influenced by personal bias.

Recommendations

The identification of clinical assessment skills that can identify signs of early deterioration in patients has been identified as a problem in the current literature (Audet et al., 2018). The phenomenon of ALF significantly correlates with lack of clinical assessment skills and critical thinking (Audet et al., 2018). The results of the literature search indicated that nursing education and clinical skills are vital to recognizing patient deterioration and alerting RRS early, thereby decreasing adverse patient outcomes (Padilla et al., 2018). This study showed that clinical assessment and reasoning skills can be successfully assessed and quantified, resulting in early identification of deteriorating patients and calling RRT services.

Reasoning and clinical assessment skill evaluations may also be conducted with participants who provide patient care in different patient environments, including ICU, pediatrics, rehabilitation, psychiatry, and other areas. The identification of different clinical assessment skills may depend on the patient environment, severity of illness, or patient demographics. Further identification of clinical assessment skills that help in detecting early deterioration in patients can be enhanced through skill proficiency education with nurses who work in many different patient-care environments. The study may be duplicated, enhanced, or altered to effectively test participants from many types of institutions.

Implications

The hospital environment is an organization of professional health care providers who depend on each other to deliver quality care. Professional cultures can contribute to effective interprofessional teamwork and collaboration (Hall, 2009). Providing information to increase nurses' awareness and knowledge of the effectiveness of higher level clinical education in identifying early patient deterioration may assist in changing cultural norms about nursing and the ability to identify deteriorating patients. The study helped to identify critical factors that affect early recognition of patient decompensation, thereby improving patient safety, levels of critical nursing care, and nurse retention due to job satisfaction, collegial respect, and better interprofessional collaboration. Findings from the study may support positive social change within the professional cultures in hospital settings by improving nurses' awareness of the clinical assessment factors

needed to determine early deterioration in patients, improving validity, confidence, and awareness in nurses as well as the healthcare team.

Identification of weak clinical assessment skills can be used to provide education to staff for safer patient care. Early recognition of patient deterioration and activation of RRT services may promote earlier intervention by critically trained providers, appropriate interventions for treatment, and decreased length of stay in the hospital setting. Reduction in patient hospitalizations may lead to less cost to the institution and improved patient satisfaction due to shorter and more effective health care.

Conclusion

Strong clinical assessment skills that enable the identification of early deterioration in patients are important in effective patient care. Clinical and reasoning skills can be identified and evaluated in individual nurses, with follow-on education or further development of these skills. Nursing experience, number of years practicing, and the reasoning skills of induction and explanation are significant in clinical assessment skills. Summoning critical care resources to the patient's bedside in a timely manner can reduce morbidity and mortality throughout the hospital. Further research on nursing clinical assessment skills is important to patient safety, improved patient clinical outcomes, and decreased length of hospital stay.

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Appendix A: INSIGHT Health Professional Nursing Assessment Tool Letter of

Permission

Advancing Thinking Worldwide

February 5, 2020

James B. Tormey:

    This letter is to confirm that you've been approved by Insight Assessment to purchase individual use licenses of the INSIGHT Health assessment for use in your dissertation. Please note that no actual INSIGHT Health items can be published in your dissertation in any way. However, sample items from our website and anything found in the instrument manual can be included. Please see our website for full privacy and instrument security details and feel free to contact me directly with any questions.

Best Regards,

James Morante, Ph.D.
Chief of Staff
California Academic Press LLC / DBA Insight Assessment
650-697-5628
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Appendix B: INSIGHT Health Professional Nursing Assessment Tool Information

INSIGHT HEALTH Professional

Assessments for clinical professionals in the health sciences

Target highly skilled individuals with the professional mindset and reasoning skills to deliver quality care across your clinical specialties.

Health Professional Mindset

Truthseeking
Inquisitiveness
Analyticity
Professional Mindset
Systematicity
Maturity of Judgment
Confidence in Reasoning
Open-mindedness

Health Professional Reasoning Skills

OVERALL Professional Reasoning

Interpretation
Analysis
Inference
Evaluation
Explanation
Induction
Deduction
Numeracy

