FACTORS INFLUENCING REGISTERED NURSES’ JUDGMENTS AND DECISIONS IN MEDICATION MANAGEMENT

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Doctor of Philosophy

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ABSTRACT

Medication errors represent a significant concern in healthcare. The process of preventing medication errors is complex and involves several disciplines. Nurses play a vital role in identifying and preventing these errors using clinical judgment and astute decision-making skills. The purpose of this research was to identify the patient factors, workplace factors and nurse characteristics that influenced the conflict involved in questioning a medication order, the judgments made in administering the medication and contacting the prescriber to question the order.

The Conflict Theory of Decision-making was the model that guided this study; simply stated the level of conflict that a decision-maker experiences directly affects the final choice that is made and the action that is taken. The factorial survey method was used in this study. The strength of the method lies in the ability to examine the effect of each independent variable on the dependent variable. A convenience sample of medical/surgical and intensive care nurses employed in three acute care facilities in Northwest Ohio completed a three-part survey. Part One of the survey asked the nurse to describe the last time a medication order was questioned. Part Two contained vignettes that portray ‘real-life’ decision-making situations that nurses responded to using a Likert Scale. Part Three asked for specific information about the nurses' personal and professional characteristics.
Results of the analysis of the data from 115 nurses' responses found the single most important influence in the experience of conflict, decision to administer the medication and contacting the prescriber was the dose and the route of the medication. In addition, nurses with a baccalaureate or higher degree were found to have a significantly different level of conflict to question a medication order than nurses with Associate Degrees or diplomas. These findings give impetus for developing educational strategies to support management of conflict in questioning a medication order and the importance of nurses' decision-making in medication management to prevent errors.
ACKNOWLEDGEMENTS

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This journey has been made to help me become a better nurse and teacher. It is time for me to ‘pass it on’.
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CHAPTER I

INTRODUCTION AND STATEMENT OF THE PROBLEM

Introduction

The purpose of this study was to identify factors (patient, workplace and nurse) influencing clinical decisions in registered nurses' medication management. Publication of the report, To Err is Human: Building a Safer Health System (Institute of Medicine, [IOM] 2000), increased the awareness of healthcare professionals and consumers regarding the dangers of medical errors. The IOM (2000) reported that in studies reviewed for their document approximately 44,000 and perhaps as many as 98,000 hospitalized Americans die in the United States each year from medical errors.

The Institute of Medicine (2004a) defined an error as “the failure of a planned action to be completed as intended (error of execution) or the use of a wrong plan to achieve an aim (error of planning). An error may be an act of commission or an act of omission” (p. 30). Categories of medical errors included: medication errors, or adverse drug events, inappropriate transfusions, surgical injuries and wrong site surgery, suicides, restraint-related injuries or deaths, falls burns, pressure ulcers and mistaken patient identities (IOM, 2000).
Statement of the Problem

Medication errors represent a large percentage of the medical errors made in healthcare today. The IOM (2007) Report estimated that on average a patient in a hospital setting experiences one medication error per day. Medication errors are preventable events related to poor professional practices, questionable healthcare products, as well as badly designed procedures for prescribing medications, communicating orders and labeling medications (IOM, 2000).

The process of preventing medication errors is complex and involves several healthcare disciplines (McBride-Henry & Foureur, 2007). Nurses, pharmacists and physicians are all involved in the process of medication management (prescribing, preparing, and/or administering) and each of these individuals could contribute to the potential for error. Physicians may write an incorrect dosage of medication, pharmacists may provide the wrong form of the drug, or nurses may administer the medication to the wrong patient.

Medication administration involves more than simply handing out pills. Nurses must use clinical judgment and astute decision-making skills to assess patient health needs (American Nurses’ Association, 2001; American Association of Colleges of Nursing, 2008; National League for Nursing Accreditation Commission, 2008). Nurses work collaboratively with physicians and pharmacists to evaluate actions and adverse reactions to medications with clear documentation of the process (American Academy of Pediatrics, 2003; Gladstone, 1995; Manias, Aitken, & Dunning, 2004a; 2004b). There is a heavy burden that nurses carry to prevent errors since they make the final checks before
the medication is given to hospitalized patients (Benner, Sheets, Uris, Malloch, Schwed, & Jamison, 2002; Johnston & Kanitsaki, 2006; Osborne, Blais, & Hayes, 1999).

In this current study, registered nurses reviewed the information about the patient as presented in the vignettes. Nurses were then asked to rate their likelihood of administering the medication as ordered and contacting the prescriber to question the order. Nurses’ clinical judgments and decision-making skills are vital in the prevention of medication errors. Nurses bring their own unique compendium of prior knowledge and experience to every task. Narayan and Corcoran-Perry (1997) indicate that nurses’ decisions are based on relevant content knowledge structured in networks of information. This structure of knowledge consists of nurses’ ability to recognize essential clinical information and use the information appropriately in a specific clinical context to justify the judgment and ultimately the decision (Narayan & Corcoran-Perry).

Thompson and Dowding (2002) made the connection that the terms judgment and decision-making are frequently used interchangeably in healthcare. There is support of this statement in the nursing literature (Evans & Donnelly, 2006; Hardy & Smith, 2008; Lauri & Salantera, 1998; Pesut & McDonald, 2007; Thompson, Bucknall, Estabrooks, Hutchinson, Fraser, Riende Vos, et al., 2007; Thompson, Dalgleish, Bucknall, Estabrooks, Hutchinson, Fraser, et al., 2008; Thompson, Spilsbury, Dowding, Pattenden & Brownlow, 2008). Thompson and Dowding suggest Dowie’s definition of “judgment as the assessment of alternatives and decisions as choosing between alternatives” (p. 7).

Decision-making to prevent medication errors is a complex process. There is the potential for conflict that may be due to lack of knowledge of the medication (e.g. right dose and route), lack of information about the patient, communication issues with the
prescriber or other unknown factors important to preventing medication error. Blakeney (2002), a former president of the American Nurses’ Association (ANA), stated it is essential for nurses to be autonomous decision-makers when caring for patients in order to identify and correct potential medication errors and further called for nursing research to support this initiative.

Statement of Purpose

Many factors are assessed as registered nurses make decisions about medication management, and they may encounter conflict as decisions are made (Arford, 2005; Keenan, Cooke, & Hillis, 1998). This research project used the factorial survey method (Rossi & Anderson, 1982) and examined the patient and workplace factors and nurses’ characteristics that influence decisions during medication management. The Conflict Theory of Decision-making (Janis & Mann, 1977) was used to guide this study. The theory offers a process for decision-making, but more importantly described how psychological stress, generated by decisional conflict impacted an individual’s decisions (Janis & Mann, 1977).

The purpose of this study was to identify factors (patient, workplace, and nurse) influencing registered nurses’ decisions and the experience of conflict in medication management. The research questions that guided this study include:

1. What patient and workplace factors influence conflict to question a medication order, registered nurses' decisions about the likelihood of administering the medication, and the likelihood of contacting the prescriber to question the order?
2. What registered nurses’ characteristics influence conflict to question an order, the likelihood the medication would be administered as ordered, and the likelihood of contacting the prescriber to question the order?

