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Clinical Decision Making by Critical Care Mid-Level Practitioners Working within an Interdisciplinary Team: A Dissertation

Melinda Darrigo
University of Massachusetts Medical School

Clinical Decision Making By Critical Care Mid-Level Practitioners Working Within an Interdisciplinary Team

A Dissertation Presented

by

Melinda Darrigo

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Approved as to style and content by:

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Dr. Susan Sullivan-Bolyai, Chair

_____

Dr. Lynne Schilling, Member

_____

Dr. Kathleen Miller, Member

_____

Paulette Seymour-Route, PhD, RN

Dean

University of Massachusetts Worcester

Graduate School of Nursing

Dedication

This dissertation is dedicated in memory of my father, Miroslaw Kazimierz Wierzbicki (1917 – 1998). The insurmountable challenges you overcame and your unrelenting determination to achieve professional and personal goals provided me the resolve and motivation to complete this doctoral research.

Acknowledgements

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Abstract

Clinical Decision Making By Critical Care Mid-level Practitioners Working Within an Interdisciplinary Team

April 2009

Melinda Darrigo BSN, Salem State College

MS, University of Massachusetts, Worcester

PhD, University of Massachusetts, Worcester

Directed by Dr. Susan Sullivan-Bolyai

To improve patient safety a major change in health care reduced medical resident work hours to limit provider fatigue, in 2002 (Philibert, Friedmann, Williams, & Hours, 2002). This resulted in mid-level practitioners filling this provider void in health care teams, including critical care units (Buchanan, 1996; Christmas et al., 2005; Hoffman, Tasota, Scharfenberg, Zullo, & Donahoe, 2003; Hoffman, Tasota, Zullo, Scharfenberg, & Donahoe, 2005; Hooker & McCaig, 1996, 2001; Kaups, Parks, & Morris, 1998; Miller, Riehl, Napier, Barber, & Dabideen, 1998; Yeager, Shaw, Casavant, & Burns, 2006). In order to make appropriate clinical decisions for patients in critical care settings, mid-level practitioners are required to interpret data from multiple sources and to assimilate this information in a timely manner (Bernard, Corwin, & MacIntyre, 2000). Although these practitioners are actively involved in decision making individually and among interdisciplinary teams in critical care units, their decision making has not been described in the literature to date (Shortell et al., 1994).

Therefore, the purpose of this qualitative study was to describe how critical care mid-level practitioners (N = 17) make decisions within an interdisciplinary team, undergirded by the cognitive continuum theory. A qualitative research design using focus groups guided by naturalistic inquiry enabled data collection. An interview guide, developed from the literature review and undergirded by the cognitive continuum theory, was used to structure discussion in the focus groups. Additionally, a demographic questionnaire and vignette were used to aid in description of findings. Data was managed by note based analysis and summarized on a Microsoft Excel document. Qualitative description was used to illustrate the findings.

Prior to this study, there was a paucity of empirical literature describing the clinical decision making of critical care mid-level practitioners. The findings revealed a web of complexity in mid-level practitioner decision making on an interdisciplinary team. This included an overarching theme of *quality of care*, with central overlapping themes of *judgment, resources,* and *negotiation* interwoven with sub-themes of *trust, communication, experience,* and *team structure.* This study's findings have direct implications for mid-level practitioner training courses, mid-level training, critical care orientation programs, theory development, and health policy.

Chapter I

State of the Science

Introduction

Decision making is a cognitive process where one carefully weighs alternatives to choose a course of action (Shafir, Simonson, & Tversky, 1997). Understanding how health care practitioners make decisions can facilitate health care delivery and identify educational interventions to improve patient outcomes. Clinical decision making is the process a health care practitioner uses to synthesize various pieces of information to determine a treatment approach (Dounilet & McNeil, 1999). Four key elements of clinical decision making include:

1. Intentional choice among two or more discrete options,
2. Recognition of a stimulus for action,
3. Commitment to a path of action, and
4. Expectation of accomplishing a specific goal (Noone, 2002).

In hospitals, team decision making is at the forefront of health care practice and delivery (Brill et al., 2001). The clinical team may include physicians, advanced practice nurses, physician assistants, nurses, and other allied health care personnel (for example, respiratory practitioners, clinical pharmacists, dieticians, and physical/occupational therapists) (Society of Critical Care Medicine, 2008). In addition to physicians, mid-level practitioners (nurse practitioners and physician assistants) order patient tests, medications, nutrition, and therapy as part of directing patient management (Hoffman et al., 2003, 2005; Miller et al., 1998). It is important to understand mid-level practitioners' decision making, as these practitioners have become active members of interdisciplinary

health care teams in the critical care setting over the past decade (Christmas et al., 2005; Hoffman et al., 2005; Hooker & McCaig, 1996; Hooker, Cipher, Cawley, Hermann, & Melson, 2008).

A major change in health care delivery systems in 2002 was the reduction of available practitioner hours due to the implementation of mandatory maximum resident work hour restrictions by the Accreditation Council for Graduate Medical Education (Philibert et al., 2002). In an effort to fill this void, mid-level practitioners have become essential members of the health care delivery teams that drive patient outcomes (Buchanan, 1996; Hoffman et al., 2003; Hooker & McCaig, 1996, 2001; Rudy et al., 1998). Having an available practitioner is vital for patients in critical care units to promote recovery from an injury and/or critical illness (Levy et al., 2008). To address the needs of patients requiring critical care services, some mid-level practitioners specialized in managing a select population (Christmas et al., 2005; Hooker et al., 2008; Hoffman et al., 2003, 2005; Kaups et al., 1998; Miller et al., 1998; Yeager et al., 2006).

In order to manage patients in a critical care setting, practitioners are required to interpret data from multiple sources and to assimilate this information in a timely manner (Bernard et al., 2000). Patients managed in critical care units with similar diagnoses and in units with more available technology have lower patient risk-adjusted mortality compared to other critical care units (Shortell et al., 1994). How these practitioners' make clinical decisions has not been described (Shortell et al., 1994; Treggiari, Martin, Yanez, Cadwell, Hudson, & Rubenfeld, 2007). Therefore, the purpose of this qualitative study was to describe how mid-level practitioners make decisions in a critical care setting within an interdisciplinary team.

The following information will be discussed in this chapter to support this dissertation research. First, a focused review of clinical decision making theories and models will be presented along with their aims and limitations. This information is important since no empirical studies could be found that described how critical care mid-level practitioners make decisions individually or within a team. This information will also provide a theoretical overview of how clinical decision making is constructed. Second, mid-level practitioners' utilization, training, and practice in critical care areas will be described. Third, the mid-level practitioners' role in interdisciplinary teams and the interdisciplinary team model utilized to support patient management in the United States will be discussed. Finally, a summary describing the need for research to describe how clinical decision making occurs among mid-level practitioners who work in interdisciplinary teams in the Intensive Care Unit (ICU) is included in this chapter.

Clinical Decision Making

There is a lack of agreement across disciplines on a universal clinical decision making theory (Goldstein & Hogarth, 1997). There are many studies examining clinical decision making by health care practitioners, however they do not include mid-level practitioners on interdisciplinary teams (Baumann & Bourbonnais, 1982; Benner, Hooper-Kyriakidis, & Stannard, 1999; Cohen, 1996; Curley, Connelly, & Rich, 1990; Dolan, Isselhardt, & Cappuccio, 1989; Hammond, 1996; Leprohon & Patel, 1995; Lincoln & Parker, 1967; McNeil, Keller, & Adelstein, 1975; Offredy, 1998; Sonnenberg & Beck, 1993; White, Nativio, Kobert, & Engberg, 1992; Whitney, 2003). With the new dynamic of mid-level practitioners working on interdisciplinary teams, a targeted review of selected clinical decision making theories commonly used by practitioners is

warranted (McCallin, 2001). A summary of existing theories and their use in clinical situations is described in the following section.

Information Processing Theories and Models

Theories examining the progression of stages involved in clinical decision making evolved during World War II (1955-1956; Simon, 1979). The information processing theory was one of the first theories to describe how the human brain is similar to a computer, thereby processing information through the application of logical rules and strategies (Miller, 1956). Building on this theory of memory, initial consensus for the staged theory which describes how memory occurs, was supported and studied (Atkinson & Shiffrin, 1968). This understanding of memory guided future decision making theory development (Miller).

The information processing model first examined decision making when a persuasive communication occurred (McGuire, 1967). This model also examined the internal factors such as demographic characteristics and personality that affect the channeling of information through completion of six successive cognitive steps, or mediators (McGuire, 1967; see Table 1).

Table 1. Six Mediators of the Information Processing Model

1	The persuasive message must be communicated
2	The receiver will attend to the message
3	The receiver will comprehend the message
4	The receiver yields to and is convinced by the arguments presented
5	The newly adopted position/attitude is retained
6	The desired behavior takes place

Following is an illustration of this theory's clinical application. An elderly man is hospitalized with a right hip fracture. He underwent surgery for his hip and has been on bed rest for several days. On the night of postoperative day five, the mid-level practitioner covering the service is called to evaluate his right lower leg pain. The mid-level practitioner notes this area is more swollen then the other leg and is warm to the touch. The patient also complains of pain when this area is touched. Applying the information processing model, the mid-level practitioner receives this persuasive message of pain from the patient and notes this clinical status change. Based on this information, the mid-level practitioner orders right leg elevation. Further, convinced an action needs to be implemented, he/she orders pain medication demonstrating the final phase of the decision behavior.

Ongoing research of information processing theories led to the development of the levels-of-processing theory, which examined how information is stored in one's memory (Craik, 2002; Craik & Lockhart, 1972). This theory was further developed by examining how individuals access and process information (Bransford, 1979). The five stages of skilled acquisition (Dreyfus & Dreyfus, 1986) and from novice to expert

(Benner, 1982) both described how individuals process information as they become more experienced. Although these theories aid in describing how clinical cues, symptoms, physical examinations, and diagnostics can be processed by a practitioner to make a clinical decision, they lack the means to include other factors such as the impact of a practitioner's personal beliefs on their decision making (Benner; Dreyfus & Dreyfus).

Further considering the patient described above, in applying these information processing theories, the mid-level practitioner's prior experiences in caring for a patient after hip fracture helps inform decision making. A novice practitioner may attend to the patient's symptoms, take action, and reevaluate this intervention. An expert practitioner, being aware of the high incidence of deep vein thrombosis in this population would ensure comfort measures are implemented and order immediate confirmatory diagnostic tests (Wallis & Autar, 2001). Although this theory can explain differences in the behavior of a mid-level practitioner due to his/her experience, this theory still lacks the ability to understand the individual practitioner practices that informed decision making (Benner 1982; Dreyfus & Dreyfus, 1986).

Intuitive Reasoning Theories

Previously, intuition has been described as an important factor in decision making, but it is not well understood. When there are a lack of guidelines or protocols, a practitioner may describe using intuition to guide clinical decisions (Benner et al., 1999). The six key aspects of intuitive judgment are: pattern recognition, similarity recognition, common sense understanding, skilled know-how, sense of salience, and deliberative rationality (Dreyfus & Dreyfus, 1986). Understanding the impact of prior experience on individual judgment reflects an accumulation of experience, not intuition. Further,

intuitive reasoning theories help describe how a mid-level practitioner's clinical decision making occurs based on knowledge of the specialty information gained through his or her clinical practice (Dreyfus & Dreyfus).

When applying the intuitive reasoning theory to the patient scenario described above, the mid-level practitioner's evaluation of the patient's leg pain and edema may be a common clinical situation this practitioner encounters. Thus, this practitioner's intuition to diagnose deep vein thrombosis may be reflective of knowledge accumulated from prior similar clinical situations. Although this theory provides a conceptual framework to describe clinical decision making and the affect of intuitive judgment, it lacks the ability to understand how mid-level practitioners' clinical decision making occurs (Lamond & Thompson, 2000). Further, the information processing and intuitive judgment theories do not provide the ability to measure how an individual's prior experiences may influence decision making (Hammond, Hamm, Grassia, & Pearson, 1987).

Probability Models

The use of a mathematical probability model provides another means to examine data to make a clinical decision (Lincoln & Parker, 1967; Sadatsafavi, Moayyeri, Bahrami, & Soltani, 2007; Tversky & Kahneman, 1983). With a heightened focus on using evidence-based practice in medicine, many practitioners utilize mathematical models that are based on probability to support their clinical decisions (Glasziou, 2001; Sahai, 1992). For example, Bayes' theorem calculates conditional probabilities and has been utilized in research examining medical decision making for over 40 years (Lincoln & Parker; Sadatsafavi et al.). In fact, Bayes' theorem has been used to examine management of patients with cardiac disease (Felker, Petersen, & Mark, 2006; Hohnloser

& Gersh, 2003; Khairy, 2007; Patterson, Eng, Horowitz, Gorlin, Goldstein, 1984; Steingart, Wassertheil-Smoller, Tobin, Wexler, & Budner, 1991). For example, Hohnloser & Gersh (2003) described use of the Bayesian approach to predict the sensitivity and specificity for risk of death or arrhythmia after a myocardial infarction. The findings from these studies provided evidence to support the use of probabilities when managing patients with heart disease (Felker et al.; Hohnloser & Gersh; Khairy; Patterson et al.; Steingart et al.).

Another example of utilization of Bayes' theorem might be to predict the probability of a deep vein thrombosis occurring to determine the most appropriate test to order for a confirmatory diagnostic test (Katz, 2001). This statistical approach may be used by the mid-level practitioner. However, despite using this highly analytical approach to support practitioners' clinical decision making, ongoing research has identified the lack of sensitivity and specificity in using probability models (Moons, van Es, Deckers, Habbema, & Grobbee, 1997). This mathematical approach lacks incorporation of other factors such as history and clinical presentation that is used in making this diagnosis (Katz).

Dialog Approach

When it is unclear to a provider what clinical decision is appropriate, additional information may be obtained via a purposeful dialog with a peer or colleague (Walton, 2000). This approach is different from a problem-based learning method, where practitioners use known triggers from a clinical problem to increase knowledge or understanding (Woodruff, 2003). The dialog approach can clarify an ill-structured problem such as determining why the patient described has a requirement for oxygen by

providing information to support the practitioners' clinical decision making (Walton). Furthermore, goal-directed dialogs support the cognitive process and aid in clarifying information (Huitt, 2003; Walton). This theoretical framework also supports practitioner's utilization of pattern recognition in supporting their clinical decision making. However, a limitation of this framework is that the dialogue is dependent on the sharing of complete and accurate information between two practitioners. Thus, if a practitioner omits critical information decisions may be seriously compromised.

Illustrating this approach, a mid-level practitioner evaluates the patient described above. The patient history of prolonged bed rest and clinical examination support the diagnosis of deep vein thrombosis (DVT). The practitioner calls the surgeon to discuss the clinical exam and diagnostic options. However, with this method it is limited to the information shared (Walton, 2000). For example, the patient above has additional clinical information including a persistent new oxygen requirement, elevated respiratory rate, and increasing tachycardia. Discussion of the patient's pulmonary status was not included, thus an investigation for a pulmonary embolism would not occur.

Existing Theory and Model Limitations

The clinical decision making theories and models described thus far have significant limitations to describe inclusion of diverse factors such as personal belief, empirical literature, and defined standards of care that influence how mid-level practitioners make decisions. To date there are no empirical studies that have specifically described how mid-level practitioners make clinical decisions within critical care teams. For example, the information processing theories are focused on the process used in decision making, specifically in relation to accessing and to processing information

(Miller, 1956; Atkinson & Shiffrin, 1968). However, these theories are limited by not factoring in individual characteristics such as personal and professional values and beliefs (Miller; Atkinson & Shiffrin). Additionally, these theories are limited because they do not consider the effects of interpersonal communication among mid-level practitioners (Lamond & Thompson, 2000).

The probability model lacks the ability to measure subjective data that may be influential in making a complex clinical decision (Glasziou, 2001; Moreira, Bisoffi, Narvaez, Ende, 2008; Sahai, 1992). Moons et al. (1997) described a lack of sensitivity and specificity of Bayes' theorem to diagnose suspected coronary artery disease using a patient's history, physical examination, exercise test results, and disease severity. Further, Katz (2001) illustrated three clinical situations where the patients have clinical history and exam findings consistent for deep vein thromboses, but also have other clinical and pharmacology considerations that limited the ability to diagnose deep vein thrombosis in these patients using Bayes' theorem. In addition, this model does not allow for consideration of the patient's and/or family wishes, beliefs, and/or cultural influences on health decisions (Glasziou; Sahai).

Intuitive reasoning models are subjective to the individual decision maker and do not include the concept of experience (Dreyfus & Dreyfus, 1986). Similarly, the dialog approach is limited to a focused discussion with a peer using known information by the decision maker to solve a problem (Walton, 2000). When using this method, the health care practitioner may omit important clinical information or research findings that may influence clinical decision (Walton).

Figure 1 depicts the everyday cognitive factors that critical care mid-level practitioners evaluate and incorporate into their decision making when managing a patient. Figure 2 highlights the isolated factors of the theories/models described above. There is a dearth of empirical and theoretical literature to help describe or explain how mid-level practitioners use and incorporate all of these cognitive factors into their clinical decisions when working in teams (Standing, 2008). This study provides a beginning description of how critical care mid-level practitioners make complex clinical decisions in an interdisciplinary team.

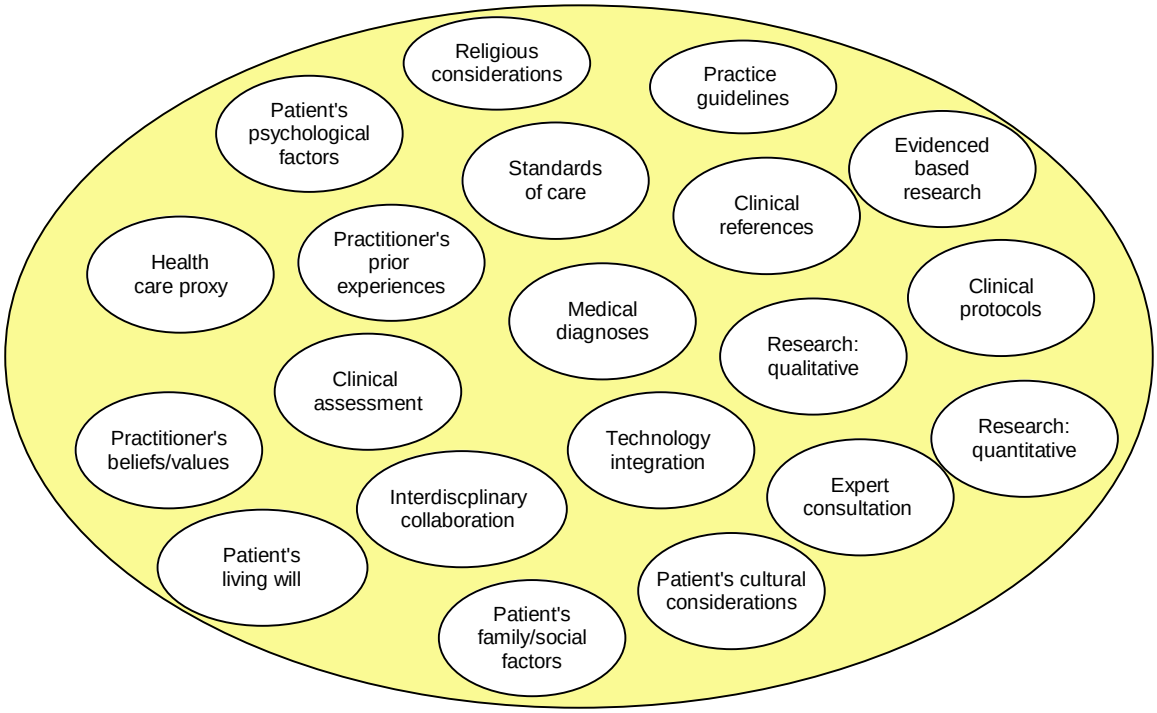


Figure 1. Cognitive Factors Involved in Mid-Level Practitioners' Decision Making

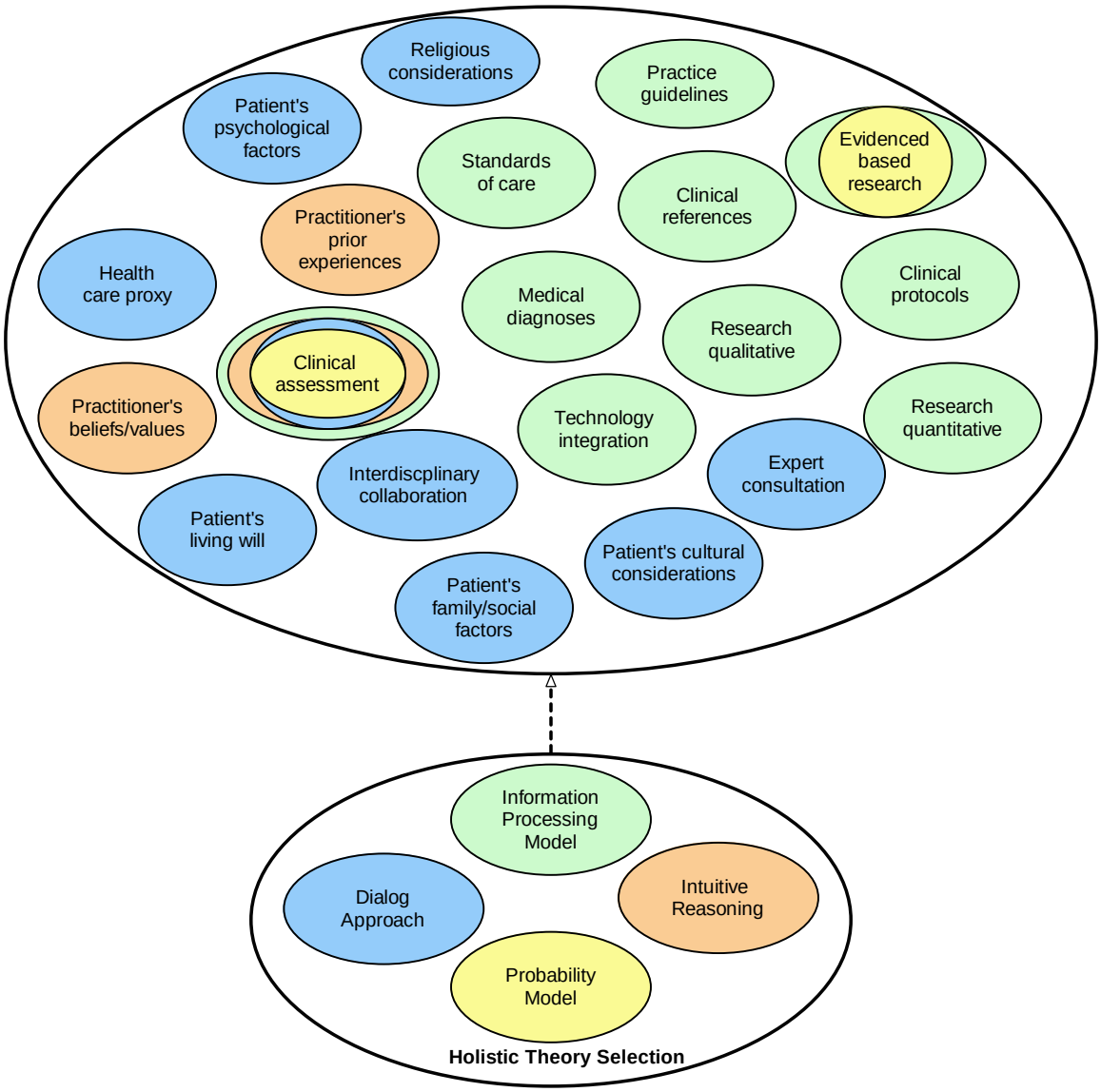


Figure 2. Theory/Model Relationship to Mid-Level Practitioners' Decision Making

Mid-Level Practitioners

The term mid-level practitioner refers to a provider, other than a physician, dentist, veterinarian, or podiatrist, who is permitted by the United States (or the jurisdiction in which they practice) to dispense a controlled substance in the course of professional practice (U.S. Department of Justice Drug Enforcement Administration, 2008). Examples of these practitioners include nurse practitioners, nurse midwives, nurse anesthetists, clinical nurse specialists, and physician assistants, in accordance with the State Board of Registration for health care in which they are licensed (U.S. Department of Justice Drug Enforcement Administration). For the purpose of this review, the term mid-level practitioner included only nurse practitioners and physician assistants.

A significant number of mid-level practitioners deliver clinical services to patients across the United States (Hooker & McCaig, 2001). Mid-level practitioners provide services in various health care settings including primary, acute, and critical care (Rudy et al., 1998; Hooker & Berlin, 2002). In a review of two United States surveys, an estimated 136,397 mid-level practitioners were licensed to provide health care services in 2004 (see Table 2; American Academy of Physician Assistants, 2004; Bureau of Health Professions Health Resources and Services Administration, 2004). It is important to gain a more precise understanding of how these practitioners make clinical decisions within an interdisciplinary team. This information may help in the development of structuring teams to provide a more effective health care delivery system and may improve service allocation (Hawryluck, Espin, Garwood, Evans, & Lingard, 2002).