Professional Reasoning Skills

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INSIGHT HEALTH Professional

Measuring Thinking Worldwide

Clinical Professionals	Health Professional Mindset	Health Professional Reasoning Skills
	Metrics: • Truthseeking • Open-mindedness • Analyticity • Systematicity • Confidence in Reasoning • Inquisitiveness • Maturity of Judgment *Professional Mindset*	**Metrics:** • **OVERALL Reasoning Skills** **Specific Indicators** • Analysis • Interpretation • Inference • Evaluation • Explanation • Induction • Deduction • Numeracy *Professional Reasoning Skills*
Global assessment capability calibrated to match your employee group	**Specifications:** **Time:** 30 Minutes **Format:** "Agree-Disagree" (75 items) **Testing Mode:** Secure, encrypted, online, multi-lingual interface **Assessment Report:** Delivered to your specified Email	**Specifications:** **Time:** 55 Minutes **Format:** Scenario-based multiple choice questions (38 items) **Testing Mode:** Secure, encrypted, online, multi-lingual interface **Assessment Report:** Delivered to your specified Email

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INSIGHT HEALTH
Professional

Health Professional Mindset
Perspectives on leadership, foresight, and integrity

- **Truthseeking**
- **Open-mindedness**
- **Analyticity**
- **Systematicity**
- **Confidence in Reasoning**
- **Inquisitiveness**
- **Maturity of Judgment**

Truthseeking	**Truth-seeking** is the habit of always desiring the best possible understanding of any given situation; it is following reasons and evidence where ever they may lead, even if they lead one to question cherished beliefs. Truth-seekers have the intellectual integrity to ask hard, sometimes even frightening questions; they do not ignore relevant details; they strive not to let bias or preconception color their search for knowledge and truth. In clinical settings truth-seekers press for evidence that a diagnosis, treatment plan or health outcome is actually correct, effective, or genuine.
Open-mindedness	**Open-mindedness** is the tendency to allow others to voice views with which one may not agree. Open-minded people act with tolerance toward the opinions of others, knowing that often we all hold beliefs which make sense only from our own perspectives. Open-mindedness, as used here, is important for harmony in a pluralistic and complex society where people approach issues from different religious, political, social, family, cultural, and personal backgrounds. One manifestation of open-mindedness in clinical settings is tolerance and respect for patients, their families, and their cultural beliefs and values.
Analyticity	**Analyticity** or foresight is the tendency to be alert to what happens next. This is the habit of striving to anticipate both the good and the bad potential consequences or outcomes of situations, choices, proposals, and plans. In the clinical setting foresight manifests itself as attempting to anticipate problems for the patient that may be created by such things as drug interactions, failures to anticipate needs, or inattention to signs that a treatment is ineffective.

Systematicity	Systematicity is the tendency to approach problems in a disciplined, orderly, and systematic way. The person who is strong in systematicity may not know of a given approach, or may not be skilled at using a given strategy of problem solving, but that person has the desire and tendency to try to approach questions and issues in an organized and orderly way. In the clinical setting an organized and systematic approach is essential to ensure a complete and comprehensive analysis of patient problems and needs.
Confidence in Reasoning	Confidence in reasoning is the habitual tendency to trust reflective thinking to solve problems and to make decisions. As with the other attributes measured here, confidence in reasoning applies to individuals and to groups. A clinician or clinical team that is trustful of reasoned judgment is more likely to apply strong, objective, evidence-based scientific reasoning when making diagnoses and considering treatment options.
Inquisitiveness	Inquisitiveness is intellectual curiosity. It is the tendency to want to know things, even if they are not immediately or obviously useful at the moment. It is being curious and eager to acquire new knowledge and to learn the explanations for things even when the applications of that new learning are not immediately apparent. The opposite of inquisitiveness is mental laziness or indifference. The inquisitive clinician is driven to keep up with the latest advances in health care knowledge and practice.
Maturity of Judgment	Maturity of judgment is the habit of seeing the complexity of issues and yet striving to make timely decisions. A person with maturity of judgment understands that multiple solutions may be acceptable while yet appreciating the need to reach closure at times even in the absence of complete knowledge. Maturity of judgment enables the clinician to avoid the problems created by imprudent, black-and-white thinking, failing to make timely decisions, or stubbornly refusing to change when the clinical evidence shows that change is warranted.

Seven key metrics
reported on three evaluative categories

INSIGHT
HEALTH
Professional

Measuring
Thinking
Worldwide

Reasoning Skills and Mindset at Work in Health Care

- ➤ diagnosing patient problems
- ➤ evaluating therapies
- ➤ analyzing emergent conditions
- ➤ planning long term care
- ➤ evaluating clinical research
- ➤ communicating effectively with patients
- ➤ coordinating team efforts
- ➤ understanding treatment implications
- ➤ interpreting, analyzing and explaining health risks
- ➤ anticipating treatment related complications
- ➤ hiring and promoting leaders
- ➤ analyzing staffing needs
- ➤ explaining policy and protocols
- ➤ preventing errors of omission
- ➤ designing evaluation programs
- ➤ allocating resources
- ➤ using and managing information systems
- ➤ ....