The tool administered to nurses had three parts: (a) the most recent case (Ludwick & O’Toole, 1996; Ludwick, Wright, Zeller, Dowding, Lauder, & Winchell, 2004) asked the nurse to describe the last time a medication order was questioned, (b) the medication administration-based vignettes using factorial survey design, and (c) the demographic section that asked about nurses’ personal and professional characteristics.

Significance

This study was significant in terms of the issues being examined, the methodology employed, and the theoretical approach used. Patient safety, particularly safe medication management, is considered a high priority in healthcare (IOM 2000, 2004a, 2004b, 2007). The research study was timely in that several healthcare associations have developed standards to protect patients and emphasized a culture of safety in a variety of settings. Findings from this study could be used to strengthen activities related to this effort.

The Joint Commission (JC) reaffirmed the need to prevent medication errors in their patient safety goals for 2009. The standards mandated (a) increasing the accuracy of patient identification, (b) enhancing the effectiveness of communication among care givers, and (c) improving the safety of medication administration (JC, 2009). This research addressed two of the three initiatives (communication and administration).

Many professional nursing organizations (ANA, The American Association of Critical Care Nurses, and the Academy of Medical Surgical Nurses) emphasize the
essential role of nurses in the prevention of medication errors. Among the strategies proposed to assist in this initiative is the development of effective communication skills and collaboration with other members of the healthcare team to prevent errors.

Accrediting bodies for nursing education have also reaffirmed the critical role of nurses' decision-making for patient safety. The Commission on Collegiate Nursing Education (CCNE, 2008) and the National League for Nursing Accreditation Commission (NLNAC, 2008) recognized clinical decision-making as a core competency for professional nursing practice. Both organizations targeted decision-making as a necessary skill to be included as an essential educational component in nursing curricula. Therefore, factors in this study found to be significant in the prevention of medication errors could be included in nursing education programs as well as continuing education for seasoned nurses.

Factorial survey is a composition of multivariate experimental design and sample survey procedures (Rossi & Anderson, 1982). The strength of the research method facilitated the examination of the unique effect of each independent variable on the dependent variables (Ludwick & Zeller, 2001; Ludwick, Wright, Zeller, Dowding, Lauder, & Winchell, 2004; Rossi & Anderson, 1982). There was random insertion of multiple levels of independent variables in a vignette. In this study 12 independent vignette variables each with multiple levels replicated the complex judgments and decisions nurses make in everyday medication management (Ludwick & Zeller, 2001; Rossi & Anderson, 1982). The strength of the method was the absence of risk to the patient and the ability to disentangle the variables in medication decision-making medication management that are often highly correlated. Two studies have used the
factorial survey method with the focus on medication errors. Schwappach and Koeck (2004) surveyed patients for their judgments on how physicians handle the disclosure of medical errors. In a study of medical student preceptors (Mazor, Fischer, Haley, Hatem, Rogers, & Quirk (2005), 115 primary care physicians were queried as to how they would respond to a trainee's medication error. This current study was unique in that factorial survey research was extended to include the examination of nurses’ experience of conflict and the decisions made in medication management.

The Conflict Theory of Decision-making offered a foundation for identifying the process of decision-making and introduced the idea that conflict can affect the decision-maker’s final choice. In the process of examining alternatives for a decision, positive and negative consequences are identified resulting in conflict (Janis & Mann, 1977). Very low and very high levels of conflict result in the decision-maker being complacent with their decision or so stressed about the choices that it impairs the cognitive ability of the individual (Janis & Mann, 1977). The theory described a moderate amount of conflict as placing the decision-maker in a state of ’vigilant information processing’ which generally results in the best decision outcome (Janis & Mann, 1977).

In the next chapter of this paper the literature review identified the known sources of conflict for nurses’ as they make decisions for their patients. Although the Conflict Theory has not been used previously to describe nurses’ decision-making, it offered a new perspective by allowing the researcher to ask subjects to what level, if any, conflict was experienced with decisions in medication management.
CHAPTER II
THEORETICAL FRAMEWORK AND LITERATURE REVIEW

Introduction

This chapter is organized to present (a) Janis and Mann’s (1977) Conflict Theory of Decision-making, the theoretical framework guiding this study; (b) a review of the literature concerning nurse decision-making; (c) an overview of research related to medication errors, (d) a discussion of patient, workplace factors; (e) nurses' characteristics related to medication management; and (f) the hypotheses for this study with rationale.

Theoretical Framework

Janis and Mann (1977) proposed the Conflict Theory of Decision-making as a process for resolving decisions and emphasized that decisional conflict plays a role in those decisions. Conflict Theory is built on an extensive analysis and incorporation of findings in part from theories from psychology including: Kurt Lewin (psychological conflict), Herbert Simon (Information Processing Theory), and Amitai Etzioni (mixed scanning) (Janis & Mann, 1977).

Five patterns of coping in the theory are used by decision-makers with each having either a low, moderate or high level stress leading to a similar level of conflict. Vigilant information processing was an adaptive pattern of coping described in this theory. In this
coping pattern there was a clear process for decision-making that facilitates examining and weighing multiple alternatives for a decision (Janis & Mann, 1977). The adaptive coping pattern resulted in a moderate level of conflict, however the theorists proposed this moderate conflict to be necessary to examine all alternatives carefully so a positive outcome was achieved. Conversely, maladaptive patterns of coping resulted in low or high levels of conflict leading the decision-makers to either make a decision too quickly (unconflicted adherence and unconflicted change) or so slowly (defensive avoidance and hypervigilance) that the decision has a poor outcome (Janis & Mann, 1977). See table 2.1 for definitions of each of the patterns of coping.
Table 2.1
Definitions for Patterns of Coping

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<th>Level of conflict</th>
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<tr>
<td>Vigilant information processing</td>
<td>Decision-maker performs a thorough search of the alternatives</td>
<td>adaptive</td>
<td>moderate</td>
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<tr>
<td>Unconflicted adherence</td>
<td>Decision-maker who ignores information about the alternatives and continues on the current course of action.</td>
<td>maladaptive</td>
<td>low</td>
</tr>
<tr>
<td>Unconflicted change</td>
<td>Decision-maker adopts whatever is the most strongly recommended course of action.</td>
<td>maladaptive</td>
<td>low</td>
</tr>
<tr>
<td>Defensive avoidance</td>
<td>Decision-maker hesitates in selecting a course of action, or transfers the decision-making responsibility to another individual.</td>
<td>maladaptive</td>
<td>high</td>
</tr>
<tr>
<td>Hypervigilance</td>
<td>Decision-maker urgently searches for an alternative, with a decrease in cognitive function which results in overlooking all possible courses of action.</td>
<td>maladaptive</td>
<td>high</td>
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(Janis & Mann, 1977)

Conflict as it relates to making decisions was defined by Janis and Mann (1977) as the “simultaneous opposing tendencies within the individual to accept and reject a course of action” (p. 46). O’Connor (1995) identified conflict as doubt about an appropriate course of action when positive and negative outcomes are realized. Contributing to conflict is the uncertainty and risk in making the decision (Janis & Mann, 1977). The perceived magnitude of the uncertainty and risk that results from the decision affects the
physiological and psychological symptoms of stress for the decision-maker and, thus, the level of conflict experienced (Janis & Mann, 1977).

