Testing and refinement of an integrated, ethically-driven environmental model of clinical decision-making in emergency settings

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TESTING AND REFINING AN INTEGRATED ETHICALLY-DRIVEN ENVIRONMENTAL MODEL OF CLINICAL DECISION-MAKING IN EMERGENCY SETTINGS

a dissertation

by

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Abstract

The purpose of the study was to explore the relationship between multiple variables within a model of critical thinking and moral reasoning that support and refine the elements that significantly correlate with accuracy and clinical decision-making.

Background: Research to date has identified multiple factors that are integral to clinical decision-making. The interplay among suggested elements within the decision making process particular to the nurse, the patient, and the environment remain unknown. Determining the clinical usefulness and predictive capacity of an integrated ethically driven environmental model of decision making (IEDEM-CD) in emergency settings in facilitating accuracy in problem identification is critical to initial interventions and safe, cost effective, quality patient care outcomes. Extending the literature of accuracy and clinical decision making can inform utilization, determination of staffing ratios, and the development of evidence driven care models.

Methodology: The study used a quantitative descriptive correlational design to examine the relationships between multiple variables within the IEDEM-CD model. A purposive sample of emergency nurses was recruited to participate in the study resulting in a sample size of 200, calculated to yield a power of 0.80, significance of .05, and a moderate effect size. The dependent variable, accuracy in clinical decision-making, was measured by scores on clinical vignettes. The independent variables of moral reasoning, perceived environment of care, age, gender, certification in emergency nursing, educational level, and years of experience in emergency nursing, were measures by the Defining Issues Test, version 2, the Revised Professional Practice Environment scale, and a demographic survey. These instruments were identified to test and refine the elements within the IEDEM-CD model. Data collection occurred via internet survey over a one month period. Rest's Defining Issues Test, version 2 (DIT-2), the Revised Professional Practice Environment tool (RPPE), clinical vignettes as well as a demographic survey were made available as an internet survey package using Qualtrics ^{TM}. Data from each participant was scored and entered into a PASW database. The analysis plan included bivariate

correlation analysis using Pearson's product-moment correlation coefficients followed by chi square and multiple linear regression analysis.

Findings: The elements as identified in the IEDEM-CD model supported moral reasoning and environment of care as factors significantly affecting accuracy in decision-making. Findings reported that in complex clinical situations, higher levels of moral reasoning significantly affected accuracy in problem identification. Attributes of the environment of care including teamwork, communication about patients, and control over practice also significantly affected nurses' critical cue recognition and selection of appropriate interventions. Study results supported the conceptualization of the IEDEM-CD model and its usefulness as a framework for predicting clinical decision making accuracy for emergency nurses in practice, with further implications in education, research and policy.

Keywords: *moral reasoning, clinical decision-making, emergency nursing, triage, environment of care, professional practice environment, accuracy*

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Dedication

This work is dedicated to my husband, Jon-Holcomb Noble, who has encouraged me to pursue both practice and education. He has reared three children, kept the hearth fires burning, edited manuscripts, and made coffee for 20 years. I would not be where I am without his love and support.

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Chapter 1

Introduction

Nurses are accountable for accurate decision-making (Lunney, 2001).Understanding the components of effective decision making in environments where patients are essentially unknown (high uncertainty) and potentially very ill (high acuity) is important because the patient outcome is highly dependent on the initial assessment and subsequent judgment of the emergency nurse. An experienced nurse making effective clinical decisions is often able to delineate the "well-looking ill" from the "ill-appearing well" and send each patient to an appropriate setting for further evaluation and safe, effective treatment. The preparation of nurses to recognize, evaluate, and judge assessment data and then act appropriately on that data is critical to cost effective, safe, quality care especially in high acuity/high uncertainty settings such as the emergency department (ED). Discerning which critical cues, or cues that indicate physiologic or emotional instability, are important in problem identification and understanding how and why they are selected or ignored by nurses is a significant concern in both nursing education and practice. Identifying confluences of factors which facilitate or hinder informed clinical decision-making and which are related both to the nurse and the environment are also significant for safe, effective practice.

Background of the Problem

Clinical decision making is a process requiring knowledge and critical thinking and is a reflective, self-correcting cycle (Lonergan, 1957; Dewey, 1910). For these and other authors, critical thinking is not a linear process, but a "looping" one. Benner (1984) and Facione & Facione (1990) also are supporters of this perspective. Using clinical reasoning as an integral component of the nursing process helps to identify and resolve

clinical problems and is an example of a directed self-correcting cycle as discussed by Lonergan (1957), and is designed to allow the nurse to use patient data and clinical knowledge to challenge or confirm the initial clinical judgment. From that judgment, desired outcomes and strategies or interventions to achieve the desired goal can be derived. Finally, "evaluation" enables the nurse to judge the process, and returns to "assessment", as needed, especially if the problem is unresolved.

In the United States, over 119 million people per year seek care in emergency departments for complaints ranging from a laceration to the finger to a life-threatening stroke or myocardial infarction (CDC website, 2010). These millions of people represent multiple demands in the health care setting. Nurses are often the first person a patient encounters when they enter this system, and nurses are the individuals who determine the severity of a problem while directing the patient to appropriate care and resources in the emergency setting.

Given the millions of patient who visit emergency department (ED) each year, it is not always possible to immediately bring a patient to a treatment bed and begin care. Patients must be triaged, or prioritized by acuity or severity of condition. The word "triage" is derived from the French "trier" meaning "to sort or select" (Collins Robert French College Dictionary, 2007) and this "sorting" is most commonly a nursing function. However, "triage" as it is understood in the context of the emergency department is only the first and perhaps most formal stage of the initial patient encounter, the goal of which is to rapidly identify patients with immediate threats to life, limb or sight. Triage is actually a process, not a location, and therefore this initial encounter between the nurse and the patient can extend well into initial delivery of care and the identification of the presence or absence of life threatening conditions. Accuracy in problem identification is a crucial component of clinical decision-making. This type of

clinical decision-making requires the nurse to establish boundaries of physiologic and psychological stability, as well as predict the potential trajectory of the patient condition based on correct problem identification and the resultant clinical decision. To make effective clinical decisions, nurses must draw from an extensive database of knowledge and experience to determine salient cues, identify their presence or absence, and act based on the clinical picture then presented..

Lunney (2001) has posited a useful definition of critical thinking, stating that "critical thinkers in nursing practice the cognitive skills of analyzing, applying standards, discriminating, information seeking, logical reasoning, predicting, and transforming knowledge" (p. 10). When critical thinking is discussed in the contemporary literature it is suggested that assessment and action are important components of the process. Critical thinking in this context is the process that informs and guides the action based on an accurate judgment. When clinical decision making is examined, it is often considered a holistic process and as the expression of critical thinking.

Up until now, research linked to nurses' clinical decision making has focused on decision making by nurses in general (Del Bueno, 2005; Hicks, et al., 2004; Muir, 2004; Standing, 2007; and Banning, 2007), decision making by emergency nurses, and emergency nurses specifically in the triage setting (Andersson, et al., 2006; Goransson et al., 2008, Chung, 2005; Gerdtz and Bucknall, 2001, Cone and Murray, 2002; and Edwards, 2007). The literature has reported that there are a number of factors used by nurses to make decisions about patient situations (Chung, 2005; Gerdtz and Bucknall, 2001, Goransson et al., 2008; Brannon and Carson, 2005). Most of these data have been derived through surveys (Cone and Murray, 2002), questionnaires, and interviews (Goransson et al, 2008, Andersson et al., 2006, Gerdtz and Bucknall, 2001). To date, studies linking critical thinking and decision-making examined decision-making after the

fact through subjective reconstruction of the process, suggesting that the contextual understanding of decision-making may not be fully appreciated. Findings from these studies have focused on nurses justifying clinical decisions retrospectively and are not an examination of decision-making as a process in-the-moment. These reports however, do not account for certain contextual and process factors and fail to provide an adequate picture of the entire process of reasoning and decision-making.

What is currently written about the clinical decision making process as it occurs within the initial patient encounter is contradictory. Available clinical decision-making models provide thinking strategies that are normative, describing what nurses *should* be doing. In contrast, much of the research around decision making in the context of the triage environment is descriptive, focusing on what nurses believe they *are* doing. Both give incomplete information because the knowledge about cognitive processes involved in the triage process as well as an understanding of the influences of the social context in which decision making occurs is equally underdeveloped. There remains a gap in knowledge that addresses decision-making and the lack of clarity around the interplay of factors related to decision-making in high acuity/high uncertainty environments. To date, there is limited information about what factors facilitate the accurate search for, interpretation of, and reflection on those critical cues required to identify a problem and thus take effective action.

Using a framework that connects the understanding of what constitutes the 'good' for any particular patient at the time of the interaction with the motivation needed to achieve this 'good' enhances the deliberate search for critical cues or defining characteristics required to make an accurate judgment. Within this perspective, the search for information is ethically driven and suggests ethical reasoning and clinical reasoning are not separate processes, but one interrelated cognitive process. Accuracy in identifying

these critical cues facilitates the identification of the patient problem and the appropriate action needed to resolve it. Therefore:

Purpose

The purpose of this study is to evaluate the clinical usefulness of an integrated, ethically –driven environmental model of clinical decision-making in emergency settings. This model is based on the synthesis of current literature and the study findings of two investigations of clinical decision-making in emergency settings conducted by this author. The model integrates the constructs of knowledge, moral reasoning and the environment of care on the accuracy of clinical decision-making in the context of a high acuity/high uncertainty nursing environment.

Development of a Model for Clinical Decision Making in High Acuity, High Uncertainty Environments

The extant literature on clinical decision-making highlights many 'variables' (e.g. report from others, collected data, intuitive sense) associated with the process of making clinical decisions under conditions of high uncertainty. The literature around data collection and the initial patient assessment (Goransson et al., 2008; Lyneham, et al., 2008, Chung, 2005; Vance and Sprivulis, 2005) is problematic in that the majority of research conducted in this area focuses on reconstructive rather than observational data and lends an additional layer of uncertainty to the decision-making process.

In order to better explicate the variables involved in decision-making and consider their interplay in initial problem identification and patient acuity decisions, a conceptual model for care delivery by nurses in high acuity, high uncertainty environments was derived from both the available literature and several pilot studies (Wolf, 2010a). The impetus for the model was prompted by the author's frustration with clinician inability to engage in efficient, effective decision-making in emergency department settings. Failure to engage in an effective process of decision-making can compromise safety and increase

the risk of adverse patient outcomes. Educational initiatives designed to improve use of triage systems and accuracy in patient acuity assignation failed to achieve desired outcomes and prompted the current investigation.

Pilot data and Model Development

Two studies provided preliminary data to address the challenge of effective decision making by triage nurses. An ethnographic approach, most commonly used in anthropology and sociology to better understand the contextuality of particular phenomena, was used to initially address the problem. In an ethnographic study, the researcher positions him/herself in the environment of interest and collects data via observation, formal and informal interviews and other modalities, including chart review. In this investigation, preliminary ethnographic data was collected in a single emergency department in the spring of 2009, followed by a more extensive ethnographic study in the summer of 2009. The first study highlighted several factors important to the decision-making process used by nurses in an emergency department environment. These included the adequacy of provider knowledge and critical thinking skills of the nurse, presence or absence of trust between providers and nurses, and the perceived legitimacy of authority of unit leadership. This preliminary study yielded a working model (Figure 1).

Operationalization of trust-driven model.

In this open interactive model, the perceived accuracy and usefulness of clinical data was dependent on the level of trust between the giver and recipient of the information. This was largely dependent on relationships between nurses and providers and their perceived levels of collegiality and collaboration. A second component of this model was perceived legitimacy of authority between nurses and their unit leaders (charge nurses and administrative managers) which determined responsiveness to clinical directives. The last component was the perceived legitimacy of administrative or

institutional authority with regard to clinical knowledge and what was best for patient care and nursing practice.

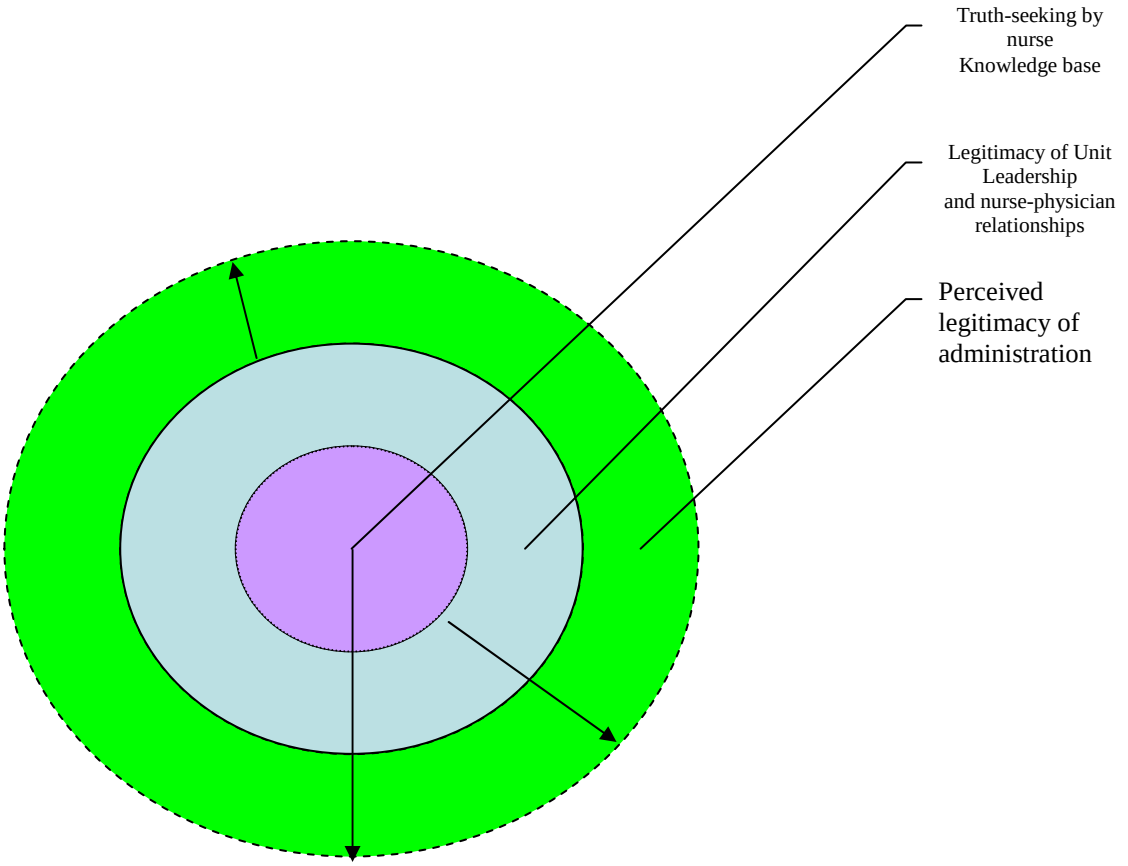
Each element of this model affected and was affected by the other elements. In an environment where there was a high degree of trust between nurses and providers, patient care was facilitated, with confidence that nurses and providers would support each other clinically. When there was trust between nurses and unit leaders, the flow of patients in and out of the department was efficient, directives for patient care were followed, and appropriate care was delivered in a timely manner. When there was a high level of trust in the hospital administration, changes in policies were accepted quickly. When there was compromised trust in these relationships, patient care was not as efficient: for example, when there was compromised trust between nurses and providers, care was based on the preferences of the provider. This could mean a delay in obtaining intravenous access, asking for orders for medications or radiologic exams, or placing a patient in a potentially inappropriate area of the emergency room because the provider preferred not to care for a particular patient population such as children or intoxicated patients. New policies were resisted when there was compromised trust between nurses and hospital administrators. The configuration of these relationships could change on a shift-by-shift basis.

Study 2.

To validate the presence and importance of the elements of the first model, a larger, second study was conducted also using ethnography as the methodology of choice. Potential factors contributing to accuracy in decision-making were observed in two emergency departments to better understand the meaning of patient presentation to nurses and the cues nurses relied on to make initial problem identification and acuity decisions (Wolf, 2010a). The ethnographic method was chosen for the second study because it allowed for observation of the interaction between providers and patients and how

decision making strategies were used in real time (as they actually occurred) rather than after the fact. The method also allowed for the examination of the conditions, context, and timing under which emergency nurses make clinical decisions during initial patient encounters.

Figure 1: Trust-driven Model



Lines of trust run through each of the three rings, affecting the quality of decision-making

Site and sample – study 2.

Twelve emergency nurses in two clinical sites were observed as they engaged in the process of data gathering, problem identification, and decision-making during the initial patient encounter. There were 150 initial patient encounters observed over the

course of three months in the summer of 2009. Most of the encounters were observed in a designated triage area within the two emergency department sites; the remaining encounters occurred at the bedside of those patient brought in directly from triage or by ambulance. The study also explored both personal and environmental factors affecting the decision making process.

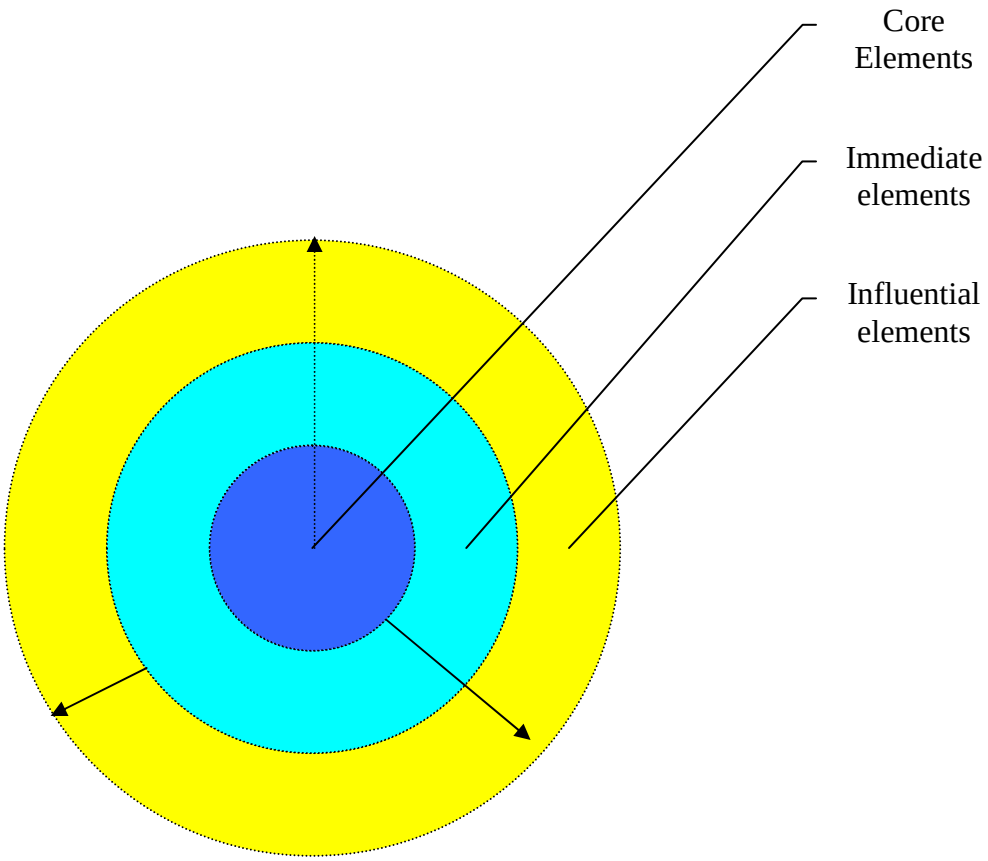
Findings – study 2.

Study results suggested that nurses perceived acuity to be a function of patient presentation (including how sick the patient looked, ambulatory status, and arrival by EMS or by car). The presenting complaint (patient symptoms), duration of symptoms (how long the symptoms had been present), and body habitus (size and shape of the patient, e.g. morbidly obese or very thin *vs*. "average" size) were additional data used to inform acuity decisions. Often this information was not relevant to the patient problem. The ineffectiveness of the nurses' assessment of patient problem and acuity during the initial encounter with the patient was also influenced by environmental and contextual challenges including patient volume, unit leadership, communication with patients and providers and length of time in triage. While few patient encounters observed during this investigation resulted in life-threatening outcomes, multiple factors were found that compromised the nurses' ability to promptly identify the most pressing patient problem, posit an etiology, and take appropriate action.

It was observed that the nurses' performance and responses varied in both the sequence and content of their data collection process as well as their interpretation of this information. It was observed, for example, that physiologic data was not rigorously assessed nor considered as a primary determinant of acuity. It was determined that critical cues needed to identify patient problems and establish parameters of physiologic stability were not being considered. Instead, added weight was being given to those factors that

were considered extraneous to the immediate patient complaint (e.g. body habitus and length of time between onset of symptoms and when patient was initially seen). Elements within the decision-making process particular to the nurse, the patient, and the environment and their interplay as identified in Study 2 led to the evolution of the second conceptual model to depict this interplay.

Figure 2: An integrated, ethically driven environmental model of clinical decision-making in emergency settings



1. Core elements
    a. Knowledge base
    b. Critical application
    c. Moral reasoning
2. Immediate elements
    a. Unit leadership
    b. Nurse-provider relationships
3. Influential elements
    a. Environment of care
    b. Sociopolitical environment and resources

Current model.

The current model (Figure 2) originated as a response to a significant gap in current knowledge. This model reflects a deficiency in the understanding and practice of initial patient assessment in the emergency department. The initial patient encounter in the ED serves as the beginning of the nurse-patient relationship and helps to guide the assessment of patient complaint and presentation (IOM report 2000, 2001, 2002). Accuracy in the initial assessment of the patient presenting to an emergency department is critical to the provision of safe, cost effective, and efficient care.

The current model as conceived is a theoretical representation that emerges from ethnographic research (Wolf, 2010a) and current literature addressing clinical decision making. This model is a dynamic, interactive representation of the encounter between the nurse, the patient, and the environment and the decision-making process. It focuses on the "in the moment" patient experience within the context of the whole person, nurse, environment, health dynamic.

Within this model (Fig. 2), open concentric rings radiate out from the center; in the core are variables pertaining to the individual nurse: knowledge, i.e.content belonging to the nurse, clinical application i.e. the ability to apply the knowledge base to the situation at hand), and moral agency i.e. the drive to address a patient care problem for the good of the patient. The second ring, called "immediate elements", contains those variables that actively interact within the immediate environment of care. They include nurse-physician relationships, staffing, and unit leadership. The outermost ring, comprised of less immediate but still influential elements, contains variables pertaining to the general environment of care. They include patient volume, patient acuity, institutional leadership and support for practice, as well as such variables as diversion policies and

patient access to care/insurance. Within this framework of the decision-making process these elements, these elements are interactive and focus on the assessment and evaluation of patient data in the environment of care to arrive at the *sunnum bonum* ("highest good") for the patient.

Each of the concentric rings in the model represents an open, interactive and dynamic system. A change in one ring or selected element will create changes on other components of the model. This application of systems theory is supported by Neuman (1972) and King (1981) and helps to frame nursing care within the nurse patient relationship. In an open system, there are elements of personal, interpersonal, and social interactions which influence the perceptions and behavior of a person (King, 1981). The IEDEM-CD model suggests that these elements correspond to similar "rings" of the model, which are interactive and interconnected.

Operationalizing the Model.

This model is grounded in the value that that a nurse holds a strong proclivity for moral reasoning that may be used to overcome an ineffective practice environment in order to engage in effective decision-making. Conversely, in a practice environment that is supportive of effective communication between nurses and their physician colleagues and holds nurses accountable for the accuracy and effectiveness of their decision-making, a nurse with a weak tendency of moral reasoning may by virtue of the environment's expectations be more effective. In situations of concern, the nurse with weak moral reasoning tendencies in a poor practice environment; the model would suggest less effective decision-making and less-optimal patient outcomes.

The integrated ethically driven environmental model of clinical decision making (IEDEM-CD) as it depicts clinical reasoning in emergency settings integrates ethical and clinical judgment as a component of the clinical reasoning process. A similar model that

also incorporates an integration of ethical and clinical judgment advanced by Gordon *et al*., (1994), posits a generic process of decision-making, with the nurse making ethical and clinical judgments as appropriate. The IEDEM-CD model views ethical reasoning as the driving motivation behind the deliberative collection of data and determination of critical cues that allow for clinical judgment. As such, ethical reasoning cannot be separated from clinical judgment. The position that the effective search for information as well as the processing of that information is driven by moral reasoning and sensibility has not yet been demonstrated in this way, and is therefore potentially a significant contribution to the advancement of nursing science and patient care.

The IEDEM-CD model allows for further study of the interplay between and among these elements and further refinement of the IEDEM-CD model. It may help to identify factors that contribute to ineffective decision making and promote methods to foster best practices, especially in emergency settings.

Elements of the Model

Core elements.