This list goes on almost indefinitely in high-stakes practice settings which require employees who must make critically important judgments.

In addition to a professional mindset, valued health professionals demonstrate strength in reasoning skills.

Critical Thinking Skills

Analysis
Interpretation
Deduction
Induction
Inference
Numeracy
Evaluation
Explanation

Quantitative Reasoning Skill

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OVERALL Reasoning Skills

Specific Indicators:

- Analysis
- Interpretation
- Inference
- Evaluation
- Explanation
- Induction
- Deduction
- Numeracy

OVERALL	The OVERALL Reasoning Skills metric on the INSIGHT Professional represents the integration of thinking and reasoning skills needed to make operational decisions and to address concerns at the professional levels of an organization.
Analysis	Analytical reasoning skills enable people to identify assumptions, reasons and claims, and to examine how they interact in the formation of arguments. We use analysis to gather information from charts, graphs, diagrams, spoken language and documents. People with strong analytical skills attend to patterns and to details. They identify the elements of a situation and determine how those parts interact. Strong interpretation skills can support high quality analysis by providing insights into the significance of what a person is saying or what something means.
Interpretation	Interpretative skills are used to determine the precise meaning and significance of a message or signal, whether it is a gesture, sign, set of data, written or spoken words, diagram, icon, chart or graph. Correct interpretation depends on understanding the message in its context and in terms of who sent it, and for what purpose. Interpretation includes clarifying what something or someone means, grouping or categorizing information, and determining the significance of a message.
Inference	Inference skills enable us to draw conclusions from reasons and evidence. We use inference when we offer thoughtful suggestions and hypotheses. Inference skills indicate the necessary or the very probable consequences of a given set of facts and conditions. Conclusions, hypotheses, recommendations or decisions that are based on faulty analyses, misinformation, bad data or biased evaluations can turn out to be mistaken, even if they have been reached using excellent inference skills.

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Evaluation	Evaluative reasoning skills enable us to assess the credibility of sources of information and the claims they make. And, we use these skills to determine the strength or weakness of arguments. Applying evaluation skills we can judge the quality of analyses, interpretations, explanations, inferences, options, opinions, beliefs, ideas, proposals, and decisions. Strong explanation skills can support high quality evaluation by providing the evidence, reasons, methods, criteria, or assumptions behind the claims made and the conclusions reached.
Explanation	Explanatory reasoning skills, when exercised prior to making a final decision about what to believe or what to do, enable us to describe the evidence, reasons, methods, assumptions, standards or rationale for those decisions, opinions, beliefs and conclusions. Strong explanatory skills enable people to discover, to test and to articulate the reasons for beliefs, events, actions and decisions.
Induction	Decision making in contexts of uncertainty relies on inductive reasoning. We use inductive reasoning skills when we draw inferences about what we think must probably be true based on analogies, case studies, prior experience, statistical analyses, simulations, hypotheticals, and familiar circumstances and patterns of behavior. As long as there is the possibility, however remote, that a highly probable conclusion might be mistaken, the reasoning is inductive. Although it does not yield certainty, inductive reasoning can provide a solid basis for confidence in our conclusions.
Deduction	Decision making in precisely defined contexts where rules, operating conditions, core beliefs, values, policies, principles, procedures and terminology completely determine the outcome depends on strong deductive reasoning skills. Deductive reasoning moves with exacting precision from the assumed truth of a set of beliefs to a conclusion which cannot be false if those beliefs are true. Deductive validity is rigorously logical and clear-cut. Deductive validity leaves no room for uncertainty, unless one alters the meanings of words or the grammar of the language.
Numeracy	Numeracy skills are used when applying knowledge of numbers, arithmetic, measures, and mathematical techniques to situations that require the interpretation or evaluation of information. Numeracy refers to the ability to solve quantitative reasoning problems, or make judgments derived from quantitative reasoning in a variety of contexts. More than being able to compute a solution to a mathematical equation, numeracy includes the understanding of how quantitative information is gathered, manipulated, and represented visually, such as in graphs, charts, tables and diagrams.

Nine key reasoning skills metrics
reported on four evaluative categories

Ask for a sample report!

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Appendix C: Research Data Ownership, Retention, Access, and Security

Research Data Ownership, Retention, Access, and Security

- **Responsible Office:** Research Administration and Compliance, Research and Innovation
- **Current Approved Version:** 11/16/2017
- **Policy Type:** Administrative

Table of Contents

Policy Statement and Purpose

This policy asserts and protects the rights of Virginia Commonwealth University with regard to ownership and retention of research data and related records. It also outlines the university's treatment of research data security that includes stipulations on access to university research data. This policy aims to establish a consistent and efficient management of university research data that is consistent with applicable federal regulations and with the Library of Virginia Public Records Act.