Table 2. Survey of Mid-Level Practitioners in the United States in 2004

Survey	Data point	Number in 2004
The National Sample Survey of Registered Nurses 2004	Registered nurses respondents	2,909,357
The National Sample Survey of Registered Nurses 2004	Number of nurse practitioners	84,042
2004 American Academy of Physician Assistants Physician Assistant Census Report	Physician assistants respondents	23,494
2004 American Academy of Physician Assistants Physician Assistant Census Report	Number of physician assistants	52,355*

* Survey sent to 58,826 physician assistants in 2004, of the 23,494 that responded, 89% (*n* = 20,910) reported they were working in clinical practice. Based on an approximate 89% employment rate from these respondents, an estimated 52,355 physician assistants may have been providing clinical services in the United States in 2004.
(Bureau of Health Professions Health Resources and Services Administration, 2004)

Educational Training

Although nurse practitioners and physician assistants (mid-level practitioners) may be viewed as interchangeable, their practice preparation is different (Mitchell, 2004). For example, nurse practitioners are traditionally trained in a specialty area, whereas physician assistants are trained as generalists (Lipman & Deatrick, 1997; Mitchell). Since their training is different, a brief summary of each discipline is warranted in order to understand how each practitioner approaches and makes clinical decisions.

Nurse practitioners. In the United States, a nurse practitioner must be a registered nurse (Bureau of Health Professions Health Resources and Services Administration, 2004). In a 2004 national survey (N = 23,850), of the 16,543 participants that responded, the majority (69.7%) completed their master's degree in nurse practitioner preparation and did not have a masters degree in another field (Goolsby, 2005). The focus areas in nurse practitioner preparation included management for health and disease states, nurse practitioner/patient relationship, the teaching/coaching function, professional role, managing health care systems, ensuring quality health practices, and cultural competence (American Academy of Nurse Practitioners, 2007).

For many nurse practitioner students, completion of a master's degree includes a two-year degree program that builds on the student's nursing education and undergraduate baccalaureate degree (American Nurse Credentialing Center, 2008). The time commitment for nurse practitioner preparation varies according to the prior educational credits completed (American Nurse Credentialing Center). Graduate level nurse practitioner education preparation, supported by the Commission on Collegiate Nursing Education or the National League for Nursing Accrediting Commission, expands the knowledge to include differential diagnosis and disease management, participation in and use of research, development and implementation of health policy, leadership, education, case management, and consultation (American Nurse Credentialing Center). In addition, a minimum of 500 faculty supervised clinical hours must be included in the training curriculum (American Nurse Credentialing Center). A new terminal degree in nursing, Doctorate in Nursing Practice, is currently evolving but will not be part of this study (American Association of Colleges of Nursing, 2004, 2007). Future considerations

on advanced practice nurses prepared as a Doctor of Nursing Practice could influence interdisciplinary teams and will require additional research.

Physician assistants. The pool of students that apply to physician assistant schools have a diverse professional background (Mitchell, 2004). These backgrounds included medical, allied health professional, nursing, or others (Hooker & Berlin, 2002; Mitchell). In a 2004 national survey (N = 58,826) of practicing physician assistants, 50% of the respondents reported completing a bachelors degree (n = 9849) and 21.7% (n = 4275) reported completing their masters degree as part of their physician assistant preparation (American Academy of Physician Assistants, 2004). A physician assistant program is focused on a core curriculum that emphasizes a generalist model, similar to medical training (Mittman, Cawley, & Fenn, 2002).

A physician assistant training program takes approximately 26.5 months to complete (American Academy of Physician Assistants, 2007; Mittman et al., 2002). The training consists of one year of didactic education including anatomy, physiology, pharmacology, microbiology, biochemistry, pathology, clinical lab, health promotion, clinical medicine, medical ethics, and psychosocial issues (American Academy of Physician Assistants, 2007). The second year includes clinical rotations in family medicine, internal medicine, emergency medicine, pediatrics, geriatric medicine, obstetrics/gynecology, surgery, orthopedics, psychiatry, and psychosocial issues (American Academy of Physician Assistants, 2007).

Certification for Mid-Level Practitioners

A mid-level practitioner is a graduate of a formal, accredited, education program that requires the applicant to successfully meet delineated educational and clinical

rotation requirements (Hooker & Berlin, 2002). Upon completion of the training program, the applicant must pass a certification examination administered by the applicable state or national organization in his or her specialty, in order to practice as a mid-level practitioner (Hooker & Berlin). Once licensed, a mid-level practitioner can diagnose, treat, prescribe, and educate patients on various health issues and diagnoses (Hooker & Berlin; Mittman et al., 2002).

Patient Management

Little research has been conducted to gain an understanding how these mid-level practitioners make clinical decisions in patient management situations (Burman, Stephans, Jansa, & Steiner, 2002). Burman et al. conducted a study of primary care nurse practitioners (N = 36) using grounded theory and noted pattern recognition is frequently used in their diagnostic reasoning methods to support their clinical decisions. They also found that nurse practitioners factor in the patient's agenda and patient/family and community context when making decisions (Burman et al.) The use of pattern recognition was also described in a retrospective verbalization qualitative study of nurse practitioners' (N = 20) prescriptive practices in England (Offredy, 1998). Additionally, Kosowski & Roberts (2003) utilized interpretative phenomenology to describe novice nurse practitioners (N = 10) using intuitive reasoning to support their decision making. How physician assistants make clinical decisions has not been described in the literature (Mitchell, 2004). Understanding how mid-level practitioners make clinical decisions can support development of professional training programs (Beach et al., 2005; Chassin, Galvin, & The National Roundtable on Health Care Quality, 1998; Larme & Pugh, 1998).

Further, understanding mid-level practitioners' decision making may support cohesive interdisciplinary team management for patients (Shortell et al., 1994).

Specialized Mid-Level Practitioners

Mid-level practitioners require additional management training to meet the health care needs of specialized patient populations, such as cardiology, neurology, orthopedics, mental health, and critical care (Association of Postgraduate Physician Assistant Programs, 2008; UMass Memorial Health Care, 2008a, 2008b). A nurse practitioner working in an adult critical care unit is usually trained as an adult nurse practitioner or adult acute care nurse practitioner (Graduate School of Nursing University of Massachusetts Worcester, 2008a). In addition, some nurse practitioner masters programs include a critical care/acute care rotation (Graduate School of Nursing University of Massachusetts Worcester, 2008a, 2008b). On the other hand, a physician assistant working in a critical care unit may complete a postgraduate training program in cardiothoracic surgery, critical care, emergency medicine, neurosurgery, trauma/critical care or general surgery (Association of Postgraduate Physician Assistant Programs; UMass Memorial Health Care, 2008a, 2008b).

The reduction in the maximum weekly resident work hours has resulted in hospitals incorporating mid-level practitioners into interdisciplinary teams in critical care units (Hoffman et al., 2003, 2005). An interdisciplinary team consists of health care practitioners from different training specialties that integrate their skills, perspectives, and experiences from different disciplines, resulting in a coordinated, coherent, effort to optimize patient outcomes (Harvey, 2005). In order to fully participate on these interdisciplinary teams, mid-level practitioners require specialized training in critical care

management and advanced cardiac life support (Brill et al., 2001). As a result, specialized mid-level practitioners have become an integral part of the interdisciplinary teams required to meet the needs of patients in critical care settings (Hoffman et al., 2003, 2005; Karlowicz & McMurray, 2000; Kaups et al., 1998).

Mid-level practitioners can also be trained to perform specialized procedures to optimize patient outcomes (Kaups et al., 1998; Krasuski et al., 2003). In a study (N = 215) that compared placement of an intracranial pressure monitor by different practitioners (physician, resident or mid-level practitioner) in a neurosurgical critical care unit, it was reported that there was no complication difference (chi-squared, p = 0.09) among these practitioners (Kaups et al.). In other words, their skill for this procedure was similar (Kaups et al.). Practitioners in this study included neurosurgeons (n = 105), mid-level practitioners (nurse practitioners and physician assistants; n = 97) and general surgery residents (n = 13; Kaups et al.). A comparison of similar technical skills was supported among physicians and mid-level practitioners in the cardiac catheterization laboratory (Krasuski et al.). Physician assistants (n = 3) were reported to have shorter (70.2 vs. 72.6, p = 0.045) procedural times compared to cardiac fellows (n = 21) performing diagnostic cardiac catheterizations (Krasuski et al.). In addition, there was no significant difference in complication rates between these two groups (t-test, p = 0.892) Krasuski et al.). It was also noted that cardiac fellows catheterized more class three and four heart failure patients than the physician assistants (t-test, p < 0.001; Krasuski et al.). However, the difference in patient selection by cardiology fellows may include their involvement in management of sicker patients for academic learning (Krasuski et al.). These research studies described quality care delivery for patients when managed by a

specialized mid-level practitioner on an interdisciplinary team in diverse critical care settings (Kaups et al.; Krasuski et al.).

The literature has described patient outcomes by critical care mid-level practitioners working in neurosurgery (Kaups et al., 1998; Yeager et al., 2006), ICUs (Hoffman et al., 2003, 2005), emergency services (Christmas et al., 2005; Miller et al., 1998), cardiology (Krasuski et al., 2003), and cardiac surgery (Callahan, 1996; Jensen & Scherr, 2004; Meyer & Miers, 2005). However, how they make clinical decisions has not been described (Carzoli, Martinez-Cruz, Cuevas, Murphy, & Chiu, 1994; Christmas et al.; Hoffman et al., 2003, 2005; Karlowicz & McMurray; Kaups et al.; Yeager et al.).

Considerations in Clinical Decision Making

Contemplating the above information, it is necessary to consider how critical care mid-level practitioners make clinical decisions for patient management when their primary educational preparation is different (Hammond, 1986). When available, mid-level practitioners use evidence-based guidelines to support their clinical decisions (Dellinger et al., 2004; Kallet et al., 2005; MacIntyre, Cook & Guyatt, 2001; Murray et al., 2002). These guidelines support more of an analytic approach to clinical decision making (Hammond, 1986). Furthermore, mid-level practitioners specializing in the management of patients who are critically ill or injured also utilize critical care research to support their clinical decision making (Irwin & Rippe, 2008; Parrillo & Dellinger, 2008; Society of Critical Care, 2007). For example, mid-level practitioners specialized in the management of patients with cardiac disease utilize the American College of Cardiology guidelines and the American Heart Association national clinical guidelines to make clinical decisions (American College of Cardiology/American Heart Association

Task Force on Practice et al., 2008; Bonow et al., 2008; Brunzell et al., 2008; Epstein et al., 2008; Fleisher et al., 2007; Fraker, Fihn, & Writing on behalf of the Chronic Stable Angina Writing, 2007). Their specialized knowledge in working with cardiology, general, and neurology critical care patients provides them with the ability to readily identify clinical concerns that may require rapid clinical decision making, in order to optimize a patient's health status (Brill et al., 2001). However, little is known about how decisions are made when specific guidelines are not available or clearly defined (Shortell et al., 1994).

The Interdisciplinary Team

Although the National Institutes of Health identified the need to conduct transdisciplinary research to examine and solve complex health problems (Heitkemper et al., 2008; Magill-Evans, Hodge & Darrah, 2002; McDaniel, Champion, & Kroenke, 2008), for the purposes of this study the focus was on interdisciplinary teams. A transdisciplinary team includes professionals from several disciplines that seek to move from an individual disciplinary perspective to a team consensus blurring disciplinary boundaries in order to optimize communication and cooperation among members (Woodruff & McGonigel, 1988). An interdisciplinary team is a term utilized to describe the collaboration of individuals from different disciplines working together by combining the knowledge acquired in their area of specialty to jointly develop a management plan for patients (Sorrells-Jones, 1997; Weaver, 2008). This definition is in contrast to a multidisciplinary team, where each specialty treats the patient individually and shares this information with other practitioners (Sorrells-Jones; Weaver). Since the early 1990's the structure in the delivery of adult health care began to focus on interdisciplinary

teamwork, in order to improve patient outcomes (Minnen et al., 1993; Stein, 1990). Today, best practice models for care delivery support an interdisciplinary team with specialized practitioners to manage critically ill patients (Brill et al., 2001; Curry, 2000; Gutsche & Kohl, 2007; Kane, Weber, & Dasta, 2003; Kelley et al., 2004; Leapfrog Group, 2007).

Intensivist Role

The empirical literature describes interdisciplinary teams in critical care units as being composed of intensivists (board certified physicians in critical care), nurses (including critical care nurses, clinical nurse specialists, and nurse practitioners), pharmacists, and respiratory practitioners (Brill et al., 2001; Gutsche & Kohl, 2007; Society of Critical Care Medicine, 2008). Intensivists for specialty units, for example, can include cardiologists, cardiac surgeons, or neurosurgeons with intensivist privileges (Brill et al.; Gutsche & Kohl). Additionally, with a heightened focus on optimizing patient safety, financial rewards can be provided to hospitals that have a dedicated intensivist in critical care units during the daytime hours to assist in leading and coordinating patient care (Gutsche & Kohl; Leapfrog Group, 2007).

Research Examining Interdisciplinary Teams

An effective interdisciplinary team would exemplify a dynamic and collaborative process where practitioners share their broad-based expertise to jointly develop a comprehensive management plan for critical care patients in order to optimize patient outcomes (Amin & Owen, 2006; Paul & Stevenson, 1988). Despite recommendations for the implementation of a team approach in critical care patient management in the United States (Brill et al., 2001), there is no research examining practitioners' decision making

process on critical care interdisciplinary teams. Table 3 summarizes the four research studies found, conducted in England and Canada, examining interdisciplinary teams.

Table 3. Interdisciplinary Team Research

Author, Year, Country	Method	Participants	Topic	Findings
Coombs, 2003, England	Qualitative Ethnography 200 hours participant observation and 18 ethnographic interviews	Doctors and ICU nurses Study size not described	Clinical Decision Making	• Inter-professional conflict • Nurses: behavioral strategies used to deal: playing the game • Power and conflict in clinical decision making • Breaking through the inner circle: nurses perceived their views as insignificant in clinical decision making
Lanceley, Savage, Menon, & Jacobs, 2008, England	Qualitative Ethnography	Cancer Center Team *N* = 53	Decision Making	• Decisions dominated by medical providers • Decision making guided by adherence to policies • Decision making by providers when knowing patient influenced decisions
Hawryluck et al., 2002, Canada -Phase one	Qualitative Ethnography 144 hours team interactions	ICU team *N* = 122	Communica-tion Patterns	• Expanding and contracting nature of the team • Degrees of collaboration and conflict • Catalysts underlying fluctuations in collaboration
Lingard, Espin, Evans, & Hawryluck 2004, Canada -Phase two	Qualitative Focus Groups	ICU team *N* = 37	Decision making Professional boundaries Negotiating system issues	• Perception of ownership • Perception of trade • Negotiations of power among the team to meet patient goals

It is critical to note three important considerations. First, these studies were conducted outside the United States. Second, the studies did not mention participation of mid-level practitioners in the teams studied. Third, although three studies examined members interactions among an ICU team, the structure of the team (interdisciplinary or multidisciplinary) was not described (Coombs, 2003; Hawryluck et al., 2002; Lingard et al., 2004). Additionally, the fourth study, examined a multidisciplinary teams decision making (Lanceley et al., 2008).

Themes from Interdisciplinary Research

Several themes emerged from the literature review for consideration in examining the factors influencing mid-level practitioners' clinical decision making. The current research is summarized by this author into the concept of three Cs in conducting interdisciplinary research: conflict, communication, and collaboration. A description of each concept is discussed below.

Conflict. In the literature, conflict occurred among physicians, nurses, and allied health care members when the decision making emphasis was focused on medical decisions with the physician being the decision maker (Coombs, 2003; Hawryluck et al., 2002; Lanceley et al., 2008; Lingard et al., 2004). The specialty medical knowledge required by physicians to make a medical diagnosis and to enact these management decisions for patients placed physicians in a role of power on the team as the primary decision maker (Coombs). This physician dominance in directing patient management resulted in a reduction of contributions from other team members (Coombs). This dominance prevented multiple disciplines on the team from providing input when determining a collaborative management approach (Coombs; Hawryluck et al.; Lanceley

et al.; Lingard et al.). Furthermore, all four studies shown in Table 3 described conflicts among team members as a result of the dominance in patient management decisions by physicians, thus limiting nursing and allied health members contributions (Coombs; Hawryluck et al.; Lanceley et al.; Lingard et al.).

This dominance can result in a power struggle among the physician and other team members seeking to contribute to the patient's management (Coombs, 2003). However, this power struggle related to physician dominance is not limited to nursing and allied health members (Hawryluck et al., 2002). Hawryluck et al. also described physician to physician power struggles in patient management.

Another catalyst for team conflict is ineffectively negotiating trade (Lingard et al., 2004). This method of conflict involved trade of equipment, resources, knowledge, social commodities, and respect (Lingard et al.). Each of these components was illustrated by the investigator in the Lingard et al. study. Findings from this study identified the importance of offering to trade one commodity for another to reduce conflict among the team (Lingard et al.). Ineffective communication among members (included nurses within the same unit, nurse from transferring units, nurse to resident, nurse, and resident or consultant provider, etc.) lead to conflict working in a team (Hawryluck et al., 2002; Lanceley et al., 2008; Lingard et al.).

Exclusion of nurses' input in decision making resulted in conflict, as nurses' opinions are perceived as not valued (Coombs, 2003). Conflict was also shown to be reduced when each member's role among the team was established (Lingard et al., 2004). Team members that integrated individual team expectations in their communication among members were successful in fostering interdisciplinary communication (Coombs).

Lingard et al. also emphasized the need for team members to understand the rules, including social norms of communication and responsibilities, to prevent barriers to teamwork among practitioners. Hawryluck et al. (2002) reported that conflicts are resolved when team roles are clarified.

Adaptive behavioral strategies by nursing and allied health care personnel have been described as a method to ensure their concerns for patients are heard by the team (Coombs, 2003). Coombs (p. 131) described nurses "breaking through the inner circle" by physically inserting themselves into the physician team discussion of patient management to ensure their concerns are included. Adaptive behavior by these nurses was described as "playing the game" (Coombs, p.133) and was used to ensure the nurse's voice for patient care was heard on patient rounds.

Communication. When a team exhibited effective communication teamwork occurred, whether by means of identifying patient management goals and/or by defining team member roles (Hawryluck et al., 2002; Lanceley et al., 2008; Lingard et al., 2004). Establishment of management guidelines enabled communication among an interdisciplinary and a multidisciplinary team (Hawryluck et al.; Lanceley et al.; Lingard et al.). When patient management standards were defined among team members this supported communication in planning patient care among the team (Lanceley et al.).

Lanceley et al. (2008) reported that having established teams managing patients helped communication. The team had an opportunity to collect and incorporate the patient's medical, social, psychological, and family considerations into the plan of care (Lanceley et al.). This team continuity of care also provided the involved nurses and allied health care providers the ability to identify and communicate identified patients

needs (Hawryluck et al., 2002). Teamwork occurred when the inclusion of all team members input occurred (Hawryluck et al.).

Another means to foster communication included a defined structure for discussing/reviewing patients to incorporate multidisciplinary practitioners input (Hawryluck et al., 2002; Lingard et al., 2004). Lanceley et al. (2008) suggested structuring team meetings where the initial presentation occurs by the team member most familiar with the patient to frame a holistic decision making approach. This approach provided a forum for all members to contribute in the plan of care (Lanceley et al.). In addition to effective communication, collaboration among members was vital for successful teamwork (Hawryluck et al.).

Collaboration. Collaboration among all team members was necessary to have a successful team (Hawryluck et al., 2002). When team rules were known, there was an ability to negotiate roles among the team members to foster collaboration (Coombs, 2003, Hawryluck et al.; Lanceley et al., 2008; Lingard et al., 2004). Examples of role negotiation included completing procedures and writing admission or transfer orders. Lingard et al. described the concept of effective trade as fostering collaboration. Effective trade was described as the process of negotiating equipment for patients among interdisciplinary team members (e.g., bed scales, IV infusion pumps, glucose machine availability, et al; Lingard et al.). The negotiation of equipment supported patient management and optimized teamwork (Lingard et al.) This concept of effective trade was a similar finding to that of Hawryluck et al. that described the importance to define team member roles and allocation of resources.

Hawryluck et al. (2002) described the importance of understanding the complexities of an expanding and contracting nature of teams in relationship to the decision making process. This view described the fluidity of the team members in their decision making (Hawryluck et al.). They observed a fluctuation of members depending on the clinical situation (Hawryluck et al.). Team members that understood these team dynamics and responsibilities of select members, at different times, supported this type of collaborative approach (Hawryluck et al.).

Hawryluck et al. (2002) also identified the need to address six catalysts to enhance team collaboration: authority, education, patient needs, knowledge, resources, and time (Hawryluck et al.). Delineating authority for decision making enhanced team collaboration when members of the team were in agreement (Hawryluck et al.). However, as described previously, the dominance of physician control over decision making often lead to conflict (Coombs, 2003).

Education and patient needs were described as a catalyst to foster collaboration (Hawryluck et al., 2002). For example, consider the relationship among practitioners sharing knowledge about the patient and his or her diagnosis using a patient with pneumonia requiring intubation and ventilator management: the physician had general patient management plans, the nurse recommended an established *Patient on Ventilator Support Care Plan*, and the respiratory practitioner had additional suggestions in regards to the diagnosis. These team members collaboratively shared their understanding to develop an interdisciplinary plan for the patient based on the education of the disease process, individualized patient needs, and knowledge of standards of care and outcome measures (Hawryluck et al.).

Knowledge was a catalyst for collaboration or conflict (Hawryluck et al., 2002). Collaboration was fostered when members shared information, versus taking over or ownership based on their clinical expertise (Hawryluck et al.). A collaborative illustration is described by the respiratory practitioner who shared his/her recommendations with the team to be incorporated into the management of the patient. Additionally, sharing of resources and time allocation were other catalysts that fostered collaboration or resulted in conflict (Hawryluck et al., 2002). Role sharing or consideration of time allocation for treatments was identified as collaborative strategies that favored collaboration (Hawryluck et al.).

When team rules were transparent and understood by all members, negotiation of roles could occur which reduced team conflict (Coombs, 2003, Hawryluck et al., 2002; Lanceley et al., 2008; Lingard et al., 2004). Examples of role negotiation included completing procedures and writing admission or transfer orders. In addition, Lingard et al. described the concept of effective trade as fostering collaboration. Effective trade was defined in this study as the process of negotiation of equipment for patients among interdisciplinary team members (Lingard et al.).

Decision Making in Critical Care Units

Critical care units can be described as environments energized with technology that provides information and resources to care for critically ill patients in need of timely assessment and interventions by practitioners (Brill et al., 2001; Rosenfeld et al., 2000). Although the systems and processes of critical care units have been examined with respect to patient outcomes, the dynamics of how practitioners' decision making working on interdisciplinary teams has not been theoretically explored in the literature (Knaus,

Draper, Wagner, & Zimmerman, 1986; McCallin, 2001; Mitchell, Armstrong, Simpson, & Lentz, 1989; Mitchell, Shannon, Cain, & Hegyvary, 1996). The specific roles of practitioners on interdisciplinary teams has been identified as an influencing factor on clinical decision making (Lingard et al., 2004). Personal qualities, commitment to staff, communication among the team, and opportunities to develop creative working methods have also been identified as affecting interdisciplinary relationships (Molyneux, 2001). However, to date there have been no studies published that describe how mid-level practitioners make decisions within interdisciplinary teams.

Specialized Critical Care Units

In addition to providing critical care management, some patients require practitioners with additional specialization to optimize their outcomes (Brill et al., 2001). It has been reported that homogenous patient population in a critical care unit supported the practitioner's ability to provide state-of-the-art care and management (Shortell et al., 1994). However, no empirical literature has described the mid-level practitioner's role in decision making within specialized medical and surgical critical care units (Gutsche & Kohl, 2007).

Cardiac surgery, neurosurgery, and neonatal services have dedicated critical care units to provide the specialized care required by their patients (Bojar, 2005; Diringer & Edwards, 2001; Patel, Piotrowski, Nelson, & Sabich, 2000). For example, cardiac surgery practitioners have additional expertise including identification and treatment of cardiac dysrhythmias, implementation and utilization of temporary modes of cardiac pacing, assessment and management of intra-aortic balloon counter pulsation, management of ventricular assist devices, ability to perform emergency sternotomy, and mastery of other

surgical techniques (Bojar). The cardiac surgery practitioner must also explain this type of specialty care and decision making to patients and their families (Bojar).