The core elements of the model are comprised of that which pertains to the individual nurse: knowledge, clinical application, and moral reasoning and action.

Knowledge of the Nurse.

The *knowledge* of the nurse is a critical component of the model. A more complete knowledge base comprised of broad knowledge from empiric, personal, ethical and aesthetic ways of knowing (Carper, 1978) allows for a deep well from which to draw knowledge that facilitates the recognition of critical cues needed to identify a patient problem and connect patient information to treatment decisions. A nurse whose clinical knowledge base is inadequate lacks the needed information to adequately assess, analyze,

and synthesize information to consistently name the problem (i.e., the threat to physical or psychological stability) she is managing.

Recognizing critical cues.

Wotton and Redden (2001) call this ability to recognize and name a problem the result of "pivotal cues" or defining characteristics. Literature focusing on nursing diagnosis calls the cues "defining characteristics" (Carpenito, 1997) or "pivotal cues" (Redden & Wotton, 2001). Research exploring decision-making in critical care and medical-surgical nurses and their ability to recognize and treat a phenomenon called "third-spacing" provides important information about the importance of knowledge and expertise associated with reasoning strategies. "Third-spacing" occurs when a fluid and electrolyte imbalance, and/or inefficient cardiac function is present, and causes fluid to leave the blood vessels of the body and overfill the spaces between cells. Fluids can collect in the lower extremities, the lungs or the abdominal cavity, and presents a potential threat to breathing, circulation, and skin integrity. The expert nurses, mostly the critical care nurses, used a selective and deliberative hypothetico-deductive approach that allowed the nurses to discern the etiology of the problem and derive and test an appropriate nursing diagnosis. To achieve this goal required the "clustering" of critical cues and using "pivotal" cues to further refine the diagnosis (Redden and Wotton, 2001). To obtain an actual nursing diagnosis, defining characteristics including subjective and objective signs or symptoms must be applied in a cluster; that is, they must appear together (Carpenito, 1997).

A study finding important to decision-making is that the medical-surgical nurses in the study used "limited cue recognition" and ignored cues that did not fit into their initial diagnostic schema. Redden and Wotton's (2001) findings suggest that this limit to problem identification puts the medical-surgical nurses' decision-making capacity in the

"novice" category as described by Benner (1984) and partially explains Del Bueno's findings that new nurses are not able to make critical distinctions in patient assessment (2005). New or novice nurses do not generally function in the triage role specifically because of their limited knowledge base and clinical experience in decision-making. The nurses described in Redden and Wotton's (2001) work were not inexperienced; however their ability to problem-solve was at a similar level. This study raises concern around experienced nurses functioning cognitively at a novice level.

Clinical Application.

Simmons' (2010) concept analysis of clinical reasoning defined the process as a complex process that uses cognition, metacognition, and discipline-specific knowledge to gather and analyze patient information, evaluate its significance, and weigh alternative actions. A necessary corollary to processing knowledge is the *ability to critically apply* what is known to identify a particular patient problem. To evaluate the significance of a particular cue, the nurse must be able to recognize and contextualize the cue that is unique to the clinical situation at hand. A nurse who does not make a deliberative search for pivotal cues may not recognize the connection between presentation and etiology and develop an inaccurate judgment resulting in ineffective interventions and compromised outcomes..

The goal of nursing is to relieve problems by linking clinical judgments to the selection of desired outcomes and interventions that restore function, promote comfort, and promote optimum health (Jones, 2007). The cornerstone of emergency nursing practice is the immediate identification and relief of patient problems, accomplished by identifying cues, linking them to unique patient presentations, and selecting effective interventions to achieve desired outcomes. To accomplish this with accuracy, the nurse must actively search for critical cues to determine the presence or absence of physiologic

or psychological threat to the patient. The IEDEM-CD model suggests that this motivation to actively seek out information is the result of higher levels of moral reasoning and drive.

Moral Reasoning.

A third core element of the IEDEM-CD model is the ability of the nurse to *reason morally* at a high level. To reason morally within this context requires an understanding of the 'good' and the motivation on the part of the nurse achieve this goal. There is a link between active and careful attention within a moral or ethical realm that is distinct from the cognitive realm and the process of decision making that is crucially important to nursing. Rest (1982) describes psychological processes that are involved in moral reasoning (derived from the available literature and his own work), which he theorizes is comprised of several components; *interpretation of the situation*, which requires a cognitive process to determine if and how one's actions affect the welfare of others, *formulating the morally ideal course of action* or *knowing what ought to be done* (p. 31). The third and fourth components of Rest's model involve *deciding* and *acting upon a morally good course of action*. Rest suggests that these are not separate processes, but are interrelated and like other researchers he agrees that the outcome of moral reasoning must be action of some sort. The action the nurse chooses based on accurate problem identification must be in line with the goals of nursing, which is the 'good' for this patient at this time in this place, and thus this element of the model is the driving force to diligent pursuit of pivotal cues.

ANA Code of Ethics.

Currently the American Nurses Association Code of ethics charges that the nurse assumes responsibility and accountability for individual nursing judgments and actions, maintains competence in nursing, and exercises informed judgment and uses individual

competence and qualifications as criteria in seeking consultation, accepting responsibilities, and delegating nursing activities to others.

As a discipline, nurses' ethical obligations include practice competence, knowledge development, and the improvement of standards. The individual nurse by virtue of licensure has an obligation to adhere to the code of ethics. Grace (1998) suggests that there may be a tension between the nurse's internal code and the external code imposed by the profession to which the nurse may or may not adhere. Because nurses have professional responsibilities to achieve a 'good', keeping that 'good' in the forefront of the decision-making process facilitates the deliberate, diligent search for pivotal cues that is so critical to accuracy in problem identification. The process by which the nurse searches for, integrates critical cues, and acts upon the judgment derived in this context of "praxis" can be considered the expression of "critical thinking".

Ring 2: Intermediate elements - Culture and Leadership.

Moving outward from the core, the next set of elements in the IEDEM-CD model are unit culture and leadership. Previous researchers have established the influence of unit-based culture on nursing practice, in particular, practices around pain assessment and management (Layman Young, Horton, & Davidhizar, 2006; Dihle, Bjølseth, & Helseth, 2006; Chung, 2003; Wild & Mitchell, 2000; Willson 2000).

Nurse-physician relationships.

Schmalenberg *et al*. (2005) found that collegial and collaborative relationships between nurses and physicians positively affect patient outcomes; where there are good relationships between providers, patients benefit. One could extrapolate that when these relationships are not collegial, patient outcomes may not be as good. The structures that secure RN-MD relationships (Schmalenberg *et al*., 2005) include joint nurse-physician practice committees, primary nursing, autonomy in nursing clinical decision making, an

integrated patient record, and joint practice review. Institute of Medicine studies, including *To Err is Human: Building a Safer Health System* (Kohn et al., 2000), *Crossing the Quality Chasm: A New Health System for the 21st Century* (Committee on the Quality of Health Care in America, 2001), and *Keeping Patients Safe: Transforming the Work Environment of Nurses* (Page, 2004) clearly hold the organization in which both nurses and physicians practice accountable for adverse patient events resulting from ineffective nurse-physician communication.

Within this context of accountability and joint practice, a recent study by Weinberg, Miner and Rivlin (2009) suggests that medical residents do not perceive professional relationships with nurses as either collegial or collaborative. Study findings suggest that medical residents cannot differentiate between differently educated nurses, do not view nursing practice as autonomous, and view the role of nursing as subservient to and for the benefit of physicians. This may have a potential impact on the unit culture and environment within which decisions are made.

Ring 3: Influential elements.

The outermost ring of the IEDEM-CD model contains the influential elements affecting decision-making within the general practice environment. Characteristics thought critical to an effective professional practice include nurse autonomy, control over practice, and effective communication, and were derived from qualities established to be present in the professional practice environments of Magnet hospitals (Ives Erickson, et al., 2009). The professional practice model generated by these organizations provides a guide for the providers of care and the designers of the practice environment. It identifies the elements and organizational characteristics defined by system leaders as important (Ives Erickson et al., 2004, 2009), are corroborated by ethnographic research (Wolf, 2010b) and are determined to be important elements of the IEDEM-CD model.

Little is known regarding the influence of the practice environment and specific settings like the emergency department culture and norms on the decision-making practices of emergency nurses.

Summary of the current IEDEM-CD Model

The IEDEM-CD model represents an open, dynamic process within which decision-making occurs. It contains core elements including knowledge base, critical application, and moral agency, immediate elements of unit leadership and immediate environment of care, and influential elements of general practice environment institutional leadership and sociopolitical climate. The suggested interplay between and among these elements assumes that the nurse who performs a focused patient assessment to determine the most acute problem in an emergency room is using knowledge of the 'good' in an environment that does not necessarily see the 'good' as other than timely throughput. The nurse who possesses a depth and breadth of knowledge across patient groups and is able to critically apply that knowledge to unique and familiar patient situations is in a better position to make effective clinical decisions. Integrating moral reasoning to enhance problem-solving requires the nurse to persist in spite of organizational and cultural obstacles.

The IEDEM-CD model as it exists also posits a professional practice environment that supports and expects excellence in nursing decision making as critical to practice. By providing education, support and resources (increasing the knowledge base and its critical application), and supporting collegial and cooperative nurse-provider relationships, nursing leaders may be able to improve nursing decision making, even in the face of lower level moral reasoning as described by Kohlberg (1971). A more complete description of moral reasoning as it applies to this model is found in chapter 2.

Significance and Purpose of the Study

Nursing as a discipline has a professional obligation to promote the goals of nursing, which have been discussed here as fostering that which is 'good' for humans (ANA Social Policy Statement, 2008). Accuracy in problem identification involves in-depth and focused assessment in order to uncover the phenomenon of concern and seek effective resolutions that link outcomes with nurse-driven actions. The understanding of the interplay between and among factors involved in the decision making process lacks clarity and challenges the effectiveness of the decision-making process. The IEDEM-CD model provides a framework to guide both education and research around this challenge. It provides a framework that promotes the integration of moral reasoning and clinical decision-making that yields a clinical judgment responsive to nursing action that is unique to nursing.

Reducing adverse events and promoting safety and efficiency in the delivery of patient centered care (Institute of Medicine, 2001) is enhanced by understanding the influence of nursing knowledge, moral reasoning, and environment of care as separate factors in decision making, but in relation to each other as well. To date, there is no research examining the interaction of all of these elements. The purpose of this study was to identify and delineate the relationship of each of the variables in the model to each other, and to ascertain the relative "weight" of each of the variables as they influence the accuracy of clinical decision making and to determine the clinical usefulness of this model.

Findings of this study provide a model to depict the complexity of clinical decision-making and contribute to the literature in this area of reasoning and decision-making. Study findings also support the integration of moral reasoning and clinical reasoning as a relational and integrated process, and provide a model to guide the

decision-making education of nurses at all levels. The study findings provide information to design learning activities within standards-based curriculum, guide clinical expectations and orientation for new staff, and evaluate outcomes of that education.

Improved understanding of the elements that enhance or hinder the processes by which nurses identify problems and determine action based on those judgments has broad implications for many types of nursing environments. The potential benefit of more efficient, safe, and cost-effective patient care that meets the individual patient's needs makes this an important line of inquiry to pursue.

Research Questions

Guided by the IEDEM-CD model, this research identified the factors that enhance or challenge good clinical decision making in a high acuity, high uncertainty environment. Within the context of this framework, the following hypothesis and research questions were developed:

1. H1: Controlling for other variables as stated (environment of care, age, educational level, experience and certification), there is a positive relationship between moral reasoning and accurate decision making for emergency nurses.
2. Q1: What is the relationship between environment of care and the accuracy of decision making for emergency nurses?
3. Q2: To what degree do the age, gender, educational level, and years of experience in emergency nursing predict the accuracy of clinical decision-making in emergency nurses?

Definition of Terms

For the purposes of this study, the following terms were defined as follows:

Moral reasoning is defined as the degree to which the subject is able to discern the morally appropriate action in a given circumstance. It was measured using the Defining Issues Test, version 2 (Rest, 1979).

Perception of environment of care is defined as the nurse's understanding of the situated reality in which they practice. It was measured using the Revised Perception of Professional Practice Environment tool (RPPE).

Accuracy of clinical decision making describes the level of accuracy with which the nurse interprets critical clinical information and from that identifies a patient problem and assigns acuity to a fictional patient. It was measured via scoring on three clinical vignettes using a rubric to record the presence or absence of responses.

Assumptions

The following assumptions were made for this study:

1. The IEDEM-CD model captured the elements that inform clinical decision-making.
2. The subjects were able to understand the questions posed in the instruments used to collect study data.
3. The data provided by study participants reflected accurate and truthful answers as understood by the subjects.
4. The instruments used in the study to measure the variables were valid and reliable and captured the concepts being measured in this population.
5. The conceptual model of clinical decision making in high acuity high uncertainty environments identified key constructs important enough to decision-making so that correct variables were being measured and refined.

Limitations

The IEDEM-CD model is being used for the first time to guide this study. The sample is a self-selected convenience sample of emergency nurses contacted by snowball technique via the internet. This may bias the results to a more educated, engaged and/or well-resourced subset of emergency nurses and may alter the applicability of the results to all emergency nurses. The clinical vignettes, although tested in small groups and reviewed by emergency nurse educators, have not undergone extensive testing and may skew results.

Summary

This chapter provided the background and significance for conducting this study on the interplay and relative weight of elements in a conceptual model of decision making in high acuity, high uncertainty clinical environments. The specific purpose of the study and research questions was delineated. A conceptual model was put forward to frame the scope of the study. Definitions of terms, limitations, and inclusion and exclusion criteria were described. Chapter 2 consists of a review of the literature, to describe what is known and not known about the major elements of the model and to lay the groundwork for an interpretation of the results of the study.

Chapter 2

Review of Literature

Introduction

Clinical decision-making is complex. There are many strategies used to communicate nursing phenomena of concern, assign appropriate nursing staff based on the acuity of a patient problem, as well as cue recognition and sorting and "knowing" the patient. Decision-making involves the moral reasoning of an individual nurse and the environment of care in which the nurse practices as well as clinical decision-making Gordon, Murphy, Candee and Hiltunen, 1994; Wolf, 2010a). A critical analysis and synthesis of the current literature is required to identify knowledge and research associated with clinical decision-making by nurses, their ability to reason morally, and the environment in which they practice, particularly in areas where patients are potentially very sick (high acuity) and unknown to the clinicians (high uncertainty).

Critical thinking as a process integral to clinical reasoning/decision-making

Critical thinking and clinical decision making are part of a reflective, self-correcting cycle as found in the writing of Lonergan (1957) Dewey (1910), Benner (1984) and Facione & Facione (1990) among others. Nursing process (Orlando, 1961, Potter & Perry, 1994) has been describes as a self-correcting, iterative process, involving data collection, analysis of cues, and judgment leading to action and achievement of outcome. Evaluation is an analytic process that brings one back to "assessment", the first step. In developing a conceptual framework for critical thinking using published literature, Redding also (2001) found five cognitive skills associated with critical thinking which correlate with the cyclic nature of nursing process: problem definition, selection of supportive evidence, analysis of cause and effect, formulation of relevant hypotheses and

drawing conclusions. Redding's framework was derived from literature which is more normative than descriptive, and provides a framework that may be theoretically useful only.

Critical thinking is described as a non-linear dynamic process, a "lived activity", not a static one. In a review of concepts and terms, Maudsley & Strivens (2000) concluded that flexibility, persistence, a willingness to plan and self-correct as well as an awareness of thought processes are important components of critical thinking, and may contribute to accuracy in problem identification. Dewey (1910) concluded that "active, persistent and careful consideration of any belief…in the light of the grounds that support it, and the further conclusions to which it tends constitutes reflective thought" (p. 7). Use of metacognition, or "thinking about thinking" and reviewing the underlying assumptions of one's decision-making process, was found to be crucial to avoid error and maintain an appropriate ratio of intuitive and analytic thinking strategies (Glatter, Martin & Rex, 2008), rather than overreliance on either "gut feelings" or protocols.

Measures of critical thinking

A number of evaluative tools commonly used to determine the presence, absence, and quality of critical thinking include the California Critical Thinking Dispositions Inventory (CCTDI) proposed by Facione & Facione (1994). This instrument was developed with 1019 participants using a Delphi method to arrive at a consensus definition of critical thinking and as a theoretical basis for measuring critical thinking dispositions. This instrument contains seven subscales and is used frequently to assess critical thinking tendencies in college students, but not necessarily nursing students.

The Watson-Glaser Critical Thinking Appraisal (WGCTA) is composed of five subscales: Inference, Recognition of Assumptions, Deduction, Interpretation and Evaluation of Arguments. Gadzella and colleagues (2006) found the WGCTA a valid and

reliable measurement of critical thinking in groups of psychology, educational psychology, and special education graduate students, but did not test it with nursing students. Reviews of literature on critical thinking (Riddell, 2007; Jeffries 2001) as well as comparative studies (Gidddens and Gloeckner, 2005) reported a lack of correlation between CCTDI or WGCTA and NCLEX pass rates. There was no reported correlation between CCTDI or CCTST in comparative studies of nursing students from baccalaureate to doctoral level (Stone, et al, 2001).

Critical thinking dispositions and learning styles

Literature on critical thinking dispositions (as measured using the CCTDI) and learning styles, Colucciello (1999) reported low scores on all critical thinking dispositions in a study of 100 BSN students. Findings suggested a lack of good disposition towards critical thinking, and especially low scores in analyticity, systematicity, inquisitiveness, and self-confidence as measured by the CCTDI. Study findings supported a positive correlation between self-confidence and reflective observation, but found that when students were described as “accommodators”, they relied on others for their information rather use than their own analysis, as the predominant learning style. The work of Ip, *et al*. (2000), supports Colucciello’s findings reporting that the lowest scores on the CCTDI instrument were found on the subscale of truth-seeking in a sample of Chinese nursing students. The low truthseeking scores were thought to be a possible effect of Confucian thought and an authoritarian educational system which promotes memorization and discourages reflective questioning. Hicks, *et al.* (2003) report limitations in analyticity, open-mindedness, truth seeking in a sample of critical care nurses, and theorized that low scores might be related to uses of protocols which failed to encourage independent critical thinking in that practice situation, a finding which echoes the work of Ip, *et al.* (2000). The implications of these findings and

decision making suggest learner difficulties in focused inquiry, problem identification may impede both effective decision-making and initiation of action leading to desired outcome.

Serious concerns have been reported around the nature of critical thinking (Riddell, 2007), the ability to measure the process in some meaningful way (Walsh and Seldomridge, 2006; Staib, 2003; Giddens and Gloeckner, 2005), and its relationship to nursing education (Daly 2001). Because critical thinking is a non-linear process involving data collection and synthesis, it may be possible that one cannot evaluate critical thinking via paper and pencil tests, but these processes may need to be evaluated in real time. The inability to measure the decision-making process is a major challenge to nursing knowledge and requires concerted attention by researchers interested in advancing quality care.

Descriptions of the processes of clinical decision-making

In an attempt to provide a theoretical background for decision-making in clinical practice Muir's (2004) reviewed of literature suggested that decision making occurs only when doubt is present. The author further posited three main types of decisions used by nurses: intervention, communication and evaluation. In looking at analytical and intuitive decision making frameworks, Muir described two main processes. The first was information-process model/pattern recognition, which described how individuals store information in short and long term memory, and how data can be recalled. The second is an intuitive framework/heuristics, which uses subconscious algorithms or pattern recognition to create a "mental shortcut" to problem identification. Banning (2007), in a similar review, suggested that decision making required knowledge of pre-existing pathological conditions, explicit patient information, nursing care and experiential learning as well as pattern recognition. The author concludes that the O'Neill model

(2004) may be more useful. This model combines pattern recognition and hypothetico-deduction, a traditional way science is conducted – one is assumed to begin with a theory, deduce a hypothesis from the theory and then gather evidence to test the hypothesis. Both approaches can be useful in describing clinical decision making in practice.

A third normative view of the clinical decision making process was put forward as a modification of Hammond's cognitive continuum theory (Standing, 2008). Cognitive continuum theory presumes that there is not an absolute division of decision-making types, but a continuum, moving from the very analytical to the very intuitive. Hammond suggested a six component model of decision-making extending from intuition on one end to analysis on the other. Standing (2008) extended this model into a nine component, nonhierarchical model as a synthesis of intuitive/experiential and analytical/rational. The model also includes a "reflective judgment" component, acknowledging the "looping" process of clinical decision making.

Kahnemann and Tversky (1982) described a heuristics-based decision-making strategy which is used in many disciplines. The strategy is comprised of "System 1", which is a more intuitive, unconscious strategy, and "System 2", which is a more linear, analytic, conscious process. Croskerry (2009) in his discussion of diagnostic reasoning, acknowledged the shortcomings of System 1 thinking as the tendency to override System 2 (hypothetico-deductive) thinking, but acknowledged the efficiency of System 1 thinking versus the analytic, linear System 2 process. Croskerry suggested that resolving the question of poor clinical decision-making is of paramount concern to patient safety.

Decision analysis

Decision analysis is identified as another way of examining clinical decision-making; it acknowledges that decisions "are commonly taken against a background of incomplete and imperfect information compounded by uncertainty" (Tavakoli, Davies &

Thomson, 2000). Decision analysis posits a method of breaking down a complex cognitive task into more manageable pieces, involves patient preference and estimates of the net value of clinical decisions. Tavakoli et al. suggested the method as a good structure for clinical decision-making, and reviewed it as an approach that may be more useful in a non-time-pressured situation.

Knowledge development as a problem-solving process

Nursing process can be viewed as a problem solving endeavor (Rodgers, 2007), and thus each clinical decision made by any individual nurse is an exercise in knowledge development about a particular situation. Support for the view that science is a problem solving activity is also found in the writing of Kuhn (1970) and Laudan (1977) and Jones and Roy (2007), all of whom concluded that one process in the advancement of nursing knowledge development was the process of problem-solving. Rodgers suggested that using a problem solving approach does not limit itself to the mere production of data, but that the "attendant increase in knowledge and understanding that contributes to a solved problem" (p. 112). Thus, as each problem is identified and "solved", the nurse learns more about patient situations both in general and in particular. Kassirer (2010) discussed the importance of continued exposure, repeated investigation and experiential learning as part of a "tool box" for clinical problem solving. The development of a clinician, thought Kassirer, has been built on years of practice in problem solving, in both medicine and nursing. The author reported that medical education continues to produce excellent clinicians, although the mechanism of what was considered effective problem solving remained unclear.

Grossman, Krom and O'Connor (2010) reported that nursing students taking a case study based critical care course where they practiced applying their knowledge to simulated case studies improved their clinical decision-making skills. There appears to be

agreement that a crucial piece of both medical and nursing clinical education involves practice in problem solving; more practice leads to better decision-making with the caveat that student or clinician errors are immediately identified and remediated. Supervised practice appears from the literature (Kassirer, 2010; Grossman, *et a*l., 2010) to be more effective than unsupervised practice, and thus the practice or educational environment becomes important to learning an effective problem solving process over time.

Problem Identification by Cues

The most important aspect of clinical decision-making is accurate identification of the problem (Mullenbach, 2007), meaning a decision about a problem is made using appropriate cues and deriving appropriate action from those data. Lunney (2001) noted that the recognition of a patient cue that has special meaning related to a patient problem is dependent on the knowledge base of the nurse, to access data that is foundational for clinical judgment to be realized. This would suggest that it is not just knowledge content that drives critical thinking and clinical decision-making; critical to the process is the ability to sort through data and identify relevant cues.

Data synthesis from multiple cues is critical to the formulation of a nursing diagnosis. Defining characteristics including subjective and objective data must be clustered as they appear to occur together (Carpenito, 1997). The nurse who cannot isolate the defining characteristics linked to a patient problem cannot properly identify and effectively treat that problem. Several studies have explored how expert and novice nurses select and cluster cues to arrive at a diagnosis or problem statement (Tanner, Padrick, Westfall & Putzier, 1987; Benner, Tanner & Chesla, 1997; Hoffman, Aiken & Duffield, 2009; Reischman & Yarandi, 2002; Redden & Wotton, 2001) and found significant differences. These differences can reflect recognition of cues (Redden &

Wotton, 2001) appropriate clustering of cues (Hoffman, Aiken & Duffield, 2009, Carpenito, 1997)) and highly relevant or "pivotal cue" recognition (Reischman & Yarandi, 2002; Redden & Wotton, 2001). Seldomridge (1996) found that expert nurses interpreting data from a video clip of a patient encounter distinguished relevant from irrelevant cues more accurately than novices, and generated initial and final, correct hypotheses identifying what was wrong more quickly than novices. Benner, *et al* (1997) report expert nurses derive diagnoses from paradigm cases, supporting Seldomridge's findings. Experts used experiential cues and were more confident in nursing judgments than the novice nurses. Novices and experts did not differ on factual knowledge, number of cues selected, or confidence in general ability to reason, as measured by the CCTDI Confidence subscale (Seldomridge, 1996).