In cases involving allegations of misconduct in research and scholarly activities, the threat of imminent loss of data custody, maintenance of intellectual property records, incapacity of the principal investigator (PI) or for other justifiable causes, the university, acting through the vice president for research or designee, may take immediate custody of research data in its entirety or by allowing investigator access after a forensically sound copy is made.

Noncompliance with this policy may result in disciplinary action up to and including termination. VCU supports an environment free from retaliation. Retaliation against any employee who brings forth a good faith concern, asks a clarifying question, or participates in an investigation is prohibited.

Principal Investigator's General Responsibilities:

The use of Research Data gathered or created within a group of Investigators is subject to the reasonable control of the PI. Principal Investigators are subject to university commitments and

university policies when using information or data gathered or created through research. The Office of Science and Technology Policy issued a Memorandum in February 2013 that seeks to increase access to the results of federally funded research by mandating certain funding agencies to maintain a database of research data and results. Investigators must be aware of, and comply with, sponsor requirements for data management plans, data sharing, and data preservation. Investigators are obligated to discuss and be aware of responsible data handling, university policies, and university commitments with other members of their research team.

Custody of Research Data:

The Principal Investigator is considered to be a Data Custodian under the VCU Information Technology Policy Framework, Data Classification Standard and is therefore charged with the creation, integrity, preservation and security of Research Data, as well as appropriate marking and reporting of all university intellectual property that may be included in, or derived from, the Research Data.

Retention of Research Data:

The Principal Investigator of each Research program must ensure that Research Data documentation is retained according to the standards of the Virginia Public Records Act, the requirements of the sponsor, and according to VCU policy.

If an investigation, legal action or official inquiry concerning a Research activity is ongoing; all Research Data related to the project must be retained and made accessible until all issues are resolved.

Research Data should be kept for as long as may be required to protect any patents or other intellectual properties resulting from this work.

If a student or trainee is involved in research, that research data must be retained at least until the degree is awarded to the student, the training period is complete, or it is clear that the student has abandoned the work.

This policy does not create an obligation to retain Research Data ensuing from an abandoned or unfunded project, unless it results in a Report in which the investigator is identified as a University Member, constitutes a record of university intellectual property, or involves the use of animal or human subjects.

Access to Research Data:

The university has the right to access Research Data for all Research that is either performed at the university, supported by university administered funds, or conducted using university facilities, provided such access shall be for reasonable cause, at reasonable times and after reasonable notice, except in the event of a bona fide emergency. The university's right of access shall continue regardless of the location of the Principal Investigator or of the Research Data.

The university and appropriate external officials shall have access to Research Data concerning matters of compliance with human or animal research subject laws, regulations and policies.

Subject to provisions of law, individual human research participants may be allowed to access Research Data that pertains to them but not to access Research Data pertaining to others.

When an Investigator separates from the university, a written Agreement on Disposition of Research Data shall be negotiated between the Investigator and the Investigator's department chair or dean. These agreements will serve to ensure appropriate access to the transferred Research Data in fulfillment of the university's obligations to funding sources and other supporting entities, and for research compliance purposes. When required by law, regulation or contract, or to fulfill other obligations, the university may transfer title or custody of Research Data and records at its discretion.

Sponsor requirements for public access and/or data sharing must be met.

Security Requirements for Stored Research Data:

The VCU Information Technology Policy Framework contains VCU Information Technology policies, standards and baseline requirements which must be followed in conjunction with this policy in addition to abiding by all grant related regulations.

Who Should Know This Policy

All University Members involved in the conduct of research are responsible for knowing this policy and familiarizing themselves with its contents and provisions.

Definitions

Availability

"Ensuring timely and reliable access to and use of information…" [44 U.S.C., SEC. 3542] A loss of availability is the disruption of access to or use of information or an information system.

Confidentiality

"Preserving authorized restrictions on information access and disclosure, including means for protecting personal privacy and proprietary information…" [44 U.S.C., Sec. 3542] A loss of confidentiality is the unauthorized disclosure of information.

Database

A database is an organization or collection of data. The definition is intentionally broad, and is intended to include but is not limited to spreadsheets or Word documents used to store data and saved on a laptop or desktop, space partitioned on VCU owned servers for data storage, and any

data stored on third party or "cloud" servers owned by an entity other than VCU. (Examples of third party or "cloud" storage: Dropbox, VCU Wiki, or other web based file repositories.) The degree of data sensitivity may determine whether use of third party storage entities is permitted.