Nurses have a professional responsibility to question the care that is given to patients. Nurses recognize that in making decisions there is uncertainty and risks that may cause stress resulting in the presence of conflict (Attree, 2007; Jenks, 1993; Kim, An, Kim, & Yoon, 2007). In general, when nurses identify that an inappropriate medication, dose or route is ordered there are alternatives to respond to the issue. Nurses have an opportunity to consult with other healthcare providers (nurse peer, supervisor or pharmacist), make a decision to administer the medication as ordered or contact the prescriber to clarify the order. In these situations, nurses search for the best alternative. Each alternative has a specific consequence not only for nurses, but for the patient. In the current study two of the three alternatives were examined (administration of medication and contacting the prescriber).

As an additional risk, Mann, Burnett, Radford, & Ford (1997) described conflict resulting from psychological stress as rising from at least two sources: concerns about severe personal, material or job-related social losses and anxiety over a loss of reputation and self-esteem if the decision is wrong. Nurses’ concerns about the experience of conflict in questioning the prescriber related to their medication knowledge, interacting with the prescriber, institutional policies and procedures (Attree, 2007), and the outcome of a decision resulting in a medication error if a wrong choice is made potentially leading job loss, their license to practice, or injury to the patient.

Risks in the decision to contact the prescriber could result in inappropriate physician behavior (verbal abuse, impatience with questions, reluctance or refusal to
answer questions or telephone calls, and other forms of intimidation [Institute for Safe Medication Practices, 2003]), a verbal reprimand from supervisors for questioning an order (Chase, 1995) and the absence of peer/manager support (Attree, 2007; Coombs & Ersser, 2004). These types of responses make nurses hesitant to question a physician because of fear of negative personal or professional outcomes (Attree, 2007; Chase, 1995).

The risk of questioning a physician order may be perceived as a challenge to the status and power currently experienced by physicians that may lead to previously described physician behaviors (Arford, 2005; Attree, 2007; Cook, Hoas, Guttmannova, & Joyner, 2004; Chase, 1995; Coombs & Ersser, 2004; Jenks, 1993). Nurses questioning a medication order described conflict that arose with new residents and attending physicians that were not known to well-known to them (Bucknall & Thomas, 1997; Jenks, 1993; Keenan, Cooke, & Hillis, 1998; Kim, An, Kim, & Yoon, 2007).

Some studies have shown that nurses were hesitant to question physicians’ orders. Nurses were attempting to maintain collegial relationships by not reporting medication order discrepancies (Attree, 2007; Cook, Hoas, Guttmannova, & Joyner, 2004). In a 2003 survey by the Institute for Safe Medication Practices (ISMP), healthcare workers revealed that in some instances medications prescribed by physicians should have been questioned, but due to intimidation by the physician or fear of a physical outburst by the prescriber, 40% of the instances were not questioned. Moreover, nurses reported pressure to administer the medication even though 50% of the respondents stated they felt it was wrong (ISMP, 2003). Kim, An, Kim, & Yoon (2007) found only 48% of nurses queried would report an event that affected patient care.
A systematic search of the literature on the Conflict Theory of Decision-making revealed the absence of nurse decision-making studies using this theory. However, a qualitative study (Di Caccavo & Reid, 1995) involving general practice physicians used Janis and Mann (1977) to discuss their findings of the variables influencing decisions about patient care management. The three variables that contributed to conflict by physicians were time pressure, uncertainty and patient characteristics (age and gender).

Six decision-making tools were developed using the Conflict Theory. Jenkins developed the Clinical Decision Making in Nursing Scale (Strickland & Waltz, 1988) to assess how student nurses saw themselves making clinical decisions. The Decision-making Quality Scale (DMQS) and the Decision-making Quality Inventory (DMQI) developed by Hollen (1998); and the Flinders Decision Making Questionnaire and the Melbourne Decision Making Questionnaire (Mann, Burnett, Radford, & Ford, 1997) were used in identifying decision-making patterns of coping by cancer patients, adolescents and parents. There had been minimal use of these tools in research studies so that sufficient statistical reliability has not been fully established. Annette O’Connor has developed a Decisional Conflict Scale based on Janis and Mann’s work that identified the patient’s coping pattern and level of decisional conflict. As a result of this work patient-centered tools; cardiac rehabilitation exercise (Al-Hassan & Wierenga, 2000), oncology patients (Koedoot et al., 2001), participation clinical trials (Rabin & Tabak, 2006), and end-of-life issues (Song & Sereika, 2006) were successfully developed to assist patients in making the appropriate care choices.

There has been no tool developed to identify the patterns of coping used by nurses as they make decisions. As a result, in this study a determination was not made as to the
specific pattern of coping the participant exhibited, rather nurses were asked to identify
the level of conflict present when making the decisions using a Likert Scale. Zero
equaled no conflict, one to three on the Likert Scale indicated a low level of conflict, four
to seven on the scale equated to a moderate level of conflict, and an eight to ten equaled a
high level of conflict.

The use of the Conflict Theory of Decision-making proposed a process for
examining alternatives for a decision. Moreover, uncertainty and risks are inherent for
the decision-maker leading to stress and conflict which may impede the selection of an
alternative with a successful outcome (Janis & Mann, 1977). The theory offers a new
perspective for describing how the experience of conflict impacts decisions for
medication management.

Decision-making

This section of the paper gives an overview of the literature of nurses’ decision-
making research. General themes are examined for their influence on nurses’ decision-
making and studies focusing on nurses’ decision-making in medication management are
presented.

Overview of Nurses’ Decision-making

The nature of clinical decision-making in nursing practice is of interest to nurse
researchers. Quantitative and qualitative methods have been used to attempt to describe
the process and the factors influencing nurses’ decision-making. Quantitatively,
scales/questionnaires have been developed to measure nurse decision-making (Decision-
making Questionnaire, Bakalis & Watson, 2005; Decision Analytic Questionnaire, Hicks,
Merritt, & Elstein, 2003; Hughes & Young, 1990; Rhodes Scale, Hoffman, Donoghue, Duffield, 2004; Jenkins Clinical Decision-making Questionnaire, Girot, 2000; Jenkins, 1985). A concern for the tools is a lack of significant Cronbach alpha coefficients to measure the reliability of the instrument (Kerlinger & Lee, 2000) and/or absence of replication studies to validate the continued use of the scales. Additionally, none of the tools have looked at conflict in decision-making.