Wynne, Brand and Smith (1997) reported that cue clustering was a pre-requisite to accurate diagnosis. They reported that an inadequate knowledge base resulted in reliance on single cues, which may hinder appropriate problem identification. Gambrill (2005) also described problem structuring and application of knowledge as potentially problematic issues in effective decision-making, increasing the need for further investigation of decision-making process. Clear examples of deficiencies in critical cue recognition and subsequent problem identification have been found in the work of Arslanian-Engoren (2004), who described triage decisions made by emergency nurses. Arslanian-Engoren notes these nurses had low specificity and sensitivity to acute coronary syndrome in patients at the initial encounter. The low rates of accurate problem identification found in data from this quantitative descriptive study of 108 triage encounters were ascribed to failure to recognize and act upon critical cues (Arslanian-Engoren, 2004).

Intuition as a decision-making strategy

Many nurses use the strategy of "intuition" as proving effective in their decision making in high acuity, high uncertainty environments. Benner (2000) also found intuition crucial to the decision making process; However, "intuition" may be contextually embedded reasoning, influenced by past experience, personal bias, and previous judgment. Lyneham, *et al*. (2008) suggested in findings from a phenomenological study that intuition use by fourteen emergency nurses "validates the use of intuitive decision-making as a construct in explaining expert clinical decision-making practices" (p.381). These researchers reported three stages of intuition used by nurses to arrive at a decision. They included *cognitive intuition*, where assessment is processed subconsciously and can be justified after the fact; *transitional intuition*, where a physical sensation and other behaviors enter the nurse's awareness; and *embodied intuition*, a state wherein the nurse trusts the intuitive thoughts, presumably without other supporting evidence. Findings suggested that the validity of intuitive practice should be recognized, but that it is probable that intuition as a strategy could not be taught (Lyneham *et al*, 2008, p. 385). Chung (2005) also found intuition to be a common strategy used by nurses, although not initial, intuitive decisions were not confirmed using physical data collected from the patient. Chung suggested that "intuition" was the ability to make a judgment without being able to pinpoint all the data points that contributed to the decision. This process was present in the expert nurse and thought to be a conglomeration of simultaneous algorithmic calculations and representative heuristics. Gambrill (2005) described two different types of "intuition". *Informed intuition* is based on clinician experience and is a looping cognitive process with feedback and correction; *uninformed intuition* is a "gut" decision with no such corrective feedback. Wolf (2010a, 2010b) discussed the over-reliance of emergency nurses on "uninformed intuition" in both simulated and naturalistic

settings, and the potentially erroneous problem identification that results when no corrective feedback is sought by the nurse.

"Knowing the patient" as a decision making strategy

"Knowing the patient" as context-specific knowledge may be central to skilled clinical judgment, and provides a baseline against which changes and critical cues may be recognized (Whittemore, 2000; Luker, Austin, Caress & Hallett, 2000; Radwin, 1995). Knowing the patient in some way is recognized as an important component of clinical decision making in nursing (Tanner, *et al*., 1993). Radwin's (1995) study of nurses reported that "knowing the patient" involved individualized care and was dependent on extended time spent with the patient, intimacy with the patient and the nurse's previous experience of caring for patients. Tanner's (1993) research involving 130 critical care nurses suggested that "knowing the patient" was embodied in an understanding of the effect their nursing care had on the patient. Researchers concluded that knowing the patient required an involved rather than detached understanding of the patient's situation and responses to treatment (Tanner *et al*., 1993). Henderson (1997) noted that trust and knowing came about within the context of direct patient care. This finding was related to Crocker's (2009) description of how "knowing the patient" could affect weaning from mechanical ventilation in a critical care unit. In her ethnographic study, the author discusses how knowledge of the patient over many days and weeks gives insight into the most effective nursing care around ventilatory weaning.

Rush, et al. (2009) described knowing the patient as a strategy that involved the use of assessment, monitoring and communicating, along with the knowledge of the patient's subjective perception of their world which necessarily preceded nursing intervention. In an ongoing relationship with a patient, "knowing" allowed for different weights to be assigned to pieces of data, predicated on the patients' history and baseline

condition. Speed and Luker (2004) reported that while "knowing the patient" was a central element of nursing practice, in their population of home care nurses, there is a shift in nursing focus from Carper's (1978) description of aesthetic and personal knowing ("knowing the patient") to empirical knowing ("knowing *about* the patient"). In a high acuity/high uncertainty environment, by definition the patients are "unknown" and so this component of clinical decision-making may take more the empiric form, "knowing about" the patient by symptom or disease state.

This concept of intuitive knowing may be problematic in the ED environment. A sense of "knowing" brought about by repeated visits or a misrepresented understanding of a given patient condition may lead to premature closure and compromised patient outcomes. "Knowing about" a given condition or the life circumstances of a discrete patient must be carefully correlated with the presenting cues in order to allow for accuracy in problem identification and appropriate care.

Evaluating the components of clinical decision making in situ

Given the complexity of decision-making processes, a more effective method for evaluating clinical decision making has been reported using simulated clinical scenarios, either with role playing or high fidelity simulation. Initial work in the area of emergency nursing (Wolf, 2008, 2010b) suggests that competency evaluation in clinical decision-making is best undertaken with simulation experiences. Medical education literature reports more useful results with simulation than with written exams. Rogers (2004) and Kim (2006) found simulation a more complete strategy to evaluate clinical decision making in a high acuity high uncertainty setting. Attributes such as leadership, problem solving, situational awareness, and communication and management skills, crucial non-medical skills, have been included in the Ottowa Crisis Resource Management Global Rating Scale to discern differences between Post Graduate Year 1 and Post Graduate

Year 3 medical residents around decision-making (Kim, Neilipovitz, Cardinal, Chiu, and Clinch, 2006). Within the nursing literature, Edwards (2007) and Ottested (2007) reported that real time observation may be necessary to appropriately evaluate clinical decision-making because this process reveals contextual and communication factors that may not otherwise be uncovered in usual testing procedures.

Nursing Language

As Gordon (2008) asserts, the language of nursing diagnosis can be viewed not as a label, but as a clinical judgment. Nursing diagnoses provide a perspective for naming, understanding and thinking about a set of clinical observations. Correctly naming a problem requires both a considerable knowledge base and the recognition and clustering of specific cues and their meaning when they appear both separately and together. Most importantly, as Lang (1992) has stated, "If we cannot name it, we cannot control it, practice it, teach it, finance it, or put it into public policy" (Clark & Lang, 1992, p. 109).

The use of commonly understood descriptions of clinical problems or phenomena of concern to the discipline (nursing diagnosis) requires the appropriate recognition of cues leading to the identification of discreet patient problems and their potential solutions. There is a critical link between problem identification and problem solving and, therefore, effective patient care. Van Horn and Kautz (2010) recognized that the use of “NNN” (NANDA, NIC and NOC) language in evidence based practice promoted the retention of essential nursing practice rather than an immediate jump to the medical model for evidence based practice (Dochlerman & Jones, 2004).

As part of the Outcomes-Present State-Test (OPT) model described by Pesut and Herman (1999), standardized nursing language (NANDA-I) is used specifically to determine problem and etiology so that the best interventions can be derived to address the patient’s problem and assist the patient in moving from the present state to the desired

outcomes state. Use of NANDA language, linked with NIC and NOC in this model makes it universally applicable – everyone, everywhere using standardized nursing language can identify problems in the same way, and thus derive interventions and outcomes.

The American Nurses Association (ANA) has recognized thirteen standardized languages; two are minimum data sets, seven are nursing specific, and two are interdisciplinary (Rutherford, 2008). The purpose of these languages is to allow for "translations" of clinical terms across practice areas and across geographical and cultural boundaries (Simpson, 2007), essentially for the same purpose: to ensure a commonality of recognition of both problem identification and well as intervention and outcome for the patient. All use of standardized nursing language implies a need for accuracy in problem identification, and each term has a series of "defining characteristics" which require a cue search. Naming a problem is not just *identifying* it, but *understanding* it (Johnson, Bulecheck, Butcher, Dochterman, Maas, Moorehead & Swanson, 2005).

Decision making by emergency nurses: factors in accuracy of initial assessment

Accuracy.

Thus far, studies of accuracy in problem identification at the initial patient encounter focus on correct assignation of acuity level in a triage system, such as the Emergency Severity Index (Wolf, 2010a), Australasian Triage System (Vance and Spirivulis, 2005) or National Triage Scale (Fry and Burr (2001). In these studies, "accuracy" is understood to mean assigning to the patient a correct level of severity as described by a particular system. It does not necessarily mean that the nurse understood either what the actual physical or psychological threat to the patient was, or the appropriate intervention to relieve the patient's problem. Vance & Spirivulis (2005) report that nurses can reliably determine the acuity and resource requirements of ED

patients, meaning that the nurses could assign an acuity level and predict selected laboratory tests and radiologic studies the patient might need.

Strategies used in initial assessment at triage.

Goransson et al (2008) and Chung (2005) used different qualitative descriptive studies to identify several types of thinking processes nurses used to make this determination. They included pattern recognition, priority setting, information searching, hypothesis development, predicting, forming relationships, asserting rules, making choices, value judgment, concluding, explaining, and questioning. Chung (2005) reported that accuracy was affected by interruptions in care delivery, lack of knowledge, and time constraints. Several studies reported limited use of physiologic measures to determine triage acuity; decisions appear to be made via subjective data (Gerdtz and Bucknall, 2001; Chung, 2005; Wolf, 2010a; Fry and Burr, 2001).

Challenges to accuracy in initial assessment at triage.

(Fry & Burr, 2001) used questionnaires developed using a Delphi technique to explore factors in decision making at triage within a sample of 412 Australian nurses. The researchers reported that decision making was based on patient presentation, vital signs and history, followed by mechanism of injury, patient appearance and severity of pain. The authors suggested that nurses “manipulate” the triage guidelines depending on other, as yet unknown contextual factors to facilitate or delay care.

Research on decision making by Brannon & Carson (2001) found that nurses make decisions based on a medical mental prototype (heuristics) and this mechanism may aid judgments but may also be inaccurate. Findings from this study reported that an extraneous variable, a “stressor” added to the clinical picture, substantially increased the likelihood that the “patient” would have their symptoms attributed to that stressor variable. The authors reported that this premature closure caused nurses to disregard

physiologic cues that might have led to a more complex patient problem. Tanner (2006) similarly notes that clinical judgments are more influenced by what the nurse brings to the situation than the objective data about the situation at hand, an issue also recognized in a study of emergency triage nurses by Wolf (2010a). Cone & Murray (2000) have suggested that desirable characteristics of good triage nurses include the use of intuition, assessment, critical thinking, and communication, but do not fully describe the components of these characteristics.

Moral reasoning

There are several ways reported in the literature to structure moral cognition; two approaches which are seen as challenges to each other are the theories of Kohlberg (Kohlberg & Turiel, 1971) and Carol Gilligan (1982). Kohlberg, based on the theory of cognitive development, posited six stages of moral development, divided into three levels; pre-conventional, conventional and post-conventional. Stage 1 is characterized by heteronemous orientation and a fear of breaking the rules; Stage 2 focuses on pragmatic reciprocity (“I’ll help you if you help me”). The second level, containing stages 3 and 4, is marked by a shift outward; persons at this stage are aware of shared feelings, agreements, and expectations which take primacy over individual interests. The perspective is that of the local community or family, but not an orientation toward the generalized social system. Stage 4 is characterized by the "member of society" perspective in which one is moral by fulfilling the actual duties defining one's social responsibilities. Laws must be obeyed in order to keep social cohesiveness, except if the law conflicts with social duties. Rest (1982) and de Casterle et al. (2008) suggested that the average staff nurse is morally functioning at the “conventional” level, and that this constitutes a major hindrance to ethical action by nurses. This occurs because in order to promote the goals of nursing and to do that which is ‘good’, nurses may need to engage

in moral reasoning at higher levels that are based on universal principles, rather than those that are "rule bound".

Stages 5 and 6, the post-conventional level, are marked by a level of reasoning based on principles, not rules. Stage 5 has received substantial empirical support, while Stage 6 remains as a theoretical endpoint which rationally follows from the preceding 5 stages. This last stage of moral judgment entails reasoning rooted in the ethical fairness principles from which moral laws are devised and separate from their function in an ordered society. Thus, there is an understanding that the higher elements of moral cognition such as regard for life and human welfare transcend particular cultures and societies and are separate from other conventions or normative obligations. Kohlberg's first five stages have been empirically supported by findings from longitudinal and cross-cultural research (Power et al., 1989).

An important critique of this moral structure was advanced by Gilligan (1982), who found Kohlberg's theory limiting and male-oriented. Her understanding of morality, particularly from a feminist vantage point, was firmly rooted in the ethics of caring relationships. Possibly both males and females reason based on both justice and care, and those different situations call for different strategies of reasoning.

Moral Reasoning in Nursing

The moral authority of nursing has been emphasized since the development of modern nursing in nineteenth century (Gordon and Nelson 2006). Davis and colleagues (1997) suggested that a predilection for moral reasoning was more a phenomenological way of being in and viewing the world than something learned. Weaver (2007) places perception, receptivity, reflection, and attention in the "cognitive" domain, linking ethical sensitivity with some characteristics we associate with clinical decision making. A perspective of "virtue ethics" is implied here. Virtue ethics focuses on the agent,

specifically on their intentions, dispositions and motives. One learns by seeing what the virtuous or good person does. The theoretical basis for virtue ethics is that the person wants to do good, to be good, and to act on the good. The 'good nurse' as described by Bishop and Scudder finds that being a 'good nurse' is

> "…integrally related to efficient, effective and attentive care which fosters the well-being of my patient. Even when I am not directly concerned with my patients' well-being, I am focused on ways of fostering their well-being because I am engaged in a practice with an inherent moral sense" (p. 36).

The link between active and careful attention in the moral or ethical realm as distinct from the cognitive realm is important to nursing Meyer and Lavin (2005) noted that "professional vigilance is the essence of caring in nursing". To "care" about a patient is to be constantly in a state of preparation to act. This requires attention, surveillance, and an anticipatory cognitive process. Smith and Godfrey (2002) used a qualitative descriptive approach to study 53 nurses and found that the 'good' nurse does the right thing at the right time, and possesses both cognitive and affective traits that fell into seven categories: personal characteristics, professional characteristics, knowledge base, patient centeredness, advocacy, critical thinking, and patient care.

Rest (1982) described a psychological process in moral reasoning comprised of several components. The first is *interpretation of the situation*, which requires a cognitive process to determine if and how one's actions affect the welfare of others. Rest described several studies that suggested that this is a very individual process, and that not all persons are able to correctly interpret even the simplest of situations (p.29). The second component Rest described is *formulating the morally ideal course of action* or *knowing what ought to be done* (p. 31). Rest suggested that the average staff nurse is about halfway along the sequence of moral reasoning categories as put forward by Kohlberg.

The third and fourth components of Rests' model involve *deciding and acting upon a morally good course of action*.

Praxis as ethically focused nursing

To further delineate Rest's (1982) findings, McCormack (2003) reported on the distinction between "those who know and do not act and those who act and do not know" (p. 180). McCormack argues that this phenomenon is an illustration of the researcher/practitioner divide (p. 180), but it is possible that this thought is equally applicable the structure of moral reasoning in clinical decision-making. The nurse who can identify a problem and act accordingly, acts with knowledge and purpose for the 'good'. The nurse who intervenes in a clinical situation without correctly identifying the patient problem, is acting without purpose or deliberation and cannot be said to be acting in pursuit of the 'good'. Praxis is "concerned with *the morally worthwhile good* that cannot be determined in advance and it is *dependent on the context in which action is taken*" (McCormack, 2003 p.181**).**

McCormack(2003) calls this "determining the right thing to do at the right time in the right way" and argues that it requires a certain knowledge ("craft knowledge") that is intertwined with practice and entails "perception, reasoning, and virtue" (p. 181). Newman et al (2008) suggested that knowledge develops as nursing praxis, which is a synthesis of theory, research, and practice. Nursing praxis is the actualization of transformational practice, which incorporates presence and intention (Neuman, et al. 2008).

Researchers including Benner (2000) and Gordon, Murphy, Candee, and Hiltunen (1994) also suggest that clinical judgment cannot be separated from ethical reasoning as each clinical decision requires knowledge of what is good and right, embedding the science in the center of the art.

Moral cognition of nursing students and nurses

Moral cognition is the ability to recognize the ethical nature of nursing and to promote the 'good' for humans. Current literature, however, has reported a distinct lack of ability of nurses and nursing students to engage in high-level moral reasoning. Song (2009) reported that Chinese nursing students from trade schools did not score as high on quantitative tests of moral reasoning as students from higher level educational programs, implying that there may be a connection between education and ethical/moral reasoning. This was also suggested by the research of de Casterle et al, (1996), who found a significant relationship between ethical reasoning and education. (Nolan and Markert, 2002) suggested that increased education may enhance higher-level ethical reasoning but Woods (2005) reported that newly graduated nurses who had received formal education in nursing ethics still felt unable to act on or acknowledge their individual or collective moral responsibility.

Doane (2002) reported that nurses and nursing students see themselves as morally situated. Findings from this study (Doane, 20002) suggested that nurses perceived themselves a moral, but felt unable to act morally on a day to day basis due to the practice environment.

Environment of Care/Professional Practice Environment

The environment in which decisions are made influences those decisions (Gambrill, 2005), especially situations in which time pressures, uncertainty, and conflicting goals confound information gathering or application. In an environment such as the emergency department setting where time is often pressured, the literature suggests that this time pressure reduces nurses' ability to detect a high risk situation (Thomson et al, 2008). The environment may be a contextual component in the process of problem identification and can affect decision-making. Previous researchers have established the

influence within unit-based culture practices around pain assessment and management (Layman Young, Horton, & Davidhizar, 2006; Dihle, Bjølseth, & Helseth, 2006; Chung, 2003; Wild & Mitchell, 2000; Willson, 2000).

Pierre Bourdieu's (1977, 1990) theory of practice is a relational theory describing an individual's practices as situated within structured social contexts. Bourdieu explains that repeated exposure to a particular field or practice setting, such as a specific emergency department, creates an inclination for individuals to practice in ways that are generally considered appropriate and acceptable in that unique setting. Over time, these patterns become second nature, and each nursing unit becomes a setting for its own unique culture-driven practice (Bourdieu, 1977; Bourdieu, 1990). Tanner (2006) noted that nursing decisions made during actual work are influenced by workflow and unit knowledge, and acknowledges Benner's inclusion of the "social embeddedness" of nursing practice in her work. Aiken *et al* (2002) found that the practice environment was a critical factor in maintaining mortality rates whether the nurse cared for four or eight patients. In hospitals without good practice environments, mortality rates varied widely and were more dependent on staffing ratios. Similarly, Manojlivich (2005) reported that practice environment and nurse-provider communication were significant factors in nurse empowerment and satisfaction. Ives Erickson *et al* (2003) concluded that practice environment was intimately linked with staff empowerment and job satisfaction.

Little is known about how the culture of an ED influences decision making, but ethnographic data (Wolf, 2010a) has suggested that it may play a significant part by encouraging or discouraging particular processes, such as the use of empiric data or overreliance on patient appearance to determine "sick or not sick". The implication for nursing practice and especially nursing in the emergency department setting is that the culture of both unit and institution has significant influence on the processes and

strategies used for making clinical decisions. The question remains as to what can overcome the obstacles found in a clinical environment hostile to good nursing practice.

Summary

What is known about clinical decision making at this point is that clinical decision making and its corollary, critical thinking, are complex processes that require both a knowledge base and the ability to critically apply that knowledge to a clinical situation. An important component of this process is accuracy in problem identification.

Identified strategies for clinical decision making include pattern recognition, priority setting, information searching, hypothesis development, predicting, forming relationships, asserting rules, making choices, value judgment, concluding, explaining, and questioning. “Intuition” is identified as a component of clinical decision making in the initial patient encounter, but measurement of this component is immature. “Knowing the patient” is identified as a component in clinical decision-making, but the nature of this “knowing” may manifest itself differently in unique clinical situations.

It is known that clinical decision making is a process that most often occurs in a practice environment and can be affected by factors within that environment. It is known that the evaluation of clinical decision making is best undertaken in real time so as to allow for contextual influences to be factored in. Simulation and observation may be useful ways to more accurately assess the quality of the clinical decision-making process.

Moral reasoning within the context of the clinical decision-making process postulates that staff nurses are at a “rules based” stage of moral reasoning, and that it is possible that a nurse’s capacity to reason morally at a high level may have some impact on the ability to make effective clinical decisions. Moral reasoning at the higher stages as posited by Kohlberg may mediate the influence of the practice environment. Education may have a positive effect on moral reasoning, but how much and what kind is unknown.

To date, the relative weight of contextual influences on clinical decision making is not understood. The influence of nursing education on clinical decision-making as an evaluation of practice and the process by which a clinical decision is reached in high acuity high uncertainty environments is inadequately understood. Given the unknowns in this area, this research focused on the components of the decision making process nurses use to identify a problem, and reach a clinical judgment as well as their use of specific language to describe both the problem and its intervention.

CHAPTER 3

Methods

The purpose of the study **was** to explore the relationship between multiple variables as described in a conceptual model of decision-making (the IEDEM-CD) to determine which are most significantly correlated with accurate decision making in a sample of emergency nurses.

Research questions or hypotheses

1. H1: Controlling for other variables as stated, there is a positive relationship between moral reasoning and accurate decision making for emergency nurses
2. Q1: What is a relationship between environment of care and accuracy of decision making for emergency nurses?
3. Q2: To what degree do the age, gender, educational level, and years of experience in emergency nursing predict the accuracy of clinical decision-making in emergency nurses?

Variables

The dependent variable is accuracy of clinical decision making as measured by scoring on clinical vignettes. The independent variables are moral reasoning, perceived environment of care, age, gender, certification in emergency nursing, educational level, and years of experience in emergency nursing (see Table 1).

Operational definitions of major variables.

Moral reasoning.

Moral reasoning is defined as "being able to identify the 'good' in a given situation, and was measured using the Defining Issues Test, version 2 (Rest, 1979).

Perception of environment of care.

Perception of environment of care is defined as " the nurse's understanding of factors in the practice environment that hinder or facilitate safe, efficient, cost-effective, patient-centered care", and was measured using the Revised Professional Practice Environment tool (RPPE), as developed by Ives Erickson, *et al*. (2004, 2009).

Accuracy of clinical decision making.

Accuracy of clinical decision making is defined as "the ability to identify the most pressing physiologic or psychological threat to a patient, its etiology and an appropriate intervention", and was measured via scoring on three clinical vignettes using a rubric to record the presence or absence of responses.

Methods

Design.

The research questions/hypotheses suggested a descriptive correlative design, which would examine naturally occurring situations with no manipulation. (Burns & Grove, 2005, p. 240) A correlational design examined the relationships between variables (Burns & Grove, 2005, p. 239), which was one of the purposes of the study.

Sample.

Participants in this study were a purposive sample of emergency nurses educated and/or practicing in the United States. Inclusion criteria were as follows: age over 18 years, English speaking, current as an emergency nurse with direct patient care responsibilities, and willingness and ability to read and answer items on the instruments.

A sample size of 183 was determined to yield a power of 1.00, significance of .05, and a moderate effect size (Cohen, 1988). Using the rule of $N \geq 50 + 8m$ (where m = the number of independent variables) also calculated out a sample size of 170 (Green, 1991). Taking into account both these methods, the final N of 194 was calculated as adequate to determine statistical significance.

Recruitment of participants.

Primarily the networking or "snowball" technique (Burns & Grove, 2005) was used to recruit the appropriate number of participants. The internet survey link information was sent to key colleagues of the investigator (emergency nurses who were involved in their Emergency Nurses Association State Councils) with the intent that they would forward the link and survey information to their colleagues. A request for participants was also posted to the Emergency Nurses Association Educators List Serve and respondents were given the internet survey link by electronic mail and asked to forward it via electronic mail to colleagues and staff. Because there was no identifying information on return information, this method did not compromise the confidentiality of the participants.

Setting

Emergency nurses practicing in emergency departments, freestanding clinics, and urgent care centers across the United States participated in this study. The survey was accessed via electronic mail link to the Qualtrics™ internet survey site, either at the participants' home, office or emergency department.

Protection of Human Subjects

Before data collection began, the approval of Institutional Review Board of Boston College was obtained (October 28, 2010). Because the networking technique was used, identification of individual participants was nearly impossible, unless they volunteered the information to the investigator or another colleague. There was no way to link back the responses of any participant with their study number. Return of the instruments via internet to the Qualtrics™ secure site and a check off of consent constituted the consent of the participant. Each participant's data was assigned a study number and no identifying information (name, address, or telephone number) was

collected. Qualtrics™ states that the program "has SAS 70 Certification and meets the rigorous privacy standards imposed on health care records by the Health Insurance Portability and Accountability Act (HIPAA). All Qualtrics™ accounts are hidden behind passwords and all data is protected with real-time data replication." (Qualtrics™ website, 2010) All data was kept in a laptop and accessible only with a pass code.