Data Custodian

The Data Custodians can have both a business and/ or technical role, though it is typically considered a business role. The Data custodians are responsible for entering, modifying and maintaining data in the enterprise databases and information systems.

Digital Data

The digital recorded factual material commonly accepted in the scientific community as necessary to validate research findings including data sets used to support scholarly publications.

HIPAA Data

HIPAA (Health Insurance Portability and Accountability Act) data is data that contains individually identifiable health information. Some examples are; names, social security numbers, birth dates, and other identifiers. HIPAA data is required by the federal government to be retained for six years.

Integrity

"Guarding against improper information modification or destruction, and includes ensuring information non-repudiation and authenticity…" [44 U.S.C., Sec. 3542] A loss of integrity is the unauthorized modification or destruction of information.

Investigator

Means any University Member engaged in the conduct of research as either an employee or student of the university or any person using facilities owned or operated by, or resources administered by, the university.

Original Copy

The top copy or document having the actual typed, handwritten, or computer generated print or signature on it. In cases where the original copy has been sent outside of the university, the institutional copy that resides in the originating office is to be treated as the original copy. The requirement for records retention and disposition schedules relates specifically to original/institutional copies.

Principal Investigator (PI)

Has primary stewardship of Research Data on behalf of the university. In this capacity the Principal Investigator (PI) is responsible for data collection, recording, storage, access, and retention in keeping with this policy and best practices in the PI's discipline.

Public Records

All original copies of written papers, letters, documents, photographs, magnetic tapes, microfiche, microfilm, sound recordings, maps, other documentary materials, or information in any recording medium regardless of physical form or characteristics, including computer generated and electronically recorded materials and information, made or received in connection with the transaction of public business by any agency or employee of state government or its political subdivisions. State law prohibits individuals and departments from destroying or otherwise disposing of public records without proper authorization.

Report

Means any summary, statement or description of Research activities published in the open literature or provided to the public, the university, a sponsor, or other researchers by a University Member.

Research

Means a systematic investigation designed to develop or contribute to knowledge and may include the stages of development, testing, and evaluation.

Research Data

Recorded information, regardless of form or the media on which it may be recorded, which constitute the original observations and methods of a study and the analyses of these original data that are necessary for reconstruction and evaluation of the Report(s) of a study made by one or more Investigators. Research Data also includes all such recorded information gathered in anticipation of a Report. Research Data differ among disciplines. The term may include but is not limited to technical information, computer software, laboratory and other notebooks, printouts, worksheets, other media, survey, memoranda, evaluations, notes, databases, clinical case history records, study protocols, statistics, findings, conclusions, samples, physical collections, other supporting materials created or gathered in the course of the Research, Tangible Research Property, unique Research resources such as synthetic compounds, organisms, cell lines, viruses, cell products, cloned DNA as well as genetic sequences and mapping information, crystallographic coordinates, plants, animals and spectroscopic data, and other compilations formed by selecting and assembling preexisting materials in a unique way. The term does not include information incidental to research administration such as financial, administrative, cost or pricing, or management information.

Research Development Advisory Council (ReDAC):

Inaugurated in 2006, its members are Associate/Assistant Deans for Research or individuals who hold comparable responsibilities for research development within their respective College/School. Council members represent the research interests of each of the Schools and Colleges at the university, and serve as a conduit of information from the Office of Research and Innovation back to their constituencies. The Council meets regularly with the Vice President for Research and Innovation and the Associate Vice President for Research Development to address topics of specific interest to the university research enterprise, and to identify resources and supports necessary for increasing the strength and competitiveness of VCU as a research university.

Tangible Research Property

Products of research that include, but are not limited to, compositions, biologics, materials, illustrations and drawings, prototypes, devices, and equipment.

University Member

Any full- or part-time faculty member, classified employee, administrative staff member, paid student assistant, student, volunteer, fellow or trainee, visiting faculty member or researcher. One is not a University Member when acting in a purely private role that in no way or manner implicates the university, unless the activity results in a Report in which the individual is identified as having a university affiliation.

University Record

Recorded information that documents a transaction or activity by or with any appointed board member, officer, or employee of the university. Regardless of physical form or characteristics, the recorded information is a university record if it is produced, collected, received or retained in pursuance of law or in connection with the transaction of university business. The medium upon which such information is recorded has no bearing on the determination of whether the record is a university record. University records include but are not limited to: personnel records, student records, research records, financial records and administrative records. Record formats/media include but are not limited to: email, electronic databases, electronic files, paper, audio, video and images (photographs).