Neurosurgery practitioners require specialization of advanced neurological assessment and management, placement and interpretation of intracranial monitoring, and assisting in neurosurgical procedures (Diringer & Edwards, 2001). Neurosurgery practitioners require this expertise to care for their patients with treatment goals to promote neurological recovery (Diringer & Edwards). And finally, neonatal practitioners require specialization to manage neonates requiring intensive care management, procedures, and support of their parent(s) (Patel et al., 2000).

Critical Care Mid-Level Practitioners' Clinical Decision Making

The provider role of a critical care mid-level practitioner may seem relatively straightforward, as he or she has specialized training and certification to be able to assess, diagnose and manage patients in the critical care unit using a medical diagnostic and treatment model (Hooker & Berlin, 2002). For example, consideration for a mid-level practitioner's role in decision making for patient management may vary depending on the type of team in which the practitioner works (Shortell et al., 1994). Differences in mid-level practitioner roles and responsibilities on medical and surgical teams may explain differences seen in clinical decision making processes (Callahan, 1996; Hoffman et al., 2003, 2005; Jensen & Scherr, 2004; Karlowicz & McMurray, 2000; Kaups et al., 1998; Meyer & Miers, 2005; Yeager et al., 2006).

As outlined below, additional knowledge is needed to examine how clinical decision making occurs for patients with complex medical and/or surgical issues in critical care units (Shortell et al., 1994).

- Does the continuity of critical care mid-level practitioners influence treatment decisions in their team?
- Are the clinical decisions of a mid-level practitioner influenced by knowing the patient and family in the critical care unit?
- How are the patient and family concerns incorporated into the mid-level practitioners' decision making?
- Are critical care mid-level practitioners making decisions based on the patient's wishes?

Clearly, there are many unanswered questions in describing how the critical care mid-level practitioner makes clinical decisions on critical care interdisciplinary teams in the United States. Examining how mid-level practitioners work together to make decisions is important for several reasons (Hammond, 1986; Hammond et al., 1987). This knowledge can support development of educational interventions to optimize mid-level practitioners' decision making. It may also lead to better patient care and clinical outcomes.

Summary

Critical care mid-level practitioners working in interdisciplinary teams make critical decisions in the management of patients (Brill et al., 2001). How these clinical decisions for complex medical issues are made has not been described in the literature (Brill et al.). Therefore, the purpose of this research study was to describe the clinical decision making of critical care mid-level practitioners working on interdisciplinary teams. The three aims were:

- Describe clinical considerations that critical care mid-level practitioners use to make clinical decisions,
- Describe how clinical decision making (the cognitive process) occurs among critical care mid-level practitioners on an interdisciplinary team; and
- Describe how interdisciplinary providers' recommendations are incorporated into the critical care mid-level practitioner's decision making.

The descriptions gained from this qualitative dissertation research study provided a robust description of the clinical decision making of critical care mid-level practitioners.

Chapter II

Conceptual Framework

Introduction

The purpose of this chapter is to describe the cognitive continuum theory that undergirded this study. An illustration of a complex clinical decision in a critical care unit was used to aid the portrayal of this scenario and discussed in relation to the cognitive continuum theory. The last section of this chapter discusses prior research using the cognitive continuum theory.

There is an array of complexities factored into examining mid-level practitioners' clinical decision making on interdisciplinary teams. The identification of a clinical decision making theory to support this research required the ability to describe:

- How practitioners process information,
- The type of information used in practitioners' decision making,
- The types of cognitive processes used during decision making,
- Influences of environmental factors, and
- Interactions among interdisciplinary team members who may approach decision making differently.

Therefore, a holistic theory was utilized in this study to describe how mid-level practitioners make decisions within interdisciplinary teams.

Cognitive Continuum Theory

Selection

The cognitive continuum theory was selected to examine clinical decision making of mid-level practitioners working on an interdisciplinary critical care team. It provides a theory to describe and measure how cues identified by the individual as meaningful information influenced the cognitive activity of decision making (Hammond, 1980, 1986, 1988). A practitioner's common sense is the approximate center of this cognitive continuum model, which combines elements of intuition and analysis in a practitioner's clinical decision making (Hammond, 1980, 1986, 1996). Common sense is dependent on the concept of a cognitive continuum where imperfect reasoning can occur, resulting from intuitive through an analytic cognitive process (Hammond, 1996; Hammond, Hamm, Grassia, & Pearson, 1997).

Origins

The cognitive continuum theory's origins are from cognitive psychology that examined the success and errors in decision making in relationship to the environment (Hammond, 1980, 1986). This theory describes individual's decision making occurring on a cognitive continuum, or spectrum, from intuition through analysis (Hammond, 1986). Additionally, it states one's cognition is influenced by cues that are referred to as tasks in the theory (Hammond, 1981, 1986). Tasks are described as triggers that individuals perceive as meaningful information in their decision making (Hammond, 1986, 1988, 1996, 2000). In summary, the cognitive continuum theory seeks to explain, and predict, how one's decision making occurred on a cognitive spectrum, using intuition and analytic approaches (Hammond, 1980, 1986, 1988, 1996, 2000). This view diverges

from prior decision making theories that support a view of either a purely intuition or a purely analytic process for clinical decision making (Hammond, 1986). In addition, the cognitive continuum theory provides a conceptual framework, based on theory, to describe the clinical decision making of critical care mid-level practitioners working on an interdisciplinary team (Hammond, 1986). This theory provided a framework to support this qualitative research examining clinical decision making (Hammond, 1986).

Assumption

The principal assumption of the cognitive continuum theory is that decision making occurs along a cognitive continuum where an individual may use intuitive, analytical, or a combination of both cognitive views, to make a decision (Hammond, 1986). The cognitive continuum theory's view of cognition, using intuition through a spectrum to analysis, in a person's clinical decision making is ontologically congruent with the holistic view of nursing (Harman, 1991). In a holistic world view, researchers look at all the evidence in describing how clinical decisions may occur (Harman). The cognitive continuum theory provides a framework to describe decision making using this holistic approach (Hammond, 1986, 2000).

Propositions

A proposition is a theoretical statement of relationships between two or more variables (Chin & Kramer, 1999). The cognitive continuum theory describes a relationship between the type of cognitive mode used and the decision making that occurs by an individual (Hammond, 1986). This theory explains six cognitive modes used by an individual to aid in his/her decision making (Hammond, 1986, 1988). The type of reasoning utilized by individuals, as described in the cognitive continuum theory, is

referred to as the *modes of inquiry* (Hammond, 1986). The origin for the modes of inquiry is based on prior work by Churchman (1971), who examined inquiry systems using the way an individual approaches tasks.

Hammond (1978) expanded on Churchman's (1971) concept and developed six modes of inquiry in the cognitive continuum theory. These six modes of inquiry were illustrated and by Hamm (1988) (reference Figure 3).

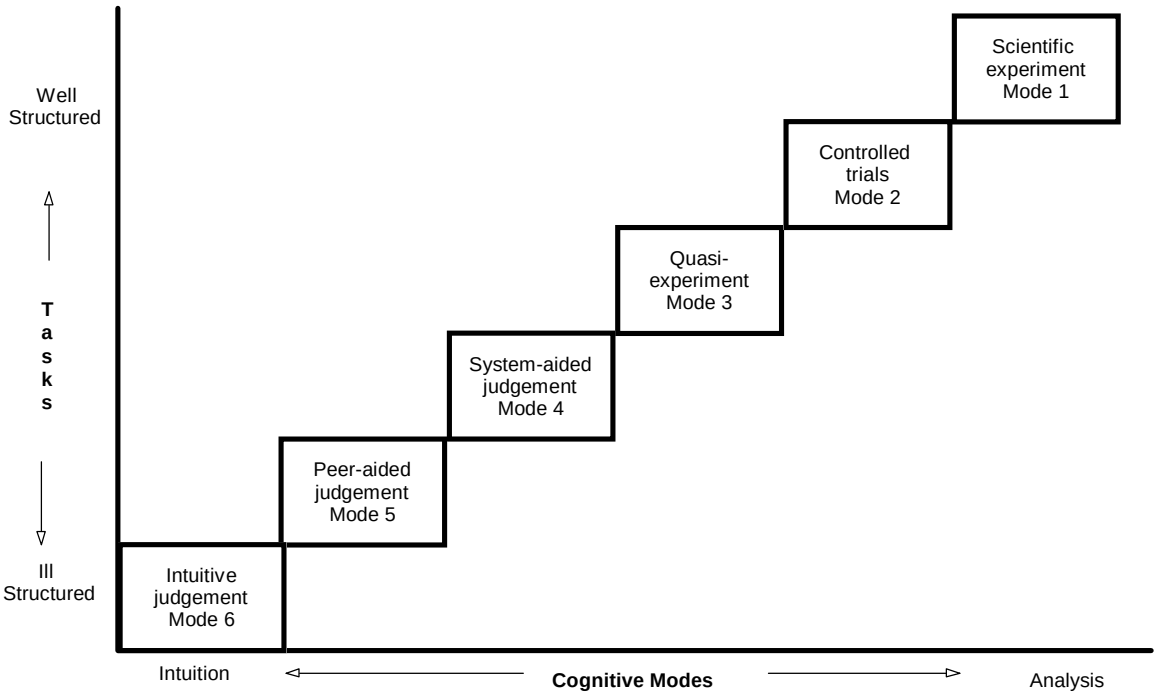


Figure 3. Cognitive Continuum Theory- Six Modes of Inquiry (Hamm, 1988).

These modes were further developed from quantitative measurements in examining decision making and will be described in detail later in this chapter (Hammond et al., 1987). In general, Mode 1 refers to a highly experimental/analytical approach in decision making, which is similar to a bench lab researcher who controls every variable (Hammond, 1978). On the opposite end of the spectrum, Mode 6 describes purely intuitive thought (Hammond, 1978). Table 4 provides a general description of

each mode and its characteristics. Each mode and an illustration will be described later in this chapter when discussing each premise. The middle of the cognitive continuum is where common sense reasoning occurs (Hammond, 1978). Common sense, termed quasirationality, describes the cognitive link on a spectrum between pure intuition and analysis in an individual's clinical decision making process (Cader, Campbell, & Watson, 2005; Hammond, 1980, 1986, 1996, 2000). The concept of one's accumulated knowledge is described and measured in examining one's common sense in decision making (Hammond, 1996).

Table 4. Modes of Inquiry (Hammond et al., 1987; Standing, 2008)

Mode	Name	Description	Characteristics
Mode 1	Scientific experiment	Analytical	Data from experiments occurring in the laboratory (Example: Chemistry)
Mode 2	Controlled trials	Moderately strong analytical experimentation	Data from experiments by social scientists, biologists, and educational researchers. (Example: Randomized control groups and logic of statistic inference)
Mode 3	Quasi experimental	Weak analytical experimentation	Quasi-experiments/surveys by social scientists. (Example: Unable to attain strict random assignment, double blind, or pre-post test experiments to examine phenomena)
Mode 4	System aided judgment	Strong common sense judgment	This mode of cognition is the strongest of common sense type of decision making. (Example: Bayes' theorem using logistical probabilities with subjective assessment)
Mode 5	Peer aided judgment	Moderately strong common sense thought	The mode of cognition is based on individuals known data. (Example: Include practitioner practice that incorporates psychological factors)
Mode 6	Intuitive judgment	Weak common sense thought	The mode of cognition is based on uncertain and inconsistent rules. (Examples: A practitioner having a gut feeling to proceed in ones decision making)

Premises

Using deductive logic, a premise delineates relationship statements for forming a conclusion, providing a measurable means to examine decision making (Chin & Kramer, 1999). There are five main premises of the cognitive continuum theory, providing a means to conduct qualitative and/or quantitative research examining clinical decision making of mid-level practitioners working on interdisciplinary teams (Hammond, 1986).

First premise. The cognitive continuum theory supports the concept that cognition occurs along a continuum from intuition to analysis (Hammond, 1986). In contrast to other decision making theories that view cognition as a process utilizing intuition or analysis, the cognitive continuum theory says that cognition occurs among different locations on a cognitive continuum, depending on cues (tasks) represented to the individual (Hammond et al., 1997).

A clinical decision made by intuition is a process that is "reached by an informal and unstructured mode of reasoning without the use of analytical methods or deliberate calculations" (Kahneman &Tversky, 1982, p.124). Intuition can be also described by a mid-level practitioner's statement such as "I have a gut feeling about this." This type of decision making describes the cue (gut feeling) that influences a practitioner to obtain a lab or diagnostic study or to alter patient management (Benner et al., 1999). In contrast, a clinical decision by analytic cognition has been described as a process which is "slow, conscious, and constant" (Hamm, 1988, p.81) and can be conceptually defined as a judgment that occurs from a step-by-step, logically defensible cognitive process (Hammond, 1996). An example of analytic approach use by critical care mid-level practitioners is described below.

When a critical care practitioner makes a clinical decision to order ventilator settings, a step-by-step process occurs. Initial steps include examining the patient, his/her chest radiograph, hemodynamics, oxygenation requirements, arterial blood gas, and calculation of the ratio of partial pressure of arterial oxygen to fraction of inspired oxygen (P/F ratio) to aid in determining a diagnosis. A P/F ratio less than 200, in addition to other clinical criteria, supports a diagnosis of acute respiratory distress syndrome (The Acute Respiratory Distress Syndrome Network, 2000). Founded on evidence-based research, the mid-level practitioner makes a clinical decision in ventilator management to order a low tidal volume ventilation management mode (The Acute Respiratory Distress Syndrome Network). This example demonstrates the first premise that cognition occurs along a continuum from intuition to analysis using a combination of analytical types of reasoning (Hammond, 1986).

Second premise. The second premise of the cognitive continuum theory supports the view that common sense reasoning is the most frequent and powerful form of cognition (Hammond, 1996). Forms of cognition, which are on the continuum between analysis and intuition, encompass this spectrum of cognition (Hammond, 1996, 2000). Common sense is conceptually defined as the middle of the cognitive continuum, combining elements of intuition and analysis (Hammond, 1996; Hammond et al., 1987, 1997). More specifically, common sense is dependent on the concept of a cognitive continuum where imperfect reasoning can occur resulting from both intuitive and analytic cognitive processes (Hammond et al., 1997).

To illustrate the second premise, one can reflect on the cognitive activity in the mid-level practitioner's decision making to determine ventilator settings for a critical care

patient. An analytical step-by-step process occurs during the patient evaluation (Hammond et al., 1987). The P/F ratio is confirmed as less than 200, supporting a diagnosis of acute respiratory distress syndrome. However, the mid-level practitioner also factors in the knowledge that the patient had no prior pulmonary disease before the placement of a breathing tube for surgery. Additionally, the practitioner takes into account the patient required a large amount of crystalloid volume resuscitation in surgery with known prior heart failure. Based on these cues, the mid-level practitioner uses a common sense cognitive approach to determine that the probable cause of the decreased P/F ratio is related to heart failure, not acute respiratory distress syndrome (Hosenpud & Greenberg, 2006). Considering all of these factors, the practitioner makes a clinical decision not to use the acute respiratory distress syndrome low tidal volume ventilator management on initial critical care admission orders (Hammond, 1996).This type of common sense approach to decision making illustrates the second premise. Common sense reasoning is the most frequent and powerful form of cognition (Hammond, 1996).

Third premise. The third premise states that decision making, or cognitive tasks, can be ordered on the continuum according to the ability to induce intuition, common sense, and analysis (Hammond, 1986, 1996, 2000). This premise can be examined by designating quantitative values for each cue so tasks can be ordered on the cognitive continuum (Hammond, 2000). A researcher could then assign the mode of cognition used based on the mathematical calculations derived from the cognitive continuum index and task characteristic index described below (Hammond, 2000).

To measure the third premise, a cognitive continuum index was developed from quantitative research examining engineers' decisions concerning safety considerations in

analysis of highways to the subjects' cognitive properties on the cognitive continuum (Hammond et al., 1997). This index provided the researcher another means to test the cognitive mode once tasks have been identified for the required clinical decision making (Hammond et al., 1997). In this case, the cognitive continuum index identified and measured four properties as follows: cognitive control, organizing principle, error distribution principle, and differential confidence (Hammond et al., 1997).

Statistical methods were developed and tested to examine the four properties of the cognitive continuum index (Hammond et al., 1997). Cognitive control measures the belief of the individual's accuracy about a decision (Hammond et al., 1997). Cognitive control was originally examined by the linear predictability of engineers' judgment (measured by R2) in response to the data presented (Hammond et al., 1997). The organizing principle is expected to be nonlinear in clinical decision making (measured by the difference between R2 values; Hammond et al., 1997). The error distribution is measured by the difference between the engineers' judgment and the criterion, once judgments were rescaled to the same criterion, known as kurtosis of the error distribution (Hammond et al., 1997). Lastly, differential confidence between method and answers were examined and the higher the difference, the more analytic the cognition use (Hammond et al., 1997). The cognitive continuum index score provided a means to measure cognition and assign this cognitive function to a cognitive continuum mode (Hammond, 1981, 2000).

Fourth premise. The fourth premise states that individual cognition moves along a continuum of analysis to intuition over time (Hammond, 1986, 2000). This change in cognition describes the concept of oscillation. In other words, as time elapses, one's

common sense/perspective will change as a result of changes from the environment impacting the type of cognitive mode used on the cognitive continuum (Hammond, 1986). This concept of oscillation described an important factor for being able to examine the evolutionary process of one's perspective over time (Hammond, 2000).

The cognitive continuum index score provided the researcher an objective means to examine cognitive modes over time to describe and measure oscillations in clinical decision making (Hammond et al., 1997). The cognitive continuum index provided a statistical means to predict tasks in relation to an individual's decision making over time (Hammond et al., 1997). This measurement is important to examine the fourth premise stating individual's cognition moves along a continuum of analysis to intuition over time Hammond et al., 1997).

Fifth premise. The last premise supports human cognition and its capability to use both functional relations and pattern recognition (Hammond, 2000). This premise is critical to be able to measure an individual's prior experiences in clinical decision making when examining his/her judgment on a situation that is similar to one or more prior experiences (Hammond, 1986, 2000). The individual's identification cues and grouping of cues (pattern recognition), described as tasks in this theory, can be defined and measured to predict individuals cognitive mode used in decision making (Hammond, 1986, 2000). The concept of tasks will be described following the summary below.

Summary. These five premises provided a descriptive and prescriptive theory to examine how practitioners make clinical decisions (Hammond, 1986, 2000). Additionally, the type of cognitive mode (analysis, intuition, and common sense) an individual used in clinical decision making was influenced by the type of task and its

characteristics, task complexity, and cues available to the individual (Hammond et al., 1987). This theory's holistic perspective undergirded this qualitative research study.

Tasks

The cognitive continuum theory defines tasks, or cues, an individual perceives as meaningful information that are then factored into one's decision making process (Hammond, 1986, 2000; Hammond et al., 1987). The clarity, or structure, of a cue influences the type of cognition used on the cognitive continuum (Hammond et al., 1987). Well-structured cues induce analytical modes of cognition while ill-structured cues induce intuitive cognition (Hammond, 1986). Further, how an individual may use a different cognitive mode to approach a similar structured task is described as oscillation (Hammond, 1986).

Task characteristics. The cognitive continuum theory states cues that may influence decision making should be identified and then grouped into a relational meaning to be able to statistically examine the influence of a cue in an individual's decision making process (Hammond et al., 1987). Eleven criteria were described by Hammond (1988) to be able to measure characteristics by calculating a task characteristic index score using the cognitive continuum theory. Each criterion is assigned a task location on the task continuum (Hammond, 1988). To test these task characteristics, eight task sub-indices were tested to develop a task continuum index score (Hammond, 1988). This mathematical formula provides a means to test clinical decision making and to identify the type of cognitive process used in decision making (Hammond, 1988).

In the prior illustration that described clinical decision making for prescribing ventilator settings, the cues would be the physical exam, patient and pulmonary history,

diagnosis, laboratory data, chest radiography, calculation of the P/F ratio, et al. that are considered during the practitioner's clinical decision making (Hammond, 1986). Identifying cues the practitioner takes into account during his or her decision making can be further measured and tested in quantitative research (Hammond 1986, 1988). A task continuum index score can be calculated once cues are identified to test a hypothesis in quantitative research examining clinical decision making (Hammond, 1988). This index provides a means to use the cognitive continuum theory to predict cognitive activity when tasks are identified for a clinical decision making situation (Hammond, 1988). Use of a task continuum index has also been used in quantitative research to examine surface and depth of task characteristics in clinical decision making (Hammond et al., 1997).

Depth and surface characteristics. The depth and surface characteristics of a task also influence the cognitive mode in decision making (Hammond et al., 1987). The concept of depth and surface characteristics seeks to describe the relationship of the cue to the decision making and the judgment made based on these cues (Hammond et al., 1987). The depth of the task characteristic is described by Hammond et al. (1987) as a covert relationship among the variables within the task by the organizing principle and environment (context) where the task occurs. The surface task characteristic examined the relationship of task variables related to the judgment at hand (Hammond et al., 1987). These definitions provide a quantitative means to test relationships of task characteristics in this theory (Hammond et al., 1987). The significance of testing these task characteristics to examine decision making was demonstrated in two studies, one of highway engineers (Hammond et al., 1987) and the other was an assessment of threat for aircrafts based on number of cues presented to subjects (Dunwoody, Haarbauer, Mahan,

Marino, & Tang, 2000). These studies demonstrated the importance of the decision makers' assessment of task in relationship to the environment to predict decision making.

Cognitive Continuum Theory in Research

The main assumption of the cognitive continuum theory, that decision making occurs along a cognitive continuum, has been utilized to examine the clinical decision making of nurses (Lauri & Salanterä, 1998), physicians (Hamm, 1988; Hamm, Clark & Bursztajn, 1984), and other professionals (Hammond et al., 1997). The cognitive continuum theory premises have also been tested using the cognitive continuum index and the task continuum index in engineering (Hammond et al., 1987) and psychology research (Dunwoody et al., 2000). Conceptually, the cognitive continuum theory's assumptions that describe cognition is congruent with the view of nursing and health care providers today (Cader et al., 2005; Offredy, Kendall, & Goodman, 2008; Thompson & Dowding, 2002).

Utilization in Nursing

Although the cognitive continuum theory originated from cognitive psychology, it has also been evaluated by Fawcett's (1993) criteria supporting its applicability to nursing research as a middle range theory (Cader et al., 2005). Nursing literature on nursing theory and practice has also described the cognitive continuum theory to support research in examining nursing clinical decision making (Lamond & Thompson, 2000; Muir, 2004; Thompson, Cullum, McCaughan, Sheldon, & Raynor, 2004; Thompson & Dowding, 2002). However, research examining nursing decision making has not specifically tested any of the premises of this theory (Lauri & Salanterä, 1998; Lauri et al., 2001; Offredy et al., 2008). In examining nurses' decision making on an intuition

through analytic cognitive spectrum, one study (N = 483) of Finnish nurses from five different fields of nursing was described (Lauri & Salanterä). For this study, a 56-item questionnaire was developed based on decision making stages across a continuum of analytical to intuitive decision making (Lauri & Salanterä). This instrument was developed from the assumption of the cognitive continuum theory (Hammond, 1996) and intuitive judgment theory (Dreyfus & Dreyfus, 1986) supporting the need to understand nurses cognition. In the Finnish study (Lauri & Salanterä), the instrument examined four stages of decision making that included: 1) data collection, 2) data processing and identification of problems, 3) plans of action, and 4) implementation and evaluation of care across a decision making continuum. A factor analysis with Varimax rotation described five factor loading to examine the research questions (Lauri & Salanterä). The type of nursing task and context was associated with clinical decision making in all five models identified (see Table 5). However, the nurses' practical experience was not explained in these five models (Lauri & Salanterä, 1998). The findings from this study support the assumption that different cognitive modes are used in different clinical decision making among these nurse participants (Lauri & Salanterä).

Table 5. Nursing Tasks and Context in Decision Making

Factor	Eigen-value	Relative Explanatory Power	Cumulative Explanatory Power	Cronbach's Alpha	Factor Loading	Description	Label
Factor 1 (*N* = 12)	4.54	8.11	8.11	0.92	0.401–0.784	Interpretive decision making	Patient-Oriented decision making model
Factor 2 (*N* = 9)	3.41	6.10	14.21	0.89	0.320–0.673	Systematic decision making	Rule-Oriented Decision Making Model
Factor 3 (*N* = 2)	2.32	4.14	18.35	0.84	0.836 and 0.861	Nursing process model	Nursing Process-Oriented Decision Making Model.
Factor 4 (*N* = 14)	3.83	6.84	25.19	0.76	0.335–0.601	Decision making as intuitive, multifaceted process.	Intuitive Decision Making Model
Factor 5 (*N* = 14)	3.24	5.79	30.98	0.72	0.217–0.523	Stage of data processing and identification of problems	Nurse-Oriented Decision-Making Model.
Total	17.34	30.98					

Note. Five items did not load highly on any factor. (Lauri & Salanterä, 1998).