Measurements

Copies of the Defining issues Test version 2, the clinical vignettes and the scoring rubric, and the Revised Professional Practice Environment scale, may be found in Appendices A, B, C, and D.

Defining Issues Test.

The Defining Issues Test (DIT-2, appendix A) was used to measure the variable "moral reasoning". The DIT is an instrument for activating moral schemas (to the extent that a person has developed them) and for assessing them in terms of importance judgments. The DIT contains dilemmas and standard items and the participant's task is to rate and rank the items in terms of their moral importance. The version of the DIT chosen for this study is the DIT-2, a five scenario instrument, which is shorter than the original version. It was selected so that participants would incur a smaller time burden.

The DIT-2 measures percentages of pre-conventional (Personal Interest, Stage 2/3), conventional (Maintaining Norms, Stage 4) and post-conventional (P score, Stages 5/6) moral reasoning. Validity for all forms of the DIT was established in terms of reliability, specifically, Cronbach alpha is .70 to .80. Test-retest reliability is .70-.80. DIT scores are significantly related to cognitive capacity measures of Moral Comprehension ($\underline{r}$ = .60s). DIT scores were significantly linked to many "prosocial" behaviors and to desired professional decision making. Moreover, the DIT has proven to

be equally valid for males and females (Center for the Study of Ethical Development website, 2009).

The DIT offers a means of measuring moral reasoning that fits with current views in cognitive science. The DIT is able to measure understanding at the level that drives most decisions for most people (Narvaez & Bock, 2004), thus making it an appropriate instrument for nurses who have different educational levels and thus possibly varying levels of articulation of their moral reasoning.

Revised Professional Practice Environment scale.

The Revised Professional Practice Environment (RPPE, 2009, appendix D) scale is an instrument developed at the Massachusetts General Hospital in Boston, MA to describe and measure professional practice environments (Ives Erikson, *et al*, 2004, 2009). The elements in the instrument were derived from qualities in the professional practice environments of Magnet hospitals. The development of this instrument recognizes that the environment of care delivery is an important contributor to bedside care.

Instrument subscales.

The eight subscales used in the RPPE were derived from the characteristics of practice environments at of Magnet hospitals and described by Ives Erickson *et al* (2009) as follows: *Leadership and autonomy in clinical practice* is the "quality or state of being self-governing and exercising professional judgment in a timely fashion". *Staff relationships with physicians* are "those associations with physicians that facilitate exchange of important clinical information". *Control over practice* signifies "sufficient intraorganizational status to influence others and deploy resources when necessary for good patient care". *Communication about patients* is defined as "the degree to which patient information is related promptly to the people who need to be informed through

open channels of interchange". *Teamwork* is described as "a conscious activity aimed at achieving unity of effort in the pursuit of shared objectives". *Handling disagreement and conflict* is "the degree to which managing discord is addressed using a problem-solving approach". *Internal work motivation* is "self-generated encouragement completely independent of external factors such as pay, supervision, or coworkers". *Cultural sensitivity* is described as "a set of attitudes, practices, and/or policies that respects and accepts cultural differences".

Among the more important factors found by McClure *et al* (2003) were nurses' autonomy, control over practice, and the quality of the nurse-physician relationship in the environment of care. All of the elements described by Ives Erickson *et al* (2009) were also seen to be relevant to clinical decision-making in an ethnographic study of emergency nurses (Wolf, 2010) and for this reason this instrument was selected to yield insight on these variables and their relationship to clinical decision-making.

Ives Erickson *et al* (2009) reported that the multidimensional RPPE is a psychometrically sound measure of the eight identified components of the professional practice environment in the acute care setting. Scores for each of the eight subscales range from 1 to 4 on a Likert scale, with higher numbers reflecting higher levels of the attribute Psychometric testing of the RPPE demonstrates Cronbach internal consistency reliability of the total score (r = 0.93 [CS] and 0.92 [VS]), resulting subscale scores (r range: 0.80-0.87 [CS], 0.81-0.88 [VS]), and principal components analyses with Varimax rotation and Kaiser normalization (8 components, 59.2% variance [CS], 59.7% [VS]) reported nearly identical results in both samples. This 39 item instrument is thus assumed to be a reliable and valid tool for use in healthcare research (Ives Erickson *et al*, 2009).

Clinical Vignettes.

In order to evaluate accuracy in clinical decision-making, a series of clinical vignettes (appendix B) were developed over six months and trialed with small groups of emergency nurses. Peabody, Luck, Glassman, Dresselhaus and Lee (2000) reported that clinical vignettes appear to be a valid and comprehensive method of evaluation that directly focuses on the process of care provided in actual clinical practice; this was further validated in a later study (Peabody, Luck, Glassman, Jain, Hansen, Spell and Lee, 2004). The strength of clinical vignettes as an evaluative tool lie in the ability to present a standardized case, control for case mix, and give different levels of difficulty to the clinical problem presented.

Each participant answered questions based on three vignettes. The vignettes provided patient presentation, duration of symptoms, medication history, varying levels of medical history, and vital signs. These are all components identified in both the literature and in pilot studies as factors in assigning triage acuity levels. The number of vignettes was chosen to give enough information to score without being overly burdensome.

Vignette development.

In pilot studies of decision-making at triage (Wolf, 2010) data suggest that nurses have varying levels of ability to deliberately search for critical information and apply the data to the situation at hand to derive accurate triage acuity levels. With this as a backdrop, vignettes were developed using a critical cues strategy over the course of six months. A patient problem was chosen (for example, cardiac event, stroke, psychiatric problem) and a constellation of critical cues or defining characteristics was identified using nursing and pathophysiology textbooks (Howard and Steinman (eds.), 2010;

McCance and Heuther, 2006). The critical cues or defining characteristics were then woven into the vignette.

Expert panel.

Emergency nurses with national expertise in clinical education and triage processes were contacted and asked to review each vignette for content, readability, veracity, and usability. The same group of experts was consulted on the "leveling" of vignettes to differentiate a level of complexity. Once agreement was reached on the adequacy of each vignette for use in evaluation and the level of complexity it reflected, three vignettes (one of each level) were chosen for inclusion in the study instrument. The final three vignettes selected for the study were patient situations describing a 1) cerebral vascular accident, 2) a psychiatric presentation, and 3) an atypical cardiac presentation, and were chosen because they were representative of patient problems that all emergency nurses would have to identify on a regular basis. All involve core measures or National Patient Safety Goals (Joint Commission website, 2010).

Levels of complexity.

Level 1: the scenario provides clear direction to the problem – the details are straightforward and the level is basic – a nurse with 6 months of emergency nursing experience should be able to identify the problem, assign appropriate acuity, and select an appropriate initial intervention.

Level 2: the scenario provides mostly clear direction to the problem – the details are more subtle, there are some confounding details and the level is more advanced – a nurse with 1-2 years emergency nursing experience and a larger knowledge base should be able to identify the problem, assign appropriate acuity, and select an appropriate initial intervention.

Level 3: the problem may be more difficult to identify – recognition of more advanced critical cues may be necessary to accurately identify the problem, assign acuity and select an appropriate intervention. A nurse may need an extensive knowledge base and more than 2 years emergency nursing experience to accurately identify the problem and select appropriate interventions.

Development of scoring rubric.

A panel of four local emergency nurses with expertise in education and triage developed the scoring rubric and trialed it with ten vignettes completed by emergency nurses. It was felt that a rubric for scoring was a critical piece of the evaluation for standardization.

Acuity (ESI) level, "most important piece of information" (pivotal cue) and "differential diagnosis" (problem identification) were deemed by the panel of local experts to be the crucial pieces of information for accuracy, and so two points were given for correct answers, and zero points for incorrect answers. The other two questions, "second most important piece of information" and "initial intervention" were deemed essentially dependent on the other questions and assigned one point for a correct answer and zero points for an incorrect answer. Thus the total points allotted for all correct answers would be eight. This allows the ability to differentiate between "right answer, right reason" and "right answer, wrong reason".

The scoring is done as follows: there is a case presentation, and five questions following to ascertain 1) the Emergency Severity Index (ESI) rating, a measure of patient acuity and projected resources, and if ESI is not used by the nurse's facility, a choice of emergency/urgent/nonurgent 2) deliberate search for information by identifying the most pivotal piece of data used to make the acuity decision, 3) deliberative search for information by identifying a second most important cue, 4) ability to identify the possible

clinical problem by choosing a differential diagnosis from a list, and 5) ability to apply knowledge in identifying an initial intervention.

Procedures

Qualtrics™ Internet Survey Instrument

This survey package was chosen for its security, usability, and ability to both analyze data in real time and export data directly into PASW software for further analysis, thus decreasing potential problems with data entry that could lead to error in analysis. Boston College has an account with Qualtrics™ and so using this package was also cost-effective.

Data collection:

Data collection took place using the Qualtrics™ internet survey instrument. Data collection began on November 3, 2010 and ended on December 3, 2010. The intent was to avoid major holidays such as Thanksgiving and Christmas, as per the current literature. Recent work in this area (Im & Chee, 2004) indicated that recruiting during summer holidays and major holidays may result in low return of internet surveys. However, the largest group of completed surveys in this study was returned over the Thanksgiving weekend.

The networking or "snowball" technique (Burns & Grove, 2005) was used as the primary recruiting strategy to obtain the required number of participants. The survey link information was given to key colleagues of the investigator with the intent that they would forward the link and survey information to their colleagues. Of the 368 participants who began the survey, 200 participants completed surveys (58%).There was no indication as to why 42% of participants did not complete the survey, and the number who completed the survey was adequate for statistical analysis.

The DIT-2, the RPPE, the clinical vignettes and the demographic survey were made available via the Qualtrics™ internet survey package program. Upon return, data from each packet was downloaded into a PASW database. The clinical vignettes and the RPPE were scored by the investigator and the DIT-2 responses were returned for scoring to the Center for Study of Ethical Development, the entity which developed and scores the instrument. Scored data was returned the same day, and placed back in the PASW database for analysis.

Data Collection and Management

Participants completed the survey instruments on line via the Qualtrics™ site. Data were collected via the Qualtrics™ internet survey package program and held in a secure internet site accessible only by passcode. Once the appropriate number of complete surveys was reached, data were downloaded into a PASW database and held on the researcher's secure computer, accessible only by passcode.

Data Analysis

The analysis plan consisted of a bivariate correlation analysis using Pearson's product-moment correlation coefficients followed by chi square and multiple linear regression analysis to determine the strength and direction of the relationships between independent and dependent variables (see Table 1). Initially, a correlation coefficient matrix was generated using PASW version 18 (the most recent version) software to demonstrate the strength and the direction of the relationships between pairs of variables. To further understand the relationship, chi square and linear regression analysis was performed, also using PASW software. The dependent variable was the score on individual components of the vignettes as well as total score and the independent (predictor) variables were age, experience, education, certification, geographic location, institution type, DIT-2 post-conventional reasoning percentage score, and RPPE score.

This model shows a correlation for each independent variable to dependent variable and how much of the variation in vignette scores can be accounted for by age, experience, education, certification, geographic location, institution type, DIT-2 score, and RPPE scoring. Data were entered as individual variables as well as two blocks of variables: demographic variables as the first block and the key independent variable(s) as the second block.

Summary

This chapter described processes for recruitment of participants, data collection and data analysis. Chapter 4 describes the results of the study

Table 1 - Components and measurements of the research questions and hypotheses

Question or hypothesis	Variables	Definition	Operational definition	Measurement Tool	Element of model
H1: Controlling for other variables as stated, there is a positive relationship between moral reasoning and accurate decision making for emergency nurses	Moral reasoning (Independent variable) Accuracy in decision making (Dependent variable)	being able to identify the 'good' in a given situation the ability to identify the most pressing physiologic or psychological threat to a patient, its etiology and an appropriate intervention	Score on DIT-2 Scoring on clinical vignettes series as described by rubric	DIT-2 Clinical vignettes rubric	Core element (Ring 1) Core element (Ring 1)
Q1: What is the relationship between environment of care and accurate decision making for emergency nurses?	Environment of care (Independent variable) Accuracy in decision making (Dependent variable)	The nurse's understanding of factors in the practice environment that hinder or facilitate safe, efficient, cost-effective, patient-centered care The ability to identify the most pressing physiologic or psychological threat to a patient, its etiology and an appropriate intervention	Scoring on subscales of the RPPE Scoring on clinical vignettes series as described by rubric	RPPE Clinical vignettes rubric	Immediate elements, (Ring 2) influential elements (Ring 3) Core element (Ring 1)
Q2: To what degree do the age, gender, educational level, and years of experience in emergency nursing predict the accuracy of clinical decision-making in emergency	Demographics as named (Independent variable) Accuracy in decision making (Dependent variable)	As named The ability to identify the most pressing physiologic or psychological threat to a patient, its etiology and an appropriate	Demographics tool Scoring on clinical vignettes series as described by rubric	Clinical vignettes rubric	Core element (Ring 1)

nurses?		intervention			

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CHAPTER 4

Results of the Study

Introduction

The purpose of the study was to explore the relationship between multiple variables to determine which are most significantly correlated with accurate decision making in a sample of emergency nurses.

This chapter describes the results of the study. The IEDEM-CM model was tested using a quantitative correlational design to determine relationships between the independent variables of practice environment, moral reasoning, and demographics and the dependent variable of accuracy in problem identification. 200 subjects were recruited using the networking technique.

Data Preparation

Prior to undertaking statistical analysis, the study data were systematically examined for normality, missing values, and outlying values. Study variables were found to be normally distributed and Pearson's skewness statistic was noted to be within the -1.0 to +1.0 standard deviation units range, indicating very minimal skew for each variable (Hair, Anderson, Tatham, & Black, 1998). No extreme outlying values were detected.. Data for one subject contained several missing values; these were handled on an analysis-by-analysis basis, rather than excluding the entire case, in order to maximize sample size. The median was substituted for missing data points point versus the mean; in this case, vignette scores ranged from 0-2, and subscales on the RPPE from 1-4, so the median was a more useful number for substitution.

Characteristics of the Study Population

The study sample consisted of 200 subjects who completed the survey (all three instruments) in response to electronic mail requesting their participation in the project.

Table 2 provides demographic characteristics for the study cohort. The majority of study subjects had obtained a professional degree or higher, which includes baccalaureate, Master's and doctoral degrees (62.9%). A majority had more than 10 years of emergency nursing experience (68%), were certified in emergency nursing (56.5%), worked in community hospital settings (52.8), and worked in the Northeast geographic region (47.5%). The mean age of study participants was 47.5 years, standard deviation (SD) 9.4 years.

Within the study population (N=200), 194 participants completed the Defining Issues Test, version 2 (DIT-2). Mean scores are presented in Table 5. The DIT-2 measures percentages of pre-conventional (Personal Interest, Stage 2/3), conventional (Maintaining Norms, Stage 4) and post-conventional (P score, Stages 5/6) moral reasoning.

All 200 study participants completed the Revised Professional Practice Environment (RPPE) scale. Scores for each of the eight subscales range from 1 to 4, with higher numbers reflecting higher levels of the attribute. Mean scores for each of the RPPE subscales are presented in Table 3. Participants scored highest on the *Internal Work Motivation* subscale, mean = 3.35, SD = 0.38, 95% confidence interval (CI): 3.30 to 3.41 and scored lowest on the *Handling Disagreement and Conflict* subscale, mean = 2.44, SD = 0.23, 95% CI: 2.41 to 2.47.

As described in Chapter 3, the individual triage vignettes utilized in the study were scored using the scoring rubric provided in Appendix C, resulting in possible scores ranging from zero to 8 points for each vignette, and a total possible score of 24. Mean scores for the triage vignettes are displayed in Table 4. Mean vignette scores ranged from 1.71, SD 1.77 on vignette 3 to 4.61, SD 2.10 on vignette 2. The mean total vignette score for the study participants was 10.04, SD = 3.45, 95% CI: 9.55 to 10.52.

Table 2
Demographic Characteristics of the Study Subjects N = 200

Demographic Variables	n (%)
Education Level Obtained	
Vocational/Technical	12 (6.2)
Junior College	14 (7.2)
*Sophomore	1 (0.5)
*Junior	5 (2.6)
*Senior	30 (15.5)
Professional Degree	52 (26.8)
Masters Degree	61 (31.4)
Ph.D./Ed.D	8 (4.1)
Other	11 (5.7)
Experience (Years)	
0-5	28 (14.0)
6-10	36 (18.0)
11-20	56 (28.0)
21-30	50 (25.0)
>30	30 (15.0)
Emergency Nursing Certification	
Yes	113 (56.5)
No	87 (43.5)
Institution Type	
Community Hospital	104 (52.8)
Teaching Hospital	39 (19.8)
Trauma Center	50 (25.4)
Freestanding Emergency Department	3 (1.5)
Urgent Care Center	1 (0.5)
Geographic Region	
Northeast	94 (47.5)
South	50 (25.3)
Midwest	35 (17.7)
West	19 (9.6)
Age (Years) (Mean, SD)	47.5 (9.4)

Note. Six subjects did not provide education level data, three did not provide institution type data, two did not provide geographic region data, and eleven did not provide age data. * Finishing BSN

Table 3

Mean Scores on Revised Professional Practice Environment Subscales N=200

Subscale	Mean (SD)	95% Confidence Interval
Handling Disagreement and Conflict	2.44 (0.23)	2.41 – 2.47
Leadership and Autonomy	2.95 (0.58)	2.87 – 3.03
Internal Work Motivation	3.35 (0.38)	3.30 – 3.41
Control Over Practice	2.68 (0.58)	2.60 – 2.76
Teamwork	2.55 (0.38)	2.50 – 2.61
Communication About Patients	2.81 (0.34)	2.76 – 2.86
Cultural Sensitivity	3.04 (0.52)	2.97 – 3.12
Relationships with Physicians	3.07 (0.61)	2.98 – 3.15

Note. SD = standard deviation

Table 4

Mean Scores on Clinical Vignettes N=200

Vignette	Mean (SD)	95% Confidence Interval
Vignette 1	3.71 (1.78)	3.46 – 3.96
Vignette 2	4.61 (2.10)	4.32 – 4.91
Vignette 3	1.71 (1.77)	1.47 – 1.96
Total Vignette Score	10.04 (3.45)	9.55 – 10.52

Notes. SD = standard deviation; triage vignettes increase in complexity, with vignette 1 being the least complex and vignette 3 being the most complex.

Table 5

Mean Scores on Defining Issues Test Version 2 (DIT-2) N=194

Vignette	Mean (SD)	95% Confidence Interval
Post Conventional (P score)	38.7320 (14.82)	36.63-40.83
Maintains Norms (stage 4)	30.5155 (12.65)	28.72-32.31
Personal Interest (stage 2/3)	24.8660 (10.53)	23.37-26.36

Notes. SD = standard deviation;

Hypothesis 1: Controlling for other variables (RPPE and demographic) as stated, there is a positive relationship between moral reasoning and accurate decision making for emergency nurses.

The first research hypothesis posited the relationship between moral reasoning, as measured by the Defined Issues Test-2 (DIT-2), and accurate decision making in a sample of emergency nurses. This hypothesis was evaluated using Pearson's correlation coefficient (*r*), chi-square testing, and multiple linear regression modeling.

Accuracy in triage vignettes and post conventional moral reasoning.

Pearson's product moment correlation coefficient was utilized to examine the strength and direction of the relationships between participants' scores on each of the triage vignettes, total vignette score, and the percentage of post conventional moral reasoning. As shown in the correlation matrix provided in Table 6, strong, positive relationships were noted between total vignette score and scores on each of the individual triage vignettes ($p < 0.01$ for each pair of variables). At this level of analysis, there was no statistically significant relationships uncovered between vignette scores and the percentage of post conventional moral reasoning utilized by study participants (r range = -0.016 to 0.137, p range = 0.058 to 0.820). There was, however, a trend towards a significant relationship between scores on vignette 3, the most complex vignette, and the percentage of post conventional moral reasoning, $r = 0.137$, $p = 0.058$. Following correlation analysis, the relationship between nurses' accuracy and the percentage of post conventional moral reasoning was evaluated using ordinary least squares linear regression analysis. For this series of analyses, each of the four outcomes of interest (namely, scores on triage vignettes 1, 2, and 3 and total vignette score) was used as the

outcome variable in a series of regression models. The percentage of post conventional moral reasoning was used as the predictor variable. To evaluate the relationship between vignettes and the percentage of post conventional moral reasoning after controlling for the effect of demographic variables, a series of hierarchical multiple regression models using multiple predictors (percentage post conventional moral reasoning, certification status, age, experience, education, type of institution, and geographic region) were then employed. This was accomplished using a forced entry variable selection strategy. Data were entered as individual variables as well as two blocks of variables: demographic variables as the first block and the key independent variable(s) as the second block. No difference in significance was noted between these two strategies.

Vignette 1.

The results of the regression analyses for the vignette 1 score outcome are detailed in Tables 6, 7 and 8. Table 6 provides a summary of the regression models constructed and tested in this study. For model 1 in Table 6, the initial simple logistic regression model, the *R*-square value (0.005) indicates that only approximately 0.05% of the variability observed in vignette 1 scores is accounted for by the simple regression model. The omnibus *F* test is a ratio of the model and residual variances, providing information regarding whether there is an association between the variables of interest, score on vignette 1 and percentage post conventional moral reasoning. The *F* test evaluates the overall significance of the model ($H_0 : \rho^2 = 0$) and is depicted in Table 7. Because the observed value of *F* (0.832) is less than the critical value of *F*, it was determined that the model was not statistically significant overall (R^2 = 0.005, *F* = 0.832, *p* = 0.363); therefore, the null hypothesis was retained and it was concluded that the

"percent post conventional moral reasoning" variable is not a significant predictor of scores on triage vignette 1. The two variables share only approximately 0.05% of their variance and are not significantly correlated ($R = 0.068$, $p = 0.301$).

In order to examine the relationship between score on vignette 1 and the percentage post conventional moral reasoning while accounting for any variance attributable to demographic characteristics (certification status, age, experience, education level, type of institution, and geographic region), multiple regression models were constructed by adding one demographic characteristic into the model at a time, resulting in the construction of six additional models evaluating the relationship of interest. The additional models are also detailed in Tables 6, 7, and 8. Examination of the *R*-square values in Table 6 demonstrates increases in the variance explained with the addition of each new demographic variable into the model. Model 7, the full multivariate model, ultimately accounted for approximately 7.3% of the variance observed in vignette 1 scores. The addition of the six control variables into model 7 explained an additional 2.1% of variance over the simple regression model, an increase that was statistically significant (F Change = 3.901, $p = 0.05$).

Table 8 provides information regarding the regression coefficients for each of the multivariate models. Here it is demonstrated that the slope of the partial regression coefficients for the percent post conventional moral reasoning variable was not statistically significant in any of the additional models ($b = 0.008$, $p = 0.384$ for model 7), when the covariance introduced by the demographic variables was taken into account. The partial regression coefficients for two variables, education level and geographic region, were, however, significant in models 5, 6, and 7. Using model 7 as an example,

the slope of the partial regression coefficient for education level (0.127) indicates that for every unit of increase in education (for example, from “junior” to “senior” level education), a corresponding increase of 0.127 points was observed supporting the hypothesis that increased education resulted in higher scores on vignette 1. Further, variation in geographic location is identified in model 7, with a 0.259 decrease in vignette 1 scores for every unit of change in geographic region, from Northeast, to South, to Midwest, to West, with nurses from a Western location scoring, on average, 0.259 points less than nurses from the Midwest, and so on.

For each additional outcome of interest (score on vignette 2, score on vignette 3, and total vignette score), the same methodology beginning with a simple linear regression model and ending with a multivariate regression model that accounted for the six demographic variables was employed. For the score on vignette 2 outcome, results of these analyses are displayed in Tables 9, 10 and 11. Tables 12, 13 and 14 provide the data for the score on vignette 3 outcome. Details of the analysis using total vignette score as the outcome are available in Tables 15-17.

Vignette 2.

The analyses for score on vignette 2 revealed that the percentage post conventional moral reasoning and vignette 2 score variables shared approximately 5.6% of their variance. The introduction of the control variable for institution type produced a statistically significant increase in the *R*-square value (*F* Change = 7.418, $p = 0.007$), Table 9. As seen in Table 10, the omnibus *F* test did not produce a statistically significant result for any of the 7 models tested. The slopes of the partial regression coefficients for the percent post conventional moral reasoning variable were not significant ($b = -0.004$, *p*

= 0.689 for model 7) and only the slope of the partial regression coefficient for institution type was found to be statistically significantly different from zero (b = -0.465, p = 0.008). Ultimately, it was concluded that when taking into account the covariance introduced by the demographic variables, the variables score on vignette 2 and percentage post conventional moral reasoning are not significantly related and that the moral reasoning variable is not a significant predictor of score on vignette 2 (F = 1.462, p = 0.184 for model 7).