Qualitative research has been by far the most frequently used method to examine nurse decision-making in areas like medical/surgical units, intensive care, and emergency departments. Various qualitative data collection strategies have been used for the nurses’ decision-making research: (a) direct observation of provider procedures with the researcher asking questions as to why the nurse is taking a certain course of action (think aloud method) (Aitken, 2003; Bucknall, 2000, 2003; Eisenhauer, Hurley, & Dolan, 2007; Hedberg & Larsson, 2004; Henry, LeBreck, & Holzemer, 1989); and (b) interviews with nurses after patient care procedures are completed (Attree, 2007; Cioffi, 2000; Currey, Browne, & Botti, 2006; Ellis, 1997; Hagbaghery, Salsali, & Ahmadi, 2004; Hancock & Easen, 2006; Henry, LeBreck, & Holzemer, 1989; Higgins, 1999; Manias & Street, 2001). There are several limitations with each data collection strategy including: distraction of the nurse being observed in direct patient care, interruption of the nurse during questioning of why a decision was made and recall of information at a later time as to how a decision was made.

Much of the nursing research in decision-making is fragmented with no one theoretical model explaining how nurses make decisions in complex care. Decision Analysis (Bonner, 2001; Dowding, Swanson, Bland, Thomson, Mair, Morrison et al.,
2004; Mosher, Cuddingan, Thomas, & Boudreau, 1999), Information Processing
(DiGuilio & Crow, 1997; Higgins, 1999; Offredy, 2002), and Cognitive Continuum
(Lauri, Salentera, Chalmers, Ekman, Kim, Kappeli, & MacLeod, 2001; Offredy, Kendall,
& Goodman, 2008) are a few of the models that have appeared in nursing decision-
making studies. Recently, Arslanian-Engoren (2009) has used a synthesis of Hammond's
Lens Model and the Evan's two-stage reasoning process to describe emergency room
nurses' cardiac triage decisions. Although the research related to the development of
theoretical models is occurring, the challenges may be the result of the recognition of the
complexity of nurse decision-making.

General Themes

General themes contributing to nurse decision-making have been documented in
nursing research. Knowing the patient, complexity of care, and nurses' experience with
patient care decisions are discussed in the following section.

Knowing the patient.

Studies about nurse decision-making inform as to what nurses need to make good
decisions. Knowing the patient assists nurses in focusing on the assessment, developing
interventions and evaluating care (Beuscart-Zephir, Pelayo, Anceaux, Maxwell, &
Guerlinger, 2007; Bucknall, 2003; Chase, 1995; Hedberg & Larsson, 2004; Jenks, 1993;
Junnola, Eriksson, Salantera, & Lauri, 2002; Tanner, 2006; Tanner, Benner, Chesla, &
Gordon, 1993). Nurses gather and use this information to make individualized decisions
about important aspects of patient care (Tanner, Benner, Chesla, & Gordon, 1993).
Complexity of care.

Complex patient care has been described as affecting decision-making (Hughes & Young, 1990; Lewis, 1997). Results in one study showed that as complexity of the situation increased nurses moved away from routine decision-making, so responding to a complex patient’s healthcare needs became unique for that situation (Hughes & Young, 1990). Task complexity challenges the demands on the decision maker to retain information on the patient, recall information on the specific care scenario, and process all the information gathered (Lewis, 1997). When conflict was present task, complexity increased (Lewis, 1997).

Nurses’ experience.

Nurses reported that, at times, prior experience with patient care problems helped in making decisions. Data revealed that effective decision-making was correlated with experience (Bakalis & Watson, 2005; Bucknall, 2000; Currey, Browne, & Botti, 2006; Hancock & Easen, 2006; Junnola, Eriksson, Salantera, & Lauri, 2002; Thompson, McCaughan, Cullum, Sheldon, Mulhall, & Thompson, 2001; Thompson & Sutton, 1985; Watson, 1994). Experienced nurses were found to be more accurate in decision-making and made the appropriate decision in a shorter period of time. Bucknall (2000); Eisenhauer, Hurley, and Dolan (2007); and Hagbaghery, Salsali, and Ahmadi, (2004) identified that nurses’ decision-making occurred due to the need for ongoing evaluation of the patient’s condition as well as communicating concerns about the patient to other members of the healthcare team. Less experienced nurses may look to seasoned nurses for advice in making decisions when the complexity of the patient increased.
Inexperienced nurses may feel anxiety, fear or nervousness in managing patient care, whereas experienced nurses are challenged (Currey, Browne, & Botti, 2006).

Decision-making in Medication Management

Nurses described the complexity of decision-making and the constant vigilance needed for medication management by discussing the ‘routines’ followed for scheduled medications (Beuscart-Zephir, Pelayo, Anceaux, Maxwell, & Guerlinger, 2007; Eisenhauer, Hurley, & Dolan, 2007; Manias, Aitken, & Dunning, 2004a). At times, nurses needed to extend decision-making to include selection dosages of medications, (pain management or titrating medications to a specific physiologic response) which required knowledge of the drug and experience with what the expected outcome should be for the patient (Eisenhauer et al., 2007; Manias et al., 2004a). The importance of nurses’ vigilance is shown in studies that report that nurses’ watchfulness intercepted nearly half of the prescribing errors made by physicians (Guy, Persuad, Davies, & Harvey, 2003) and one third of transcription and dispensing errors prior to medication administration (Leape et al., 1995).

Summary

Nurses' decision-making has been studied in a variety of patient settings and nurse practice specialties using multiple research methods. No one model or method has been selected to explain the ideal process in making decisions for patient care. Although there is limited information about nurse characteristics for decision-making, and specifically medication management, there is some support for nursing experience influencing the
decision-making process. Nurses recognize the importance of decision-making in patient care and cite instances in which their decisions have contributed to quality care and medication error identification. The proposed research study assumes that the nurse, at times, will experience some level of conflict when questioning a medication order. Identifying the essential nurse characteristics in medication management decision-making will assist in developing strategies to enhance this important skill and the prevention of medication errors.