VCU Technology Services Data Security Classifications:

Category I - Highly Sensitive Records
Records containing personal information that can lead to identity theft if exposed, health information that reveals an individual's health condition and/or history of health services use, export controlled data, and proprietary data.

Category II - Moderately Sensitive Records
Physical records containing data that is not explicitly defined as highly sensitive information or is not intended to be made publically available.

Category III - Public Information (not sensitive) Records
Information that is intentionally made available to the public.

Contacts

VCU's Office of Research and Innovation officially interprets this policy. The Office of Research and Innovation is responsible for obtaining approval for any revisions as required by the policy Creating and Maintaining Policies and Procedures through the appropriate governance structures. Please direct policy questions to the Office of Research and Innovation.

Policy Specifics and Procedures

1. Acquisition and Use of Research Data:

Investigators shall record original observations in accordance with the standards of their respective disciplines and the university's Responsible Conduct in Research and Scholarship policy.

The Investigator who gathers or creates Research Data may use the information as they deem appropriate and may authorize others to make appropriate use thereof, subject to university contractual commitments and university policies.

2. Custody of Research Data:

All Research Data shall be preserved in the custody of the Principal Investigator who is responsible for treating such data in accordance with this policy

In the case of incapacity of the Principal Investigator, that individual's supervisor will take custody of that individual's Research Data until other appropriate arrangements are made for alternative custody.

As required by this policy, investigators on Research teams are obligated to discuss with other members of a Research team the responsibilities of data:

- Acquisition
- Use
- Management
- Access
- Retention
- Security
- Further access and use of de-identified human subjects data that is acquired via student research projects
- Dissemination of data and research findings in presentations and manuscripts submitted for publication.

Preservation and security of Research Data is typically an allowable direct cost of conducting research and can be a budgeted item in many sponsored program agreements.

3. Retention of Research Data:

Research Data disclosed or referenced in publications, including the primary experimental results, must be retained for a minimum of five years (or as otherwise defined by state or federal regulations or agreement) to allow analysis and replication by others.

Research Data resulting from sponsored programs are to be retained for a minimum of five years after submission of the final Report on the Research project, unless a longer retention period is specified by the sponsor.

A Final Report for each closed sponsored project must be maintained permanently at VCU according to the Records Retention and Disposition General Schedule No. GS-111 updated 12/12/2013. The Office of Sponsored Programs will comply with this new requirement by tracking all sponsored project closeouts, and will generate a standard "Final Completion Report" for each sponsored project that has been closed. This report will then be uploaded, no less than once per year, and archived permanently in digital format in the system the VCU Library currently maintains for open access storage of digital files.

The most common exception to the five year period required by the Virginia Code is the six year retention required by HIPAA if any personally identifiable health information is included in the data.

Research data collected for product application to the Food & Drug Administration (FDA) may be subject to additional data retention requirements as specified by the sponsor and/or the FDA.

If an investigation, legal action or official inquiry concerning a Research activity is ongoing; all Research Data related to the project must be retained and made accessible until all issues are resolved. In addition to the five year retention requirement above, if a student or trainee is involved, Research Data must be retained at least until the degree is awarded to the student, the training period is complete, or it is clear that the student has abandoned the work.

4. Access to Research Data:

University Members who are an integral part of a Research project have the right and responsibility to review all Research Data that they gathered or created, or which support publications for which they are named authors, even after departure from the university, to the extent that such Research Data continues to exist and can be identified.

Standards of data sharing have been published by national scientific organizations and by federal funding agencies:

- Sharing Publication-Related Data and Materials: Responsibilities of Authorship in the Life Sciences (The National Academies Press)

- NIH Data Sharing Policy (National Institutes of Health)
- NSF General Grant Conditions (National Science Foundation)
- COGR (Council on Government Relations)
- Sharing Clinical Trial Data: Maximizing Benefits, Minimizing Risk (Institute of Medicine)

University Members are expected to share their published data upon request.

In the case of requests that have commercial implication or those that involve Tangible Research Property which may represent potential or protected intellectual property such materials may be shared under the terms of a university-approved Materials Transfer Agreement.

Shared data resulting from human subjects research shall be de-identified, with the linkage code residing in the custody of the university Principal Investigator.

Research Data Management, VCU Libraries, can assist in writing data management plans for awards, training research teams in the responsibilities of data, and finding publicly accessible data repositories.

University Members should request preparation of a Data Use Agreement via the Data Use / Data Sharing Agreement Request form prior to providing Research Data to a third party.