Vignette 3.

Exploration of scores for vignette 3 followed. Table 12 demonstrates that when taking into account variance accounted for by the demographic variables, the two variables of interest share approximately 4.5% of their variance (model 7). None of the multivariate regression models was significant overall (F = 1.156, p = 0.331 for model 7) (Table 13), and none of the slopes for the partial regression coefficients in these models was statistically significantly different from zero (b = 0.016, p = 0.087 for model 7) (Table 14). As a result of these analyses, it was concluded that, when controlling for the demographic variables, score on vignette 3 and percent post conventional moral reasoning do not share a significant amount of their variance and moral reasoning score was not a significant predictor of vignette 3 score.

Total vignette score.

When total vignette score was examined as the outcome of interest, total vignette score and percent post conventional moral reasoning shared approximately 6.5% of their variance, partialling out the effects of the demographic variables. The introduction of the institution type variable into model 6 produced a statistically significant increase in the R-

square value (*F* Change = 5.769, *p* = 0.017) (Table 15). As previously, none of the multivariate models was significant over all (*F* = 1.695, *p* = 0.113 for model 7) (Table 4.15). Table 17 demonstrates that only the slope of the partial regression coefficient for the institution type variable (*b* = -0.614, *p* = 0.028) was statistically significantly different from zero, indicating that with each 1 unit change in institution type (for example, from trauma center to freestanding emergency department), a corresponding 0.614 point decrease in total vignette score was observed. In sum, it was concluded that after accounting for covariance introduced by the demographic variables, total vignette score was not predicted by the percentage of post conventional moral reasoning and that the two variables do not share a significant amount of their variance.

Vignette components.

Following modeling using the complete score on each vignette, vignette scores were deconstructed into their components to examine the relationships between component of the vignette scores and the percentage of post conventional moral reasoning demonstrated by the study participants. Each vignette score was comprised of five components: initial acuity assignation, first basis for acuity assignation, second basis for acuity assignation, differential diagnosis, and first intervention. Pearson's product moment correlation coefficient was employed to examine the strength and direction of the relationships between the vignette components and percent post conventional moral reasoning. Results of these analyses are displayed in the correlation matrices found in Tables 18 and 19. The tables display many significant correlations between scores on the various vignette components, but most importantly a positive relationship between the

percent post conventional moral reasoning and score on the differential diagnosis portion of vignette 3 ($r = 0.158$, $p = 0.028$) (Table 19).

To facilitate further analysis of the components of the vignette scores, each vignette component was dichotomized into correct or incorrect responses. Chi-square analysis was then undertaken to examine the data for differences in the proportion of correct responses to each vignette component on the basis of percentage post conventional moral reasoning. The findings of these analyses are detailed in Tables 20 and 21. A statistically significant difference in the proportion of participants responding correctly to the second acuity basis portion of triage vignette 1 was noted on the basis of percent post conventional moral reasoning ($\chi^2 = 47.986$, df = 32, $p = 0.035$) (Table 19). In addition, a statistically significant difference in the proportion of subjects correctly responding to the first intervention portion of vignette 2 was also noted on the basis of post conventional moral reasoning ($\chi^2 = 46.526$, df = 32, $p = 0.047$) (Table 20).

Research Question 1: What is the relationship between environment of care and accurate decision making for emergency nurses?

The aim of the first research question was to examine the relationship between environment of care, as measured by the Revised Professional Practice Environment (RPPE) scale, and accurate triage decision making in a sample of emergency nurses. This question was evaluated using Pearson's correlation coefficient and multiple linear regression modeling.

Pearson's correlation coefficient was used to examine the strength and direction of the relationships between participant's scores on each of the triage vignettes, total vignette score, and scores on each of the eight RPPE subscales. The results of this

analysis are presented in the correlation matrix depicted in Table 22. Statistically significant relationships were also noted between subscale scores, with all but two subscale pairs (*Teamwork* and *Internal Work Motivation*, r = -0.078, p = 0.277; *Teamwork* and *Communication About Patients*, r = -0.085, p = 0.236) being correlated. There was also a statistically significant relationship between scores on the *Teamwork* subscale of the RPPE and total vignette scores, r = 0.215, p = 0.002. In addition, there were trends towards significant relationships between *Teamwork* subscale scores and scores on vignette 1 (r = 0.139, p = 0.051) and *Teamwork* subscale scores and scores on vignette 2 (r = 0.133, p = 0.061).

Accuracy in clinical vignettes and practice environment.

Following correlation analysis, the relationships between nurses' accuracy and scores on the eight RPPE subscales were evaluated using ordinary least squares regression analyses. For this series of analyses, each of the four outcomes of interest (scores on triage vignettes 1, 2, and 3; total vignette score) were used as the outcome variable in a series of regression models. For each model series, scores on one of the subscales (*Handling Disagreement and Conflict, Leadership and Autonomy in Clinical Practice, Internal Work Motivation, Control Over Practice, Teamwork, Communication About Patients, Cultural Sensitivity,* and *Staff Relationships with Physicians)* was utilized at the predictor variable. To evaluate the relationships between vignette scores and RPPE subscale scores after controlling for the effect of demographic variables, a series of hierarchical multiple regression models using multiple predictors (subscale score, certification status, age, experience, education, type of institution, and geographic region)

were then employed. This was accomplished using a forced entry variable selection strategy.

As described for research question 1, scatterplots of the primary variables on interest were created and examined. Extreme outlying cases, potential influential points or consistent patterns to high and low scoring were not identified.

Tables 23 through 34 provide details on modeling for all four outcome measures and the *Handling Disagreement and Conflict* subscale of the RPPE. For each outcome (vignettes 1, 2, and 3, total vignette score), the first table in the series presents a summary of the regression models, the second provides analysis of variance details, and the third presents regression coefficients for the models.

Vignette 1.

For the vignette 1 score outcome, Table 23 indicates that the *R*-square value for model 7 is 0.072, meaning that when controlling for demographic variables, vignette 1 score and scores on the *Handling Disagreement and Conflict* subscale share approximately 7.2% of their variance. While *F*-test values were not statistically significant (Table 24) there was a trend towards significance in model 7 (R^2=0.072, F = 1.955, p = 0.064). The slopes of the regression lines for these models were not statistically significantly different from zero (b = -0.474, t = -0.836, p = 0.404 for model 7). Only the slope of the partial regression coefficient for the education level demographic variable was statistically significantly different from zero (b= 0.132, t = 2.260, p = 0.025 in model 7) in models 5, 6, and 7. This indicates that for each increase in education level (e.g. from “junior” to “senior” college level education), an increase of 0.132 points on vignette 1 score was observed (Table 24). In sum, when controlling for

demographic variables, score on the *Handling Disagreement and Conflict* subscale of the RPPE was not a significant predictor of vignette 1 score.

Vignette 2.

Results for the vignette 2 score outcome were similar (Tables 26 through 28). No model was statistically significant overall and only the slope of the partial regression coefficient for the institution type was statistically significantly different from zero (b= -0.439, t = -2.608, p = 0.010 in model 7). Score on the *Handling Disagreement and Conflict* subscale of the RPPE was not a significant predictor of score on vignette 2.

Vignette 3.

For vignette 3 (Tables 29 through 31), F-tests demonstrated that none of the models were statistically significant. In addition, none of the regression coefficients was statistically different from zero. As a result, it was concluded that scores on the *Handling Disagreement and Conflict* subscale were not predictive of scores on vignette 3. For the total vignette score outcome (Tables 32 through 34), no model was significant and only the institution type demographic variable partial regression coefficient was significant. These findings suggest that scores on the *Handling Disagreement and Conflict* subscale of the RPPE are not predictive of total vignette score.

Subscale outcomes.

Leadership and Autonomy.

The relationship between *Leadership and Autonomy* subscale scores and the four outcomes was evaluated in the same manner and findings are summarized in Tables 35 through 46. For vignette 1, there was a trend towards statistical significance in two cases, R^2 = 0.057, F = 2.141, p = 0.063 for model 6 and R^2 = 0.073, F = 1.979, p = 0.060 for

model 7 (Table 35). The slope of the partial regression coefficient for the education level variable was again statistically significantly different from zero (Table 37). In sum however, it was concluded that score on the *Leadership and Autonomy* subscale did not predict score on vignette 1.

For the score on vignette 2 outcome (Tables 38 through 40), no model was statistically significant using the *Leadership and Autonomy* subscale score as the predictor variable. Only the partial regression coefficient for the intuition type variable was statistically significantly different from zero (b = -0.449, t = -2.671, p = 0.008) (Table 40). It was concluded that score on the *Leadership and Autonomy* subscale did not predict score on vignette 2. For vignette 3, no model was significant and no regression coefficient was significant (Tables 41 through 43). Similarly for total vignette score, no model was significant and only the partial regression coefficient for the institution type variable was significantly different from zero (b = -0.653, t = -2.394, p = 0.018) (Tables 44 through 46). In summary, it was concluded that when controlling for demographic variables, score on the *Leadership and Autonomy* subscale was not a significant predictor of vignette scores.

Internal Work Motivation.

For the *Internal Work Motivation* subscale, no model was significant for any of the four outcomes (Tables 47 through 58). Only the education level (vignette 1, Table 49) and institution type (vignette 2 and total vignette score, Tables 52 and 58) variables demonstrated statistically significant partial regression coefficients. These findings suggest that score on the *Internal Work Motivation* subscale of the RPPE does not predict vignette score.

Control Over Practice.

Score on the *Control Over Practice* subscale was found to be a significant predictor of score on vignette 1 (Tables 59 through 61). The two variables share approximately 7.4% of their variance (Table 59) and the education level partial regression coefficient was again statistically significantly different from zero in models 5 through 7 (Table 60). Overall, it was noted that when controlling for the certification status, age, experience level and education level demographic variables, score on the Control Over Practice subscale was a significant predictor of score on vignette 1, $F = 2.367$, $p = 0.041$ (Table 60).

For vignette 2, 3, and total vignette score (Tables 62 through 70) no significant models were observed. The institution type partial regression coefficient was statistically significantly different from zero for vignette 2 ($b = -0.444$, $t = 2.618$, $p = 0.010$) and total vignette score ($b = -0.617$, $t = -2.249$, $p = 0.026$), again indicating that lower scores were observed for nurses working in freestanding emergency departments and urgent care centers.

Teamwork.

Details of the analysis for the *Teamwork* subscale of the RPPE are provided in Tables 71 through 82. There was a strong trend towards significance for the relationship between *Teamwork* scores and scores on vignette 1, $F = 2.035$, $p = 0.053$ (Table 72). *Teamwork* scores were noted to be predictive of vignette 2 scores, $F = 2.398$, $p = 0.030$ (Table 75), and of total vignette scores, $F = 2.518$, $p = 0.017$ (Table 81). In addition, the slope of the partial regression coefficient for the education level variable was statistically significantly different from zero for vignette 1 ($b = 0.126$, $t = 2.155$, $p = 0.033$) (Table

73), while the institution type partial regression coefficient was significant for vignette 2 (b = -0.460, t = -2.752, p = 0.007; Table 75) and total vignette score (b = -0.675, t = -2.508, p = 0.013; Table 82).

Communication About Patients.

Communication About Patients subscale scores were found to be significant predictors of scores on vignette 1 when controlling for certification status, age, experience, and education level, F = 2.668, p = 0.024 (Tables 84 through 86). The slope of the partial regression coefficient for the educational level variable was also significant in this series of models (b = 0.141, t = 2.432, p = 0.016) (Table 86). Models for vignettes 2, 3, and total vignette score were not significant overall (Tables 86 through 94); however, the partial regression coefficients for the institution type variable were significant for the vignette 2 and total vignette score outcomes (b = -0.440, t = -2.601, p = 0.010, Table 88 b = -0.683, t = -2.496, p = 0.013, Table 94).

Cultural Sensitivity.

Details of the findings relative to the analysis for the *Cultural Sensitivity* subscale of the RPPE are located in Tables 95 through 106. For each of the four outcome measures, *Cultural Sensitivity* subscale score was not found to be a significant predictor of score on the vignette of interest. The education level partial regression coefficient was statistically significantly different from zero for vignette 1 (b = 0.131, t = 2.245, p = 0.026, Table 97), again indicating higher scores for nurses with higher levels of education. The institution type partial regression coefficient was significant for vignette 2 score and total vignette score (b = -0.434, t = -2.546, p = 0.012, Table 100; b = -0.632, t = -2.281, p = 0.024; Table 106).

Staff Relationships with Physicians.

Data regarding modeling with the *Staff Relationships with Physicians* subscale scores as the predictor variable are provided in Tables 107 through 118. Overall, no model demonstrated that *Staff Relationships with Physicians* subscale scores were significant predictors of vignette scores. The partial regression coefficient for the educational level variable remained significant for vignette 1 (b = 0.127, t = 2.169, p = 0.031; Table 109) while the institution type variable was significant for vignette 2 and total vignette score (b = -0.445, t = -2.626, p = 0.009, Table 111; b = -0.653, t = -2.374, p = 0.019, Table 118).

Research Question 2: To what degree do the age, certification status, educational level, institution type, geographic location, and years of experience in emergency nursing predict the accuracy of clinical decision making in emergency nurses?

The aim of the second research question was to examine the relationship between the accuracy of emergency nurses' decision making, as measured by scores on clinical vignettes, and demographic variables including certification status, age, educational level, emergency nursing experience, institution type, and geographic location. This question was evaluated using Pearson's product moment correlation coefficient (r) for continuous variable pairs, Spearman's rho (ρ) for continuous – categorical variable pairs, and evaluation of partial regression coefficients obtained through multiple regression modeling.

Accuracy in clinical vignettes and demographic variables.

A correlation matrix for the relationships between vignette scores and the demographic variables of interest is shown in Table 119. A positive relationship was

noted between score on vignette 1 and educational level ($\rho = 0.146$, $p = 0.043$). In addition, significant relationships between vignette 2 score and institution type ($\rho = -0.161$, $p = 0.024$) and total vignette score and institution type ($\rho = -0.166$, $p = 0.020$) were identified.

Accuracy in clinical vignettes and educational level.

As detailed in the results for research question 2, multiple regression analyses revealed several significant partial regression coefficients for the educational level and institution type variables. Across all eight subscales of the RPPE, educational level was a significant predictor of vignette 1 score, with higher educational attainment being predictive of higher vignette 1 scores.

Accuracy in clinical vignettes and clinical setting.

Across all of the subscales, working in a less complex (urgent care or freestanding ED) setting was predictive of a lower score on vignette 2 as well as a lower total vignette score. No other demographic characteristic was a significant predictor of any vignette score. Scores on vignette 3, the most complex vignette, were not affected by any of the demographic variables evaluated.

Whole-model regression analysis.

After correlations and regression analysis were conducted for individual research hypotheses and questions, a regression analysis was conducted, with all variables entered at once. No new correlations or relationships were uncovered using this process.

Summary of Findings

Findings from this study support the IEDEM-CD framework elements (Figure 2) of moral reasoning and environment of care as significant factors in the accuracy of

decision-making as posited in Chapter 1. There was a weak positive relationship between total vignette scores and percentage of post conventional moral reasoning. In complex clinical situations however, higher levels of moral reasoning significantly affected accuracy in problem identification.

Attributes of the environment of care as measured by the Revised Professional Practice Environment (RPPE) scale also significantly affected critical cue recognition and selection of appropriate interventions. Overall, the IEDEM-CD model appears to be supported in both elements and relationships. Chapter 5 will discuss the implications of these results.

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CHAPTER 5

Discussion

As I do understand it, laws, commands, rules and edicts are for those who have not the light which makes plain the pathway. - Anne Marbury Hutchinson

The purpose of this study was to explore the relationship between multiple variables to determine which are most significantly correlated with accurate decision making in a sample of emergency nurses. This chapter will discuss the findings of the study, and place them into the context of the extant literature. It will also discuss the implications of these findings for nursing research, practice, and education.

Hypothesis 1: Moral reasoning and accuracy

Findings of the study.

The core elements of the IEDEM-CD model focusing on the identification and relief of patient problems as the cornerstone of emergency nursing practice were supported. Accuracy in decision-making was accomplished by identifying cues, linking them to unique patient presentations, and selecting effective interventions to achieve desired outcomes. The accurate nurse must actively search for critical cues to determine the presence or absence of physiologic or psychological threat to the patient. The IEDEM-CD model suggests that this motivation to actively seek out information and select appropriate interventions based on that decision is at least in part the result of higher levels of moral reasoning. The first research hypothesis, that moral reasoning would have a positive effect on accuracy, was supported by the findings in the context of more complex clinical situations.

A small positive relationship was found between the percent post conventional moral reasoning (reasoning based on higher principles of social justice, rather than on

"rules") and scoring on the differential diagnosis portion of vignette 3 ($r = 0.158$, $p = 0.028$) (Table 19). This finding supports the premise that accuracy in problem identification is related to moral reasoning and again supports the hypothesis that higher levels of moral reasoning are necessary to accurately respond to the complex (Level 3) scenario presented in vignette 3, an atypical cardiac presentation, as well as correctly choose interventions in vignette 2, a psychiatric (Level 2) presentation.

A statistically significant difference in the proportion of participants responding correctly to the second critical cue of triage vignette 1 and in selecting the correct intervention for vignette 2 was noted on the basis of percent post conventional moral reasoning, or reasoning at the "social justice" level. Taken together, the results of these analyses suggest the presence of a small but significant relationship between accurate decision making in emergency nurses and moral reasoning at the post conventional level, particularly when the components of each triage vignette were examined individually. This analysis provides evidence supporting the premise that moral reasoning based not on "rules", but on the "*sunnum bonum*", or 'ultimate good' of the patient at hand, may be required for emergency nurses to accurately respond to more complex clinical presentations, such as the one described in vignette 3.

Discussion.

Research investigating the effect of moral reasoning on clinical decision-making is scant. Rest (1982) and de Casterle et al. (2008) suggest that the average staff nurse is morally functioning at the "conventional", or "rules oriented" level, and that this constitutes a major hindrance to ethical action by nurses. Other current literature (Benner, 2000; Gordon, Murphy, Candee, and Hiltunen, 1994) suggests that clinical judgment

cannot be separated from ethical judgment; nurses see themselves as ethically situated (Doane, 2000), but unable to act due to practice environments hostile to such decision-making. The 'good nurse' as described by Bishop and Scudder (1996) is "… focused on ways of fostering [the patient's] well-being because [the nurse] is engaged in a practice with an inherent moral sense" (p. 36). Benner's (2000) work supports this, suggesting that each clinical decision requires knowledge of what is good and right, embedding the science in the center of the art. The findings of this study support and go beyond this literature. This study's findings support the posited link between functioning at the higher, "social good" (post-conventional) level and accurately identifying more complex clinical problems. This suggests that not only is a moral grounding important for patient care in general, it is specifically important in promoting accurate problem identification, and thus *effective, efficient* patient care.

The findings related to Hypothesis 1 support the IEDEM-CD model as a representation of synthesized ethical and clinical judgment needed for accurate problem identification and intervention selection. Study findings acknowledge that in complex clinical situations, moral reasoning at high levels is related to accuracy in identifying patient problems, a deliberative process achieved by the collection of data and determination of critical cues. Moral reasoning is an integral part of the process that results in a clinical judgment. The model put forward by Gordon, *et al* (1994) incorporates ethical and clinical decision-making. It posits two arms of a decision tree, with the nurse using different adaptations of a core decision-making process to identify ethical and clinical judgments as appropriate. The findings of Gordon and colleagues (1994) suggest that moral and clinical reasoning use a similar process, but the data

collected to make an ethical judgment may differ from the data collected to make a clinical judgment. The IEDEM-CD model depicts the integration of moral reasoning and clinical reasoning as interdependent, with data collection and clinical judgment informed by moral orientation, especially in complex clinical situations.

It is possible that both over-reliance on past experience and intuition by emergency nurses may hinder problem identification. The lack of time to complete an assessment may yield insufficient data and therefore, if supporting cues are not sought out or contradicting information is ignored, an inaccurate clinical judgment. Accurate decision-making requires confirmation of the intuitive or initial problem identification with supporting evidence, as in the O'Neill model (2004), which combines pattern recognition and hypothetico-deduction. The nurse is assumed to begin with a theory, deduce a hypothesis from the theory and then gather evidence to test the hypothesis; this process is also evident in the self-correcting cycle described by Lonergan (1957). Results from the current study confirm and extend the importance of testing the hypothesis and suggests there is a relationship between this testing and higher levels of moral reasoning.

In clinical vignette 3, a complex (Level 3) cardiac presentation with fatigue and pale, cool skin, 35% of respondents incorrectly chose 'hyperglycemia' as the differential diagnosis with no supporting evidence and in fact in direct opposition to the evidence presented. The IEDEM-CD model suggests that nurses who tend to 'anchor' to a diagnosis immediately without testing it or questioning it may have lower levels of post-conventional reasoning and the study findings support this. This is a critical finding, because education is linked to higher post conventional scores, and therefore the study findings also support the call for more education for nurses.

Research Question 1: Practice environment and accuracy

The immediate elements of unit culture, nurse-provider relationships, and leadership contained in the second ring of the IEDEM-CD model were explored in Research Question 1 using Pearson's Product-moment correlation and regression analysis. In general, the study findings support the importance of these elements, and are consistent with the extant literature.

If we believe that nursing judgments about patient care are influenced by care environment i.e. workflow and unit knowledge (Tanner, 2006), and acknowledge Benner's "social embeddedness" of nursing practice, then the findings of this study provide further support for this literature. Earlier studies (Wolf, 2010a) suggested that attributes of the practice environment may play a significant part by encouraging or discouraging particular strategies. These strategies in turn can affect accuracy in problem identification, such as the use of empiric data or overreliance on patient appearance to determine whether the patient is "sick or not sick". This study continues to support this as tested in emergency settings.

Influence of Teamwork.

Given the hypothesized relationship between practice environment and accuracy in decision-making, it is not surprising that an environment that scores high in teamwork would foster accuracy in clinical decision-making. Teamwork subscores on the RPPE were a significant predictor of total vignette scores and specifically vignette 2 scores as well as significantly related to interventions in vignettes 2 and 3 and critical cue recognition in vignette 1. This suggests that there is some sense of "group wellbeing", obligation to someone outside the self, or or higher good that informs the work

environment which transfers itself to patient care. It is possible that in environments where there is a shared sense of responsibility and accountability, accuracy in decision-making is supported and encouraged.

Scores on the Handling Disagreement and Conflict subscale.

This subscale is described as "the degree to which managing discord is addressed using a problem-solving approach" (Ives Erikson *et al*, 2009). Scores on the *Handling disagreement and conflict* subscale of the RPPE were significantly related to both acuity assignation and correct selection of differential diagnosis on vignette 1. Vignette 1 described an older woman brought to the ED by her son, who states she has suffered an unwitnessed fall of unknown etiology. The patient is described as having some word-finding difficulty and the son answers for her. Possible differential diagnoses include elder abuse, hip fracture, cerebrovascular accident (CVA or stroke), hypoglycemia or 'not enough information'. The role of the nursing provider in the emergency setting is unique in that the emergency nurse must often make a clinical judgment without the benefit of a clear history. Perhaps the ability to work through feelings of irritation at a family member inserting themselves into an assessment, even on paper, and avoiding a conflicted interaction, may be a valuable skill in maintaining the focus on solving the clinical problem for the patient and promoting the '*sunnum bonum'* .

Staff relationships with Physicians and Communication about Patients.

Although Manojlivich (2005) reports that practice environment and nurse-provider communication are significant factors in nurse empowerment and satisfaction, it is not clear whether those attributes improved accuracy in nurse decision-making. In the findings of this dissertation study, there was no significant relationship between vignette

score and the *Staff relationships with physicians* subscale of the RPPE. This is surprising, because in the ethnographic data that provided the basis for the model (Wolf, 2010a), nurse-provider relationships and communication played a significant role in the assignation of acuity. The findings reported from the current study may be a result of nurse perceptions or the result of a paper survey rather than observation, where the outcomes of nurse-physician relationships can be measured. . The study findings support the work of Manojlivich (2005), uncovering significant relationships between critical cue recognition and total vignette score in vignette 1 and the *communication about patients* subscale on the RPPE.

Leadership and Autonomy in Professional Clinical Practice.

Leadership and autonomy as it relates to practice environment is the "quality or state of being self-governing and exercising professional judgment in a timely fashion. This study found that the first critical cue for vignette 2 and the *autonomy* subscale of the RPPE are significantly related. Because this vignette required the nurse to look to the recent history, rather than the presentation, a set of internal rules and the autonomy to apply them may have had some impact on this critical cue recognition. Similarly, the score on the *control over practice* subscale predicted the score on vignette 1.