In a follow-up study (*N* = 459) of nurses examining clinical decision making (*n* = 236 geriatric, *n* = 223 acute medical-surgical) from Canada (*n* = 87), Finland (*n* = 194), Sweden (*n* = 78), Switzerland (*n* = 40), and United States (*n* = 60), five models of decision making were identified and described using factor analysis (Lauri et al., 2001). The five cognitive factors are described in Table 6. This study's findings further support the concept that nurses use different cognitive modes ranging from intuition through analysis in their clinical decision making (Lauri et al.). The findings from these two nursing studies (Lauri & Salanterä, 1998; Lauri et al.) are conceptually congruent

with the assumption of the cognitive continuum index stating cognition occurs on a continuum from intuition through analysis in clinical decision making (Hammond, 1986).

Table 6. Models of Decision Making - Factor Loading from Five Countries

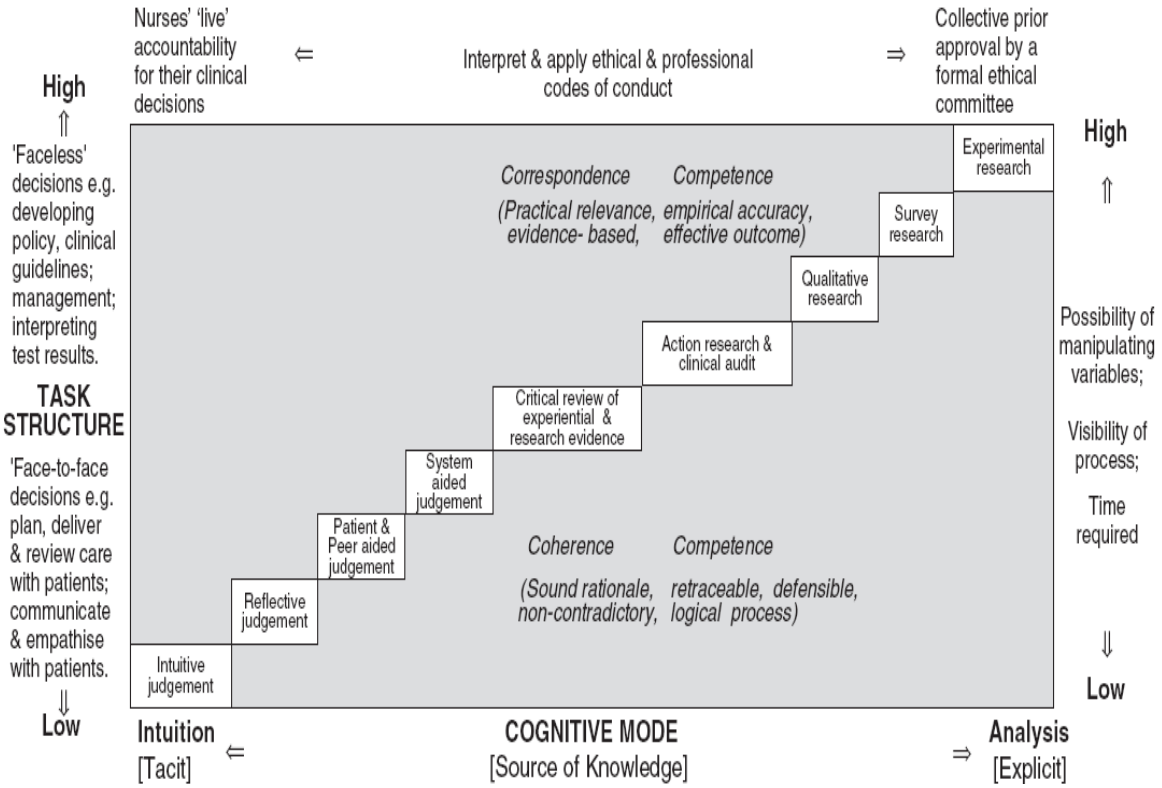
Factor	Eigen-value	Relative Explanatory Power	Cumulative Explanatory Power	Cronbach's Alpha	Factor Loading	Description	Label
Factor 1 (*N* = 20)	4.80	8.73	17.31	0.92	0.601 to .312 and -.457 to -.301	Analytical decision making = + loading	Analytical step-by-step model
Factor 2 (*N* = 12)	4.72	8.58	8.58	0.93	0.605 to .385 and -.532 and -.348	Intuitive decision making = + loading Analytical negative loading	Intuitive pattern recognizing model
Factor 3 (*N* = 8)	2.74	4.98	25.54	0.89	0.624 and 0.319 and -.542 and -.419	Intuitive decision making = + loading Analytical negative loading	Intuitive processing model
Factor 4 (*N* = 6)	2.70	4.90	30.44	0.90	0.578 - 0.446 and -0.343	Intuitive decision making = + loading Analytical negative loading	Intuitive interpreting model
Factor 5 (*N* = 2)	1.79	3.25	20.56	0.85	0.721 and 0.647	Analytical/systematic decision making process = + loading	Analytical processing model
Total	16.75	30.44					

(Lauri et al., 2001)

A recent study by Offredy et al. (2008) described the clinical decision making of nurse prescribers in England (N = 25) undergirded by the cognitive continuum theory. Nurse prescribers in this study included nurses having prescriptive ability in England (Offredy et al.). The researchers used real-life scenarios that identified relevant cues that may influence the type of cognition used (Offredy et al.). This theory supported development of an interview guide, clinical scenarios, guiding analysis and reporting of findings in nursing research examining clinical decision making supporting this theory's application to undergird this study (Lauri & Salanterä, 1998; Lauri et al., 2001; Offredy et al.). By using this theory, the importance of including an examination of social and institutional factors that influence decision making by nurse prescribers was identified as an important consideration to understand decision making (Offredy et al.).

Theory Evolution for Nursing Research

The cognitive continuum theory provides a model to examine individual's decision making, however it does not describe the inclusion of qualitative research (Standing, 2008). Standing proposed a revised cognitive continuum with nine cognitive modes, instead of six, to include the holistic view of nurse decision making (see Figure 4; Standing). Additionally, Standing proposed changing the concepts of *ill* and *well* structured tasks to a *low* and *high* task structure. Low structured tasks include face-to-face decisions, where high structured tasks include development of guidelines and policies (Standing). Further, in the revision, Standing (2008) removed the numerical assignment from each mode for conceptually congruency with oscillation that occurred among different cognitive modes. Numerical representations are listed in Table 7 to aid the reviewer in comparing the changes to the original theory.



(Standing, 2008, p. 130).

Figure 4. Nine Modes of Practice - Standing's Revised Cognitive Continuum of Clinical Judgement and Decision Making in Nursing.

Table 7. Mapping of Standing's Revised Cognitive Continuum Theory to Hammond's

Hammond's Cognitive Continuum Theory	Standing's Revised Cognitive Continuum Theory
1 Scientific experiment	1 Experimental research
2 Controlled trial	2 Survey research
	3 Qualitative research
3 Quasi experiment	4 Action research and clinical audit
	5 Critical review of experimental and research evidence
4 System aided judgment	6 System aided judgment
5 Peer aided judgment	7 Patient and peer aided judgment
	8 Reflective judgment
6 Intuitive judgment	9 Intuitive judgment

(Hammond, 1986; Standing, 2008)

Standing (2008) provided a detailed description and rationale for the revised and added cognitive modes of Hammond's (1986) cognitive continuum for nursing education and research. This revised cognitive model assists in clarifying and structuring a cognitive clinical decision making theory conceptually congruent with a holistic nursing ontology (Standing). However, theoretical assumptions and premises have not been developed to date (Standing). Therefore, Hammond's (1986) cognitive continuum theory was utilized to undergird this qualitative research study. Findings may support further theory development of Standing's revised cognitive continuum of clinical judgment and decision making in nursing nine modes of practice.

Application of Theory to Describe Clinical Decision Making

This research study described clinical decision making, among a continuum of cognitive intuition and analysis, among critical care mid-level practitioners working on an interdisciplinary team. Because real-life scenarios have provided valuable information in understanding the decision making of nurse prescribers (Offredy et al., 2008), the researcher used a vignette to facilitate this research. The vignette described a common complex medical issue, managing anticoagulation therapy for an intubated patient with thrombocytopenia who has been diagnosed with a right femoral deep vein thrombosis in a critical care unit (reference Appendix A). This illustration provided additional data to describe the identification of cues, to foster discussion, and to generate interaction among the participants.

The findings from this study provided a description of oscillations that occur during these practitioners' clinical decision making and illustrated the influences of an interdisciplinary team on mid-level practitioner's clinical decision making. The description of the cues for clinical decision making of critical care mid-level practitioners support further research in clinical decision making theory development using the cognitive continuum theory. Figure 5 displays the research framework for this research study.

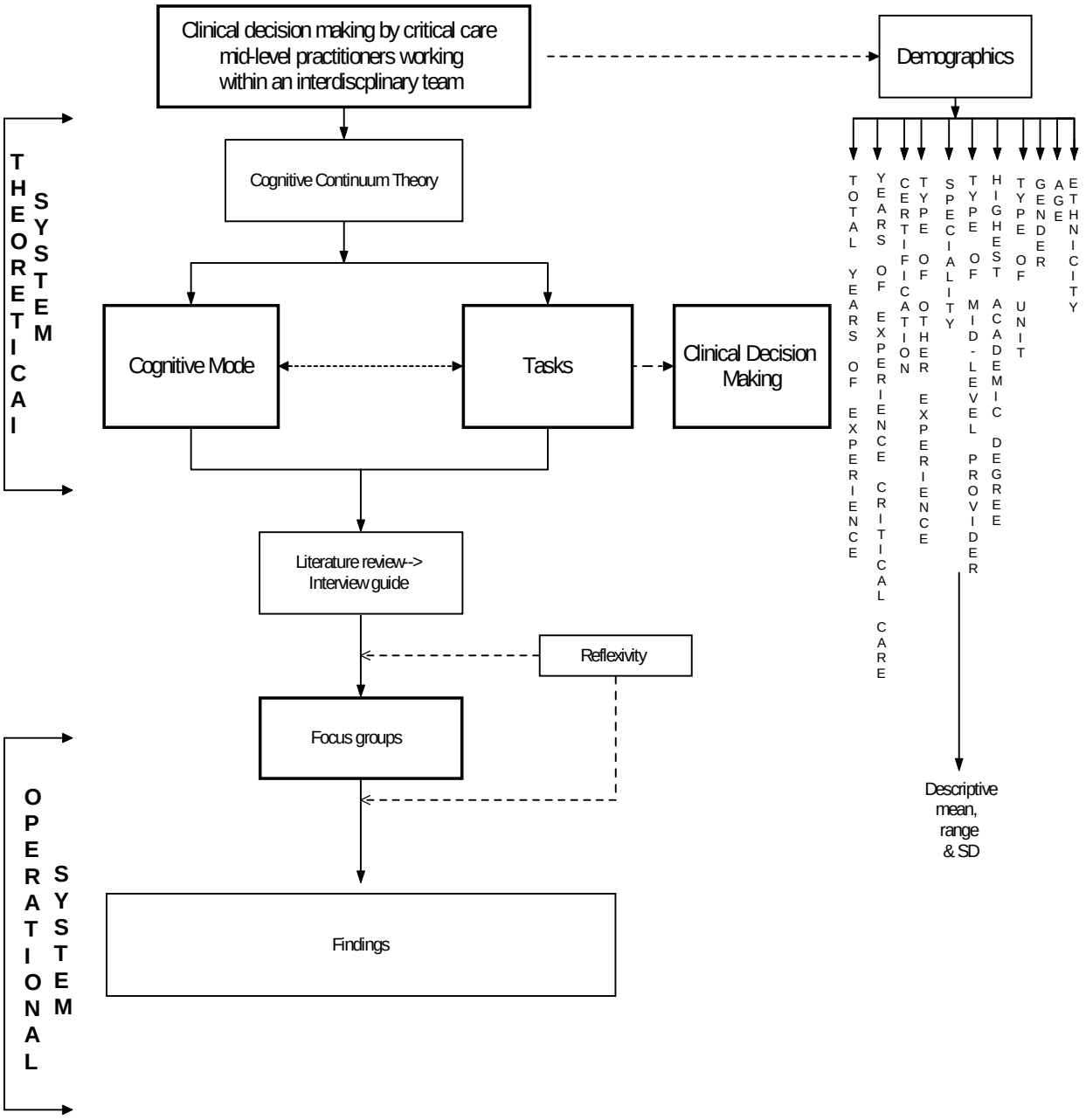


Figure 5. Research Framework

Summary

This chapter described propositions and premises of the cognitive continuum theory using a critical care scenario for a mid-level practitioner to aid in linking the theory to the clinical decision making of these mid-level practitioners. Description of this theory supporting its applicability to examine clinical decision making in qualitative and quantitative research studies was also highlighted. This review included a description of three nursing research studies that used the cognitive continuum theory. The cognitive continuum theory provided a holistic theoretical framework to undergird this study that described, using qualitative description, how mid-level practitioners working on an interdisciplinary team make clinical decisions in critical care units (Hammond, 1986, 2000; Hammond et al., 1987).

Chapter III

Methods

Introduction

The purpose this chapter is to describe the methods that undergirded this study. The chapter will begin with an overview of the qualitative descriptive approach and the ontological and epistemological underpinnings for this study. The last section will describe the proposed study including the methods, design, limitations, and ethical considerations.

To describe the clinical decision making of mid-level practitioners working within the context of interdisciplinary teams in critical care units, a qualitative research design was chosen to meet the three aims of this study. The three aims were:

- Describe clinical considerations that critical care mid-level practitioners use to make clinical decisions,
- Describe how clinical decision making (the cognitive process) occurs among critical care mid-level practitioners on an interdisciplinary team, and
- Describe how interdisciplinary providers' recommendations are incorporated into the critical care mid-level practitioner's decision making.

Due lack of research describing clinical decision making of critical care mid-level practitioners among interdisciplinary teams, a qualitative methodology was selected for this research (Burns & Grove, 2005). By conducting this research in a natural setting using focus groups compromised of mid-level practitioners (two interdisciplinary team members), with emphasis on control, supported the internal validity for this research (Guba, 1990; Phillips, 1990). Using a qualitative description approach enabled the

researcher to provide rich descriptions of how these practitioners make clinical decisions on an interdisciplinary team (Sandelowski, 2000).

Ontological and Epistemological Underpinnings

Qualitative research provided a systematic process in a rigorous, interactive, and subjective manner to describe life experiences (Burns & Grove, 2005). Conducting research describing the decision making of mid-level practitioners working on an interdisciplinary team in critical care units necessitated a holistic research approach (Cader et al., 2005; Harman, 1991). This ontological view is congruent with the qualitative research design used in this study. This method also enabled the researcher to describe emotional responses, human experience, and to allow discovery of the individual as a whole (Burns & Grove).

Furthermore, a qualitative research design provided a scientific method to obtain and to synthesize information to gain an understanding about this phenomenon by naturalistic inquiry (Guba, 1990; Phillips, 1990). Naturalistic inquiry seeks to identify reality through complex relationships, but it does not try to predict the real world (Guba). This ontological perspective is intertwined within multiple contexts, which provided the researcher the ability to describe the clinical decision making of critical care mid-level practitioners and to gain knowledge for illustrating how an interdisciplinary team may impact these clinical decisions (Guba).

Epistemologically, the naturalistic paradigm undergirded this qualitative descriptive research approach (Guba, 1990). In other words, the researcher supported the assumptions that these practitioners' clinical decision making is complex and that this phenomena can best be understood by examining practitioners' responses, to gain an

understanding of how clinical decisions are made (Ambert, Adler, Adler, & Detzner, 1995). This naturalistic approach allowed for analysis and discoveries from the interaction from different points of view (Ambert et al.; Guba; Harman, 1991). Therefore, to examine complex decision making, utilization of a holistic theory was chosen.

The cognitive continuum theory provided a tested clinical decision making theory and was used as a conceptual framework to undergird this study. This theory supported this study, which sought to describe how critical care mid-level practitioners make decisions within an interdisciplinary team, as the factors influencing these clinical decisions have not been described in the literature (Shortell et al., 1994). Qualitative description also allowed for the emergence of other ideas, thoughts, or views beyond this theory (Sandelowski, 2000). There are many cues factored into a mid-level practitioners decision making (Hammond, 1986). Depending on the type of decision making required, different cues are used (Hammond, 1986, Hammond et al., 1987). Figure 6 visually presents the many decision making cues identified a priori that were considered and undergirded by the cognitive continuum theory in this study.

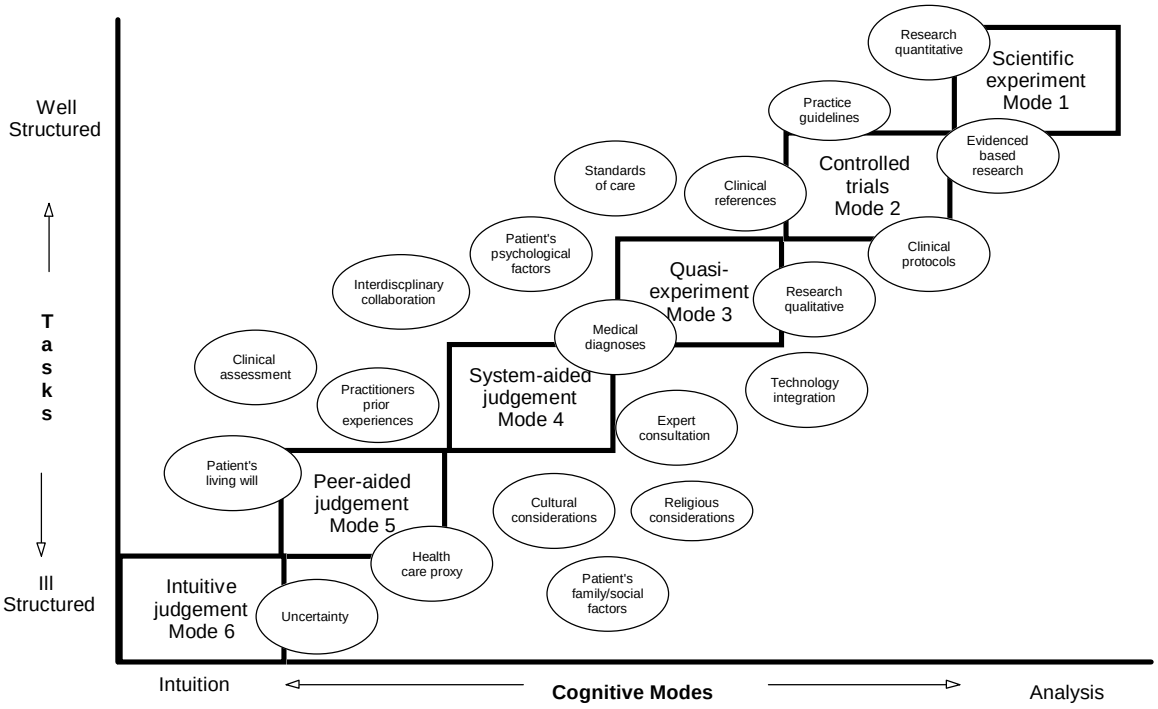


Figure 6. Conceptualization of Framework

Research Design

Qualitative Descriptive Approach

A qualitative descriptive approach was chosen for this study, as little information is known about mid-level practitioners' clinical decision making as part of interdisciplinary teams in critical care units (Shortell et al., 1994). Qualitative description provided a comprehensive means to richly describe the cues used in this type of decision making (Sandelowski, 2000). This approach allowed the researcher to remain close to the data, while permitting an in-depth description of participants' contextual responses (Sandelowski, 2000; Sullivan-Bolyai, Bova, & Harper, 2005). Capturing data from multiple participant sources supported the research aims in describing the clinical decision making of critical care mid-level practitioners working on interdisciplinary teams (Sullivan-Bolyai et al.).

Setting

Attaining a sample of critical care mid-level practitioners currently participating on established interdisciplinary teams provided an opportunity to gain a comprehensive description of their clinical decision making. An urban, academic medical center located in Massachusetts was selected for recruitment. Although many hospitals in Massachusetts have mid-level practitioners providing critical care services, the academic center selected has established interdisciplinary teams that deliver critical care management for approximately 103 critical care beds, with a dedicated intensivist for each critical care unit (R. Ligeti, personal communication, June 11, 2008; UMass Memorial Health Care, 2008c, 2008d).

Sample

Mid-level practitioners are integrated members of the institution's critical care interdisciplinary teams (UMass Memorial Health Care, 2008d). Moreover, this institution provides mid-level practitioner clinical training opportunities for nurse practitioner students and postgraduate physician assistants who are training in critical care management (UMass Memorial Health Care, 2008b). Approximately 63 critical care mid-level practitioners provided critical care management for patients in the critical care units on both campuses during the planning of this research (R. Ligeti, personal communication, June 11, 2008). Table 8 represents the type of mid-level practitioners in these units.

Table 8. Critical Care Mid-Level Practitioners within an Academic Medical Center

Practitioner Type	Estimated Number of Practitioners
Physician assistants in adult non-cardiac critical care units	19 *
Physician assistants in cardiac surgery critical care unit	5
Physician assistant postgraduates training in all critical care units	4 *
Nurse practitioners in adult critical care units	34 *
Nurse practitioners in cardiac surgery critical care unit	1
Total	63

*(R. Ligeti, personal communication. June 11, 2008)

Excludes mid-level practitioners working in neonatal and pediatric critical care units.

Recruitment Process

Upon successful completion of the dissertation proposal defense, the researcher requested approval to proceed from the Senior Vice President and Chief Nursing Officer, the Chair of the Critical Care Operations Committee at the institution, and the Professor of Medicine and Nursing. With institutional support to proceed, the researcher submitted an application to the Institutional Review Board (IRB) at this institution. Upon IRB approval, potential study participants were recruited by an invitation sent through the critical care and cardiac surgery mid-level practitioner's email by a nurse associate not working in the department of cardiac surgery (Appendix B). Additionally, an invitation flyer was posted in each ICU practitioner office. A surgical critical care nurse practitioner who is faculty at the graduate school of nursing and two lead critical care physician assistants also volunteered to assist in disseminating invitations to recruit subjects. Potential subjects were instructed to contact the researcher by email or phone to discuss the proposed study.

An approved IRB consent form was provided to each respondent to participate. The consent form included an optional check box to allow the researcher to follow up with the participant to verify findings. Each participant was instructed to bring the signed consent form at the time of the assigned focus group session. The researcher provided a copy of the signed consent form to each participant at the beginning of each focus group. An email reminder, or phone reminder if requested by the participant, occurred for each participant one and two weeks prior to the assigned focus group session. An additional email (or call, at the request of the participant) was sent as a reminder the day prior to the session (Krueger, 1998c).

A purposeful sample was used to recruit critical care mid-level practitioners working at the urban Massachusetts medical center so that a maximum variation of the target population was obtained (Sandelowski, 1995; Sullivan-Bolyai et al., 2005). Purposeful sampling was used in this qualitative study to ensure the clinical decision making of critical care mid-level practitioners working on interdisciplinary teams was richly and fully described (Sandelowski, 2000). Further, it was important to attain maximum variation of the sample to be able to generalize findings to other mid-level practitioners working among interdisciplinary teams in critical care units (Sandelowski, 2000). Demographic data were obtained and reported on each participant to ensure maximum variation of the sample (see Table 9).

Table 9. Demographic Data

1	Type of mid-level practitioner (nurse practitioner or physician assistant)
2	Total years practice as nurse practitioner or physician assistant
3	Years of practice as nurse practitioner or physician assistant in critical care
4	Years of other critical care experience prior to current role
5	If yes to #4, describe the type of experience
6	Highest academic degree achieved
7	Age in years
8	Ethnicity
9	Gender
10	Identify your primary critical care practice setting (medical, surgical, or medical/surgical)
11	Certification in critical care or specialty
12	Do you work in a specialty critical care population? If yes: describe

Inclusion criteria. The inclusion criteria for participants were:

1. Licensed mid-level practitioner in Massachusetts currently in this role
2. Provides management of critical care patients
3. Works on an interdisciplinary team
4. Ability to speak and understand English

Exclusion criteria. The exclusion criteria for participants were:

1. Mid-level practitioners working on a contractual basis
2. Mid-level practitioners working in neonatal and pediatric critical care units

Mid-level practitioners working on contractual basis were excluded because their temporary role on a team may have inhibited the ability to describe interdisciplinary team's impact on clinical decision making of mid-level practitioners. Additionally, mid-level practitioners working in neonatal and pediatric units includes management of the child and family, which was outside the scope of this study.