Sponsor Requirements for Public Accessibility
Some sponsors mandate specific methods for long-term preservation and analysis for digital data. Research Data resulting from sponsored programs must comply with all sponsor-mandated preservation. Long-term preservation methods include deposit of data in a publicly accessible sponsor-approved subject repository, the sponsor's repository, or the VCU institutional repository, Scholars Compass, managed by VCU Libraries.

Sharing of data as required by sponsors, including the primary data, samples, physical collections and other supporting materials, should occur in a timely manner and involve only necessary costs.

5. Transfer of Research Data:

In most cases, when an Investigator is transferring to another institution, VCU shall allow the Investigator's Research Data (other than personally identifiable clinical Research records) to be transferred with the Investigator. However, in order to ensure the university and appropriate external officials have access to Research Data concerning matters of compliance with human or animal research subject laws, regulations and policies, a copy of all transferred data will remain in the appropriate school or department at VCU

The Investigator and Department Chair shall enter into a written agreement describing the disposition of research data. Under the terms of the agreement, the Investigator shall have the obligation to hold these Research Data in trust for the university. See Forms section for a template "Agreement on Disposition of Research Data."

In some cases (e.g., Research Data supporting a patent application, Research Data generated and/or used by other university Investigators, some Tangible Research Property, or as required by the terms of extramural funding agreements), it may be necessary for original Research Data to be retained at the university. In such cases, this agreement shall allow the Investigator to access and, where practical, to copy Research Data.

In cases of multi-institutional studies, the institution of the primary study director shall be responsible for arranging appropriate access to, use of, and retention of Research Data.

If the university transfers title or custody of Research Data and records as required by law regulation, contract, or to fulfill other obligations, the university, insofar as possible, will ensure access by Principal Investigators, Investigators and other appropriate individuals to that Research Data.

6. Security Requirements for Digitally Stored Research Data:

All sponsored projects and/or IRB protocols involving Category I data must go through an assessment process. (Data Management System (DMS)). Individuals should use the DMS as their main tool for assessing storage requirements.

This policy is designed to address research projects with standard data security needs that focus on the Integrity and Availability aspects of data/information Security. Please reference the Compliance with United States Export Control Laws for data/information security issues focusing on confidentiality and other highly restricted data/information.

7. Research Data Policy Oversight and Dispute Resolution:

The Vice President for Research and Innovation has responsibility for oversight of, and resolution of, disputes resulting from this policy. If an Investigator desires to contest the decision of the Vice President for Research and Innovation, the Investigator may file a written appeal to be reviewed by a committee of researchers, appointed by VCU Research Development Advisory Council.

Appendix D: Screening Procedures for Human Participants

Identifying Screening Activities that Involve Human Subjects

Definitions:

HHS regulations define *human subject* at 45 CFR 46.102(f) as follows:

Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains

1. data through intervention or interaction with the individual, or
2. identifiable private information.

Obtaining identifiable private information or identifiable specimens includes, but is not limited to using, studying, or analyzing for research purposes identifiable private information or identifiable specimens that have been provided to investigators from any source or that were already in the possession of the investigator.

Intervention includes both physical procedures by which data are gathered (for example, venipuncture) and manipulations of the subject or the subject's environment that are performed for research purposes.

Interaction includes communication or interpersonal contact between investigator and subject.

Private information includes information about behavior that occurs in a context in which an individual can reasonably expect that no observation or recording is taking place, and information which has been provided for specific purposes by an individual and which the individual can reasonably expect will not be made public (for example, a medical record).

Individually identifiable means that the identity of the subject is or may readily be ascertained by the investigator or associated with the information (linked to specific individuals by the investigator(s) either directly or indirectly through coding systems).

Recruitment vs. Screening:

Recruitment activities involve giving potential subjects information about the study so that they can decide whether they are eligible. A consent process is not required.

> Examples: posting flyers, websites, handing out consent forms, word of mouth solicitation

Screening activities involve obtaining information from/about a potential subject so that the study team can decide whether they are eligible.

When a screening activity involves human subjects, consent (and HIPAA) regulations apply.