"Self-government" as it appears as a descriptor in the RPPE implies ownership of practice and responsibility for the outcome of one's practice. Again, the practice of emergency nursing is unique in that nurse providers must make clinical judgments in a time pressured environment based on preliminary information. Higher scores on this subscale imply the ability to exercise professional judgment in a timely fashion and be

responsible for the outcome. This may require internal algorithms that allow for practice autonomy in the best interests of the patient.

Cultural Sensitivity.

"Cultural sensitivity" is described by Ives Erikson *et. al* (2009) as "a set of attitudes, practices, and/or policies that respects and accepts cultural differences." There was no relationship established between vignette scores and the *cultural sensitivity* subscale scores. This is potentially because there was no "cultural" component built into the vignettes. Research reports (Wolf, 2010a) that cultural sensitivity may be an important factor in initial acuity assignation and so further exploration of this issue is warranted. This is important because culture may create difference manifestations of critical cues by the patient, or different perceptions of the cue by the emergency nurse.

Research Question 2: Demographic information and accuracy

Educational Level and Practice Setting.

A positive relationship was noted between score on vignette 1 and educational level, with the score on vignette 1 increasing as education level increased. Across all eight subscales of the RPPE, educational level was a significant predictor of vignette 1 score, with higher educational attainment being predictive of higher vignette 1 scores. The study sample contained a higher percentage of baccalaureate or higher-prepared nurses (62.9%); in the general population of nurses approximately 50% hold a baccalaureate degree or higher (Institute of Medicine Report, 2010). Vignette 1 was a "level 1" scenario, a basic patient presentation that a nurse by virtue of licensure should be able to identify acuity, the nature of the problem and select an initial intervention.

Therefore, study findings suggest that higher levels of education are required for a *minimal* level of accuracy in problem identification.

In addition, significant relationships between vignette 2 score and institution type and total vignette score and institution were identified with working in a less complex (freestanding ED or urgent care center) being associated with a lower score. Similarly, across all of the subscales, working in a less complex (urgent care or freestanding ED) setting was predictive of a lower score on vignette 2 as well as a lower total vignette score. This was an unexpected finding; as nursing practice would be by necessity more autonomous in these freestanding centers, it was anticipated that nurses would have to be more accurate, given the need to immediately transfer patients who required a higher level of care.

Scores on vignette 3, the most complex vignette, were not affected by any of the demographic variables evaluated. In sum, study findings indicate that the demographic variables education level and institution type are related to emergency nurses' accuracy in decision-making.

Age, Educational Level and Years of Experience.

In multivariate linear regression modeling, increased respondent age, years of experience, and education level were associated with higher total vignette scores, indicating higher accuracy over all three levels of complexity. This further supports literature (Aiken, *et al,* 2003) that reports that increasing educational levels correspond to better patient outcomes as measured by morbidity and mortality. Study findings reported by Aiken *et. al* suggest that years of experience did not correlate to decrease in mortality, but years of education did. Study findings also support the recommendation of the

Institute of Medicine (IOM, 2010) to increase the percentage of baccalaureate prepared nurses to 80% by 2020.

Practice Setting.

Working in freestanding EDs, urgent care settings, and Midwest or Western geographic locations were associated with lower total vignette scores. However, the very small percentage of respondents (2%) who worked in either freestanding EDs or urgent care centers may lessen the significance of these findings. There is a need for further research in this area.

Limitations

Several important limitations should be considered when interpreting the study findings. First, participants were enrolled using a networking or 'snowball' technique, introducing the possibility of bias in subject selection. Although subject responses were anonymous, connection to the investigator or contact may have influenced participation. Self-reported data also has its limitations; observational data is preferred in assessing decision-making, but was highly impractical for this study.

Another important limitation is the use of clinical vignettes and rubric which were tested in smaller group settings prior to use in this larger sample; further testing of these vignettes in determining clinical decision-making skills is warranted. Finally, data collected in the unique setting of the emergency department may not fully reflect the processes of decision-making and clinical judgment by nurses in other types of patient care settings.

Implications for Nursing Practice

The IEDEM-CD model as validated by this study is unique in that it addresses components of the clinical decision-making process in both individuals and their practice environment and treats that constellation as an environmental system. The implications for nursing practice address all of the components of the model and include a need for a larger emphasis on the ethical nature of nursing practice as a core principle, while drawing lines between accuracy in problem identification and the '*sunnum bonum*' or 'highest good' for patients. Other "core" issues that the study findings support are enhancing knowledge base and critical application of that knowledge through higher levels of education. Nursing leaders, then, are especially critical to this dynamic. A nurse in a leadership position who is at a basic educational level (diploma or ADN) and thus theoretically at a "rules" level of moral reasoning may have difficulty in raising the level of practice. The implications for the importance of both education and specifically education about nursing ethics are significant, especially as they pertain to nursing practice and leadership.

The environment in which practice occurs is also significantly related to accuracy, and so environments where teamwork, communication, autonomy, and control over nursing practice are expected and fostered should also demonstrate better accuracy in problem identification, which translates into safer patient care. Especially in emergency nursing, the emphasis on patient "flow" through the ED cannot take precedence over culturally/practice-environmentally encouraged patient assessment and care.

Thus, in settings with problematic decision-making, the attributes of the practice environment should be examined and managed as well as the skill level of individual

nurses who practice in that environment. Using the IEDEM-CD model as a diagnostic and therapeutic framework may assist in correctly identifying issues in the practice environment. The IEDEM-CD model also allows for a differentiation between clinical judgments by nurses, i.e. nursing diagnosis focusing on the problem as it manifests in the patient, versus a medical model of clinical decision-making.

The emergency department setting will always be a busy, chaotic one, and so strategies that can improve accuracy in problem identification can improve efficient, effective patient care. Research focusing on the element of professional practice environment requires intervention studies that evaluate the environment and target selected attributes as identified by the RPPE subscales. Changes in these areas could be measured independently, and also in terms of their effect on clinical accuracy. In particular, more knowledge about nurse-physician relationships and communication about patients may suggest strategies for team-building structures and multidisciplinary collaborative work that can ultimately improve accuracy in problem identification. Increased work across settings is needed.

A curious finding with regard to the correlation between geographic location (Midwest/West) and lower total vignette scores also suggests further exploration with regard to specific characteristics of this population of nurses. This may be due to the relatively low numbers of participants from these areas, but warrants further study.

Implications for Nursing Education

Because increasing educational level was associated with higher accuracy as measured by scoring on the vignettes, the call for higher levels of education both in general and as entry into practice should be supported. Additionally, because moral

reasoning at the post-conventional level correlates with increased accuracy, it is recommended that educational guidelines include formal courses in ethics required in both pre-licensure and advanced nursing education at multiple points throughout the curriculum. Levels of moral reasoning should be evaluated over time. Because there is some debate about whether an ethical orientation can be taught, exploration around selecting nursing students for higher post-conventional reasoning scores is suggested to clarify both personal and educational factors that enhance ethical reasoning.

Similarly, examination of the ethical nature of nursing practice at the bedside may prove helpful. Engaging in "ethics rounds" or case studies may increase the moral reasoning skills and/or perspective of nurses over time, thus improving accuracy in decision-making and fostering safe practice.

Examination of the relationship between different types of pre-licensure education clinical education environments, moral reasoning, and accuracy may yield insight into more effective educational settings and modalities. Results of this type of work may improve nursing education and thus patient care. Another important component of the model specifically which is not well documented is the type and intensity of education needed to improve moral reasoning capacity; this area is fertile ground for important work as well.

Implications for Further Research

The results of this study support the elements and framework of the IEDEM-CD model, and as such open up many possibilities for further research. The IEDEM-CD is essentially an "intervention theory" as described by Sidani and Braden (1998) and as such, using the model as a framework to make changes in moral education and

environment of care to examine the effect on accuracy would be a logical step. As Rodgers (2007) points out, the pursuit of a problem solving agenda does not preclude the development of theory. Because they are theory-driven, intervention theories can address different epistemological perspectives and can therefore reflect a more holistic approach to nursing problems. Intervention theories offer the advantage of guiding the development, design and delivery of an intervention as well as the design of the effectiveness study for that intervention. It improves the validity of the results and enhances the clinical applicability of the intervention (Sidani and Braden, 1998, p.55). Using the IEDEM-CD model as an intervention theory would address some of the problems with intervention research as it stands in terms of measureable outcomes. In designing effectiveness studies using the IEDEM-CD framework, a researcher could identify the target population, the subgroups of nurses for whom the intervention may have different effects, the study variables and appropriate measures, the timing of the intervention and its outcome measures, and delineate relationships among the variables which can be used to select appropriate statistical models for analysis (Sidani and Braden, 1998, p. 57). In investigating the issues that the IEDEM-CD framework encompasses the intervention should be evaluated using observational data collection techniques, as self-reported survey data has significant limitations. The IEDEM-CD model should be tested across practice settings, to further refine the understanding of relational and integrated factors in clinical decision-making.

Policy implications.

The importance of accuracy in decision-making for safe, effective, and efficient patient care should inform policy that promotes the factors that improve accuracy as

reported in the IEDEM-CD model. The study results strongly support more education for nurses, and therefore support calls for the baccalaureate degree as an entry level into practice. Because of the strong correlations of various aspects of the practice environment to accuracy in decision-making, the configuration and training of emergency department personnel should be interdisciplinary. This would foster improved communication about patients, staff relations with physicians, and teamwork. The results of the study have implications for policy that improves not only the level of education for nursing providers and leadership, but also policy that strengthens and improves the environment in which decision-making occurs.

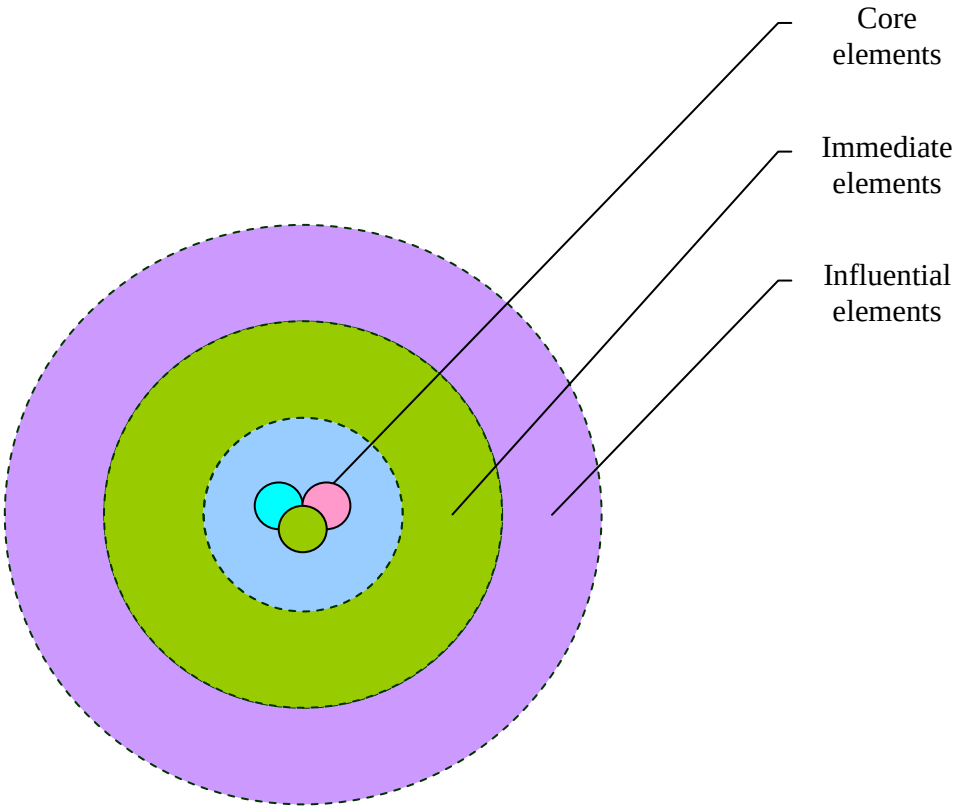
Impact on the IEDEM-CD model

Problem identification is critical to effective clinical decision-making in high acuity high uncertainty environments. A framework for determining factors that enhance and discourage accuracy in clinical decision-making was developed from the extant literature and observational studies. The Integrated, Ethically-driven Environmental Model of Clinical Decision-Making (IEDEM-CD model) was developed as both an explanatory and predictive model of accuracy in clinical decision-making. Revisions to the model reflect the strength and importance of the core elements of knowledge base, clinical application, and moral reasoning, as well as the increased importance of the immediate elements of unit leadership and nurse-provider relationships (Figure 4).

Figure 4 – Revised Integrated Ethically Driven Environmental Model of Clinical Decision-Making

1. Core elements
    a. Knowledge base
    b. Critical application
    c. Moral reasoning

2. Immediate elements
    a. Unit leadership
    b. Nurse-provider relationships
3. Influential elements
    a. Environment of care
    b. Sociopolitical environment and resources



Core elements exert an influence on accuracy in problem identification and decision-making.

Immediate elements of the practice environment can be influenced by the core elements of leaders and as such may enhance or challenge accuracy within the practice environment.

Influential elements will also reflect the core attributes of leaders, managers and administrators in the health care environment.

Summary

The purpose of this correlational descriptive study was to provide and evaluate a model to depict the complexity of decision-making and test the relationships between elements of the model for accuracy and relevance, as well as to contribute to the literature of clinical reasoning and decision-making. Evaluation was conducted with a sample of 194 emergency nurses completing an internet survey package that measured the elements of the model. Results indicated that the model as revised appears to be sufficiently reliable as a framework for determining etiology of ineffective decision-making and deriving interventions to improve patient care. Study results support the integration of clinical and moral reasoning as relational and integrated. The revised IEDEM-CD model provides a framework in which to teach and evaluate clinical decision-making within the environment in which it takes place, and in which to design educational components within a curriculum. The model can be used to guide clinical expectations, and guide and evaluate the orientation of new or transitioning nurses. Further research using this model is warranted to determine interventional usefulness.

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APPENDIX A: DIT-2

DIT-2

Defining Issues Test

Version 3.0

University of Minnesota
Center for Research in Ethical Development

Instructions

This questionnaire is concerned with how you define the issues in a social problem. Several stories about social problems will be described. After each story, there will be a list of questions. The questions that follow each story represent different issues that might be raised by the problem. In other words, the questions/issues raise different ways of judging what is important in making a decision about the social problem. You will be asked to rate and rank the questions in terms of how important each one seems to you.

This questionnaire is in two parts: one part contains the **INSTRUCTIONS** (this part) and the stories presenting the social problems; the other part contains the questions (issues) and the **ANSWER SHEET** on which to write your responses.

Here is an example of the task:

Presidential Election

Imagine that you are about to vote for a candidate for the Presidency of the United States. Imagine that before you vote, you are given several questions, and asked which issue is the most important to you in making up your mind about which candidate to vote for. In this example, 5 items are given. On a rating scale of 1 to 5 (1=Great, 2=Much, 3=Some, 4=Little, 5=No) please rate the importance of the item (issue) by filling in with a pencil one of the bubbles on the answer sheet by each item.

Famine --(Story #1)

The small village in northern India has experienced shortages of food before, but this year's famine is worse than ever. Some families are even trying to feed themselves by making soup from tree bark. Mustaq Singh's family is near starvation. He has heard that a rich man in his village has supplies of food stored away and is hoarding food while its price goes higher so that he can sell the food later at a huge profit. Mustaq is desperate and thinks about stealing some food from the rich man's warehouse. The small amount of food that he needs for his family probably wouldn't even be missed.

[If at any time you would like to reread a story or the instructions, feel free to do so. Now turn to the Answer Sheet, go to the 12 issues and rate and rank them in terms of how important each issue seems to you.]

Reporter --(Story #2)

Molly Dayton has been a news reporter for the *Gazette* newspaper for over a decade. Almost by accident, she learned that one of the candidates for Lieutenant Governor for her state, Grover Thompson, had been arrested for shop-lifting 20 years earlier. Reporter Dayton found out that early in his life, Candidate Thompson had undergone a confused period and done things he later regretted, actions which would be very out-of-character now. His shop-lifting had been a minor offense and charges had been dropped by the department store. Thompson has not only straightened himself out since then, but built a distinguished record in helping many people and in leading constructive community projects. Now, Reporter Dayton regards Thompson as the best candidate in the field and likely to go on to important leadership positions in the state. Reporter Dayton wonders whether or not she should write the story about Thompson's earlier troubles because in the upcoming close and heated election, she fears that such a news story could wreck Thompson's chance to win.

[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]

School Board --(Story #3)

Mr. Grant has been elected to the School Board District 190 and was chosen to be Chairman. The district is bitterly divided over the closing of one of the high schools. One of the high schools has to be closed for financial reasons, but there is no agreement over which school to close. During his election to the School Board, Mr. Grant had proposed a series of "Open Meetings" in which members of the community could voice their opinions. He hoped that dialogue would make the community realize the necessity of closing one high school. Also he hoped that through open discussion, the difficulty of the decision would be appreciated, and that the community would ultimately support the school board decision. The first Open Meeting was a disaster. Passionate speeches dominated the microphones and threatened violence. The meeting barely closed without fist-fights. Later in the week, school board members received threatening phone calls. Mr. Grant wonders if he ought to call off the next Open Meeting.

[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]

Cancer --(Story #4)

Mrs. Bennett is 62 years old, and in the last phases of colon cancer. She is in terrible pain and asks the doctor to give her more pain-killer medicine. The doctor has given her the maximum safe dose already and is reluctant to increase the dosage because it would probably hasten her death. In a clear and rational mental state, Mrs. Bennett says that she realizes this; but she wants to end her suffering even if it means ending her life. Should the doctor give her an increased dosage?

[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]

Demonstration --(Story #5)

Political and economic instability in a South American country prompted the President of the United States to send troops to "police" the area. Students at many campuses in the U.S.A. have protested that the United States is using its military might for economic advantage. There is widespread suspicion that big oil multinational companies are pressuring the President to safeguard a cheap oil supply even if it means loss of life. Students at one campus took to the streets in demonstrations, tying up traffic and stopping regular business in the town. The president of the university demanded that the students stop their illegal demonstrations. Students then took over the college's administration building, completely paralyzing the college. Are the students right to demonstrate in these ways?

[Now turn to the Answer Sheet, go to the 12 issues for this story, rate and rank them in terms of how important each issue seems to you.]

APPENDIX B: CLINICAL VIGNETTES

Your patient is Marigold Jones, a 50 year old woman brought in by her son after an unwitnessed fall in her kitchen. She was found on the floor, responsive, with an externally rotated left leg. The patient reports feeling "dizzy" prior to the fall; she speaks hesitantly about the event, occasionally pausing in her word choice. Her son occasionally interrupts the conversation to explain if she's taking a long time to answer a question.

The patient tells you her medical history includes a "heart problem", specifically, an "irregular heartbeat". She admits to smoking a pack of cigarettes a day for 35 years, and has a chronic cough. She tells you she takes a "blood thinner", calcium, and cough syrup at night as needed.

Her vital signs in triage are BP 170/120; HR 90-100, irregular; SaO2 94% on room air; RR 18; oral temperature 98.7 F

.

1. Based on the above, what acuity assignment would you give this patient?

[ ] 1/emergent
[ ] 2/unstable/urgent
[ ] 3/stable/urgent
[ ] 4/stable/nonurgent
[ ] 5/stable/nonurgent

2. What did you base your acuity assignment on MOST:

[ ] Presentation/injury pattern
[ ] Medical history
[ ] History/duration of the event
[ ] Vital signs
[ ] Medication history

3. What was the second most important piece of information you based your acuity decision on?

[ ] Presentation/injury pattern
[ ] Medical history
[ ] History/duration of the event
[ ] Vital signs
[ ] Medication history

4. What would be the differential diagnosis guiding your care for this patient?

[ ] Elder abuse
[ ] hip fracture
[ ] CVA/bleed
[ ] orthostatic hypotension

[ ] hypoglycemia
[ ] not enough information

5. What would be your first intervention for this problem (differential diagnosis)?
[ ] Oxygen
[ ] Fluids
[ ] Dextrose IV
[ ] Case management
[ ] not enough information

Level 1 problem: *The critical cues in this vignette are the patient's wordfinding difficulty, the unwitnessed fall, the patient's multiple risk factors for stroke, and the out-of-range vital signs. The nurse should put these together and decide on a triage acuity of 2(ESI acuity level) – the patient probably had a CVA (differential diagnosis) before falling or a bleed after falling and is still unstable. Generally, an unwitnessed fall is always a concern. The less skilled nurse may focus on the possibly broken hip, rather than the increased intracranial pressure indicated by the BP of 170/120. The son's interruptions may also lead the less skilled nurse to consider elder abuse as the primary problem. The cause of the fall might be hypoglycemia or orthostatic hypotension, but the primary concern is the increased BP (pivotal cue) and signs of CVA (presentation/injury pattern, secondary cue). The patient should be given oxygen (first intervention) pending further investigation.*

Your patient is Margaret Levally, a 55 year old woman who presents with a complaint of "influenza". She states she has been fatigued and vomiting intermittently for 24 hours. She states she is "pretty sure" that her whole family has the flu and she's caught it too. She states she is taking metoprolol, a baby aspirin, and glucophage. She hasn't been able to eat all day and is worried that she is dehydrated. Vital signs are BP 108/50; HR 60; RR 20; SaO2 96% on room air, tympanic temperature 98.0 F Blood glucose is 200. She is pale and cool to touch.

1. Based on the above, what acuity assignment would you give this patient?
[ ] 1/emergent
[ ] 2/unstable/urgent
[ ] 3/stable/urgent
[ ] 4/stable/nonurgent
[ ] 5/stable/nonurgent

2. What did you base your acuity assignment on MOST:
[ ] Presentation/injury pattern
[ ] Medical history
[ ] History/duration of the event
[ ] Vital signs
[ ] Medication history

3. What was the second most important piece of information you based your acuity decision on?

[ ] Presentation/injury pattern
[ ] Medical history
[ ] History/duration of the event
[ ] Vital signs
[ ] Medication history

4. What would be the differential diagnosis guiding your care for this patient?

[ ] influenza
[ ] hyperglycemia
[ ] bradycardia
[ ] cardiac event
[ ] pneumonia

5. What would be your first intervention for this problem (differential diagnosis)?

[ ] fluids
[ ] insulin
[ ] oxygen
[ ] antibiotics
[ ] not enough information

Level 3 problem: *The critical cues for this patient are the absence of confirming data for a diagnosis of flu (vital signs, pivotal cue)), and her medication history9secondary cue), which suggests diabetes, HTN and CAD. The patient is afebrile and cool to touch. More likely is a cardiac event (differential diagnosis, given the cues of hypotension, decreased perfusion as evidenced by integumentary coolness, and the patient presentation of fatigue and vomiting, more typical of female cardiac presentation. This patient should be assigned a triage level 2(ESI acuity level) and placed on oxygen(first intervention) pending further investigation. The less skilled nurse might anchor to a diagnosis of flu and, not considering other possibilities, assign the patient a lower acuity, possibly even sending the patient to a "fast-track" type area.*

Your patient is Jim Colton, an 18 year old high school student who is brought to you by his parents. On his way home from performing arts camp, he told his parents that "living was fruitless" and tried to jump out of the moving car. As you talk to him, you notice that he makes eye contact, denies drug or alcohol ingestion, and states he has nothing to injure himself with. He is alert, oriented, calm and cooperative. He denies suicidal and homicidal ideation.
Vital signs at triage are BP 110/70, HR 64, RR 12, SaO2 100% on room air.