Medication Errors

Attention to patient safety has triggered a great deal of research related to medication management in the past few years. The Institute of Medicine (2000) defines medication errors as preventable events that may lead to inappropriate medication use or patient harm at any stage of the medication delivery process. Data regarding medication management and medication errors is gathered using a variety of methods: observation of medication management procedures, interviewing participants regarding their thinking processes during medication management, and retrospective review of incident reports and questionnaires about medication errors (Antonow, Smith, & Silver, 2000; Balas, Scott, & Rogers, 2004; Barker, Flynn, Pepper, Bates, & Mikeal, 2002; Bohomol, Ramos, & D'Innocenzo, 2009; Classen, Pestotnik, Evans, Lloyd, & Burke, 1997; Cook, Hoas, Guttmannova, & Joyner, 2004; Cullen, Sweitzer, Bates, Burdick, Edmonson, & Leape, 1997). This section discusses the literature review of those studies related to frequency, types and causes of medication errors in current research.
Frequency of Medication Errors

For every drug administered to a patient there is the possibility of an error. A review of the literature provides a starting point for further investigation of medication errors despite the fact that each institution may have a unique pattern of error. Reports of medication error rates use a variety of denominators (per admissions; per patient days; and errors per number of medication orders [IOM, 2007]). Nebeker, Hoffman, Weir, Bennett, and Hurdle (2005) examined medication errors at a veterans’ hospital and reported 70 adverse drug events (ADE) per 1000 patient days. An error rate of 6.5 ADEs per 100 admissions was reported from medical surgical units in two tertiary care centers (Leape et al., 1995). Lesar (2002) recorded 12.3 errors per 1000 admissions. A rate of 40 errors per 1000 admissions was recorded in a major tertiary care center (Winterstein et al., 2004). One hospital study estimated medication errors to be as high as 1.9 errors per patient per day (Fontan, Maneglier, Nguyen, Loirat, & Brion, 2003). There is a concern that actual medication error numbers are underreported due to fear of reporting by staff, unclear definitions of what actually constitutes a medication error and the variety of methods used in identifying medication errors (IOM, 2007).

Types and Causes of Medication Errors

Medication errors are of critical concern in the care of patients and can occur during any of the five stages of the medication process: prescribing, transcribing, dispensing, administering and monitoring (IOM, 2000). As an example of reported rates, errors associated with adverse drug events (ADEs) in one study occurred in the following
stages: 61% ordering, 25% monitoring, 13% administration, 1% dispensing (Nebeker et al., 2005).

Several authors describe faulty system design as a primary source of medication errors (Cullen, Bates & Leape, 2000; Leape et al., 1995; Tissot et al., 1999; Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth & Kanjanarat, 2004). Often the lack of access to important patient and medication information results in errors (Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth, & Kanjanarat, 2004). Specifically, dissemination of knowledge about medications and their dosages, as well as patient laboratory test results and drug history, are necessary for improved patient safety.

Prescribing errors by physicians were detected in a number of studies. The range of prescribing errors varied from 56% to 75% of all errors (Cullen, Bates, & Leape, 2000; Nebeker, Hoffman, Weir, Bennett, & Hurdle, 2005; Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth & Kanjanarat, 2004). The errors reflected the wrong medication being ordered for patients along with inappropriate dosing (Cullen, Bates, & Leape, 2000). Several causes of prescribing errors were related to lack of knowledge about the medication being ordered, not following an established medication protocol, failure to consider laboratory test values and a failure of attention due to distractions during writing medication orders (Nichols, Copeland, Craib, Hopkins, & Bruce, 2008; Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth, & Kanjanarat, 2004).

At the preparation and dispensing stage (pharmacist’s responsibility) errors occurred in 2.9 per 1000 admissions (Winterstein et al., 2004). Only one per cent of errors were due to pharmacist’s mistakes in a study by Nebeker, Hoffman, Weir, Bennett and Hurdle (2005). Fanikos, Cina, Baroletti, Fiumara, Matta, and Goldhaber (2007)
identified 27 out of 361 (4.9%) dispensing errors in their study of medication errors in cardiac patients. Dispensing errors were caused by slips in attention, lapses in memory and performance deficits (calculation, preparation, and distribution) (Kelly, 1995; Nichols, Copeland, Craib, Hopkins, & Bruce, 2008; Winterstein et al., 2004).

Administration errors (nurses’ responsibility) occurred in 5.8 per 1000 admissions (Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth, & Kanjanarat, 2004). Thirty four percent of errors in the Cullen, Bates & Leape (2000) study were recognized as nurse administration errors along with 13 percent of errors in the Nebeker et al. (2005) study. Nurses in an intensive care unit were observed during 2,009 instances of medication administration events with a recorded 132 instances of medication errors (6.6%) (Tissot et al.,1999). Medication errors in this study were due to deficiencies in staff training (Tissot et al., 1999). Additionally, of 5,744 observations in 851 patients, Calabrese et al. (2001) detected 187 (3.3%) medication errors. Specific types of errors related to administration included medications given at the wrong time, wrong dose (high and low), missed doses, wrong administration technique, and not identifying patient allergies (Bohomol, Ramos, & D'Innocenzo, 2009; Calabrese et al., 2001; Cullen et al., 2000; Ludwick & Silva, 2003; Rothschild et al., 2006; Tissot et al., 1999). Lack of knowledge of the drug and failure to scan the patient’s identification band were causes of medication errors in a study by Mayo and Duncan (2004). Medications errors in the administration stage were related to performance deficits (delays or miscalculations) and inappropriate drug routes (Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth, & Kanjanarat, 2004).
Summary

Medication errors are a major quality care problem in the United States and globally (IOM, 2007). Data reviewed from healthcare facilities reveal medication errors as a common occurrence, with each institution having a unique pattern of error. Challenges exist in identifying every medication error in each step of the medication management process as well as eliminating the causes of the error.

Research demonstrates that the highest percentages of medication errors are associated with incorrect physician prescriptions (Cullen et al., 2000; Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth & Kanjanarat, 2004). Physicians need to improve their knowledge of medications available for patient therapeutics; however, this does not exempt nurses from their responsibility for patient safety. While medication prescribing falls under the control of physicians, nurses are fully responsible for administering the correct types and dosages of medications. Safe medication administration involves careful review of physicians’ orders, accurate knowledge of the medications, and the courage to question potentially inaccurate and inappropriate medication prescription orders (Mayo & Duncan, 2004).

Patient and Workplace Factors Influencing Medication Management

Decision-making in medication management is a complex activity with a variety of factors influencing patient outcomes. The following discussion identifies common patient and workplace factors contributing to decision-making and the management of medications.
Patient Factors

Numerous factors have been shown to impact medication errors. The following section reviews the current research available about the following patient factors: age, acuity, level of cognition, medical diagnosis, and drug categories including route and dose as it relates to medication management.

Age.

Although the aging process has impacted how drugs should be prescribed, relatively few researchers mentioned this in their research. Patients 65 years and older were found to be at higher risk for medication errors (Gallagher, Barry, Ryan, Hartigan, & O’Mahony, 2008; Picone et al., 2008; Rothschild et al., 2006). One study found one third of patients in this age group were prescribed inappropriate medications and those receiving greater than 5 medications were 3.3 times more likely to receive drugs that were improperly ordered (Gallagher et al., 2008). Picone et al. (2008) reported that for every additional medication a patient received the error rate increased by five percent. Patients’ mortality rates increased in older individuals experiencing adverse drug events (Classen, Pestotnik, Evans, Lloyd, & Burke, 1997).

Patient acuity.

The patient’s acuity level can affect the complexity of care (Fijn, Vanden Bemt, Chow, De Blaey, De Jong-Van den Berg, & Brouwers, 2002; Hall, Doran, & Pink, 2004; Lewis, 1997). As patient acuity increases so does the complexity of the care and the number of medications that are needed to support the stability of the patient (Scott, Rogers, Hwang, & Zhang, 2006). A higher risk of patient mortality has been identified with higher acuity and adverse drug events (Classen, Pestotnik, Evans, Lloyd, & Burke,
Furthermore, high acuity patients may affect nurses’ workloads by decreasing the time in which to focus on the care of other patients, thus increasing the risk of not recognizing a medication error (Balas, Scott, & Rogers, 2004). Only one study reported acuity as not contributing to medication errors (Picone et al., 2008).