Focus Groups

The use of focus groups in the marketing and service industry have been effective to obtain insight on topics of interest (Krueger & Casey, 2000), and they have been utilized in health care research to gain an understanding about areas of clinical interest (Bennett, Cordes, Westmoreland, Castro, & Donnelly, 2000; Robinson, 1999; Samuel-Hodge et al., 2000). Additionally, this method has been used for critical care research in order to gain an understanding of family perceptions (Jamerson et al., 1996; Kirchhoff et al., 2002) and patient experiences (Curtis et al., 2001; McKinley, Nagy, Stein-Parbury, Bramwell, & Hudson, 2002). And finally, focus groups have been used to examine the collaboration of providers in critical care units (Lingard et al., 2004). Therefore, focus groups were utilized to compile rich descriptions of the decision making practices of critical care mid-level practitioners. This method of gathering information on decision making is ideal to discover insight, feelings and opinions for homogenous groups on selected topics of discussion (Krueger & Casey).

Size. The size of each focus group had to be considered to ensure all members had an opportunity to participate (Krueger & Casey, 2000). Excessive membership (greater than 12 participants) may not allow for open and detailed discussion (Krueger & Casey). Additionally, focus groups that are too small (less than four participants) may limit the variability and identification of new ideas (Krueger & Casey). In a noncommercial setting, six to eight participants is an ideal size for a focus group (Krueger & Casey). Given this consideration, up to eight participants were recruited for each of the initial focus group sessions. This recruitment strategy allowed for one or two participants to

miss each session without compromising the integrity of the assigned session (Krueger & Casey).

Groups. The researcher ensured recruitment of physician assistants and nurse practitioners for each focus group occurred. Having interdisciplinary members in each group provided the ability to describe individual decision making and the decision making influences among these two interdisciplinary practitioners (Krueger & Casey, 2000). In addition, the researcher ensured one focus group included only critical care medical practitioners and a plan to include only surgical practitioners in another, as it was unknown if there are differences in these types of interdisciplinary teams (Shortell et al., 1994).

A general guideline for conducting focus groups is planning three or four focus groups with the identified participant population (Krueger & Casey, 2000). When homogeneity of participants is present, saturation of new emerging ideas can be reached (Krueger & Casey). Upon completion of the third focus group, data saturation was reached. A fourth focus group was deemed not necessary once confirmation of data saturation with the researcher, focus group moderator, and dissertation chair occurred (see Figure 7 for the flow of this planned process, incorporating a plan for a fourth group, if data saturation was not met).

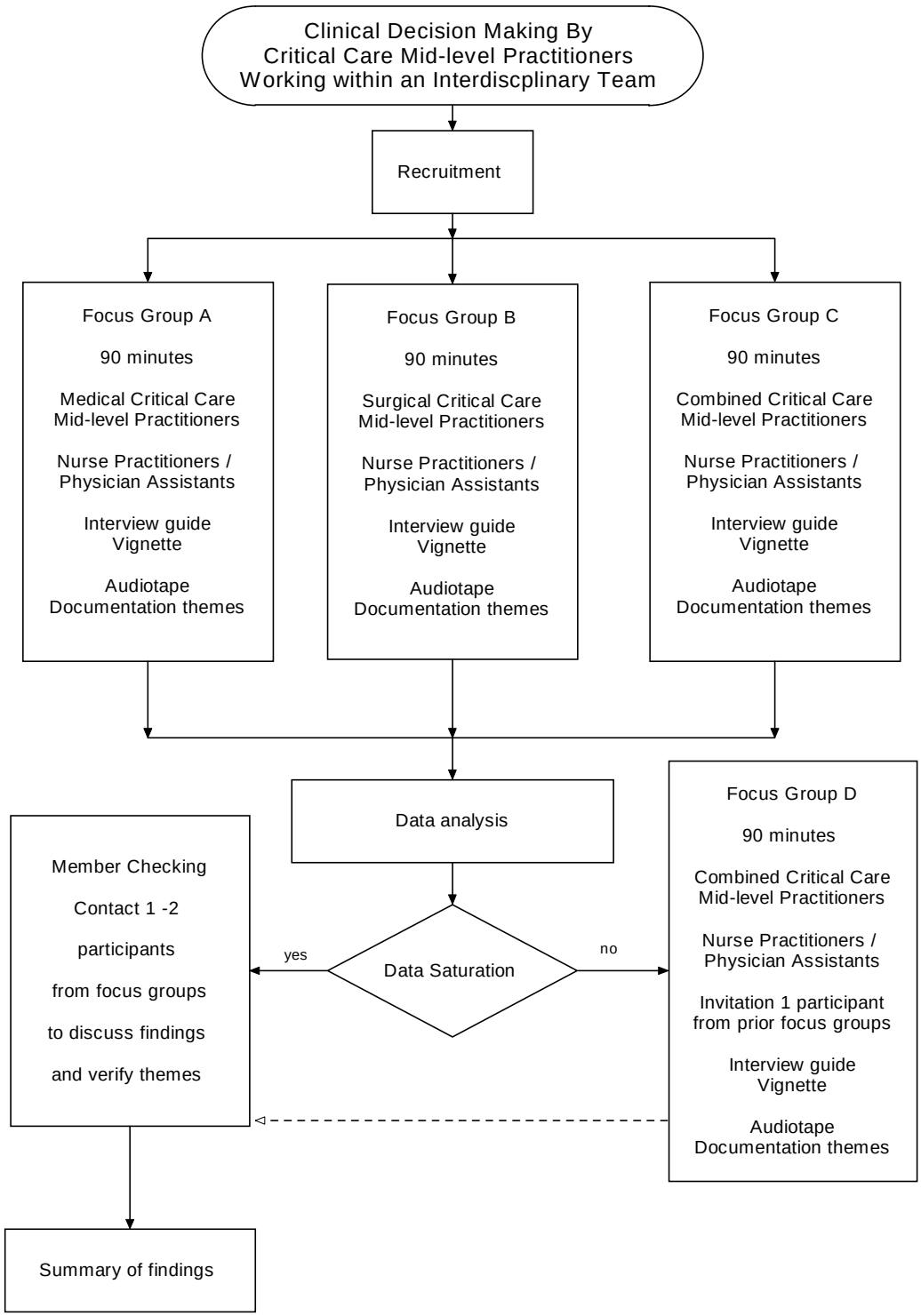


Figure 7. Planning Focus Groups

Members. The members selected for the focus groups included a homogenous group of participants (critical care mid-level practitioners), a moderator, and a note taker (Krueger & Casey, 2000). The researcher of this study limited her participation to the note taker role. The role included recording information, taking detailed field notes, and assisting in material management during the focus groups since she was known to many of the participants as an administrator in the cardiac surgery department (Krueger & Casey).

A research associate assumed the moderator role using a interview guide that will be discussed later in this methods section (Krueger & Casey). The moderator chosen for the focus group sessions had specific credentials that identified her as an ideal candidate to moderate the sessions for this research study. For example, the moderator's prior experience included work as a critical care nurse. In addition, the moderator had recently completed research using qualitative methods. She had also moderated focus groups for other nursing research studies.

Preparation. The researcher assembled the supplies required to conduct this study prior to the first focus group session. The supplies included: two audio tape recorders, eight C-120 audio tapes, an easel with detachable paper, computer, and markers for the easel (Krueger, 1998c). Individual C-120 tapes were used to record each focus group. One tape recorder was placed centrally near the table and was activated by the researcher at the appropriate time. The second audio recorder was positioned near the end of one table near the note taker and was activated by the note taker. Having two recorders ensured all data were captured, and provided the ability to screen out variant noise during the session by unforeseen circumstances, like taping on the table by participants

(Krueger, 1998c). Additionally, in the event a tape recorder had failed to function, the data would have been captured on the alternate audio recorder (Krueger, 1998c).

The researcher, as a note taker, used the easel to document ideas, themes, and concepts that emerged from the focus groups, allowing all participants to review the data as it was captured (Krueger, 1998c). The easel was set up in the room prior to beginning each focus group session. A private conference room in the medical school buildings was reserved for each focus group session; these rooms are adjacent to the hospital. Each room comfortably seated 10-15 individuals around a center table. The researcher inspected the room prior to each focus group session to assess for privacy, suitable environmental factors and arrangement of chairs for the focus groups (Krueger & Casey, 2000).

Format. Prior to the focus group, the moderator and the researcher met privately to bracket their thoughts of the study logistics (Krueger & Casey, 2000). In addition, they recorded any assumptions, thoughts, and feelings to create an audit trail (Krueger & Casey). Prior to starting each focus group, the participants registered and completed a brief demographic sheet (Krueger, 1998c). Refreshments, including sandwiches, water, sodas, and desserts were available at the beginning of each session (Krueger, 1998c). During this time, the researcher ensured informed consent was obtained from each participant. Extra consent forms were also available.

Each focus group started with an introduction of the moderator and the note taker. The moderator provided general information about the research study. The moderator used an open-ended interview guide, framed by the cognitive continuum theory and literature review, to lead the discussion (see Table 10; Krueger 1998b). Each focus group

was approximately 90 minutes in duration to provide time for the introduction, data gathering and summary (Krueger, 1998c). The discussion spanned from a general description of practitioner roles in critical care units to the roles of the interdisciplinary team members (Krueger 1998b). After the description of the practitioner roles a vignette describing a common clinical situation was used. A vignette provided an example of complex patient management clinical decision making in order to have the participants provide a description of how these practitioners make clinical decisions for their patients. At the end of each focus group, the note taker reviewed themes with the participants in order to verify accuracy of information with the participants (Krueger, 1998b). After all participants left, the moderator and the researcher debriefed and recorded their findings (Krueger 1998b.). The debriefing session was structured according to the seven criteria identified by Krueger (1998b), listed in Table 11.

Table 10. Interview Guide

Conceptual Area	Aim	Main Question	Probes
Introduction	n/a	1. Please introduce yourself to the group.	(none)
		2. Identify what type of critical care unit you work in.	Can you give an example of a typical patient you would manage?
		3. Describe the provider team that manages patients in your critical care unit.	Describe how decisions are made for patients in your critical care unit. Follow-up: Can you give an example?
Cognitive Continuum	Describe clinical considerations that critical care mid-level practitioners use to make clinical decisions	1. How do you make clinical decisions in management for your patients?	Can you give an example?
		2. What resources are used when making clinical decisions?	Can you give an example?
		3. What do you do when there are no guidelines to help make a clinical decision?	Can you give an example?
		4. What helps you make clinical decisions for your patients?	Can you give an example?
Tasks	Describe how clinical decision making (the cognitive process) occurs among critical care mid-level practitioners on an interdisciplinary team	1. What type of clinical decisions do you make on an average day while working in critical care?	What are the common types of decisions you need to make? Follow-up: Do others make similar decisions in their critical care units?
		2. Are clinical guidelines used to support your decision making for planning care?	Can you give an example?
		3. When a patient's status changes, how do you make a decisions for management?	Can you give an example? Follow up: Describe your process for communication to other team members about this change.

Table 10. Interview Guide (continued)

Conceptual Area	Aim	Main Question	Probes
Oscillation	Describe how inter-disciplinary providers' recommenda-tions are incorporated into the critical care mid-level practitioner's decision making.	1. Does the patient and/or family impact your decision making for planning care?	Can you give an example? Follow-up: Can you describe a decision made based on the wishes of the family or patient? Follow-up: Do you consider patient decision making to be a collaborative decision? Describe why/why not.
		2. Describe the interaction with the critical care physician when management decisions for your patient are made.	Can you give an example? Follow-up: Describe what occurs with patient management if the attending selects different management options. Follow-up: Describe how you resolve conflict in management decisions among your team.
Mid-level practitioners	n/a	1. Describe your role on the critical care team.	Can you give an example?
		2. Describe how you were trained to work in your critical care unit.	(none)
		3. Describe the relationship with other interdisciplinary provider members in planning patient care.	Do conflicts arise in patient management within the critical care team? Follow-up 1: Can you give an example? Follow-up 2: Does the type of provider (MD, physician assistant, and nurse practitioner) feedback influence your clinical decision? Follow-up 3: If yes, describe why.

Table 10. Interview Guide (continued)

Conceptual Area	Aim	Main Question	Probes
Context	n/a	Reference the vignette (Appendix A) 1. Describe how you would manage this patient.	What influences your decisions in planning his care?
		2. What consideration do you need to consider for anticoagulation?	If HIT is suspected by a team member for this patient, describe how you will proceed with management. Follow-up: How would others approach the same patient?
		3. Are other factors considered in planning this patient's management?	Describe other concerns. Follow up: Are institutional or social factors included in your decision making? Can you describe an example of this?

Table 11. Debriefing Guide

1	What are the most important themes or ideas discussed?
2	How did these differ from what we expected?
3	How did these differ from what occurred in earlier focus groups?
4	What points need to be included in the report?
5	What quotes should be remembered and possibly included in the report?
6	Were there any unexpected or anticipated findings?
7	Should we do anything differently for the next focus group?

(Krueger, 1998b, p. 34)

Vignette

Vignettes are used in qualitative research to explore actions within a context, to clarify peoples' judgments, and to provide a depersonalized way of exploring sensitive topics (Barter & Renold, 1999). The researcher's used a vignette (reference Appendix A) during this study's focus group sessions to assist in describing details of the clinical decisions needed for a clinical presentation of a patient managed by mid-level practitioners working in a critical care unit (Barter & Renold). This approach provided further clarification for the discussion and/or identified additional themes that may not have been initially considered (Barter & Renold). The researcher developed the vignette guided by the cognitive continuum theory and included a summary of the patient's clinical status and history in order to provide the participants the ability to visualize the patient and the scenario (Barter & Renold). The vignette described clinical information, ranging from intuition interpretations to analytical data, so the participants had the ability to share their decision making in evaluation and management of this patient (Hammond, 1986). Although the researcher provided a sufficient amount of context to the problem in order for participants to understand the clinical situation she did not present leading information (Barter & Renold).

This vignette was developed from the literature review and undergirded by the CCT. The vignette described a diagnosis requiring decision making for anticoagulation by a mid-level practitioner in the critical care setting for a patient with thrombocytopenia (Vanderschueren et al., 2000). This complex scenario was selected as there can be many etiologies of thrombocytopenia in a critically ill patient (Handin, 2001a). One etiology of thrombocytopenia, heparin induced thrombocytopenia, if misdiagnosed, can lead to

severe thrombotic complications (Warkentin & Greinacher, 2007). The second reason this clinical situation was chosen was some forms of anticoagulation agents are difficult to reverse quickly in the event a bleeding complication occurs, thus increasing the complexity of the clinical decision making that is required (Handin, 2001b). If bleeding occurs in a patient with anticoagulation, a needed interventional or surgical intervention may be delayed, increasing risk of complications if an alternate systemic anticoagulation agent is used (Handin, 2001b). The national guidelines to support the practitioner's clinical decision making in the selection of systemic anticoagulation medications for patients with thrombocytopenia identify several non-heparin anticoagulant medications from which the practitioner may choose (Warkentin & Greinacher, 2004). How mid-level practitioners currently make this and other complex clinical decisions in a critical care setting, when there are lack of specific guidelines, is unknown.

In the focus group sessions, the moderator read the vignette aloud and the participants had a hard copy for reference. It was printed in the format of a critical care mid-level practitioner's note, including past medical, surgical, and social history, and included current medications and laboratory results. This format of presenting data in a familiar way may support their ability to interpret the information (Hammond, 1986).

Data Management

Each focus group session comprised a unit of investigation. The same process for data collection and data management was repeated for each focus group. The researcher, functioning in a note taker role during the focus groups, recorded the date, time, and session number on the first page of the easel for each session. The moderator and researcher bracketed their thoughts and recorded these prior to proceeding with the focus

group sessions. The researcher recorded the ideas from each focus group session on the easel throughout each session. Themes identified by the researcher and moderator were listed on the easel at the end of the unit of investigation.

At the completion of each session, the researcher and moderator conducted a debriefing session to identify themes and areas for further exploration in the next focus group. Within one week of each focus group, the researcher and chairperson meet to discuss findings and themes. The moderator was invited to participate in these sessions. The researcher transcribed the data from each focus group into a Microsoft Excel document by Sunday on the week the focus group occurred. This document recorded the session number that is shown on the easel for each investigation. Audio tapes were used for note based analysis to aid in summarizing each focus group session. The researcher and the moderator reviewed the Excel document for accuracy. If any discrepancies were identified, the moderator and researcher would have reviewed the audio tapes and field notes for clarification. In the event an agreement is not reached among the researcher and moderator, the dissertation chair would have been requested to review the content for final disposition. The researcher and the chairperson held bi-monthly meetings to discuss findings from the focus groups. A review of the data from the audio tapes occurred bi-weekly during the month of the investigations for note-based analysis to identify emerging themes.

Data Security

The researcher is responsible for maintaining security of the data, thus the audiotapes from each focus group session were stored in a locked fire proof box in the researchers home office for five years after the dissertation is completed. In addition, the

printed field notes, the consents and the sheets from the easels will be stored in the fire proof box for five years (Burns & Grove, 2005).

The only individuals able to access data from this study were the research committee chairperson and the researcher. Written permission, with IRB approval, will be required from any other persons requesting access to the data. A log will be maintained in the fire proof box to show the list of individuals who have requested access to the data, including the reason for the data review, the time and date the data review occurred.

Data Analysis

The researcher used a note-based analysis method to examine the data. This method examined the data and the written documents that were summarized at the conclusion of each focus group session (Krueger, 1998a). In addition, the data analysis process was incremental and repetitive after each investigation (Krueger, 1998a). The data that were analyzed included the information on the Excel documents, the data from the easel pads, and the audiotapes from each investigational unit (Krueger, 1998a). The researcher reviewed the audio tapes bi-weekly and immersed into the data in order to identify themes during the month of investigation (Krueger, 1998a). Initially, the researcher used the cognitive continuum theory to organize the data (Hammond, 1986). Then, the researcher coded sub-themes upon further analysis of the data (Hammond, 1986). During data analysis, the researcher maintained a high awareness for newly emerging concepts that may not be included in the cognitive continuum theory.

Upon identification of themes and sub themes, the researcher reviewed the audio tapes to verify and clarify the themes (Krueger & Casey, 2000). Further, the researcher

used actual participant responses for theme coding, using their own words, in utilizing a qualitative descriptive approach (Sandelowski, 1994). In addition, the researcher maintained a journal to describe decisions made during the selection of concept/themes that are vague (Krueger & Casey). Ongoing discussion with the chairperson occurred during the analysis process for guidance. Lastly, demographic data were entered into a Microsoft Excel spreadsheet program. This program was used to generate graphs and tables to provide descriptive statistics of the participants in this study.

Timeline

The timeline to complete this qualitative description dissertation research is shown in Table 12. The researcher received an extension to complete this research by April 2009. Attention to meeting identified timelines was critical to complete this dissertation study to complete doctoral degree requirements.

Table 12. Timeline for Research Study

Time line	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09
Completion of dissertation proposal	Chapter 1	Chapter 2	Chapter 3	Revisions	Final							
Feedback from consultant experts	PRN	PRN	PRN			PRN			PRN	PRN	PRN	
Editor for dissertation	Hold			Hired	Review 1,2,3		Send 1	Send 2 & 3	Send 4	Send 5	Send final	Publish
Confirm moderator for focus groups				Contact	Confirm		Focus groups	Focus groups				
Dissertation proposal defense					Tentative	Complete						
IRB educational training	Done											
IRB application						Complete						
Invitation to participate						Pending IRB						
Schedule focus group rooms						Pending IRB						
Obtain audio tape recorder and easel						Purchase						
Conduct focus groups							Focus groups	Focus groups				
Data analysis								Ongoing	Ongoing	Ongoing		
Complete chapter four								Chapter 4	Edits	Edits		
Consultation with qualitative expert	PRN	PRN	Weekly	Monthly		Weekly	Weekly	Weekly	Weekly	Weekly	Weekly	
Member checks							End focus groups	PRN	PRN	PRN		
Complete chapter five									Chapter 5	Edits	Edits	
Editor for dissertation research						Chapter 1	Chapter 2	Chapter 3	Chapter 4	Chapter 5	Final	Final
Dissertation defense												**Due**

Trustworthiness

This section will describe the four components described by Lincoln and Guba (1985) of trustworthiness, transferability, dependability, confirmability, and credibility in conducting this qualitative study. Additionally, a section on reflexivity is included to support the trustworthiness of this study (Dowling, 2006).

Transferability. Transferability relates to how the researcher addressed how the study findings can be transferred to other critical care mid-level practitioners working on interdisciplinary teams (Graneheim & Lundman, 2004; Lincoln & Guba, 1985). Qualitative description provided a method to describe clinical decision making by the

participants (Graneheim & Lundman; Sandelowski, 2000). The use of direct quotes, as exemplars, further enhanced transferability of these findings (Graneheim & Lundman; Guba, 1990; Milne & Oberle, 2005; Sandelowski, 1994). Additionally, through descriptive statistics, demographic data of the participants were reported to represent the participants in this study (Lincoln & Guba). Transferability in qualitative research is analogous to addressing the external validity of a quantitative research study (Lincoln & Guba).

Dependability. According to Lincoln and Guba (1985), dependability addresses the process used to account for instability, factors of phenomenal or design-induced changes. The researcher described decisions made during the analysis process in this qualitative study in order to address the degree of data changes over time (Graneheim & Lundman, 2004; Lincoln & Guba). Tracking these decisions was accomplished by maintaining an audit trail of debriefing sessions and of coding decisions made. Further, the researcher met with the dissertation committee chairperson weekly during the analysis phase (Graneheim & Lundman; Lincoln & Guba). Dependability in qualitative research is equivalent to addressing the reliability of a quantitative research study (Lincoln & Guba).

Confirmability. Confirmability addresses how the study findings can be corroborated by others (Lincoln & Guba, 1985). The researcher supported confirmability by holding debriefing sessions at the end of each focus group to record themes. Additionally, the researcher maintained weekly consultation with her chair who is an experienced, qualitative researcher, during the analysis phase of the dissertation research study. By using qualitative description methods, actual participant responses were

reported to support contextual findings from this study (Sandelowski, 1994). Confirmability in qualitative research is the same as addressing objectivity in a quantitative research study (Lincoln & Guba).

Credibility. Credibility addresses the process used to ensure the results of qualitative research are believable (Lincoln & Guba, 1985). Credibility included examining the focus of the research, process of data collection, and data analysis (Lincoln & Guba). Additionally, the use of member validations from the focus groups supported the credibility of this study (Lincoln & Guba). The aim of this research study was supported by the literature review identifying the gap in the literature and the need to pursue this research. The process for the study design, philosophical and epistemological considerations, and theory selection are described a priori. Additionally, using the cognitive continuum theory to support development of the interview guide further validates the credibility of this data collection instrument guide. Credibility of this research study was supported by use of bracketing of ideas, maintaining an audit log, and maintaining frequent consultation with the dissertation committee chairperson. Credibility in qualitative research is analogues to internal validity of a quantitative research study (Lincoln & Guba).

Reflexivity

Reflexivity is a cognitive process where the researcher is *keenly aware* of the researcher's relationship, assumptions, and experience in relation to this phenomenon being examined during the entire research process (Dowling, 2006). This cognitive awareness included a critical examination of the research aims, methods, plan for data collection, data coding, data interpretation, and reporting of the findings (Dowling).

Further, reflexive reporting is a critical component for the reader to have insight into the researcher's experience and interest to aid the reader's interpretation of the researcher's questions, methods, outcomes, and ethical implications (Hewitt, 2007). This component of trustworthiness provided transparency for the reader reviewing the study (Dowling).

Professional roles. The researcher of this study worked in critical care units focused primarily on the adult postoperative cardiac surgery patient since 1994, in various nursing roles. These roles included critical care nurse, educator, nurse preceptor, clinical nurse specialist, nurse researcher, and nurse practitioner. Currently the researcher holds an administrative role in the department of cardiac surgery at the institution participants were recruited from. The researcher's current position includes ensuring quality delivery of care and patient outcomes including quality improvement, program development, education, staffing and scheduling, patient management and research initiatives. During these professional encounters the researcher developed professional relationships with several mid-level practitioners working in critical care areas.

Reducing bias. The researcher's professional relationships could have influenced a participant's willingness to share information that may have occurred in decision making in their critical care unit. To mitigate this risk, the moderator made a disclosure at the beginning of each focus group session reiterating the fact that all information is confidential and will be used solely for research. In order to maintain awareness of these prior experiences that could influence the study, the researcher did not ask the research questions and a bracketing log was recorded prior to each focus group. She also retained a journal to document decisions made during the data analysis. Further, to reduce possible influence on the dialog in each focus group, the researcher assumed the role as

note taker. In addition, the researcher debriefed with the dissertation committee chairperson weekly during the data analysis period to discuss themes emerging from the data in order to prevent undue influence.

Researcher interest. The researcher's interest in conducting this study stems from the researcher's primary interdisciplinary role in critical care, providing education for diverse providers on cardiac surgery patient management. Findings from this study will support future research examining the clinical decision making of critical care mid-level practitioners and interdisciplinary teams and identify methods to support mid-level professional development (Shortell et al., 1994).