1. Based on the above, what acuity assignment would you give this patient?

[ ] 1/emergent
[ ] 2/unstable/urgent

[ ] 3/stable/urgent
[ ] 4/stable/nonurgent
[ ] 5/stable/nonurgent

2. What did you base your acuity assignment on MOST:

[ ] Presentation/injury pattern
[ ] Medical history
[ ] History/duration of the event
[ ] Vital signs
[ ] Medication history

3. What was the second most important piece of information you based your acuity decision on?
[ ] Presentation/injury pattern
[ ] Medical history
[ ] History/duration of the event
[ ] Vital signs
[ ] Medication history

4. What would be the differential diagnosis guiding your care for this patient?

[ ] major depression
[ ] psychosis
[ ] head injury
[ ] substance misuse
[ ] not enough information

5. What would be your first intervention for this problem (differential diagnosis)?
[ ] close observation/ 1:1
[ ] observation
[ ] antipsychotic medication
[ ] CT scan
[ ] not enough information

Level 2 problem: *this patient is now calm and cooperative, and denies SI/H (presentation)I. However, the critical cues are that he verbalized feelings of hopelessness and actually made an attempt at self-harm (history of event). That very recent history suggests an acuity level of 2(ESI level) – the patient is suffering from a major depressive event (differential diagnosis), may decompensate and self harm and thus requires close observation (first intervention) at this time.*

APPENDIX C: Scoring Rubric for Dissertation Vignettes

	2 points	1 point	0 points
ESI level	Correctly assigned ESI level		ESI level incorrect
Pivotal cue	Correct		Incorrect
2nd cue		Correctly selected	Incorrectly selected
Differential Dx	Correct		Incorrect
Intervention		Correct	incorrect

APPENDIX D: REVISED PROFESSIONAL PRACTICE ENVIRONMENT SCALE (RPPE)

Please circle the ONE response that best reflects your level of agreement.
Strongly Disagree (1) Disagree (2) Agree (3) Strongly Agree (4)

	1	2	3	4
1. Leadership is supportive of my department/unit staff.				
2. My discipline controls its own practice				
3. I have freedom to make important patient management and work decisions.				
4. There is a lot of teamwork between unit/department staff and doctors.				
5. I have adequate support services to allow me to spend time with my patients				
6. I have enough time and opportunity to discuss patient management problems with other staff.				
7. There are enough staff to provide quality patient care.				
8. My unit/department head is a good manager and leader				
9. We have enough staff to get the work done				
10. There are opportunities to work on a highly specialized patient care unit.				
11. My unit/department head supports the staff in decision-making, even if the conflict is with a physician.				
12. Physicians and staff have good working relationships				
13. Information on the status of patients is available when I need it				
14. I receive information quickly when a patient's status changes				
15. There are needless delays in relaying information about patient care.				
16. My unit/department has constructive work relationships with other groups in this hospital.				
17. My unit/department does not receive the cooperation it needs from other hospital units/departments.				
18. Other hospital units/departments seem to have a low opinion of my unit/department.				
19. Inadequate working relationships with other hospital groups limit the effectiveness of work on this unit.				
20. When staff disagree, they ignore the issue, pretending it will "go away".				
21. Most conflicts occur with members of my own discipline				
22. Staff withdraw from conflict				
23. All points of view are carefully considered in arriving at the best solution for the problem.				

24. All staff work hard to arrive at the best possible solution				
25. Staff involved in a disagreement or conflict do not settle the dispute until all are satisfied with the decision				
26. All contribute from their experience and expertise to produce a high quality solution for a conflict.				
27. Disagreements between staff are ignored or avoided				
28. Staff involved in a disagreement or conflict settle the dispute by consensus				
29. My opinion of myself goes up when I work in this unit/department.				
30. I feel bad and unhappy when I discover that I have performed less well than I should.				
31. I feel a high degree of personal responsibility for the work I do				
32. I feel a great sense of personal satisfaction when I do my work well				
33. I have challenging work that motivates me to do the best job I can				
34. Working in this unit/department gives me the opportunity to gain new knowledge and skills.				
35. I am motivated to do well because I am empowered by my work environment				
36. Working in this environment increases my sense of professional growth				
37. Staff have access to the necessary resources to provide culturally competent care				
38. Staff are sensitive to the diverse patient population for whom they care				
39. Staff respect the diversity of their health care team				

APPENDIX E: TABLES:

Table 8
Regression Coefficients, Score on Vignette 1 and Percentage Post Conventional Moral Reasoning N = 179

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	3.433	.376		9.141	0.0000
	%PCMR	0.008	.009	0.068	.912	0.363
2	(Constant)	3.764	.585		6.431	0.0000
	%PCMR	0.007	.009	0.059	.771	0.442
	Certification	-0.200	.272	-0.056	-.736	0.463
3.	(Constant)	4.779	.984		4.859	0.0000
	%PCMR	0.006	.009	0.049	0.646	0.519
	Certification	-0.250	.274	-0.70	0.913	0.362
	Age	-0.019	0.15	-0.097	-1.283	0.201
4.	(Constant)	4.192	1.129		3.713	0.000
	%PCMR	0.008	0.009	0.070	0.889	0.375
	Certification	-0.137	0.294	-0.039	-0.467	0.641
	Age	-0.020	0.015	-0.103	-1.651	0.179
	Experience	0.123	0.116	0.087	1.057	0.292
5	(Constant)	3.368	1.175		2.866	0.005
	%PCMR	0.007	0.009	0.062	0.795	0.428
	Certification	-0.227	0.293	-0.064	-0.775	0.439
	Age	-0.021	0.015	-0.109	-1.451	0.149
	Experience	0.056	0.119	0.039	0.468	0.641
	Education	0.131	0. 059	0.172	2.240	0.026
6	(Constant)	3.475	1.209		2.873	0.005
	%PCMR	0.007	0.009	0.060	0.761	0.448
	Certification	-0.238	0.295	-0.067	-0.805	0.422
	Age	-0.021	0.015	-0.108	-1.436	0.153
	Experience	0.056	0.119	0.040	0.469	0.639
	Education	0.132	0.059	0.173	2.249	0.026
	Institution	-0.056	0.143	-0.029	-0.391	0.696
7.	(Constant)	3.944	1.223		3.226	0.002
	%PCMR	0.008	0.009	0.068	0.873	0.384
	Certification	-0.232	0.293	-0.065	-0.792	0.429
	Age	-0.022	0.014	-0.112	-1.494	0.137
	Experience	0.055	0.118	0.039	0.463	0.644

Education	0.127	0.058	0.167	2.181	0.031
Institution	-0.024	0.143	-0.013	-0.169	0.866
Region	-0.259	0.131	-0.147	-1.975	0.050

Notes: Model 1 predictors = (constant), percentage post conventional moral reasoning
Model 2 predictors = (constant), percentage post conventional moral reasoning, certification status
Model 3 predictors = (constant), percentage post conventional moral reasoning, certification status, age
Model 4 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience
Model 5 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience, educational level
Model 6 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), percentage post conventional moral reasoning, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = score vignette 1
Significant findings are noted in red

Table 16
Regression Model Summaries, Total Vignette Score and Percentage Post Conventional Moral Reasoning
N =179

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	*Regression*	19.541	1	19.541	1.693	0.195
	Residual	2043.219	177	11.544		
	total	2062.760	178			
2	*Regression*	30.186	2	15.093	1.307	0.273
	Residual	2032.574	176	11.549		
	total	2062.760	178			
3	*Regression*	37.398	3	12.466	1.077	0.360
	Residual	2025.362	175	11.573		
	total	2062.760	178			
4	*Regression*	38.126	4	9.531	0.819	0.515
	Residual	2024.634	174	11.636		
	total	2062.760	178			
5	*Regression*	41.115	5	8.223	0.704	0.621
	Residual	2021.645	173	11.686		
	total	2062.760	178			
6	*Regression*	106.726	6	17.788	1.564	0.160
	Residual	1956.034	172	11.372		
	total	2062.760	178			
7	*Regression*	133.858	7	19.123	1.695	0.113
	Residual	1928.902	171	11.280		
	total	2062.760	178			

Notes: Model 1 predictors = (constant), percentage post conventional moral reasoning
Model 2 predictors = (constant), percentage post conventional moral reasoning, certification status
Model 3 predictors = (constant), percentage post conventional moral reasoning, certification status, age
Model 4 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience
Model 5 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience, educational level
Model 6 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience, educational level, institution type

Model 7 predictors = (constant), percentage post conventional moral reasoning, certifications status, age, experience, educational level, institution type, geographic region

Dependent variable = total vignette score

Table 17: *Regression Coefficients, Total Vignette Score and Percentage Post Conventional Moral Reasoning*
N = 179

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	9.321	0.722		12.906	0.0000
	%PCMR	0.022	0.017	0.097	1.301	0.195
2	(Constant)	10.148	1.124		9.028	0.0000
	%PCMR	0.019	0.017	0.085	1.116	0.266
	Certification	-0.501	0.522	-0.073	-0.960	0.338
3.	(Constant)	8.945	1.895		4.721	0.0000
	%PCMR	0.021	.0.018	0.091	1.185	0.238
	Certification	-0.441	0.528	-0.064	-0.836	0.404
	Age	0.022	0.028	0.060	0.789	0.431
4.	(Constant)	8.677	2.182		3.977	0.000
	%PCMR	0.022	0.018	0.095	1.207	0.229
	Certification	-0.390	0.568	-0.057	-0.686	0.493
	Age	0.022	0.028	0.059	0.769	0.443
	Experience	0.056	0.225	0.021	0.250	0.803
5	(Constant)	8.312	2.302		3.611	0.000
	%PCMR	0.021	0.018	0.094	1.180	0.240
	Certification	-0.430	0.575	-0.063	-0.748	0.456
	Age	-0.021	0.028	0.057	0.748	0.456
	Experience	0.026	0.233	0.010	0.113	0.910
	Education	0.058	0. 115	0.039	0.506	0.614
6	(Constant)	9.572	2. 331		4.107	0.000
	%PCMR	0.018	0.018	0.079	1.010	0.314
	Certification	-0.550	0.569	-0.080	-0.967	0.335
	Age	0.023	0.028	0.062	0.819	0.414
	Experience	0.030	0.230	0.011	0.132	0.895
	Education	0.070	0.113	0.048	0.619	0.537
	Institution	-0.663	0.113	-0.180	-2.402	0.017
7.	(Constant)	10.286	2.367		4.346	0.000
	%PCMR	0.020	0.018	0.086	1.096	0.275
	Certification	-0.542	0.567	-0.079	-0.959	0.341
	Age	0.022	0.028	0.059	0.786	0.433
	Experience	0.028	0.229	0.010	0.125	0.901
	Education	0.063	0.113	0.043	0.554	0.580

Institution	-0.614	0.277	-0.167	-2.221	0.028
Region	-0.394	0.254	-0.116	-1.551	0.123

Notes: Model 1 predictors = (constant), percentage post conventional moral reasoning
Model 2 predictors = (constant), percentage post conventional moral reasoning, certification status
Model 3 predictors = (constant), percentage post conventional moral reasoning, certification status, age
Model 4 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience
Model 5 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience, educational level
Model 6 predictors = (constant), percentage post conventional moral reasoning, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), percentage post conventional moral reasoning, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = total vignette scores
Significant findings are noted in red

Table 18: *Zero Order Correlations Between Percentage Post Conventional Moral Reasoning and Acuity Assignation Vignette Components N=199*

	% PC MR	Initial Acuity Vig 1	Initial Acuity Vig 2	Initial Acuity Vig 3	Acuity Basis Vig 1	Acuity Basis Vig 2	Acuity Basis Vig 3	Second Acuity Basis Vig 1	Second Acuity Basis Vig 2	Second Acuity Basis Vig 3
% PC MR	*r* = 1.00									
Initial Acuity Vig 1	*r* = 0.029 *p* = 0.688	*r* = 1.00								
Initial Acuity Vig 2	*r* = 0.033 *p* = 0.645	*r* = 0.141 ***p* = 0.047**	*r* = 1.00							
Initial Acuity Vig 3	*r* = 0.127 *p* = 0.078	*r* = -0.067 *p* = 0.349	*r* = -0.084 *p* = 0.239	*r* = 1.00						
Acuity Basis Vig 1	*r* = 0.032 *p* = 0.653	*r* = 0.089 *p* = 0.211	*r* = -0.193 ***p* = 0.006**	*r* = -0.016 *p* = 0.825	*r* = 1.00					
Acuity Basis Vig 2	*r* = 0.013 *p* = 0.857	*r* = 0.036 *p* = 0.614	*r* = 0.141 ***p* = 0.046**	*r* = -0.048 *p* = 0.504	*r* = -0.094 *p* = 0.187	*r* = 1.00				
Acuity Basis Vig 3	*r* = 0.027 *p* = 0.706	*r* = -0.056 *p* = 0.435	*r* = 0.054 *p* = 0.449	*r* = -0.027 *p* = 0.700	*r* = 0.079 *p* = 0.270	*r* = 0.036 *p* = 0.617	*r* = 1.00			
Second Acuity Basis Vig 1	*r* = 0.037 *p* = 0.605	*r* = -0.007 *p* = 0.924	*r* = -0.064 *p* = 0.371	*r* = 0.027 *p* = 0.707	*r* = 0.277 ***p* < 0.01**	*r* = -0.023 *p* = 0.746	*r* = 0.115 *p* = 0.105	*r* = 1.00		
Second Acuity Basis Vig 2	*r* = 0.064 *p* = 0.376	*r* = -0.065 *p* = 0.359	*r* = 0.168 ***p* = 0.018**	*r* = -0.094 *p* = 0.185	*r* = -0.093 *p* = 0.192	*r* = 0.662 ***p* < 0.01**	*r* = 0.093 *p* = 0.189	*r* = -0.060 *p* = 0.398	*r* = 1.00	
Second Acuity Basis Vig 3	*r* = -0.081 *p* = 0.262	*r* = 0.008 *p* = 0.908	*r* = 0.114 *p* = 0.107	*r* = 0.088 *p* = 0.217	*r* = -0.027 *p* = 0.706	*r* = 0.041 *p* = 0.565	*r* = -0.030 *p* = 0.676	*r* = 0.079 *p* = 0.268	*r* = 0.089 *p* = 0.214	*r* = 1.00

Note. Statistically significant relationships are depicted in bold print.

Table 19

Zero Order Correlations Between Percentage Post Conventional Moral Reasoning and Differential Diagnosis and Intervention Vignette Components N=199

	% PC MR	Differential Diagnosis Vig 1	Differential Diagnosis Vig 2	Differential Diagnosis Vig 3	First Intervention Vig 1	First Intervention Vig 2	First Intervention Vig 3
% PC MR	*r* = 1.00						
Differential Diagnosis Vig 1	*r* = 0.024 *p* = 0.745	*r* = 1.00					
Differential Diagnosis Vig 2	*r* = -0.076 *p* = 0.291	*r* = 0.111 *p* = 0.118	*r* = 1.00				
Differential Diagnosis Vig 3	*r* = 0.158 ***p* = 0.028**	*r* = 0.239 ***p* = 0.001**	*r* = -0.079 *p* = 0.267	*r* = 1.00			
First Intervention Vig 1	*r* = 0.093 *p* = 0.197	*r* = 0.219 ***p* = 0.002**	*r* = 0.060 *p* = 0.401	*r* = 0.149 ***p* = 0.036**	*r* = 1.00		
First Intervention Vig 2	*r* = -0.096 *p* = 0.181	*r* = 0.004 *p* = 0.956	*r* = 0.108 *p* = 0.130	*r* = 0.228 ***p* = 0.001**	*r* = 0.037 *p* = 0.602	*r* = 1.00	
First Intervention Vig 3	*r* = -0.006 *p* = 0.937	*r* = 0.110 *p* = 0.124	*r* = 0.058 *p* = 0.414	*r* = 0.590 ***p* < 0.01**	*r* = 0.225 ***p* = 0.001**	*r* = 0.208 ***p* = 0.003**	*r* = 1.00

Note. Statistically significant relationships are depicted in bold print.

Table 20

Nonparametric Comparisons of the Proportion of Subjects with Correct Vignette Assignation Component Responses by Percent Post Conventional Moral Reasoning N = 194

Vignette Component	Chi-square value	df	*p*-value
Initial Acuity – Vignette 1	23.41	32	0.865
Initial Acuity – Vignette 2	33.163	32	0.410
Initial Acuity – Vignette 3	36.818	32	0.256
Acuity Basis – Vignette 1	23.483	32	0.862
Acuity Basis – Vignette 2	28.280	32	0.655
Acuity Basis – Vignette 3	32.143	32	0.460
Second Acuity Basis Vignette 1	47.986	32	0.035
Second Acuity Basis Vignette 2	20.376	32	0.944
Second Acuity Basis Vignette 3	30.990	32	0.518

Note. Values in red denote a statistically significant relationship.

Table 21

Nonparametric Comparisons of the Proportion of Subjects with Correct Vignette Differential Diagnosis and Intervention Vignette Component Responses by Percent Post Conventional Moral Reasoning N = 194

Vignette Component	Chi-square value	df	*p*-value
Differential Diagnosis Vignette 1	36.753	32	0.258
Differential Diagnosis Vignette 2	24.053	32	0.842
Differential Diagnosis Vignette 3	43.212	32	0.089
First Intervention Vignette 1	23.733	32	0.854
First Intervention Vignette 2	46.526	32	0.047
First Intervention Vignette 3	29.320	32	0.603

Note. Values in red denote a statistically significant relationship

Table 22

Zero Order Correlations Between RPPE Subscale Scores and Triage Accuracy N=199

Vig 1	Vig 2	Vig 3	Total Vig	Conflict	Autonomy	Motivation	Control	Teamwork	Communication	Culture	MD Relate
r = 1.00											
r = 0.008 *p* = 0.911	*r* = 1.00										
r = 0.083 *p* = 0.245	*r* = 0.085 *p* = 0.230	*r* = 1.00									
r = 0.563 ***p* < 0.01**	*r* = 0.656 ***p* < 0.01**	*r* = 0.606 ***p* < 0.01**	*r* = 1.00								
r = -0.042 *p* = 0.559	*r* = -0.076 *p* = 0.288	*r* = -0.044 *p* = 0.533	*r* = -0.090 *p* = 0.208	*r* = 1.00							
r = -0.059 *p* = 0.405	*r* = -0.097 *p* = 0.174	*r* = -0.015 *p* = 0.830	*r* = -0.099 *p* = 0.164	*r* = 0.366 ***p* < 0.01**	*r* = 1.00						
r = 0.002 *p* = 0.978	*r* = 0.004 *p* = 0.953	*r* = 0.079 *p* = 0.265	*r* = 0.043 *p* = 0.548	*r* = 0.284 ***p* < 0.01**	*r* = 0.494 ***p* < 0.01**	*r* = 1.00					
r = -0.101 *p* = 0.154	*r* = -0.054 *p* = 0.449	*r* = -0.084 *p* = 0.237	*r* = -0.129 *p* = 0.069	*r* = 0.257 ***p* < 0.01**	*r* = 0.635 ***p* < 0.01**	*r* = 0.424 ***p* < 0.01**	*r* = 1.00				
r = 0.139 *p* = 0.051	*r* = 0.133 *p* = 0.061	*r* = 0.126 *p* = 0.077	*r* = 0.215 ***p* = 0.002**	*r* = -0.170 ***p* = 0.017**	*r* = -0.189 ***p* < 0.01**	*r* = -0.078 *p* = 0.277	*r* = -0.244 ***p* = 0.001**	*r* = 1.00			
r = -0.107 *p* = 0.132	*r* = 0.023 *p* = 0.744	*r* = -0.052 *p* = 0.470	*r* = -0.070 *p* = 0.325	*r* = 0.166 ***p* = 0.020**	*r* = 0.401 ***p* < 0.01**	*r* = 0.382 ***p* < 0.01**	*r* = 0.394 ***p* < 0.01**	*r* = -0.085 *p* = 0.236	*r* = 1.00		
r = -0.033 *p* = 0.645	*r* = -0.071 *p* = 0.319	*r* = -0.010 *p* = 0.893	*r* = -0.066 *p* = 0.355	*r* = 0.438 ***p* < 0.01**	*r* = 0.611 ***p* < 0.01**	*r* = 0.656 ***p* < 0.01**	*r* = 0.554 ***p* < 0.01**	*r* = -0.178 ***p* = 0.012**	*r* = 0.324 ***p* < 0.01**	*r* = 1.00	
r = -0.043 *p* = 0.544	*r* = -0.035 *p* = 0.619	*r* = 0.093 *p* = 0.193	*r* = 0.001 *p* = 0.985	*r* = 0.144 ***p* = 0.042**	*r* = 0.451 ***p* < 0.01**	*r* = 0.492 ***p* < 0.01**	*r* = 0.392 ***p* < 0.01**	*r* = -0.157 ***p* = 0.027**	*r* = 0.395 ***p* < 0.01**	*r* = 0.425 ***p* < 0.01**	*r* = 1.00

Note. Statistically significant findings appear in **bold** type.

Table 59

Summary of the Regression Models, Vignette 1 Score and Control Over Practice Subscale of the RPPE N = 184

					Change Statistics					
Model	*R*	R^2	*Adjusted* R^2	*SE Estimate*	R^2 *Change*	*F Change*	*df1*	*df2*	*p-F*	*Change D-W*
1	.094	.009	.003	1.777	.009	1.611	1	182	0.206	
2	.127	.016	.005	1.775	.007	1.336	1	181	0.249	
3	.173	.030	.014	1.767	.014	2.564	1	180	0.111	
4	.182	.033	.011	1.769	.003	0.589	1	179	0.444	
5	.250	.062	.036	1.747	.029	5.562	1	178	**0.019**	
6	.251	.063	.031	1.752	.000	0.085	1	177	0.771	
7	.273	.074	.038	1.746	.012	2.194	1	176	0.140	1.966

Notes: Model 1 predictors = (constant), control over practice
Model 2 predictors = (constant), control over practice, certification status
Model 3 predictors = (constant), control over practice, certification status, age
Model 4 predictors = (constant), control over practice, certification status, age, experience
Model 5 predictors = (constant), control over practice, certification status, age, experience, educational level
Model 6 predictors = (constant), control over practice, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), control over practice, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
SE = standard error of the estimate, D-W = Durbin-Watson statistic, significant findings are noted in **bold**

Table 60

Regression Model Summaries, Vignette 1 Score and Control Over Practice Subscale of the RPPE N = 184

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	5.085	1	5.085	1.611	0.206
	Residual	574.393	182	3.156		
	Total	579.478	183			
2	Regression	9.295	2	4.648	1.475	0.231
	Residual	570.183	181	3.150		
	Total	579.478	183			
3	Regression	17.304	3	5.768	1.847	0.140
	Residual	562.175	180	3.123		
	Total	579.478	183			
4	Regression	19.148	4	4.787	1.529	0.196
	Residual	560.331	179	3.130		
	Total	579.478	183			
5	Regression	36.125	5	7.225	2.367	0.041
	Residual	543.353	178	3.053		
	Total	579.478	183			
6	Regression	36.387	6	6.064	1.976	0.071
	Residual	543.092	177	3.068		
	Total	579.478	183			
7	Regression	43.074	7	6.153	2.019	0.055
	Residual	536.404	176	3.048		
	Total	579.478	183			

Notes: Model 1 predictors = (constant), control over practice

Model 2 predictors = (constant), control over practice, certification status
Model 3 predictors = (constant), control over practice, certification status, age
Model 4 predictors = (constant), control over practice, certification status, age, experience
Model 5 predictors = (constant), control over practice, certification status, age, experience, educational level
Model 6 predictors = (constant), control over practice, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), control over practice, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
Significant findings are noted in red

Table 61

Regression Coefficients, Vignette 1 Score and Control Over Practice Subscale of the RPPE N = 184

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	4.516	0.609		7.415	0.000
	Control	-0.284	0.224	-0.094	-1.269	0.206
2	(Constant)	5.028	0.753		6.681	0.000
	Control	-0.311	0.225	-0.103	-1.385	0.168
	Cerification	-0.307	0.266	-0.086	-1.156	0.249
3	(Constant)	6.141	1.022		6.008	0.000
	Control	-0.296	0.224	-0.098	-1.322	0.188
	Cerification	-0.351	0.266	-0.098	-1.320	0.189
	Age	-0.023	0.014	-0.118	-1.601	0.111
4	(Constant)	5.846	1.093		5.349	0.000
	Control	-0.302	0.224	-0.100	-1.346	0.180
	Cerification	-0.281	0.282	-0.078	-0.997	0.320
	Age	-0.024	0.014	-0.124	-1.667	0.097
	Experience	0.086	0.112	0.060	0.768	0.444
5	(Constant)	4.974	1.141		4.360	0.000
	Control	-0.327	0.222	-0.108	-1.475	0.142
	Cerification	-0.375	0.281	-0.105	-1.334	0.184
	Age	-0.025	0.014	-0.130	-1.765	0.079
	Experience	0.022	0.114	0.015	0.093	0.847
	Education	0.138	0.058	0.177	2.358	0.019
6	(Constant)	5.026	1.158		4.341	0.000
	Control	-0.319	0.224	-0.105	-1.423	0.157
	Cerification	-0.381	0.283	-0.106	-1.349	0.179
	Age	-0.025	0.014	-0.130	-1.760	0.080
	Experience	0.023	0.114	0.016	0.198	0.843
	Education	0.138	0.059	0.178	2.362	0.019
	Institution	-0.042	0.142	-0.022	-0.292	0.771
7	(Constant)	5.216	1.161		4.492	0.000
	Control	-0.242	0.229	-0.080	-1.058	0.292
	Cerification	-0.369	0.282	-0.103	-1.310	0.192
	Age	-0.025	0.014	-0.130	-1.776	0.078
	Experience	0.017	0.114	0.012	0.151	0.880
	Education	0.134	0.058	0.173	2.301	0.023
	Institution	-0.030	0.142	-0.016	-0.210	0.834

Region	-0.196	0.132	-0.111	-1.481	0.140

Notes: Model 1 predictors = (constant), control over practice
Model 2 predictors = (constant), control over practice, certification status
Model 3 predictors = (constant), control over practice, certification status, age
Model 4 predictors = (constant), control over practice, certification status, age, experience
Model 5 predictors = (constant), control over practice, certification status, age, experience, educational level
Model 6 predictors = (constant), control over practice, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), control over practice, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
Significant findings are noted in red