*Level of cognition.*

There have been no studies specifically examining the relationship of patient cognition and medication errors. However, as hospitals increase the implementation of safety initiatives, patients have been advised to become more involved in their care (JC, 2009; Jenks, 1993; Vincent & Coulter, 2008), and more importantly, be alert to the medications they receive from healthcare professionals. Certain medication categories may result in the patient’s cognition being altered (Lehne, 2004). As an example, a narcotic analgesic may prevent a patient from questioning why a medication is being given, thus increasing the chance of a medication error.

*Medical diagnosis.*

Knowing the patient’s medical diagnosis contributes to the complexity of care (Cioffi, 2000). Few studies have reported the medical diagnoses of patients experiencing medication errors. Two studies focused exclusively on cardiac patients and reported a medication error rate of 1.9 events for every one hundred admissions (Fanikos, Cina, Baroletti, Fiumara, Matta, & Goldhaber, 2007) and 16% of Acute Coronary Syndrome patients experienced medical errors with a majority of them related to medication errors (Rothschild et al., 2006). Patients with diseases of the digestive system were found to have significant medication errors in several studies (Nebeker, Hoffman, Weir, Bennett, & Hurdle, 2005; Picone et al., 2008). Studies often report the drug categories, rather than
the medical diagnosis, at highest risk for medication errors. The selection of medical diagnoses for this study is representative of conditions that may use two of the common drug categories most frequently seen in medication errors: narcotic analgesics and antibiotics (Lehne, 2004).

Drug categories.

Knowing the drug categories that are at highest risk for errors can alert nurses, physicians, and pharmacists to potential problems during medication management. A review of the research findings reflected a unique pattern of error for each institution studied. Narcotic analgesics and/or antibiotics were found to be listed in one of the top three drug categories reported as causing medication errors in several studies (Calabrese, Erstad, Brandl, Barletta, Kane, & Sherman, 2001; Cullen et al., 1997; Lesar, Briceland, & Stein, 1997; Nebeker, Hoffman, Weir, Bennett, & Hurdle, 2005; Picone et al., 2008; Rothschild, Landrigan, Cronin, Kaushal, Lockley, Burdick, et al., 2005; Tang, Sheu, Yu, Wei, & Chen, 2007; Winterstein et al., 2004). Researchers did not offer an explanation as to why these two drug categories frequently resulted in medication errors.

Route and dose.

Drugs must be administered via the route that is appropriate for the formulation and concentration of each medication (Lehne, 2004). The intravenous route offers no barriers to absorption which is immediate and complete. There is complete control over the levels of medication dose that is given intravenously (Lehne, 2004). Intravenous medication is dangerous since toxicity can occur if medication is given too rapidly even if the dose is appropriate for the route (Lehne, 2004). There are barriers to absorption when medications are given orally thus absorption of medication is somewhat slower and varies
(Lehne, 2004). This route is considered safer than the intravenous route. Doses of particular drugs may vary in amount when given intravenously versus orally (Lehne, 2004).

Summary.

Patient factors are important in helping nurses focus on the type of care the individual needs to receive. Current studies have clearly identified those patients over the age of 65 are at highest risk for medication errors perhaps due to the number of medications that are ordered for this population. The patient’s acuity level contributes to complexity of medication management and also the time that nurses need to care for these patients. There is less information about how the patient’s level of cognition and medical diagnosis to contribute to medication errors. Narcotic analgesics and antibiotics contribute to the majority of medication errors. Understanding what key patient factors increase the potential risk for medication errors presents an opportunity for nursing professionals to provide safe care and develop interventions to prevent errors.

Workplace Factors

Workplace factors involved in patient medication management impact the care that is given. A review of the literature includes a discussion of the research findings in the following areas: prescriber, nurses’ familiarity with the prescriber, nurses’ knowledge of the patient, time of day medications are given, and the type of order.

Prescriber.

The prescribers in this study will be either the attending physician or a resident physician (has medical degree but is rotating through various specialty areas to obtain
experience in patient care). Prescribers have varying knowledge of medications and prescribing strategies (Wakefield et al., 2008). In some situations the prescriber may have limited knowledge of the patient and the patient’s medical condition (Farnan, Johnson, Meltzer, Humphrey, & Arora, 2008). Research studies have reported that frequently medical students, interns and residents do not receive formal training regarding prescribing medications, thus errors can occur (Coombes, Stowasser, Coombes, & Mitchell, 2008; Garbutt, DeFer, Highstein, McNaughton, Milligan, & Fraser, 2006). In some settings medication errors doubled when new residents entered the rotation, therefore the inexperience of medical staff can pose a serious risk to safe medication management (Wilson et al., 1998).

Attending physicians may also have limited knowledge of the patient’s clinical status, the medications that the patient is currently taking, and co-morbidity status (Wakefield et al., 2008). Frequently patients have multiple physicians ordering medications which can compound the risk for duplicate medication orders or orders that may conflict with drugs the patient is currently receiving. In general, physicians can have multiple patients they are caring for in acute care facilities, thus keeping patient information organized can be difficult.

*Nurse’s familiarity with prescriber.*

Communication with physicians in medication management is essential to prevent errors (Donchin et al., 1995; Eisenhauer, Hurley, & Dolan, 2007). Nurses have an easier time of interrupting an error if a physician is known to them (Henneman, Blank, Gawlinski, & Henneman, 2006; Kaplan, Ancheta, & Jacobs, 2006; Leape et al., 1995; Wakefield et al., 2008). Nurses will ideally have knowledge of the physician’s protocols
for patient care and have access to recent lab work and test results. Nurses are then prepared to question orders and communicate concerns to the prescriber (Wakefield et al., 2008).

*Nurse's knowledge of patient.*

Knowing the patient is important in decision-making (Beuscart-Zephir, Pelayo, Anceaux, Maxwell and Guerlinger, 2007; Chase, 1995; Cioffi, 2000; Eisenhauer, Hurley, & Dolan, 2007; Henneman, Blank, Gawlinski, & Henneman, 2006; Nichols, Copeland, Craib, Hopkins, & Bruce, 2008; Tanner, Benner, Chesla, & Gordon, 1993; Wakefield et al., 2008). Nurses know the importance of gathering and evaluating data about the patient (subjective and objective, laboratory results, previous analysis of data from other members of the healthcare team). This activity assists nurses in finding and understanding patterns and relationships that will result in a positive outcome for the patient (Bucknall, 2000; Cioffi, 2000). Nurses’ knowledge of the medical diagnosis, expected treatment, and confidence in their overall knowledge of the patient situation aids in the recognition of medication errors (Cioffi, 2000; Henneman et al., 2006; Leape et al., 1995; McBride-Henry, & Foureur, 2007; Tang, Sheu, Yu, Wei, & Chen, 2007).