Ethical Considerations

The researcher addressed ethical considerations in this proposal and attained approval from the researcher's dissertation committee members prior to proceeding with this qualitative research. Upon IRB approval from the Committee for Protection of Human Subjects in Research, the researcher requested invitations to potential participants be sent out via email by a critical care nurse affiliated with the graduate school of nursing. Additionally, invitations were posted in each ICU practitioner office area by the researcher. The researcher strictly followed the inclusion and exclusion criteria for participant selection in order to ensure the target sample was achieved. Further, no person was excluded based on ethnicity or gender.

Informed Consent

All participants were provided an informed consent form prior to participating in this study. The consent form included the purpose of the research and clearly stated that participation was voluntary and that participants may withdraw at any time without

concern for recourse. Participants were required to sign the informed consent prior to participation in a focus group. Extra consent forms were available at each focus group session in the event the participant did not bring the form.

Participant Reporting

The research findings only included summary demographic data of the participants to ensure no individual demographics are discernible. To accomplish this requirement, each participant response was coded to prevent linking a response to an individual. In addition, no participant's critical care unit was identified in the research study to prevent inadvertently identifying a participant. And finally, data will be maintained with the participant responses coded (not matched to the subject) in a secured and locked fire proof box for five years upon completion of the dissertation study, with controlled access.

Incentives

It is customary to provide participants of a focus group a monetary incentive, generally $25 to $50 (Krueger, 1998c; Krueger & Casey, 2000). As the timing of the focus groups was amenable to the standard shift time of critical care mid-level practitioners and the location for the focus groups was adjacent to the hospital, a $10 gift certificate for Dunkin Donuts was provided to participants for this study (Krueger, 1998c). At the conclusion of the focus group the participants signed a form acknowledging receipt of the gift certificate. Additionally, participants of this study were provided heart healthy sandwiches to include accommodations for vegetarians, plus refreshments and desserts (Krueger, 1998c).

Risk

The risk to participants was minimal. However, the researcher works in an administrative capacity and this association could have been perceived as threatening by the participants. To avoid this issue, the moderator conducted the focus groups with the researcher being restricted to taking notes. She also did not directly approach any of the mid-level practitioners to participant, but used flyers to recruit participants.

There was also the possibility that turf issues could have occurred between medical and surgical teams and/or between nurse practitioners and physician assistants. To mitigate this potential risk the moderator, who has many years of clinical experience working in acute care settings, would have facilitated discussions if this type of issue arose. After the focus groups, the moderator offered to lead further discussion to any participant that had unresolved decision making issues.

Summary

This chapter summarized the design and methods used for this study. A qualitative descriptive design was used with focus groups to describe how mid-level practitioners make decisions in interdisciplinary teams. The cognitive continuum theory guided the focus group discussions (Hammond et al., 1987). The process for establishing trustworthiness and ethical considerations of the study data were also described.

Chapter IV

Results

Introduction

The purpose of this chapter is to describe the participants, focus groups, and findings. The chapter begins with a discussion of the note-based qualitative content analysis used to study the clinical decision making of critical care mid-level practitioners working on interdisciplinary teams. This discussion will be followed by a description of the findings for each aim of the study. Lastly, a description of decision making is presented using participants' responses to the vignette and how the responses are linked to the cognitive continuum theory and to the central and sub-themes of this study.

Participants

Table 13 displays the study participants' years of clinical experience and Table 14 shows their demographics. A total of 17 participants meeting the specified inclusion/exclusion criteria participated in this study. The mean age of the participants was 38.7 years. The majority of the participants (n =12, 71%) were physician assistants; only five participants (29%) were nurse practitioners. Fifty-three percent of the participants were female (n = 9) and 47% were male (n = 8). The average years of practice in any health care setting as a mid-level practitioner was 6.88 years. The average critical care mid-level practitioners' experience was 5.76 years. Over half (n = 9, 53%) of the participants had prior critical care experience. Prior experiences included critical care nursing (55%), manager (1.9%), surgical technician (1.9%), clinical nurse specialist (1.9%), pharmacist (1.9%) and medical officer (1.9%). Of note, one participant's

experiences included three of these roles. Seventy-six percent of the participants (*n* = 13) had one or more critical care certifications.

Table 13. Mid-Level Practitioner Age and Years of Experience

Data Point	Mean	Median	Standard Deviation	Range	Total Participant Response
Age	38.76 years	36 years	9.47 years	26 – 58 years	*N* = 17
Clinical practitioner experience	6.88 years	5.1 years	7.02 years	0.5 – 25 years	*n* = 16
Critical care practitioner experience	5.76 years	3.5 years	6.66 years	0.5 – 25 years	*n* = 16
Years of prior critical care experience	8.70 years	2 years	11.8 years	0 – 38 years	*N* = 17

Table 14. Demographics of Participants

Category	Total Participant Response	Percent
Mid-level Practitioner	$N = 17$	
• Nurse Practitioner	$n = 5$	29%
• Physician Assistant	$n = 12$	71%
Gender	$N = 17$	
• Female	$n = 9$	53%
• Male	$n = 8$	47%
Highest Academic Degree Completed	$N = 16$	
• Associate	$n = 0$	0%
• Bachelors	$n = 4$	25%
• Masters	$n = 10$	63%
• Post-masters	$n = 1$	6%
• Doctoral	$n = 1$	6%
Ethnicity	$N = 17$	
• African-American or Black	$n = 0$	0%
• Asian	$n = 1$	6%
• Caucasian	$n = 14$	82%
• European	$n = 2$	12%
• Other: Hispanic/Latino, American Indian/Alaskan Native, Native Hawaiian or other Pacific Islander	$n = 0$	0%
Primary Practice Setting	$N = 17$	
• Medical	$n = 6$	35%
• Surgical	$n = 3$	18%
• Medical and Surgical	$n = 8$	47%
Practice in Specialty ICU	$N = 17$	
• General Medical or Surgical ICU	$n = 7$	41%
• Specialty ICU	$n = 10$	59%
Type of ICU Specialty	$N = 10$	
• Cardiac surgery	$n = 5$	50%
• Neurosurgery	$n = 2$	20%
• Other	$n = 3$	30%
Critical Care Certification	$N = 17$	
• Have critical care certification	$n = 13$	76%
• Do not have critical care certification	$n = 4$	24%
Type of Critical Care Certification	$N = 11$	
• Critical care nursing certification	$n = 4$*	27 %
• Fundamentals of Critical Care Support certification	$n = 8$*	53 %
• Other	$n = 3$*	20 %

* Some participants had more than one certification.

Focus Groups

The dates and times for conducting the focus groups were identified by a lead nurse practitioner and two lead physician assistants working in the critical care units at an academic medical center in Massachusetts. This process ensured focus group dates and times were not in conflict with other educational programs. Each focus group was held in a private educational conference room in the medical building adjacent to the hospital and conducted as described in Chapter III. Each participant provided a written consent form prior to participation in a focus group. Each focus group was audio recorded on two separate tape recorders. Central themes were written on an easel by the note taker.

Each focus group had representation of both disciplines (nurse practitioner and physician assistant) and ran approximately 90 minutes in duration. Of the three focus groups, only one was comprised of mid-level practitioners who worked solely in a medical ICU (n = 3). The first (n = 8) and third (n = 6) focus group participants worked in medical and surgical ICUs.

Available seating around a central table was available at each focus group and participants selected their own seats. Participants in all focus groups engaged in the discussion. Findings revealed some participants rotated among surgical and medical critical care units. However, despite potential clinical decision making differences in medical and surgical specialties in two of the focus groups, data saturation occurred.

Findings

The remainder of this chapter will describe the findings from this study, organized by aim. A description of the overarching, central, and sub-themes identified in this study will be discussed in aim one. Findings from aim two and three are interwoven concepts

supporting the main findings in aim one. Each of these findings will be discussed separately in aims two and three with the intention of providing clarity on how cognition and interdisciplinary providers' recommendations are incorporated into the critical care mid-level practitioners' decision making.

The overarching theme that emerged from the focus groups was ensuring quality of care. This theme best described the overall considerations in clinical decision making of critical care mid-level practitioners. The decision making is a synthesis of all data sources to make a judgment that includes incorporating best practice standards, considering interdisciplinary team members input, and appraising the decision in comparison to other interdisciplinary members' recommendations prior to making the final clinical decision. When a clinical decision is perceived as supporting best practice, meeting patient clinical needs, and is evaluated as being in agreement with the intensivist and interdisciplinary team management plan, a clinical decision occurred.

Integral to the overarching theme were three overlapping themes of judgment (individual's cognitive assessment of perceived patient needs), resources (evidenced based resources, peers, and system resources available), and negotiation (the process one uses among an interdisciplinary team to come to agreement). In addition, four sub-themes were threaded through the three overlapping themes and included trust (confidence and reliance among interdisciplinary members), communication (to transmit data and expectations among interdisciplinary team members), experience (mid-level practitioners' prior training and/or clinical experiences), and team structure (expectations of the intensivist to be included in different types of decision making and urgency) and

will be described in detail. Figure 8 visually illustrates the overlapping central themes and interwoven sub-themes that emerged in this study.

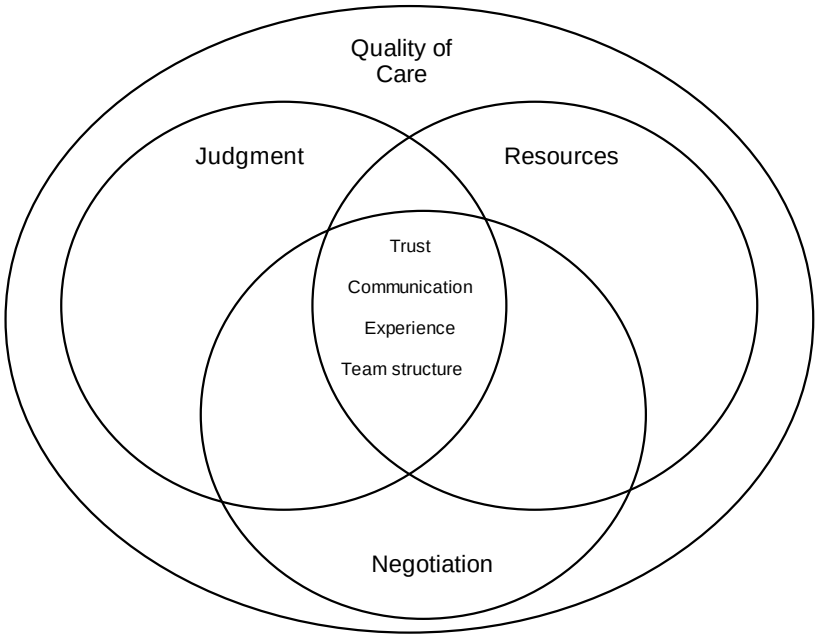


Figure 8. Clinical Decision Making of Critical Care Mid-Level Practitioners within an Interdisciplinary Team.

Aim One

Describe Clinical Considerations that Critical Care Mid-level Practitioners Use to Make Clinical Decisions

Overarching Theme

The overarching theme, to ensure *quality of care*, was expressed as the predominant factor in critical care mid-level practitioners' clinical decision making. Ensuring quality of care represented an amalgamation of data, patient needs, resources, interdisciplinary team providers, and team structure, to make a clinical decision that supported best practices to optimize a patient's recovery from their critical illness.

Participants described many situations where decisions were based on evidenced-based medicine to reduce complications, thereby improving patient outcomes. One participant described patient outcomes in using evidenced-based medicine, “Our length of stay and mortality and morbidity is improved.” Participants also described using clinical practice guidelines, protocols, and algorithms to support their clinical decision making for adult critical care patients. As examples, participants discussed clinical practice guidelines for glucose control, ventilator management, prophylaxis for deep vein thrombosis, and gastrointestinal stress prophylaxis. These clinical management decisions were identified as standards of quality care in adult critical care management and deemed “part of our practice.” The integration of guidelines into decision making is illustrated by one participant, “If (they) meet criteria by protocol, then I start them on GI (gastro intestinal) prophylaxis and deep vein thrombosis prophylaxis unless there is a contraindication; that is just what we do." Participants also described their role in patient evaluation prior to implementation of a clinical practice guideline, “…you need to know when to deviate from the protocol.” The mid-level practitioner’s evaluation facilitated patient safety in implementation, thus ensuring quality of care.

Central Overlapping Themes

All of the three central overlapping themes directly influenced critical care mid-level practitioners’ clinical decision making on an interdisciplinary team. Individual considerations within each central theme impacted their decision making to ensure quality of care. Additionally, each central theme had an overlapping connection with the other central themes depending on the type and urgency of the clinical decision required. Each of these themes is described below.

Judgment. All participants described how their assessment of a clinical situation impacted the clinical decision made. Their assessment of the patient's condition or problem was based on their judgment of the patient's clinical situation. As shared by the participants, judgment is "not (using) intuition," rather, "It is training, experience and repetition." Additionally, the participants discussed how their judgment and the type of urgency dictate when implementation of a clinical decision occurred. Clinical decisions described as "urgent" and "black and white" are easily defined and decision making readily happened. An example of a decision defined as urgent is the implementation of advanced cardiac life support algorithms for a patient in cardiac arrest for pulseless electrical activity. A non urgent "black and white" decision making situation that was discussed was the adjustment of a vancomycin dosing for a subtherapeutic drug level. In both situations the mid-level practitioners used judgment to clearly identify the problem and make the clinical decisions in management.

The participants described their inclusion of the "patient history, physical exam, social and family considerations" in their assessment when making a judgment to prioritize a daily plan of care. They discussed using multiple types of data that were cognitively assessed to formulate a judgment of a patient's needs. Pattern recognition was frequently described, as in "How does the patient fit into this pattern?" and supported their clinical assessment and decision making. When pattern recognition was not clear or was unknown, the participants said they "seek out resources" to aid in making a clinical decision.

Participants also described other times they used judgment and other resources to support their decision. "You may not always know, but just know how to find out or

know who to go to and attempt to have a plan." The participants also described their behavior when judgment on a situation was uncertain. In these situations, other experienced provider resources were available to support decision making. "You always have back up. You are never out on a limb." One type of experienced resource described by the participants was other interdisciplinary team members with knowledge and experience of a condition. Other participants described calling the electronic ICU intensivist, as in "a call can be made for input." The electronic ICU intensivist is an intensivist who remotely monitors all critical care beds in this institution. A detailed description of the electronic ICU intensivist will be provided later in this chapter.

The participants described an overlap of the central themes of resources and negotiation that influence one's judgment in decision making. An example from the participants included a clinical situation where the mid-level practitioner was unclear of the evidenced-based recommendations for a treatment plan. The participant's utilization of a clinical practice guideline and peer consultation influenced the clinical decision made. The interdisciplinary team members' discussion influenced the decision ultimately made and illustrated the overlapping of resources and negotiation among interdisciplinary members. Additionally, participants described how their critical care training and prior experiences influenced their clinical judgment to make clinical decisions enabling the delivery of quality of care. The sub-themes of trust, communication, experience, and team structure were interwoven with judgment and will be described below. Further, a detailed description of mid-level practitioners' judgment will be described in relation to the cognitive continuum theory in aim two.

Resources. The participants in the focus group discussed many types of resources used to support their clinical decision making. Written clinical resources included clinical practice guidelines, Up-to-Date (on line evidenced based reference for practitioners), and protocols. Utilization of clinical practice guidelines were described as standards of care and were described as supporting clinical decision making for unfamiliar situations: "When I am out of my comfort zone, for example, how to dose mannitol for increased intracranial pressure…." The clinical practice guideline for patient management for increased intracranial pressure is one example of using a clinical practice guideline resource that influences the judgment of a mid-level practitioner to make a clinical decision to support quality of care.

According to the participants, other practitioners and interdisciplinary resources also aided clinical decision making. When a decision is unclear, a "more experienced" peer may be the first clinical resource utilized. "(When) I can't fit this exam into a picture, (I) look to a senior person for help and (we) talk to each other." Others ask a peer "What would you do?" For specific questions, a practitioner deemed an "expert" may be formally or informally consulted for an opinion. Examples included consulting a hematologist for a patient with an unclear diagnosis of thrombocytopenia or asking a respiratory practitioner his/her opinion for making a ventilator change. Other interdisciplinary providers used "pharmacists, physical therapists, social services, and nutritionists" as resources. Additionally, many participants said they asked for the "critical care nurses' opinion" about their concerns for patient management.

The participants also described their decision making considerations when working on an interdisciplinary team that is lead by an intensivist. In the focus groups,

intensivists were identified as valuable clinical resources to support mid-level practitioner clinical decision making. These specialists were described as an "available physician resource at all times." The intensivist's knowledge, accessibility, and support, along with the institution's critical care unit model, enabled mid-level practitioner's access to these physicians to solicit input in unclear or urgent/emergent situations. This resource was described by one participant, "Surgeons are welcoming to a phone call to touch base on decision making at night." The "type of clinical decision" or "patient urgency" influenced when a mid-level practitioner would discuss a decision with the intensivist prior to implementation. When mid-level practitioners modified their clinical decisions based on a consensus of a management strategy with an intensivist or peer, this alteration in decision making illustrated the overlapping theme of negotiation among peer recommendations influencing decision making.

A new team structure that included an extended interdisciplinary team was described by most of the participants as a valuable resource for managing patients. Many participants considered the electronic ICU as part of the extended interdisciplinary team and a resource for mid-level practitioners and residents. For example, the electronic ICU practitioners provided a primary resource to support for mid-level practitioners' clinical decision making in the critical care unit, especially at night, when the unit intensivist is not in the ICU. The electronic ICU was described as located on another campus where an intensivist and a mid-level practitioner provide 24/7 clinical support. One participant described the role of the electronic ICU as to "promote preventative and quality practices, provides response to multivariate alarms and provides decision support." Remotely, the electronic ICU providers can review the patient's clinical flow sheet and diagnostic

information and are able to use a camera to look into the room to view the patients. An emergency button in each room allows any person in the unit to call the electronic ICU practitioner into the room. This extended interdisciplinary team is described by one participant managing a patient with active bleeding. “The camera portion of it has helped me at the end of the night. Can you just camera in and take a look?” The assistance of the remotely located intensivist supported the mid-level practitioner’s assessment and management decisions. The inclusion of the electronic ICU intensivist involved in management of the patients is an expected clinical norm for most of the critical care units. “After admitting the patient, I call eICU (electronic ICU) or attending of the unit and present the patient. This is an expectation.” One participant description exemplified this intensivist support: “I do not want to be left as the only person laying eyes on this patient and handling this patient before they expire. The panic button (one method to access an intensivist) is available to guide decision making.”

In addition to an intensivist and mid-level practitioner, a clinical pharmacist was described as part of the electronic ICU team in order to review patient medications and dosing. This pharmacist provided an additional clinical reference for medications to practitioners and nurses. The structure of the critical care interdisciplinary team member roles will be described in the sub-themes section in this chapter.

System resources, including the ethics committee, the legal department, and the electronic ICU, were also identified as supporting clinical decision making. The ethics committee and the legal department were described primarily as a resource to clarify end-of-life decision making with respect to withdrawing life support. One participant described a family’s request to continue care, while “(the) attending, palliative care and

every specialist that had seen that man came in and documented in the chart that it basically would be cruel and inhumane to code this man." Legal resources aided in defining the patient's wishes when the patient was unable to advocate for himself. The decision to continue or withdraw life support in a critical care patient was not always in alignment with the mid-level practitioner's decision making or interdisciplinary team view. Negotiation in the management decision may have occurred based on the legal department's input to ensure the patient's wishes are followed. This system resource illustrated how the overlapping themes of resources and negotiation among interdisciplinary team members influenced clinical judgment and are factored into decision making.

Negotiation. Negotiation was a central overlapping theme that influenced clinical decision making of mid-level practitioners working on an interdisciplinary team. The amount of negotiation that occurred in mid-level practitioners' decision making among interdisciplinary team members, the patient and/or family, was influenced by the urgency, team structure, and resources in developing the plan of care for the patient. The overlapping influences on the practitioners' clinical assessment, their judgment of a situation, and available resources influenced the negotiation that occurred with other interdisciplinary team members that directly impact the clinical decision made.

The participants did not describe negotiating their clinical decisions in urgent and "black and white" decisions. Decisions for an urgent medical condition were fairly straightforward and management strategies are executed, "…when a diagnosis is made, decisions are implemented." Another participant briefly described an algorithm for clinical decisions for a critically ill patient with tachycardia. "If the heart rate is elevated

you give fluid. If the heart rate is still elevated then consider a beta blocker. If the heart rate is low hold the beta blocker…" In contrast to urgent and "black and white" decisions, participants, in non urgent situations, they sought out and incorporated input from other interdisciplinary team members. When interdisciplinary recommendations were provided, this new perspective may have resulted in negotiating the prioritization of patient needs and could influence the clinical decision made.

Incorporating nurses' concerns into the plan of patient care was one example of interdisciplinary team member negotiation that mid-level practitioners included in their decision making. Participants described negotiating with nurses to assist in prioritizing the patient's needs when numerous interventions were required to enable care delivery. Many participants asked the nurses for opinions because "they (nurses) know most clearly what is going on." And, "they are the closest person to the patient." Mid-level practitioners less experienced in critical care described negotiating some of the patient's perceived needs with other interdisciplinary team members. Further, they described modifying their decisions based on nurse or physician feedback. "Their (intensivist/nurse) feedback will influence (my) decisions quoting literature, as I am new." This statement illustrated recommendations for evidenced-based management by interdisciplinary team members. Further, when a decision is made, the ability to have a plan of care implemented by a team member was described as a challenge for new mid-level practitioners. "If what you say is different than what they are used to, it can be difficult." One participant eloquently articulated the need to negotiate decisions in implementation of the patient's plan of care:

> Learn early it is not all about you. You do not have to be the smartest person in the world or do everything, but you have to want and know how to take good care of patients. Then you are respected by the nurses.

In addition to negotiating with the critical care nurses, mid-level practitioners may negotiate individually, or as a team, when making decisions in developing a plan of care with the patient and/or family. One participant described this negotiation process as an interdisciplinary team approach in planning and negotiating patient care, “The daughter with limited knowledge of health care challenged all diagnostic tests. We would bargain with her after the nurse, us (mid-level) and physician agreed with a plan. The intensivist would let the daughter know the plan.”

In addition to the critical care nurses’ and family’s input that could result in negotiating the priority of patient needs, the participants also described negotiations with the intensivist in planning the patient’s care. One participant illustrated this negotiation with the intensivist, “There is no point arguing during rounds. I (mid-level practitioner) circle back after rounds and ask do you want that consult today or like tomorrow? Why don't we give it just one more day?" Another participant described their awareness of an intensivist preference in planning management, “Why have me say something and have him turn around and throw out naah, I'd rather not use Lopressor lets do Cardizem.” Thus, a participant’s statement of “safety verses style” described the negotiation in patient management for clinical decision making according to preferences of the intensivist. The mid-level practitioner described making a clinical decision for a patient based on the intensivist’s preference, as long as patient safety and quality care were met.

Participants in all critical care units also described negotiating various patient management responsibilities after morning rounds. This negotiation of roles was described as “dividing up the patient list.” Descriptions of management responsibilities included admitting, transferring and discharging patients, participating in family meetings, and providing education to the nurse, patient, and/or family on the patient’s plan of care. Another aspect of these responsibilities included identifying who will perform procedures, including central line and arterial line placement. An evaluation of competency of practitioner’s clinical abilities to meet patient needs occurred among interdisciplinary team members during the negotiation of responsibilities. Illustrations of mid-level practitioners’ responsibilities to enable safety in negotiating roles included, "teaching the resident how to put lines in,” “We are the first ones to show them what a swan (pulmonary artery catheter) is.” Thus the need to identify team members’ abilities during role negotiation is vital to provide quality care. Other critical care team members described shared decision making responsibilities in patient management. For example, one may complete documentation on the plan of care, one will complete procedures, and the other will write admission and/or transfer orders.

Mid-level practitioners’ judgment, resources, and negotiation among the interdisciplinary team were described as influencing their clinical decisions to foster quality of care delivery. As described above, each central theme was interwoven with the other central themes and varied based on the type of clinical decision that was required. Further, findings identified sub-themes of trust, communication, experience, and team structure as influencing mid-level practitioner decision making. Each of these sub-themes was interwoven in each central overlapping theme of judgment, resources, and

negotiation and impacted mid-level clinical decision making individually and on an interdisciplinary team. Below, each sub-theme will be described, and the influence on clinical decision making on an interdisciplinary team will be illustrated.

Interwoven Sub-Themes

There were four main sub-themes interwoven within each central overlapping theme and directly influenced clinical decision making of mid-level practitioners. Each sub-theme was not described as independently impacting their decision making. Rather, these sub-themes were complex entities that were integrated into each of the central overlapping themes that influenced their decision making. Each sub-theme is described below with a rich description of how each concept was used to make clinical decisions.

Trust. The concept of trust was raised in all three focus group sessions. The discussion regarding trust included 1) the trust between the mid-level practitioner and the intensivist, 2) trust in the ability of the mid-level practitioner to identify changes in clinical condition of the patient, establish a diagnosis, and implement treatment, 3) trust between mid-level practitioners and nurses, and 4) trust between mid-level practitioner and mid-level practitioner.