1) Obtaining eligibility data through a research intervention

> Examples: a blood test or scan for research purposes, a drug washout period before beginning a study, having a subject do a trial run of a study procedure, testing whether a subject can tolerate an environmental manipulation

2) Obtaining eligibility data through a research interaction (where data is recorded and kept by the study team or a measure is given that would not otherwise be given)

> Examples; administering a psychological measure, giving an academic test, observations, recording and keeping data from a series of yes/no eligibility questions for analysis of non-qualifying participants

3) Obtaining (i.e. accessing or using) identifiable private information to determine eligibility
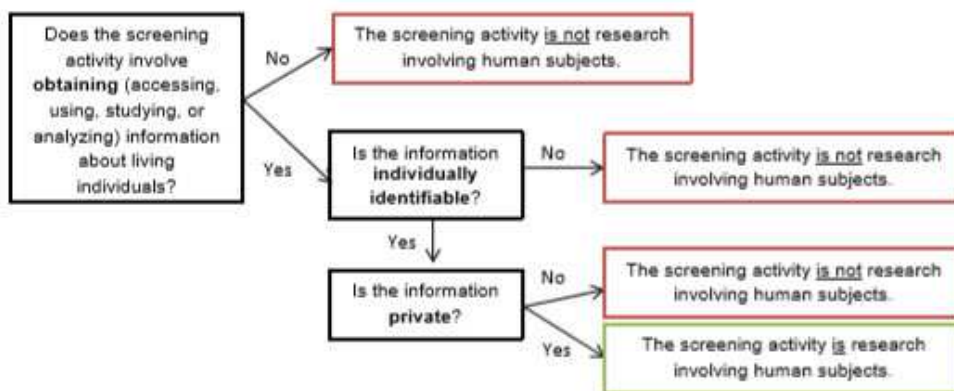
> Examples: reviewing medical, educational, psychological records, obtaining data from a registry, obtaining data from another study

Sometimes studies provide screening measures that will be used as tools or guides, not for data collection

> Examples of screening activities that do not involve human subjects:
> - Asking a series of yes/no eligibility questions and not writing down responses
> - Asking a series of yes/no eligibility questions and writing down responses but *immediately* destroying the information if the person is ineligible
> - Searching a publicly available website to make a list of potential participants' names and contact information

When deciding whether screening involves human subjects, consider each screening activity separately.

Does the screening activity involve a research **intervention** with the individuals?

No → The screening activity is not research involving human subjects.

Yes → The screening activity is research involving human subjects.

Does the screening activity involve a research **interaction** with the individuals?

No → The screening activity is not research involving human subjects.

Yes → Is screening data **recorded** by the investigator?

No → The screening activity is not research involving human subjects.

Yes → The screening activity is research involving human subjects.

Does the screening activity involve **obtaining** (accessing, using, studying, or analyzing) information about living individuals?

No → The screening activity is not research involving human subjects.

Yes → Is the information **individually identifiable**?

No → The screening activity is not research involving human subjects.

Yes → Is the information **private**?

No → The screening activity is not research involving human subjects.

Yes → The screening activity is research involving human subjects.

For additional guidance, see OHRP's decision charts and "Guidance on Coded Private Information or Specimens Use in Research." The FDA also has guidance: "Screening Tests Prior to Study Enrollment"

Appendix E: Study Participant Letter

Nursing Clinical Assessment Skill Online Analysis

Dear Participant:

Thank you for considering taking part in this research study on nursing clinical assessment skills. The project is to determine the correlation of clinical assessment skills and early recognition of patient deterioration with the result of calling the Rapid Response Team.

If you agree to participate, you will be asked to complete an online assessment that will take about 1 hour and *needs to be taken in one sitting*. The assessment is provided online by INSIGHT Assessment, an internationally known organization that provides data and analysis of clinical assessment surveys. The assessment is divided into two parts: **The Health Professional Mindset** which includes questions on truth seeking, open-mindedness, confidence in reasoning, inquisitiveness, and maturity of judgement. **The Health Professional Reasoning Skills** includes analysis, interpretation, evaluation, and explanation using clinical scenarios.

Additionally, we will ask that you provide some demographics in the same assessment form that include educational preparation (BSN vs ADN), clinical ladder designation, years of practicing as a nurse, years of practicing as a nurse in your current location, nursing certification (if any) and the number of times that you've called RRS to the bedside.

This survey is taken online and is anonymous. Taking this survey does not impact on your job at VCU Health system, your evaluation, pay, benefits, or any other aspect of your work at VCU Health System. The online assessment is voluntary, and you may withdraw from the study at any time, without penalty. You were randomly selected as a part of a general pool of inpatient general or stepdown staff nurses.

The information that you provide cannot be tracked to you and is used by the researchers only in the overall analysis of nursing clinical assessment and recognition of early deterioration in patients. You will not receive a copy of the results. **Please try to complete the study by 20 June 2020.**

If you are willing to participate, please go to the website___ www.insightassessment.com ___ and enter your password: **XXXXX** and key: **XXXXXX**(0 = zero, o = letter)

Follow the instructions on the screen. If you have any questions, concerns, or need to contact the study researcher, please contact me at:

[Blank]

Thank you for taking the time to complete this assessment. A small gift card has been supplied to thank you for your effort.