*Time of day.*

Determining the time of day when a majority of the errors occur assists nurses in developing strategies to prevent errors. Studies have shown that the earlier portion of the day shift (7 AM – 11 AM) has the highest rate of medication errors with the idea that this is the prime time for medication prescribing and administration (Donchin et al., 1995; Fahimi et al., 2008; Fanikos, Cina, Baroletti, Fiumara, Matta, & Goldhaber, 2007). These studies are supported with a finding that of a majority of the prescription errors made by
residents are made in the late morning hours which are considered to be the busiest time on a nursing unit (Davydov, Caliendo, Mehl, & Smith, 2004). Moreover, there is an increase in the rate of medication errors during periods of shift changes and the first two days of the patient’s admission to the hospital (Fanikos et al., 2007). Additional concerns related to time of day identified that as shift lengthened for nurses (greater than 12 hours) the number of medication errors increased (Rogers, Hwang, Scott, Aiken, & Dinges, 2004).

Type of order.

There are multiple ways for a prescriber to share a medication order: Verbal (face to face or by phone), written in a chart, and more recently entered into a computer which then appears on the patient’s automated medication administration record (MAR) (Kaplan, Ancheta, & Jacobs, 2006). There are strengths and risks for each method which may impact medication management and error recognition.

Verbal orders can be misunderstood as far as the pronunciation or spelling of the medication to be ordered and potentially be miswritten when nurses transcribe orders on the patient’s record (Cox, D’Amato, & Tillotson, 2001; Kaplan, Ancheta, & Jacobs, 2006; Wakefield et al., 2008). Giving or receiving verbal orders often occurs during a task being performed by the physician, pharmacist or nurses thus, there is an interruption, raising the potential for error (Wakefield et al., 2008). An additional concern is nurses’ or prescribers’ knowledge of the patient for which the medication order is given because they are not directly caring for the patient. They may not have knowledge of laboratory results, patient’s medical diagnosis, past history, or current medications the individual is taking (Coombes, Stowasser, Coombes, & Mitchell, 2008; Wakefield et al., 2008). Many
institutions discourage taking verbal orders due to the potential for error and frequently only allow this type of order during times of urgent need. Hospitals further mandate that verbal orders must be cosigned by the prescriber within a certain period of time thus verifying that the order was indeed given by the prescriber.

Written orders have the potential for error due to issues of poor prescriber penmanship, misinterpretation of abbreviations, and incomplete or misspelled orders, (Garbutt, DeFer, Highstein, McNaughton, Milligan, & Fraser, 2006; Kuperman, Teich, Gandhi, & Bates, 2001; Song, Chui, Lau, & Chueng, 2008). Written order forms also have tendency to be separated from the patient’s chart and may be lost or misplaced.

Currently, there is an initiative by healthcare facilities to introduce computer physician order entry (CPOE). This procedure allows the prescriber to type in the medication order directly into a computer thus eliminating some of the more common issues related to medication errors such as identification of patient allergies, drug interactions, poor penmanship, and drug dosage errors (Bates, Leape, Cullen, Laird, Petersen, Teich, et al., 1998; Crane & Crane, 2006; Evans, Petotnik, Classen, Clemmer, Weaver, Orme, et al., 1998; Kuperman, Teich, Gandhi, & Bates, 2001). The computer program for medication order entry can also interface with computers that manage laboratory, radiology and other data on the patient that assist the prescriber in making decisions about medication management (decision aids). Medication verification systems have been credited with the reduction of errors at all stages of the medication process (van Gijssel-Wiersma, van den Bemt, & Veen, 2005). Although the introduction of the computer medication data entry and management systems has been a welcomed addition in preventing medication errors, the result is the reduction in communication between
nurses and the prescriber, thus the opportunity to understand the prescribing practice of
the physician is lost (Beuscart-Zephir, Pelayo, Anceaux, Meaux, Degroisse, & Degoulet,
2005). Moreover, as previously stated, the lack of communication among health care
providers is a contributing factor to medication errors (Balas, Scott, & Rogers, 2004;

Summary.

Workplace factors are important in medication management. As the experience of
the prescriber (attending physician) increases the risk of medication error decreases, but
is not totally eliminated, thus nurses must still be vigilant for potential errors. Familiarity
with the prescriber increases the opportunity to discuss patient issues in order to avoid
medication errors. Nurses are more comfortable questioning medication orders when the
prescriber is known to them. Knowledge of the patient helps nurses determine what care
and medications are appropriate for the individual’s specific medical diagnosis which can
increase confidence when nurses question the prescriber. There are times of the day when
nursing units can be very busy places which are prime times for medication errors to
occur. This heightened activity can result in errors in medication management. In recent
years with the onset of computers being used for medication management, there has been
a great deal of research supporting the safety of Computer Physician Order Entry
(CPOE). Although this seems to have a positive effect on reducing medication errors
there is a lost opportunity for communication between healthcare professionals (nurses,
physicians and pharmacists).
Nurses’ Characteristics Influencing Medication Management

Nurses bring professional (education and experience) characteristics to the bedside as care is given to patients. This section of the paper discusses education and years of experience as characteristics of nurses and how they impact medication management.

**Level of education.**

The majority of registered nurses are prepared for practice by attending one of four programs (Associate Degree, Diploma, Bachelor’s degree and accelerated second-degree programs). The impact of the educational preparation of nurses on medication errors is controversial. Studies have shown that as registered nurse numbers increase on a nursing unit, medication errors decrease (Hall, Doran, & Pink, 2004; Picone et al., 2008). Chang and Mark (2009) found that as the percentage of baccalaureate prepared nurses increased on a randomly selected number of nursing units (279 units from 146 hospitals in the United States) the number of severe medication errors decreased. Of interest, Blegen, Vaughn, and Goode (2001) did a secondary data analysis from two previous studies and found rates of medication errors by baccalaureate prepared nurses (BSN) comparable to other nurses (Study 1) and in the second study found the nursing units with a majority of BSN nurses actually had a higher rate of medication errors. No other studies were found that look at differentiating professional nursing medication management by type of educational program.

**Experience.**

Nursing experience was found to be important in the anticipation of responses to medications, evaluation of their effectiveness and preparation for action should side effects occur (Eisenhauer, Hurley and Dolan, 2007). Nurses use knowledge of laboratory
values, patho-physiology and patient’s medical diagnosis with individual patient responses to medications to make or request changes in medications. This finding was also supported by a secondary data analysis from two studies (Blegen, Goode, & Reed, 1998; Blegen, & Vaughn, 1998). However, there is evidence that experience at any level is not correlated with medication errors (Fry & Dacey, 2007; Hall, Doran, & Pink, 2004; Mayo & Duncan, 2004; Mrayyan, Shishani, & Al-Faouri, 2007).

Summary.