Table 72

Regression Model Summaries, Vignette 1 Score and Teamwork Subscale of the RPPE N = 184

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	6.436	1	6.436	2.044	0.155
	Residual	573.042	182	3.149		
	Total	579.478	183			
2	Regression	9.183	2	4.591	1.457	0.236
	Residual	570.296	181	3.151		
	Total	579.478	183			
3	Regression	16.910	3	5.637	1.804	0.148
	Residual	562.568	180	3.125		
	Total	579.478	183			
4	Regression	18.720	4	4.680	1.494	0.206
	Residual	560.758	179	3.133		
	Total	579.478	183			
5	Regression	33.370	5	6.674	2.175	0.059
	Residual	546.108	178	3.068		
	Total	579.478	183			
6	Regression	34.182	6	5.697	1.849	0.092
	Residual	545.296	177	3.081		
	Total	579.478	183			
7	Regression	43.380	7	6.197	2.035	0.053
	Residual	536.098	176	3.046		
	Total	579.478	183			

Notes: Model 1 predictors = (constant), teamwork
Model 2 predictors = (constant), teamwork, certification status
Model 3 predictors = (constant), teamwork, certification status, age
Model 4 predictors = (constant), teamwork, certification status, age, experience
Model 5 predictors = (constant), teamwork, certification status, age, experience, educational level
Model 6 predictors = (constant), teamwork, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), teamwork, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
Significant findings are noted in red

Table 75

Regression Model Summaries, Vignette 2 Score and Teamwork Subscale of the RPPE N = 184

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	12.561	1	12.561	2.868	0.092
	Residual	797.042	182	4.379		
	Total	809.603	183			
2	Regression	12.661	2	6.331	1.438	0.240
	Residual	796.942	181	4.403		
	Total	809.603	183			
3	Regression	24.786	3	8.262	1.895	0.132
	Residual	784.817	180	4.360		
	Total	809.603	183			
4	Regression	25.000	4	6.250	1.426	0.227
	Residual	784.603	179	4.383		
	Total	809.603	183			
5	Regression	28.481	5	5.696	1.298	0.267
	Residual	781.123	178	4.388		
	Total	809.603	183			
6	Regression	60.874	6	10.146	2.398	0.030
	Residual	748.729	177	4.230		
	Total	809.603	183			
7	Regression	60.877	7	8.697	2.044	0.052
	Residual	748.726	176	4.254		
	Total	809.603	183			

Notes: Model 1 predictors = (constant), teamwork
Model 2 predictors = (constant), teamwork, certification status
Model 3 predictors = (constant), teamwork, certification status, age
Model 4 predictors = (constant), teamwork, certification status, age, experience
Model 5 predictors = (constant), teamwork, certification status, age, experience, educational level
Model 6 predictors = (constant), teamwork, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), teamwork, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 2 score
Significant findings are noted in red

Table 81

Regression Model Summaries, Total Vignette Score and Teamwork Subscale of the RPPE
N = 184

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	68.842	1	68.842	6.044	0.015
	Residual	2072.897	182	11.390		
	Total	2141.739	183			
2	Regression	88.540	2	44.270	3.903	0.022
	Residual	2053.199	181	11.344		
	Total	2141.739	183			
3	Regression	95.594	3	31.865	2.803	0.041
	Residual	2046.145	180	11.367		
	Total	2141.739	183			
4	Regression	95.740	4	23.935	2.094	0.083
	Residual	2045.999	179	11.430		
	Total	2141.739	183			
5	Regression	96.431	5	19.286	1.378	0.142
	Residual	2045.308	178	11.490		
	Total	2141.739	183			
6	Regression	173.181	6	28.863	2.595	0.020
	Residual	1968.558	177	11.122		
	Total	2141.739	183			
7	Regression	194.947	7	27.850	2.518	0.017
	Residual	1946.793	176	11.061		
	Total	2141.73	183			

Notes: Model 1 predictors = (constant), teamwork
Model 2 predictors = (constant), teamwork, certification status
Model 3 predictors = (constant), teamwork, certification status, age
Model 4 predictors = (constant), teamwork, certification status, age, experience
Model 5 predictors = (constant), teamwork, certification status, age, experience, educational level
Model 6 predictors = (constant), teamwork, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), teamwork, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = total vignette score
Significant findings are noted in red

Table 73

Regression Coefficients, Vignette 1 Score and Teamwork Subscale of the RPPE N = 184

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	2.510	0.885		2.837	0.005
	Control	0.490	0.343	0.105	1.430	0.155
2	(Constant)	2.911	0.984		2.959	0.004
	Control	0.471	0.343	0.101	1.372	0.172
	Cerification	-0.247	0.265	-0.069	-0.934	0.352
3	(Constant)	4.139	1.253		3.303	0.001
	Control	0.436	0.343	0.094	1.273	0.205
	Cerification	-0.294	0.265	-0.082	-1.107	0.270
	Age	-0.023	0.014	-0.116	-1.572	0.118
4	(Constant)	3.811	1.327		2.872	0.005
	Control	0.444	0.343	0.096	1.293	0.198
	Cerification	-0.223	0.282	-0.062	-0.792	0.429
	Age	-0.024	0.014	-0.122	-1.637	0.103
	Experience	0.085	0.112	0.060	0.760	0.448
5	(Constant)	3.106	1.352		2.297	0.023
	Control	0.383	0.341	0.082	1.125	0.262
	Cerification	-0.312	0.282	-0.087	-1.107	0.270
	Age	-0.025	0.014	-0.128	-1.740	0.083
	Experience	0.025	0.114	0.017	0.216	0.830
	Education	0.128	0.059	0.165	2.185	0.030
6	(Constant)	3.218	1.373		2.344	0.020
	Control	0.389	0.342	0.084	1.140	0.256
	Cerification	-0.324	0.283	-0.090	-1.144	0.254
	Age	-0.025	0.014	-0.128	-1.732	0.085
	Experience	0.026	0.114	0.018	0.227	0.821
	Education	0.129	0.059	0.166	2.200	0.029
	Institution	-0.073	0.142	-0.038	-0.513	0.608
7	(Constant)	3.682	1.391		2.648	0.009
	Control	0.375	0.340	0.081	1.105	0.271
	Cerification	-0.320	0.282	-0.089	-1.135	0.258
	Age	-0.025	0.014	-0.128	-1.742	0.083
	Experience	0.020	0.114	0.014	0.179	0.858
	Education	0.126	0.059	0.162	2.155	0.033
	Institution	-0.052	0.141	-0.027	-0.369	0.712
	Region	-0.224	0.129	-0.127	-1.738	0.084

Notes: Model 1 predictors = (constant), teamwork
Model 2 predictors = (constant), teamwork, certification status
Model 3 predictors = (constant), teamwork, certification status, age
Model 4 predictors = (constant), teamwork, certification status, age, experience
Model 5 predictors = (constant), teamwork, certification status, age, experience, educational level
Model 6 predictors = (constant), teamwork, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), teamwork, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
Significant findings are noted in red

Table 76

Regression Coefficients, Vignette 2 Score and Teamwork Subscale of the RPPE N = 184

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	2.866	1.043		2.747	0.007
	Control	0.684	0.404	0.125	1.694	0.092
2	(Constant)	2.943	1.163		2.530	0.012
	Control	0.681	0.406	0.124	1.677	0.095
	Certification	-0.047	0.313	-0.011	-0.151	0.880
3	(Constant)	1.405	1.480		0.949	0.344
	Control	0.724	0.405	0.132	1.790	0.075
	Certification	0.011	0.313	0.003	0.036	0.972
	Age	0.028	0.017	0.123	1.668	0.097
4	(Constant)	1.518	1.570		0.967	0.335
	Control	0.722	0.406	0.131	1.778	0.077
	Certification	-0.013	0.333	-0.003	-0.039	0.969
	Age	0.029	0.017	0.125	1.677	0.095
	Experience	-0.029	0.132	-0.017	-0.221	0.825
5	(Constant)	1.861	1.617		1.151	0.251
	Control	0.751	0.407	0.137	1.843	0.067
	Certification	0.030	0.337	0.007	0.089	0.929
	Age	0.029	0.017	0.128	1.710	0.089
	Experience	0.000	0.137	0.000	0.002	0.999
	Education	-0.062	0.070	-0.068	-0.891	0.374
6	(Constant)	2.570	1.608		1.598	0.112
	Control	0.790	0.400	0.144	1.973	0.050
	Certification	-0.048	0.332	-0.011	-0.143	0.886
	Age	0.030	0.017	0.129	1.767	0.079
	Experience	0.009	0.134	0.005	0.065	0.948
	Education	-0.055	0.069	-0.060	-0.795	0.428
	Institution	-0.459	0.166	-0.201	-2.767	0.006
7	(Constant)	2.562	1.644		1.559	0.121
	Control	0.790	0.402	0.144	1.967	0.051
	Certification	-0.048	0.333	-0.011	-0.143	0.886
	Age	0.030	0.017	0.129	1.762	0.080
	Experience	0.009	0.135	0.005	0.066	0.948
	Education	-0.055	0.069	-0.060	-0.791	0.430
	Institution	-0.460	0.167	-0.202	-2.752	0.007
	Region	0.004	0.153	0.002	0.025	0.980

Notes: Model 1 predictors = (constant), teamwork
Model 2 predictors = (constant), teamwork, certification status
Model 3 predictors = (constant), teamwork, certification status, age
Model 4 predictors = (constant), teamwork, certification status, age, experience
Model 5 predictors = (constant), teamwork, certification status, age, experience, educational level
Model 6 predictors = (constant), teamwork, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), teamwork, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 2 score
Significant findings are noted in red

Table 82

Regression Coefficients, Total Vignette Score and Teamwork Subscale of the RPPE N = 184

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	6.061	1.683		3.602	0.000
	Control	1.602	0.652	0.179	2.459	0.015
2	(Constant)	7.136	1.867		3.822	0.000
	Control	1.551	0.651	0.174	2.382	0.018
	Certification	-0.662	0.502	-0.096	-1.318	0.189
3	(Constant)	5.963	2.390		2.495	0.013
	Control	1.585	0.653	0.177	2.425	0.016
	Certification	-0.618	0.506	-0.090	-1.220	0.224
	Age	0.022	0.027	0.058	0.788	0.432
4	(Constant)	5.869	2.535		2.316	0.022
	Control	1.587	0.655	0.178	2.421	0.016
	Certification	-0.598	0.538	-0.087	-1.111	0.268
	Age	0.021	0.028	0.057	0.771	0.442
	Experience	0.024	0.214	0.009	0.113	0.910
5	(Constant)	5.716	2.617		2.184	0.030
	Control	1.574	0.659	0.176	2.387	0.018
	Certification	-0.617	0.545	-0.089	-1.132	0.259
	Age	0.021	0.028	0.056	0.758	0.449
	Experience	0.011	0.221	0.004	0.050	0.960
	Education	0.028	0.114	0.019	0.245	0.807
6	(Constant)	6.807	2.608		2.610	0.010
	Control	1.633	0.649	0.183	2.516	0.013
	Certification	-0.736	0.538	-0.107	-1.369	0.173
	Age	0.022	0.027	0.058	0.794	0.428
	Experience	0.024	0.217	0.009	0.111	0.912
	Education	0.040	0.112	0.027	0.355	0.723
	Institution	-0.707	0.269	-0.191	-2.627	0.009
7	(Constant)	7.521	2.650		2.838	0.005
	Control	1.611	0.648	0.180	2.489	0.014
	Certification	-0.730	0.537	-0.106	-1.360	0.176
	Age	0.022	0.027	0.058	0.797	0.427
	Experience	0.016	0.217	0.006	0.072	0.943
	Education	0.035	0.112	0.023	0.311	0.756

Institution	-0.675	0.269	-0.182	-2.508	0.013
Region	-0.345	0.246	-0.101	-1.403	0.162

Notes: Model 1 predictors = (constant), teamwork
Model 2 predictors = (constant), teamwork, certification status
Model 3 predictors = (constant), teamwork, certification status, age
Model 4 predictors = (constant), teamwork, certification status, age, experience
Model 5 predictors = (constant), teamwork, certification status, age, experience, educational level
Model 6 predictors = (constant), teamwork, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), teamwork, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = total vignette score
Significant findings are noted in red

Table 83

Summary of the Regression Models, Vignette 1 Score and Communication About Patients Subscale of the RPPE N = 184

					Change Statistics				
Model	*R*	*Adjusted* R^2	R^2	*SE Estimate*	R^2 *Change*	*F Change*	*df1*	*df2*	*p-F Change*
D-W									
1	.117	.014	.008	1.772	.014	2.540	1	182	0.113
2	.145	.021	.010	1.770	.007	1.349	1	181	0.247
3	.186	.035	.018	1.763	.013	2.516	1	180	0.114
4	.196	.038	.017	1.764	.004	0.718	1	179	0.398
5	.264	.070	.044	1.740	.031	5.990	1	178	**0.015**
6	.268	.072	.041	1.743	.002	0.434	1	177	0.511
7	.299	.089	.053	1.731	.017	3.381	1	176	0.068
1.968									

Notes: Model 1 predictors = (constant), communication about patients
Model 2 predictors = (constant), communication about patients, certification status
Model 3 predictors = (constant), communication about patients, certification status, age
Model 4 predictors = (constant), communication about patients, certification status, age, experience
Model 5 predictors = (constant), communication about patients, certification status, age, experience, educational level
Model 6 predictors = (constant), communication about patients, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), communication about patients, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
SE = standard error of the estimate, D-W = Durbin-Watson statistic, significant findings are noted in **bold**

Table 84

Regression Model Summaries, Vignette 1 Score and Communication About Patients Subscale of the RPPE N = 184

Model		*Sum of Squares*	*df*	*Mean Square*	*F*	*Sig.*
1	Regression	7.976	1	7.976	2.540	0.113
	Residual	571.502	182	3.140		
	Total	579.478	183			
2	Regression	12.203	2	6.101	1.947	0.146
	Residual	567.276	181	3.134		
	Total	579.478	183			
3	Regression	20.023	3	6.674	2.147	0.096
	Residual	559.455	180	3.108		
	Total	579.478	183			
4	Regression	22.258	4	5.564	1.787	0.133
	Residual	557.221	179	3.113		
	Total	579.478	183			
5	Regression	40.400	5	8.080	2.668	0.024
	Residual	539.079	178	3.029		
	Total	579.478	183			
6	Regression	41.719	6	6.953	2.289	0.037
	Residual	537.759	177	3.038		
	Total	579.478	183			
7	Regression	51.856	7	7.408	2.471	0.019
	Residual	527.622	176	2.998		
	Total	579.478	183			

Notes: Model 1 predictors = (constant), communication about patients
Model 2 predictors = (constant), communication about patients, certification status
Model 3 predictors = (constant), communication about patients, certification status, age
Model 4 predictors = (constant), communication about patients, certification status, age, experience
Model 5 predictors = (constant), communication about patients, certification status, age, experience, educational level

Model 6 predictors = (constant), communication about patients, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), communication about patients, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
Significant findings are noted in red

Table 85

Regression Coefficients, Vignette 1 Score and Communication About Patients Subscale of the RPPE N = 184

		Unstandardized		*Standardized*		
Model		*β*	*SE*	*β*	*t*	*Sig.*
1	(Constant)	5.477	1.084		5.050	0.000
	Communication	-0.614	0.385	-0.117	-1.594	0.113
2	(Constant)	6.024	1.182		5.098	0.000
	Communication	-0.653	0.386	-0.125	-1.690	0.093
	Certification	-0.307	0.265	-0.086	-1.161	0.247
3	(Constant)	7.086	1.354		5.235	0.000
	Communication	-0.625	0.385	-0.119	-1.622	0.107
	Certification	-0.351	0.265	-0.098	-1.324	0.187
	Age	-0.023	0.014	-0.117	-1.586	0.114
4	(Constant)	6.811	1.393		4.890	0.000
	Communication	-0.649	0.386	-0.124	-1.679	0.095
	Certification	-0.274	0.280	-0.076	-0.977	0.330
	Age	-0.024	0.014	-0.123	-1.659	0.099
	Experience	0.095	0.112	0.067	0.847	0.398
5	(Constant)	6.048	1.409		4.293	0.000
	Communication	-0.726	0.382	-0.139	-1.898	0.059
	Certification	-0.372	0.279	-0.104	-1.330	0.185
	Age	-0.025	0.014	-0.129	-1.759	0.080
	Experience	0.030	0.113	0.021	0.262	0.793
	Education	0.143	0.058	0.183	2.448	0.015
6	(Constant)	6.276	1.453		4.320	0.000
	Communication	-0.750	0.385	-0.143	-1.949	0.053
	Certification	-0.389	0.281	-0.108	-1.384	0.168
	Age	-0.025	0.014	-0.128	-1.750	0.082
	Experience	0.032	0.114	0.022	0.279	0.781
	Education	0.145	0.058	0.186	2.474	0.014
	Institution	-0.093	0.141	-0.048	-0.659	0.511

7	(Constant)	6.781	1.469		4.616	0.000
	Communication	-0.771	0.382	-0.147	-2.017	0.045
	Certification	-0.385	0.279	-0.107	-1.377	0.170
	Age	-0.025	0.014	-0.128	-1.756	0.081
	Experience	0.026	0.113	0.019	0.234	0.815
	Education	0.141	0.058	0.182	2.432	0.016
	Institution	-0.072	0.141	-0.038	-0.515	0.607
	Region	-0.236	0.128	-0.133	-1.839	0.068

Notes: Model 1 predictors = (constant), communication about patients
Model 2 predictors = (constant), communication about patients, certification status
Model 3 predictors = (constant), communication about patients, certification status, age
Model 4 predictors = (constant), communication about patients, certification status, age, experience
Model 5 predictors = (constant), communication about patients, certification status, age, experience, educational level
Model 6 predictors = (constant), communication about patients, certification status, age, experience, educational level, institution type
Model 7 predictors = (constant), communication about patients, certifications status, age, experience, educational level, institution type, geographic region
Dependent variable = vignette 1 score
Significant findings are noted in red

Table 120

Zero Order Correlations Between Demographic Variables and Triage Accuracy N=199

	Vig 1	Vig 2	Vig 3	Total Vig	Age	Education	Experience	CEN	Institution Type	Region
Vig 1	*r* = 1.00									
Vig 2	*r* = 0.008 *p* = 0.911	*r* = 1.00								
Vig 3	*r* = 0.083 *p* = 0.245	*r* = 0.085 *p* = 0.230	*r* = 1.00							
Total Vig	*r* = 0.563 ***p* < 0.01**	*r* = 0.656 ***p* < 0.01**	*r* = 0.606 ***p* < 0.01**	*r* = 1.00						
Age	*r* = -0.112 *p* = 0.127	*r* = 0.104 *p* = 0.157	*r* = 0.076 *p* = 0.299	*r* = 0.039 *p* = 0.591	*r* = 1.00					
Education	*ρ* = 0.146 ***p* = 0.043**	*ρ* = -0.137 *p* = 0.057	*ρ* = -0.023 *p* = 0.749	*ρ* = -0.006 *p* = 0.939	*ρ* = 0.072 *p* = 0.323	*ρ* = 1.00				
Experience	*ρ* = 0.061 *p* = 0.390	*ρ* = -0.011 *p* = 0.879	*ρ* = -0.001 *p* = 0.988	*ρ* = 0.024 *p* = 0.733	*ρ* = 0.094 *p* = 0.198	*ρ* = 0.131 *p* = 0.068	*ρ* = 1.00			
CEN	*ρ* =-0.075 *p* = 0.290	*ρ* = -0.001 *p* = 0.992	*ρ* = -0.119 *p* = 0.093	*ρ* = -0.105 *p* = 0.138	*ρ* = -0.059 *p* = 0.418	*ρ* = 0.019 *p* = 0.789	*ρ* = -0.289 ***p* < 0.01**	*ρ* = 1.00		
Institution Type	*ρ* = -0.025 *p* = 0.724	*ρ* = -0.161 ***p* = 0.024**	*ρ* = -0.089 *p* = 0.216	*ρ* = -0.166 ***p* = 0.020**	*ρ* = 0.038 *p* = 0.608	*ρ* = 0.074 *p* = 0.306	*ρ* = 0.005 *p* = 0.949	*ρ* = -0.077 *p* = 0.283	*ρ* = 1.00	
Geographic Region	*ρ* = -0.113 *p* = 0.114	*ρ* = 0.001 *p* = 0.987	*ρ* = -0.065 *p* = 0.367	*ρ* = -0.109 *p* = 0.126	*ρ* = 0.031 *p* = 0.672	*ρ* = 0.008 *p* = 0.909	*ρ* = -0.068 *p* = 0.339	*ρ* = 0.001 *p* = 0.986	*ρ* = 0.071 *p* = 0.320	*ρ* = 1.00

Note. Correlations between continuous variables were computed with Pearson's product moment correlation coefficient (*r*) while correlations between continuous and categorical variables were computed with Spearman's rho (*ρ*). Statistically significant relationships are depicted in **bold** print.

Table 121 *Regression Coefficients, Score on Vignette 1, Demographics, DIT, and RPPE N=179*

Variable	Estimate	*SE*	*t*
(Constant)	6.424	2.683	2.394
Certification	-0.365	0.297	-0.838
Age	-0.022	0.015	-1.467
Experience	0.095	0.120	0.785
Education	0.137	0.059	2.314*
Institution	-0.078	0.150	-0.522
Region	-0.276	0.137	-2.019*
DIT	0.010	0.009	1.043
Conflict	-0.469	0.663	-0.707
Autonomy	-0.177	0.340	-0.521
Motivation	0.069	0.503	0.138
Control	-0.091	0.327	-0.278
Teamwork	0.244	0.366	0.667
Communication	-1.017	0.451	-2.255*
Culture	0.433	0.407	1.065
Relationships	-0.011	0.265	-0.041

Note: Statistically significant ($p < 0.05$) findings are noted with a *
Omnibus *F*-test for the model: $F = 1.516$, $p = 0.105$

Table 122 : Regression Coefficients, Score on Vignette 2, Demographics, DIT, and RPPE N=179

Variable	Estimate	*SE*	*t*
(Constant)	3.423	3.254	1.052
Certification	-0.012	0.360	-0.034
Age	0.025	0.018	1.403
Experience	0.014	0.146	0.099
Education	-0.058	0.072	-0.803
Institution	-0.503	0.182	-2.761*
Region	-0.005	0.166	-0.032
DIT	-0.005	0.012	-0.451
Conflict	-0.714	0.804	-0.888
Autonomy	-0.570	0.412	-1.383
Motivation	0.437	0.609	0.717
Control	0.306	0.396	0.773
Teamwork	0.704	0.444	1.588
Communication	0.238	0.547	0.436
Culture	0.119	0.493	0.241
Relationships	-0.019	0.322	-0.060

Note: Statistically significant ($p < 0.05$) findings are noted with a *
Omnibus *F*-test for the model: $F = 1.142$, $p = 0.323$

Table 123 *: Regression Coefficients, Score on Vignette 3, Demographics, DIT, and RPPE N=179*

Variable	Estimate	*SE*	*t*	
(Constant)	0.616	2.759	0.223	
Certification	-0.213	0.305	-0.697	
Age	0.019	0.015	1.275	
Experience	0.058	0.124	0.469	
Education	-0.011	0.061	-0.181	
Institution	-0.157	0.154	-1.019	
Region	-0.115	0.141	-0.819	
DIT	0.017	0.010	1.729	
Conflict	-0.310	0.681	-0.455	
Autonomy	0.209	0.349	0.597	
Motivation	0.282	0.517	0.546	
Control	-0.319	0.336	-0.951	
Teamwork	0.467	0.376	1.242	
Communication	-0.731	0.464	-1.577	
Culture	0.057	0.418	0.136	
Relationships	0.351	0.273	1.287	

Note: Statistically significant ($p < 0.05$) findings are noted with a *
Omnibus *F*-test for the model: $F = 1.037$, $p = 0.420$

Table 124 : Regression Coefficients, Total Vignette Score, Demographics, DIT, and RPPE N=179

Variable	Estimate	*SE*	*t*
(Constant)	10.654	5.143	2.072
Certification	-0.472	0.569	-0.830
Age	0.022	0.028	0.787
Experience	0.164	0.231	0.709
Education	0.068	0.114	0.595
Institution	-0.740	0.288	-2.569*
Region	-0.392	0.262	-1.497
DIT	0.021	0.018	1.172
Conflict	-1.473	1.270	-1.159
Autonomy	-0.552	0.651	-0.848
Motivation	0.784	0.963	0.814
Control	-0.103	0.626	-0.164
Teamwork	1.382	0.701	1.971
Communication	-1.524	0.865	-1.763
Culture	0.614	0.779	0.788
Relationships	0.309	0.508	0.607

Note: Statistically significant ($p < 0.05$) findings are noted with a *
Omnibus *F*-test for the model: $F = 1.659$, $p = 0.064$