Establishing trust between mid-level practitioners and intensivists directly impacted the clinical decisions being made by these mid-level practitioners. Participants who routinely worked with the same intensivists described established trust between the intensivists and mid-level practitioner. Having established trust with an intensivist equated to having “everyone on the same page” with respect to the plan of care for a patient. Further, this relationship enabled the intensivist to trust a mid-level practitioner’s assessment.

Other participants described working on critical care units where the intensivist rotated approximately every two weeks. The uncertainty of trust by the intensivist with the mid-level practitioner's management abilities impacted the clinical decision making of the mid-level practitioner. One participant described this experience:

> The attendings are there for like two weeks at a time. So you basically, I basically, spend the first week trying to figure out what they like to do and the next week I do it. And then the next week after that I get a new person and I have to spend that week trying to figure (the intensivist) out.

Participants also described how the intensivist directed the plan of care in critical care units. When trust was established between the intensivist and the mid-level practitioner, the mid-level was able to be autonomous. As described by a participant, "When a diagnosis is made decisions are implemented." Further, the mid-level practitioners discussed how their judgment of a clinical decision needed to be in agreement with the intensivist's view in order to establish the intensivist's trust in the mid-level practitioner's ability to manage the patient. Thus, the establishment of trust between the intensivist and mid-level practitioner impacted the mid-level practitioner's decision making. One participant described efforts to establish trust, "part of our job is to predict who likes what to be able to make a decision in management for more than half a dozen of them (intensivists)."

When there is a lack of established trust between the intensivist and the mid-level practitioner, the mid-level practitioner may be challenged when making management decisions. One participant described lack of established trust in their management decisions by the intensivist as "playing the game" in "following clinical practice

guidelines" and not deviating in standard management. Furthermore, the participant described "waiting to consult with the intensivist" to implement other interventions. Similarly, another mid-level practitioner described patient management with a new intensivist as a process of "trying to keep them (the intensivists) happy while practicing what your understanding is the better way to manage." Other participants deferred making a clinical decision when it was unclear what the preferences of the intensivist are when the intensivist is on the unit. "Why put me in the middle if he (the intensivist) is right there." This sub-theme of establishing trust between the mid-level practitioner and intensivist elucidated the complexities of intra-professional relationships that influenced the practitioners' negotiations and peer resources used in making a clinical decision.

Participants also considered part of their role as providing a consistent and knowledgeable resource for nurses and patients in critical care units. This role established trust between the nurses and the mid-level practitioners. The following illustrated participants' descriptions of this trust, "They (RN) walk by the intern and resident and they come to you." "It depends on the nurse and her comfort level with the individual practitioner and her relationship with the attending." "More common they (RN) would come to me (mid-level) for a question." Establishing trust between the mid-level practitioners and the critical care nurses was described as an effective way to enable patient care needs. The establishment of trust enabled the mid-level practitioner to utilize the nurses' recommendations as a resource to make clinical decisions. Trust may influence the mid-level practitioners' judgment and may result in negotiating a priority in the plan of care.

When a nurse does not trust a decision made by a mid-level practitioner that is deemed in the nurses' opinion as not in the best interest for the patient, the nurse may seek intensivist input. As described by one participant, "Nurses will go over our (mid-level) head if they do not like the decision." Below is an example illustrating the communication process between the nurse and mid-level practitioner to establish trust in the clinical decision made by the mid-level practitioner to ensure patient quality of care.

> Come and see me (mid-level) first. Ask me the question. If you do not like the answer tell me to explain why. If I do not give you an explanation that is adequate for you then go over my head to the attending.

Additionally, mid-level practitioners critically evaluated recommendations received from other mid-level practitioners and interdisciplinary team members to make clinical decisions. For example, the management of an admitted patient by a mid-level practitioner to a critical care unit is described below:

> So if I get an admission at eleven o'clock at night, it's me who says okay these are the orders and this is what I am going to do. This is my plan of approach and then I call eICU (electronic ICU), who has the attending or mid-level, and usually when I call there I talk with the attending 'cause I am calling because I need the attending to say yes that is fine for the patient and if they have anything to add they will add it.

Mid-level practitioners' trust of a resource influenced the type of resources selected to support a clinical decision in patient management. Evaluation of different types of resources for a clinical question for a patient with sepsis was described by a participant:

> The guidelines are always available. They may not fit your patient. That is when you are stuck with who you are going to talk with the other mid-level there with you or are you going to eICU or look around in Up to Date.

In summary, the participants clearly described trust influenced the resources used, the judgment, and negotiation processes among interdisciplinary members in one's clinical decision making to deliver quality care.

Communication. Effective communication was another sub-theme identified that supported clinical decision making by the mid-level practitioner to ensure quality of care. The participants described when clear communication occurred and the problem was plainly defined, clinical decisions were made. Further, they described communicating the plan of care for patients among the team fostered care delivery, negotiation in management goals, and decision making by the mid-level practitioner. Thus, effective communication enabled the mid-level practitioner to implement decisions with other allied health care members without conflict occurring. Communication also supported collaboration among practitioners working on interdisciplinary teams. One participant described the variations in communication that may occur during formal rounds among different critical care teams, "I have seen how every unit does their rounds with different attendings. Every patient is different. It all works. There is not one (rounding process) that is better than the other. This is interesting." This illustration exemplified, despite differences in team rounding in each unit, when communication occurred among the team, patient's needs and individualized plan of care is developed.

Participants described communicating important clinical characteristics of the patient by interdisciplinary team members to the mid-level practitioner assisted in

determining the diagnosis and treatment plan. Participants described using a “standard format to address global issues.” Participants also described their review of patients’ issues and developing a plan to address each system, including prophylaxis interventions, family, social, and code status considerations during formal rounds with the interdisciplinary team. “If (the patient) meet criteria by protocol, then I start them on GI (gastro-intestinal) prophylaxis and DVT (deep vein thrombosis) prophylaxis unless there is a contraindication, that is just what we do." Some examples included “DVT (deep vein thrombosis) and code status to prompt a discussion as a team.” Using a standardized format and rounds to review patients among the interdisciplinary team provides a venue for the mid-level practitioner to communicate the patient’s plan and explain their judgment of the clinical decisions made.

Communicating the mid-level practitioner’s clinical decision making considerations for a patient admitted to the ICU was important. The mid-level practitioner’s ability to identify and communicate important clinical data to the intensivist enabled comprehensive critical care management. The following statement by a participant exemplifies this process:

> You have to have, as a mid-level or as a resident or intern, some documentation that you have spoken to an attending physician and they know about this patient, because they do not want any patient to come through without an attending eye on the patient.

Inadequate communication to the intensivist or team member could result in overlooking patient needs and critical interventions. One participant described what occurred when communication did not occur among the managing providers. “I decided

not to do something; someone else comes along and then orders it." Additionally, one participant described a situation where the failure to communicate a new plan to the patient's nurse resulted in a "tug of war" in implementing a change in management approach.

Effective communication was important when mid-level practitioners utilized another practitioner's recommendations to support their decision making. Participants described the intensivist as a resource to determine if a patient requires critical care management. Another example included the electronic ICU mid-level practitioner illustrating the ability to communicate clinical resources to the bedside mid-level practitioner in an unclear situation. "I am the third person once back removed from the bedside to look up information, outside heat of the moment, to look up answers." As illustrated above, the sub-theme of communication was a factor that influenced the judgment, resources used, and the types of negotiation among team members to ensure quality of care occurs with clinical decision making.

Experience. The mid-level practitioner's prior experiences and training was described as factoring into many types of clinical decision making. "School taught me how to organize an H and P (history and physical). I pull from my 10 years nursing experience." In addition, another participant said, "It is not intuition. It is training, experience and repetition." Participants also described why mid-levels may be approached for advice instead of medical residents. "The medical residents have a broader knowledge base." "We (mid-levels) have specialized knowledge." "Mid-levels are there all the time." Thus, their experience in the specialty of critical care patient management identified the mid-level practitioners as primary practitioners to address

common clinical questions by nurses. Another description of clinical experience was illustrated by one participant's response to a critical situation. "My comfort level bar has been pushed out a little further each time I see something worse than the time before."

Participants described how prior experiences influence their decision making. One participant described how prior experiences make selective decision making as "second nature, intuitive, because you have seen it so may times." This description of intuition is described as a result of repetition. Repetition of a frequent clinical situation led to pattern recognition and supported clinical decision making, as in "I can run a PEA (pulseless electrical activity) code in my sleep."

Participants also described their ability to make clinical decisions for situations more readily when they had prior experience. Pattern recognition was described in the focus groups as one way clinical decisions are made. "How does the patient fit into this pattern?" "This is what you do with this pattern." The "repetition" and prior experiences of a situation resulted in a "comfort level" with the clinical decision made by the mid-level practitioner. One participant illustrated this by stating, "In between (not black or white) decisions come down to experience and comfort level." These responses illustrated mid-level practitioners' prior clinical experiences as influencing their clinical decision making. Further, the type of resources and negotiation in the prioritization of care among interdisciplinary members was influenced by the experience of the mid-level practitioner.

Team Structure. The participants acknowledged patient outcomes and the focus of critical care management as the responsibility of the intensivist directing the plan of care. The participants are members of the interdisciplinary team. The type of team structure

during the day or night shifts influenced the type of clinical decisions made by mid-level practitioners. During the day shifts the intensivist was available on the unit and common decisions may be asked of the intensivist by the mid-level as a confirmatory method. At night, the intensivist in the electronic ICU was readily available for questions. However, participants described making and implementing more common clinical decisions independently at night and seeking out the electronic ICU attending for unclear situations, changes in patient condition, and/or admissions.

The participants on each critical care team are assigned to one critical care unit for a defined period of time. The structure for two of the critical care units was described as primarily mid-level practitioners managing patients with an intensivist. Other units have mid-level practitioners and residents or a fellow (senior resident) as part of a team. The format for patient review and the development for the daily plan of care were described as different for each type of team structure. But, regardless of the team structure, the participants described a designated practitioner who examines all the patients and develops a formal plan of care for each patient for morning rounds with the intensivist. This plan of care was formally presented daily and was discussed among an interdisciplinary team, lead by an intensivist. Despite described variations in the formal rounding process on each ICU to establish the daily plan of care for patients with the intensivist, the identified norm for each unit's rounding process was effective.

The participants reported that each critical care team considers input from other interdisciplinary team members when formulating the daily plan of care for a patient. For example, the nurse and the clinical pharmacist were involved in daily patient rounds. Other interdisciplinary providers described included other service teams (for example,

co-rounding with vascular, transplant, and/or trauma surgery services), respiratory therapists, nutritionists, social workers, case managers, physical therapists, wound care nurses, and consulting teams. Input from these interdisciplinary providers was incorporated into the daily plan, depending on the patient's needs. According to the participants, the type of team structure influenced the type of resources used and the negotiation that occurred in prioritization of management by mid-level practitioners. Further, direction by the intensivist to prioritize a clinical concern influenced the judgment of the mid-level practitioner. The descriptions of negotiation in management decisions illustrated the overlapping of the central themes that were synthesized by the mid-level practitioner to make a decision to enable quality of care.

The team structure described varied throughout the day, depending on the types of decisions required. Making clinical decisions during the formal daily round process could include sitting down in a conference room and discussing patients, while others present at the bedside during walking rounds. Other clinical decision making involved only the nurse and the mid-level practitioner. Some teams may involve the fellow and/or the intensivist for changes in a patient's condition when clinical decisions are made by the mid-level practitioner. The interdisciplinary team and critical care unit norms for specific management preferences and outcome goals influenced the decision making of mid-level practitioner's clinical judgment and decision making. A participant summarized the overall structure below.

> You kind of have a tree on how it works out, the patient load. The intensivist covers sixteen patients, the mid-level has five to six patients each, and the nurses

have one to two patients. The patient load is five patients you need to be intimately knowledgeable of.

According to the participants, the fluidity of the team structure during the day and the types of decisions required influence the type of resources mid-level practitioners use to make clinical decisions. For example, at night the electronic ICU reviews all patient admissions with the mid-level practitioner and/or resident, except for one specialty critical care unit where the primary intensivist is directly involved. The electronic ICU was described as being available to all critical care mid-level practitioners 24/7 and impacts the mid-level practitioner's decision making for management and patient triage. An illustration, to follow, demonstrated how the electronic ICU intensivist was able to readily triage an urgent situation while the mid-level practitioner was placing a central line in another patient. The mid-level practitioner described being already sterile, and the patient was prepped and draped. "The needle was placed under the clavicle, in the vessel, when my patient two doors down goes into ventricular tachycardia. What do I do?" The practitioner described how the intensivist in the electronic ICU was able to camera in remotely to the other room with the patient in ventricular tachycardia and provided critical care management until the other procedure was completed.

Layers of Complexity in Decision Making

Critical care mid-level practitioners' clinical decision making is a complex process. The over arching theme for this process described as a synthesis of overlapping central and interwoven sub-themes that influenced mid-level practitioners making clinical decisions to provide quality care. The overlapping central themes of judgment, resources, and negotiation among interdisciplinary team members enabled quality of care for

critically ill patients as described above. Sub-themes of trust, communication, experience, and team structure directly influenced clinical decision making of mid-level practitioners on an interdisciplinary critical care team. There were subtle overlaps of each of the sub-themes that were interwoven among the central overlapping themes of judgment, resources, and negotiation.

Aim Two

Describe how Clinical Decision Making (the Cognitive Process) Occurs Among Critical Care Mid-Level Practitioners on an Interdisciplinary Team

Cognitive Modes in Clinical Decision Making

The cognitive continuum theory undergirded this study and the development of the interview guide. The descriptions of clinical decision making by mid-level practitioners working on an interdisciplinary team were described based on the cognitive modes and tasks in this theory below. Depending on the type of clinical decision, different cognitive modes were used by critical care mid-level practitioners. Table 15 summarizes the study findings in relation to each cognitive mode from the cognitive continuum theory (Hammond et al., 1987). Modes 3, 4, and 5 were described by the mid-level practitioners in regard to how group decisions were made.

Table 15. Description of the Modes of Inquiry (Hammond et al., 1987; Standing, 2008).

Mode	Name	Description	Findings
Mode 1	Scientific experiment	Analytical	Not described by participants
Mode 2	Controlled trials	Moderately strong analytical	Not described by participants Clinical practice guidelines
Mode 3	Quasi experimental	Weak analytical	“Black and white” decisions Clinical practice guidelines
Mode 4	System aided judgment	Strong common sense	Interdisciplinary rounding Intensivist preferences Patient history and physical examination Social consideration Ethical considerations Legal consideration Family considerations
Mode 5	Peer aided judgment	Moderately strong common sense	Interdisciplinary rounding "This is what you do with this pattern” Seek out more experienced mid-level practitioner
Mode 6	Intuitive judgment	Weak common sense	Described by some participants as a culmination of prior experience: “Judgment is only converted by experience"

Influence of Tasks in Clinical Decision Making

Participants described how pattern recognition and clinical practice guidelines supported their decisions. Additionally, well structured tasks, described as “black or white”, enabled the practitioner to readily make a clinical decision. Many of the participants described using prior experience and/or seeking out additional resources to make a decision when tasks (decision making) were unclear.

The overlapping central and interwoven sub-themes identified in this study support the changes (oscillations) described in mid-level practitioner’s clinical decision making in critical care units. Descriptions of a participant evaluating a patient and

deciding not to implement a clinical practice guideline based on pattern recognition, prior experience, or intensivist preference is one example of oscillations in clinical decision making by mid-level practitioners.

Aim Three

Describe How Interdisciplinary Providers' Recommendations are Incorporated into the Critical Care Mid-Level Practitioner's Decision Making

Overarching, Central, and Sub-Themes

The primary findings in aim one described the overlapping central themes and interwoven sub-themes that influenced mid-level practitioners' decision making. This multifaceted process for decision making enabled mid-level practitioners to provide quality of care (overarching theme) for critical care patients. The complexities of mid-level practitioners' decision making on an interdisciplinary team were further illustrated by the findings from aim three.

Intensivists

All participants acknowledged the intensivist was the leader of the critical care team for patient management and has the overall responsibility for patient outcomes. Therefore, the critical care mid-level practitioners' decision making was directly influenced by recommendations from the intensivist. And, the patient's general plan for care was derived from an interdisciplinary process and directed by the intensivist. However, depending on the patient's clinical status, the interdisciplinary team structure, new patient concerns, reevaluation of management, and/or changes in the patient's clinical situation, some decision making might remain solely with the mid-level practitioner. Factors that impacted the mid-level practitioner's decision making, in

addition to their knowledge and prior experience, was having established trust with the intensivist, an ability to effectively communicate with the intensivist, and defined expectations of the mid-level practitioner's role in the team structure. These concepts influenced the clinical decision making of mid-level practitioners.

Specialists

Different recommendations by specialized physicians were incorporated into a plan of care for the critical care patient. Examples given by the participants included consulting a renal and oncology doctor for recommendations for specialty management. Even after the mid-level practitioner received advice from the specialist, the implementation of these clinical decisions for management resides with the mid-level practitioner and the intensivist. "Consults recommend whatever they want to recommend. It is up to us to implement it."

Another participant described how admission management directives from the electronic ICU intensivist might be changed in the morning when the unit intensivist returned for critical care morning rounds. This example demonstrated how one intensivist, who might be specialized in one aspect of critical care management, had a different management approach than another intensivist. Another participant described the importance of identifying and including "attending ownership" for patient management. This participant described a patient with a chronic condition of cancer. The mid-level practitioners identified the need to inform the patient's oncologist of the patient's admission to the critical care unit in order to include the oncologist's recommendations into the plan of care.

Participants of this study also reported seeking input from respiratory practitioners, nutritionists, clinical pharmacists, and physical therapists. Other than one participant, who described consultation with the respiratory therapist for making a ventilator change, there were no specific descriptions of other allied health providers' recommendations affecting the mid-level practitioners' decision making for patient management.

Peers

Seeking input from a "more seasoned" mid-level practitioner was also described by the participants. Their orientation process and training of mid-level practitioners portrayed a mentoring role with a more seasoned mid-level practitioner. The seasoned mid-level practitioner was described by one practitioner, as having a "five-year fellowship for critical care". Factoring in peer input to participants' decision making was expressed as "training meets experience." Other mid-level practitioners deemed to be knowledgeable in a situation were often sought out to support the decision making of the mid-level participants.

Vignette

An Illustration of the Mid-Level Providers' Decision Making

A clinical vignette describing a patient requiring management for a new diagnosis of deep vein thrombosis was presented during the focus groups to illustrate clinical decision making among interdisciplinary team members. The participant responses supported the overarching theme of quality of care. Overlapping central themes and interwoven sub-themes were described and are summarized below.

Quality of Care

All participants readily engaged in the discussion and offered various implications and considerations in management of the patient presented. They discussed the importance to readily manage this patient's acute clinical situation and reduce risk for further complications with an intervention, in addition to general critical care management. These discussions support the finding of making clinical decisions to ensure quality of care.

Judgment

The participants' discussions of management of deep vein thrombosis clearly illustrated use of additional clinical resources when a decision was "black or white." One illustration of a "black and white" decision included immediate identification by all on the sub therapeutic dose of Lovenox utilized in the vignette and the need to change this management. No further consultation or reference was discussed in regards to addressing the Lovenox dose. Additionally, other "black and white" clinical decisions by all participants included agreement on their judgment for the diagnosis of a deep vein thrombosis based on the clinical situation, reported physical exam, and diagnostic findings, and the need to implement treatment of an acute change.

However, the clinical decision on the type of management for a new diagnosis of deep vein thrombosis in a complex intensive care patient was not a "black or white" clinical decision. Participants described other clinical considerations (tasks) that were incorporated into their judgment to make a clinical decision. Prior to making a clinical decision in treatment, the participants discussed other possible complications including pulmonary embolism and HIT. All participants agreed to implement anticoagulation. The

patient's short and long term management goals were factored into the participants' judgment in the selection on the type of anticoagulation to use.

Other factors (tasks) were incorporated into the participant's decision making, including discussions on incorporating the patient and/or identified social support system into the plan care. Other discussions included the need to further diagnose the etiology of the patient's pulmonary status necessitating ventilator support. Considerations (tasks) of the patient's prior health, and prior and current nutritional status were also discussed. In addition to these considerations, participants discussed the need to address gastrointestinal prophylaxis, ventilator management, and nutrition evaluation.

Participants' prior experience influenced clinical decision making, and was illustrated in the discussion on anticoagulation management. Interactive discussions on possible etiologies of the thrombocytopenia occurred among participants. Due to the uncertainty in the etiology of thrombocytopenia, one participant opted not to use any heparin type product due to a prior negative patient outcome in a patient with HIT treated with heparin. Other participants described thrombocytopenia as being commonly seen in their patients with sepsis, and based on their prior clinical experiences they would recommend treatment with unfractionated heparin for deep vein thrombosis.

Resources

All participants agreed to implement anticoagulation management for the acute deep vein thrombosis presented in the vignette. And the participants discussed types of anticoagulation based on the patient's clinical information provided. As the type of anticoagulant to use was deemed not a "black or white" clinical decision, participants also agreed once a management plan was identified a discussion with an intensivist, as

the interdisciplinary team leader and resource, would need to occur prior to implementation of anticoagulation. Another participant recommended a hematology specialist in consultation for the thrombocytopenia prior to institution of heparin anticoagulation.

The participants discussed other resources including the types and timing of additional testing. For example, several participants discussed proceeding with a computerized axial tomography scan to rule out a pulmonary embolism as a cause of requiring ventilator support. And, some of the participants discussed obtaining an echocardiogram to rule out right heart strain to support a possible pulmonary embolism diagnosis while they obtained information on heart function. Other participants held brief discussions on considerations to include angiography and/or inferior vena cava filter placement into the plan of care. And finally, many participants discussed the additional laboratory information needed to make clinical decisions in critical care management.

Negotiation

The participants agreed that the etiology of the patient's deep vein thrombosis in the vignette can be multifactorial. The interdisciplinary focus groups negotiated, except for one participant, to come to the decision to use an intravenous form of anticoagulation until a long range plan of care was determined. Other negotiations among the study participants in planning management were illustrated by determining the priority of the type of additional testing and the timing of the testing.

In one focus group, the participants held an in-depth discussion regarding management considerations for this patient to use unfractionated heparin. One participant would not negotiate the decision to abstain from use of any heparin product. This

participant shared a prior negative experience about a patient with HIT that was managed with heparin. This prior negative experience influenced the participant's decision not to use any type of heparin for patient management, as the thrombocytopenia etiology was unknown. Therefore, despite the attempted negotiations among peers for this patient, one participant would defer the clinical decision for anticoagulation to the intensivist.

Summary

In order to illustrate clinical decision making of critical care mid-level practitioners on an interdisciplinary team, this chapter described the outcomes of the focus groups. The findings from this study identified the overarching theme of quality of care as influencing critical care mid-level practitioners' clinical decision making. Three overlapping central themes of judgment, resources, and negotiation were identified as essential factors that influence mid-level practitioners' decision making in critical care. Additionally, sub-themes were identified as being interwoven with each core theme and included trust, communication, experience, and team structure.

Chapter V

Introduction

The purpose of this research study was to describe the clinical decision making of critical care mid-level practitioners working on interdisciplinary teams. The mid-level practitioners studied were integral interdisciplinary team members who develop, support, and enable management of critical care patients to optimize health outcomes. Findings from this study will be the first known published in the United States describing how clinical decisions are made by these mid-level practitioners for complex medical issues.

The study's major findings will be discussed in relation to the existing empirical literature, and includes 1) the web of decision making complexity among mid-level practitioners on interdisciplinary teams, 2) the impact of intra-professional trust, and 3) the impact of telehealth on decision making. The chapter also includes a discussion of the findings with respect to the implications for education, practice, and health policy. And lastly, the chapter ends with a description of the limitations of this study and a brief summary of this chapter. Recommendations for future research for each of the major findings will be included throughout the discussions.

A Web of Complexity

The emerging thematic model of decision making (reference Figure 8) from this study depicted how quality of care was the primary decision making goal for mid-level practitioners. To accomplish this goal, the practitioners described a web of complex decision making that included judgment, resources, and negotiation, as well as interwoven concepts of communication, experience, team structure, and trust. This model

is included again in this chapter in order to frame the discussion of the findings, focusing on the overlapping themes and interwoven sub-themes.

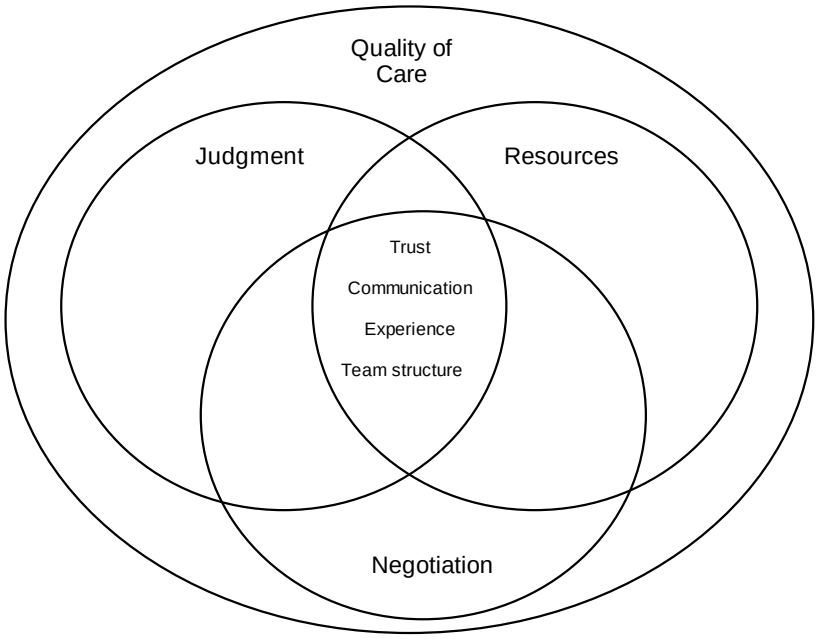


Figure 8. Clinical Decision Making of Critical Care Mid-Level Practitioners with in an Interdisciplinary Team

The overarching theme of quality of care was consistent with previous empirical descriptions of best practice models for specialized practitioners managing critically ill patients on interdisciplinary teams (Brill et al., 2001; Gutsche & Kohl, 2007; Kane et al., 2003; Kelley et al., 2004; Leapfrog Group, 2007). However, the complex and interrelated synthesis of judgment, resources, and negotiation influencing mid-level practitioners' decision making had not been previously reported. The interweaving of these concepts underscored the complexity of how clinical decisions are made within these specialized interdisciplinary teams.

The judgment and available resources influencing decision making described by study participants was similar to the cognitive continuum theory assumptions described

by Hammond (1986). Although Hammond (1986) did not use the precise terms of judgment or resources in his theory, there are parallel descriptions between the cognitive continuum theory cognitive modes and this study's findings. For instance, Hammond (1986) described how tasks (cues) that were identified as meaningful information included prior individual experiences that influenced the type of cognitive mode used. Similarly, the study participants described a continuum in judgment among a spectrum of cognitive modes of intuition through analysis using individual and team experiences (depending on the situation) and available resources to determine a clinical action. As Hammond (1996) described oscillations (change in decisions over time) in decision making, these findings were illustrated by the participants of this study. For example, participants described how their judgment and use of resources changed over time due to influences of new technology and/or prior patient experiences. Based on the study findings, there is potential value in using cognitive continuum theory in future decision making research studies either to undergird qualitative work or as a middle range theory for quantitative research (Cader et al., 2005).

In addition, the study findings of judgment and resources as key concepts to decision making were supported by other descriptive studies conducted in nursing (Lauri & Salanterä, 1998; Laurie et al., 2001; Offredy, et al., 2008). For instance, Offredy et al. described utilization of available provider resources for nurse prescribers who referred patients to general practitioners when answers were unknown (Offredy et al., 2008). Similarly, the participants in this study described utilization of other interdisciplinary members to support their decision making. Further, the findings were supported by Hawryluck et al. (2002), who reported that the number of team members involved in

clinical decisions may fluctuate depending on the clinical question. Likewise, the resources used to make a clinical decision by the participants included a core critical care team of two or three members, or the entire interdisciplinary team.

The literature also recommended use of clinical practice guidelines to support evidence-based medicine utilization (Curry, 2000). However, empirical literature had not provided a description of how mid-level practitioners specifically utilize these protocols to make decisions. In this study, the study participants described how they individualized these guidelines (when necessary) to support their decisions, which is a new finding. Hawryluck et al. (2002) also reported critical care team members who used defined standards of care (for example, a clinical practice guideline), and fostered team collaboration in meeting management goals. Both the present study findings and existing empirical literature underscore the importance of these critical care teams defining standards of care (clinical practice guidelines). Although a few participants described using Up-to Date for summarized evidenced based recommendations to support their decision making related to a diagnosis, the study participants did not describe their independent review of empirical literature to help make clinical decisions. Further investigation is warranted to explore how interdisciplinary teams integrate evidenced-based research into clinical practice.

No prior studies have described critical care mid-level practitioners' use of intensivists and/or other interdisciplinary experts as a resource to support their clinical decisions. For example, Coombs (2003) described physician dominance in directing patient management as a factor that reduced the contributions from other team members. Additionally, Hawryluck et al. (2002) described power struggles in patient management

among other physicians and allied health care members resulting in conflict. However, where Hawryluck et al. found degrees of collaboration or conflict within the core and expanding team, the study participants reported once trust was established, they would seek out recommendations from an intensivist to support clinical decision making. Perhaps this phenomenon occurred due to the established interdisciplinary team structure and clearly defined roles of members on these teams.

Negotiation among interdisciplinary team members was described by participants as a central overlapping theme that influenced decision making. In contrast, existing empirical literature described conflict among physicians, nurses, and other allied health care members when the physician made decisions (Coombs, 2003; Hawryluck et al., 2002). This finding of conflict was not supported by this study's findings. Instead, the concept of negotiation was described as an important part of the mid-level practitioners' decision making. Similarly, Lingard et al. (2004) described the "process of trade" as a method of negotiation among interdisciplinary team members that included both physical and social commodities. In the present study, mid-level practitioners reported that prior experiences, established trust with the intensivist, effective communication, and team structure influenced the type of negotiations that occurred in their decision making for patients. Coombs and Hawryluck et al. did not interview teams containing mid-level practitioners, nor did they explore the formal structure of the teams. Additionally, the descriptions of negotiation in the present study may be related to the clear role definition for the intensivist and mid-level practitioners, a supportive interdisciplinary critical care team model, and consensus by intensivists to utilize evidenced-based practice for patient

management. Clearly, role definitions should be an integral part of critical care team orientation to foster and enable interdisciplinary team dynamics.

Coombs (2003) described how exclusion of a nurse's input can cause team conflict. This finding was supported in the present study, illustrated by a participant's report that nurses "will go over our heads" if they do not agree with the decision of the mid-level practitioner. Overall, the study's participants described incorporation of nurses' recommendations into their decision making for patient management. However, inclusion of the nurse's recommendations into practitioner decision making had not been described in prior empirical literature. Additionally, no empirical literature has described interdisciplinary conflict resolution through education provided by mid-level practitioners (as described in this study) as an effective intervention for increasing nurses' knowledge regarding evidence-based practice standards. The descriptions by participants in the present study of communicating the patient's plan to the nurse supported prior findings that communication among the team enabled cohesive teamwork (Lanceley et al., 2008).

The empirical literature described the concept of agreement on team "rules" fostered collaboration (Coombs, 2003; Hawryluck et al., 2002; and Lingard et al., 2004). Clear descriptions of existing interdisciplinary team rules were described in the present study. For example, study participants described a daily routine starting with morning rounds, where team members would discuss assignments for patient management during the day. This daily rounding process defined rules for patient management among team members. Lingard et al. and Hawryluck et al.'s description of defined roles to prevent barriers and enabled teamwork was similar to the participant's descriptions of their

negotiations of procedures, documentation, admissions, discharges, teaching, management, and family meetings among other practitioners on the team.

Study participants also described using social services, the legal department, and the ethics committee to negotiate, guide or validate clinical decisions. For example, complex decisions around end-of-life issues were negotiated between the team and family with guidance from both ethics and legal support. Having ready access to these resources supported complex decisions. Previous qualitative studies have not described this concept of negotiation as a factor in mid-level practitioner decision making and requires further investigation. Further, research should focus on how important resources such as legal and ethical committees are incorporated into team decisions.

Communication has been described as an important concept in fostering interdisciplinary team interactions (Coombs, 2003; Hawryluck et al., 2002; Lanceley et al., 2008; Lingard et al., 2004). Supporting these prior descriptions, communication was identified as a key interwoven sub-theme in the present study. The findings clearly illustrated descriptions of the format for communication in daily interdisciplinary team rounds to make clinical decisions. For example, participants on the medical and surgical interdisciplinary team described how they communicate patients' issues and plan to enable team member involvement in developing an individualized plan of care for the patient. Furthermore, findings of communication were supported by Lanceley et al. who described how communicating patient management standards for all team members fostered the plan of care. In addition, continuity in the interdisciplinary team structure described by Hawryluck et al. provided nurses and allied health care providers the ability to better communicate patient needs. The study findings also supported that maintaining

patient continuity enabled mid-level practitioners to readily address patient and family needs (Lanceley et al.).

Descriptions shared by the participants of how their previous clinical experiences influenced their decision making had also been previously reported in the empirical literature (Burman et al., 2002). For instance, nurses have reported the use of pattern recognition as a way to support their clinical decisions (Burman et al.; Offredy, 1998). The rich descriptions of decision making by critical care mid-level practitioners in interdisciplinary teams in the present study illustrated the web of complexity that occurs in clinical decision making. Two additional important findings, trust and telehealth, will be discussed separately as these were new findings from current empirical literature.

Intra-Professional Trust

Although three of the four identified sub-themes 1) communication (Coombs, 2003; Hawryluck et al., 2002; Lanceley et al., 2008; Lingard et al., 2004), 2) experience (Burman et al., 2002; Hammond et al., 1987), and 3) team structure (Brill et al., 2001; Gutsche & Kohl, 2007; Hawryluck et al., 2002; Lingard et al., 2004) had previously been reported as important components in team decision making, trust within the context of interdisciplinary teams was a new finding. Trust has been defined as "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Rousseau, Sitikin, Burt, & Camerer, 1998, p. 395). Trust was described as an important component in mid-level practitioners' decision making within a team and was not previously described in the empirical literature in relationship to decision making. However, it was consistently discussed as critical to decision making in all of the study's focus group sessions.

Coombs (2003) described nurses "playing the game" as an adaptive strategy used to communicate important patient concerns to physicians during rounds. This strategy was intended to foster professional trust, hoping that by playing the game the physician would value the nurse's judgment regarding patient needs. Although participants in the present study used the same terminology ("playing the game") this term had a different meaning; to respect the intensivist's plan of care preferences. In addition, the goal of the previously published study seemed to imply manipulative strategies to win trust, whereas in the present study the goal was to have "everyone on the same page" to enhance quality care delivery.

Bi-directional trust with the critical care nursing staff is a phenomenon that had not previously been described in the literature. A couple of factors may help explain the importance of this concept for interdisciplinary teams. First, creating a culture of safety (where nursing staff feel comfortable asking mid-level practitioners for education, support, or clarification) is critical for trust to occur. And secondly, ensuring that the nurse's patient concerns were readily addressed by the mid-level practitioner may enhance the credibility of these practitioners' decision making by the nurse. Future research examining the development of trust within interdisciplinary teams and how it affects the provision of care is very timely in light of the current emphasis on interdisciplinary teams.

Telehealth

According to the empirical literature, exemplary interdisciplinary critical care teams are lead by an intensivist, with interdisciplinary members participating in planning patient's critical care management (Brill et al., 2001; Gutsche & Kohl, 2007; Kane et al.,

2003; Kelley et al., 2004; Leapfrog Group, 2007). The influence of the 1997 and 2001 telemedicine reports to the United States Congress addressing several state licensure issues to support implementation of telemedicine was reflected in the study findings (Center for Telemedicine Law, 2003). This was illustrated by participants' descriptions of integrating management recommendations from the electronic ICU, as an extension of the interdisciplinary team model that supported their decision making. This finding was unexpected because to date, it had not been described in the decision making empirical literature. The participants described the electronic ICU as an adjunctive interdisciplinary team led by an intensivist, with a mid-level practitioner and a critical care pharmacist, who monitored all critical care beds in the participants' institution and other ICUs within this health care network. The descriptions of the electronic ICU clearly illustrated the emerging new paradigm of critical care delivery systems incorporating telemedicine to optimize patient management for critical care patients (Groves, Holcomb, & Smith, 2008). Additionally, this finding of having an intensivist available from the electronic ICU to guide patient management decisions illustrated the use of different intensivist models to facilitate quality patient care in this study (Groves, Holcomb, & Smith, 2008). Further research is needed to delineate team infrastructures and how team decisions may differ when telehealth is available.

Implications for Education

Mid-Level Practitioner Training Programs

This study identified important implications for both nurse practitioner and physician assistant training programs. It is clear from the findings that students would benefit from opportunities early in their graduate education to learn about team decision

making. The interdisciplinary cognitive decision making model that emerged from the findings could be used to teach how complex decision making occurs on teams.

The utilization of a vignette, as used in this study, is another educational strategy to use with mid-level practitioner students. The teaching strategy provides a safe practice medium, similar to simulation, whereby students can practice clinical decision making for complex patients with many clinical considerations (cues) (Barter & Renold, 1999). Offredy et al. (2008) similarly used a vignette to describe the type of cognition used by participants in her study. Using vignettes in graduate level training programs may assist the students' understanding of the complexities in intra-professional team decision making.

Mid-Level Practitioner Critical Care Orientation

The findings from this study support the development and use of a structured critical care orientation program for mid-level practitioners to aid their decision making for critically ill patients. Incorporation of the conceptual model presented in this study may assist new mid-level practitioners transitioning into this professional role. Further, based on study findings, critical care preceptors should factor in mid-level practitioners prior critical care, and other experiences, and develop individualized orientation programs. Defining the team structure and the mid-level practitioner's role on the team supports communication and interdisciplinary team negotiation in the plan of care for patients. Therefore, delineating the roles and expectations for the mid-level practitioner during their orientation, or upon hire, can support them in making clinical decisions.

Outside the aims of this study, new and seasoned mid-level practitioners provided descriptions of their critical care training during the focus groups. Future research

examining training programs and critical care mid-level practitioner orientation in relationship to team development, patient outcomes, and practitioner decision making may support the integration and utilization of mid-level practitioners' abilities in critical care teams.

Implications for Practice

The findings from this study identified several recommendations for clinical practice. First, clinical practice guidelines and protocols supported and influenced mid-level practitioners' decision making. Specialty mid-level training programs and critical care units should define expected patient management goals and outcomes, when possible, to support decision making of mid-level practitioners. Furthermore, defining the team structure, roles, and related processes may further enable interdisciplinary team management, thereby reducing potential conflict in the ICU among providers, nurses, patients, and families, and could support effective utilization of provider resources. In addition, the finding regarding trust has implications to support program development, including team building, and training programs for mid-level practitioners and interdisciplinary teams.

This study's findings also have direct implications for the structure of critical care teams. The primary recommendation is to reduce the number of unit and team rotations, enabling the intensivist and mid-level practitioner to establish trust with other interdisciplinary team members, including the intensivist. A secondary recommendation is to examine any differences in patient outcomes between established mid-level and intensivist teams and those teams that rotate frequently. This type of study would fit well as a doctor in nursing practice project.

Implications for Health Policy

The most important policy implication that emerged from this study was the importance for health care systems to examine the development and nurturing of intra-professional teams to support quality health care provision. Providing internal and external resources that support such teams is critical. Examining the impact of telehealth on mid-level practitioners' decision making, and the impact of telehealth in critical care patient outcomes, is crucial. It is especially important in order to identify and implement team structures that enable cost effective and efficient health care systems (Curtis et al., 2006).

Study Limitations

Sample

Although the participants in this study included nurse practitioners and physician assistants, males and females, and a diversity of critical care experience, they were recruited from one health care system. Therefore, participant responses may not be representative of the clinical decision making of other critical care mid-level practitioners in another institution.

Discipline. There was limited nurse practitioner representation (n = 5, 29%) in comparison to the physician assistants in the total sample of participants in this study. Despite the limited number each interdisciplinary focus group discussion included at least one nurse practitioner. Despite the lower representation in the sample, the nurse practitioners readily participated in the discussions and the vignette. Furthermore, most of the nurse practitioners (n = 5) in this study were very experienced in critical care (average = 19.2 years). The lower number of critical care nurse practitioners in the sample may

reflect an increased prevalence of physician assistants in critical care units at the institution where participants were recruited, since the institution supports a critical care physician assistant training program. However, despite the limited number of nurse practitioners in the study, they were engaged in each focus group and data saturation was achieved at the completion of the third focus group.

Nationality. The sample contained representation of only three nationalities (Caucasian 82%, European 12%, and Asian 6%), possibly limiting the findings to represent only a subset of critical care mid-level practitioners. The limited diversity of participant nationality may be a reflection of the limited diversity of mid-level practitioners in the institution that has an established interdisciplinary team model from which participants were recruited. Conducting additional qualitative studies in other geographic areas in order to include other nationalities could further enrich this study's findings by describing how ethnicity of mid-level practitioners working on interdisciplinary teams in the ICU affects decision making (Padela & Punekar, 2009).

Adjunctive Interdisciplinary Team

The inclusion and exclusion criteria for this study to describe complexities in the clinical decision making of mid-level practitioners among interdisciplinary teams did not address the use of telehealth resources. The influence of the electronic ICU to support mid-level practitioner clinical decision making was an unexpected finding in this study. Participants in one critical care unit described consultation with an intensivist during the day or night versus others that described the electronic ICU intensivist as supporting their decision making only at night. However, the influences of telehealth resources on

participants' decision making may limit study findings to mid-level practitioners that have similar resources in their health care systems.

Focus Groups

This study used focus groups with a research aim in order to enable rich description of the considerations for clinical decision making by mid-level practitioners on interdisciplinary teams. This method provided the opportunity to describe the considerations that critical care mid-level practitioners use to make decisions. A limitation of this method was the inability to examine clinical decisions in relationship to patient outcomes; however examination of patient outcomes to decisions made was not one of the aims of this qualitative research. Additionally, future research warrants conducting focus groups including other interdisciplinary team members such as the intensivist, nurse, pharmacist, respiratory practitioner, and nutritionist to further describe and understand the complexities of decision making among an interdisciplinary team.

Researcher's Role

To reduce recruitment bias, the researcher used indirect recruitment strategies to invite potential participants to participate in this study. This strategy included an electronic invitation sent via email by a mid-level practitioner affiliated with the graduate school of nursing, who is also a critical care nurse practitioner. The email instructed interested parties to contact the researcher. In addition, an invitation to participate was posted on each unit. Once tentative focus group dates were identified, two physician assistant leaders in this institution aided in recruitment by identifying if an identified date or time was in conflict with planned educational or training programs. As the researcher

did not directly approach mid-level practitioners to participate, this strategy may have impacted the recruitment for this study.

The researcher's role during the focus groups was limited to note taking in order to reduce any influence on participant responses. Although this role was a method to reduce bias, it limited the ability of the researcher to ask any probing questions to further describe the participant responses to the interview guide. To mitigate this limitation, the researcher debriefed with the moderator after each focus group to identify additional questions for future focus groups.

Conclusions and Summary

Critical care mid-level practitioners are members of interdisciplinary teams that provide assessment and management of critically ill patients. The literature review found a paucity of research describing how these mid-level practitioners make clinical decisions in the critical care unit when working among an interdisciplinary team, where their decisions directly impact patient outcomes. This study's findings identified a complex interwoven matrix of concepts that influenced decision making that has implications for professional education, clinical practice, and future research.

Ensuring quality of care for patients requiring critical care management was described as the overarching theme that drives critical care mid-level practitioners' decision making on an interdisciplinary team. Furthermore, the study findings revealed a dynamic web of complexity for decision making, including a synthesis of overlapping concepts that included judgment, resources, and negotiation skills among the interdisciplinary team members. In addition, this study found that sub-themes of trust, communication, experience, and team structure are interwoven critical concepts that

impact the decision making of critical care mid-level practitioners, and need to be considered in the structuring of critical care interdisciplinary teams.

This study's findings have implications for advance practice nursing education, post-graduate physician assistant training programs, critical care training curriculum, critical care orientation programs, theory development in decision making, and health policy. The inclusion of decision making theory and negotiation into training programs is warranted to support decision making by mid-level practitioners on interdisciplinary team, enabling the delivery of quality care for patients. Further, fostering trust between mid-level practitioners and other interdisciplinary team members enables decision making and has significant implications for the structure and utilization of critical care teams with mid-level practitioners to effectively deliver care for critically ill patients.

Gaining a deeper knowledge of clinical decision making of these mid-level practitioners by repeating this research in different geographical locations in the United States may provide further insight into their decision making and may identify regional differences to support development of mid-level practitioner training programs. Future decision making research including all interdisciplinary team members will provide further descriptions and understanding of the complex dynamics that influence decision making among interdisciplinary team members. Additionally, research is needed to examine if there are differences in patient outcomes among varying interdisciplinary team structures. Research examining telehealth and the influence on decision making to optimize patient care for all interdisciplinary team members is also needed. Furthermore, understanding the use of clinical practice guidelines and protocols and how they may aid

decision making in the management of critical care patients has direct implications for doctorate in nursing programs to integrate empirical literature into clinical practice.

This study is important because the information gained contributes to understanding the complexities in decision making of critical care mid-level practitioners working on an interdisciplinary team. However, further research is needed to understand the central and sub-themes identified in this study. Because Hammond's cognitive continuum theory (1986) provided a holistic and robust decision making theory for this study, it should be used to support future research examining clinical decision making individually, among interdisciplinary teams, and in transdisciplinary research using qualitative and quantitative methods.

In conclusion, the interdisciplinary decision making thematic model presented in this study provides a framework to examine the complexities of clinical decision making of practitioners working on an interdisciplinary team. Final recommendations include utilization of this emerging model in future interdisciplinary team decision making research to refine this model, identify new concepts, and describe/measure interrelationships among practitioners working on interdisciplinary teams.

Appendix A: Clinical Decision Making Vignette

You are managing a 76-year old malnourished Caucasian gentleman who required intubation for community acquired pneumonia in the emergency department for acute respiratory distress. This is his fourth day in the ICU.

He is afebrile and hemodynamically stable requiring ongoing ventilator support. He is on goal directed antibiotics for Klebsiella pneumonia. He is tolerating enteral nutrition via a post pyloric feeding tube at goal. Glucose control/management with IV insulin protocol and DVT prophylaxis are ordered. He has been unable to wean from the ventilator.

Past Medical History: Hyperlipidemia, hypertension, TIA, COPD and arthritis

Past Surgical History: None

Social History: Widow. No children. 80 pk smoking history- stopped 2002.
No healthcare proxy identified. Lives in assisted living.

Current Medications:
IV: Regular insulin per protocol
IV: Levaquin (levofloxacin) 750 mg IV daily
IV: Versed (Midazolam) 0.5 mg/hour infusion for RASS -1
IV: Fentanyl 12.5 mcg/hour infusion
ASA (acetylsalicylic acid) 325 mg via duotube daily
Zocor (simvastatin) 40 mg via duotube daily
Lopressor (Metoprolol tartrate) 25 mg via duotube BID
Colace (Docusate) 100 mg liquid BID duotube
Combivent nebs (ipratropium bromide and albuterol sulfate) q 6 hours inhaled
Proventil (Albuterol) UD neb q 2 hours PRN wheezing
Lovenox (Enoxaparin) 20 mg SC daily

Labs today:

	9.7	
5.4		69
	32.4	

142	111	18	
			101
4.3	32	0.9	

ABG: 7.32- 48- 88- 30- 94%
(FIO2 60%- Peep 10)

Today: You note acute right leg swelling with tenderness to palpation. The nurse confirms the swelling is new. A venous duplex confirms a right femoral deep vein thrombosis.

1) Describe considerations in managing this patient with a new diagnosis of DVT.
2) If anticoagulation is determined, in regards to his thrombocytopenia, describe considerations factored into your clinical decision making in managing this patient.

Appendix B: Invitation to Participate

Invitation to Participate in Research Critical Care Nurse Practitioners and Critical Care Physician Assistants

- Nurse practitioners and physician assistants are essential members of critical care teams.
- The clinical decision you make every day impact patient outcomes.
- Presently, there is lack of information describing how critical care nurse practitioners and physician assistants make complex clinical decisions in an interdisciplinary team.

Critical Care Nurse Practitioners and Critical Care Physician Assistants working in an interdisciplinary team are invited to participate in a research study seeking to describe the clinical considerations used in making clinical decisions for patients

- The aims of this research are to describe:
  - Clinical considerations that critical care nurse practitioners and physician assistants use to make management decisions.
  - How clinical decision making occurs on an interdisciplinary team.
  - How interdisciplinary providers' recommendations are incorporated into your decision making.
- Participants will attend one 90-minute focus group with other critical care nurse practitioners and physician assistants to discuss clinical decision making.
- The knowledge gained from this study may identify implications for advance practice nursing education and postgraduate physician assistant training programs for critical care practitioners and may support the development of interdisciplinary teams.
- As a thank you for your participation, refreshments will be provided and you will receive a $10 gift certificate to Dunkin Donuts.

To learn more about this study please contact
Melinda Darrigo MS, NP (doctoral student)
Office: 508-334-7828 –or-
Email: Melinda.Darrigo@umassmed.edu.

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