The literature identifying the role of nurses’ characteristics in medication management is sparse. Further research is needed in all areas of nurse characteristics in medication management. Expanding the limited data on nurses’ education levels and experience will assist in targeting these individuals for further initiatives should concerns be noted. The importance of nurse experience in the prevention of errors is controversial and requires further replication studies in a variety of settings.

Hypotheses

The development of the vignettes using multiple levels of the independent variables allowed the researcher to set the stage with ‘real life’ scenarios from which decisions can be made by the study participants. In the following section the hypotheses are described with rationale.

Research Question 1: What patient and workplace factors influence conflict to question a medication order, registered nurses' decisions about the likelihood of administering the medication, and the likelihood of contacting the prescriber to question the order?
Hypothesis 1A: When the following patient factors were present: age less than 55 years, stable condition, alert and oriented, post-op, and receiving normal doses of the narcotic or antibiotic via any route the registered nurse will experience a moderate amount of conflict to question the order, increase the likelihood the medication was administered as ordered, and decrease the likelihood of contacting the prescriber to question the order.

Rationale: Patient information (age, medical diagnosis, response to medications, etc.) improves decision-making and error recognition (Hedberg & Larsson, 2004; IOM, 2000; Henneman, Blank, Gawlinski, & Henneman, 2006; Manias, Aitken & Dunning, 2004a; 2004b). Classen et al. (1997) found that patients with increased age and greater acuity levels had increased rates of medication error thus increasing the need for vigilance of nurses in decision-making and monitoring. As patient acuity increased so does the complexity of the care and the number of medications needed to support the stability of the patient (Scott, Rogers, Hwang, & Zhang, 2006). Eisenhauer, Hurley and Dolan (2007) reported that nurses used previous knowledge of patient response patterns and results of laboratory tests to determine if a change in drug dose or timing was indicated. Additionally, knowing the patient’s drug regimen allowed nurses to anticipate their needs such as receiving a pain medication before a physical therapy session (Eisenhauer et al.). Manias et al. (2004b) stated increased knowledge about the patient’s condition allowed nurses to make decisions about medication administration as well as the need for any additional information or for contacting the physician. See Table 3.1 Independent Vignette Variables: Patient Factors.
Hypothesis 1B: When the following workplace factors were present: Attending physician was familiar to the nurse, patient was known to the nurse, medication administration was on the evening and night shifts, and there was a computer generated medication order, registered nurses experienced a moderate amount of conflict to question the order, increased the likelihood of administering the medication as ordered, and decreased the likelihood of contacting the prescriber to question the order.

Rationale: There may be more certainty that an attending physician with experience is less likely to order an inappropriate medication. Wilson et al. (1998) found that medication errors doubled when new residents entered the rotation due to deficiencies in knowledge of medications. Nurses had an easier time of interrupting an error if the prescriber was known to them (Henneman, Blank, Gawlinski, & Henneman, 2006; Jenks, 1993). Nurses’ knowledge of the medical diagnosis, expected treatment and confidence in their overall understanding of the patient situation aid in the recognition of medication errors (Henneman et al., 2006). Manias et al. (2004b) described increased knowledge concerning the patient’s condition allowed nurses to make decisions about medication administration as well as the need for any additional information or for contacting the physician. Medication errors are more frequently occurring in the late morning of the day shift (Davydov, Caliendo, Mehl & Smith, 2004; Donchin et al., 1995; Fanikos, Cina, Baroletti, Fiumara, Matta, & Goldhaber, 2007). It is therefore hypothesized that medications given at 4 PM, 9 PM and 4 AM in this study will not be questioned. Medication errors are less likely to occur if they are entered into the computer by the physician. There will be no need to interpret handwriting, computer checks normal dosage range, important lab work is available that may need to be
considered before ordering medication, and decrease transcription errors (Bates, Leape, Cullen, Laird, N., Petersen, L., Teich, J., et al., 1998; Crane & Crane, 2006; Evans, Petotnik, Classen, Clemmer, Weaver, Orme, et al., 1998; Kuperman, Teich, Gandhi, & Bates, 2001). See Table 3.2 Independent Vignette Variables: Workplace Factors.

Research Question 2: What registered nurses’ characteristics influence conflict to question an order, the likelihood the medication would be administered as ordered, and the likelihood of contacting the prescriber to question the order?

Hypothesis 2: Registered nurses with the following characteristics: a baccalaureate degree or higher and greater than five years of nursing practice experienced a moderate amount of conflict in questioning the order, increased the likelihood of administration of the medication as ordered, and decreased the likelihood of contacting the prescriber to question the order.

Rationale: The research results were mixed in supporting a certain type of pre-licensure program enhancing the medication knowledge of the nurse, however, Keenan, Cooke, and Hillis (1998) found that nurses with higher education degrees were more likely to take action to resolve conflict with a patient’s plan of care. Wilson et al. (1998) related medication errors to the inexperience of medical and nursing staff. Deficiencies were related to lack of knowledge of medications. The more experience the nurse had in caring for patients on a certain medication regimen increased the recognition of error. Bucknall (2000) found that nurses with greater than five years of critical care experience were making more decisions about patient care and communicating their concerns to others on the healthcare team. See Table 3.3 Nurse Characteristics as Control Variables.
Summary

Multiple patient and workplace factors in addition to nurses’ characteristics influenced clinical decision-making. Nurses indicated that the more complex the patient care, the more challenging the decision-making (Hancock & Easen, 2006). Patient information (age, acuity, level of cognition, medical diagnosis, drug category, route and dose) assisted nurses in questioning and making decisions about care. Nurses were more confident and comfortable with decision-making if they had experience with the patient care situation (Bucknall & Thomas, 1997; Cone & Murray, 2002; Hancock & Easen, 2006; Watson, 1994).

Nurses reported that in some situations their role was that of an ‘information giver’ instead of a decision-maker especially as it relates to communication with physicians. In fact, nurses at times expressed conflict with certain decisions made by other health care providers, especially physicians (Bucknall & Thomas, 1997; Jenks, 1993). Henneman and Gawlinski (2004) stated the importance of identifying characteristics of the nurse and the type of work environment that allowed nurses to identify and intercede in preventing errors. “This process requires not only the knowledge to recognize an error, but also the confidence and communication skills to address the issue with the appropriate personnel” (Henneman & Gawlinski, 2004, p. 200).

Although there is descriptive data about of the types of medication errors that were occurring in acute care facilities there is more information needed concerning what influences nurses’ decision-making to identify a potential medication error, intervening to prevent the error and ways to manage conflict whether it is internal to the nurse or with the prescriber. This research study contributed to the current body of knowledge about
the patient, workplace factors and the nurse characteristics important in influencing
decisions for medication management.
CHAPTER III
METHODS

Introduction

Decision-making in nursing medication management was examined using the factorial survey method. A sample of nurses currently working in select acute care facilities in Northwest Ohio were surveyed for responses to vignettes regarding clinical decision-making for medication management. This chapter discusses the research design, which includes the factorial survey method and the study instrument, sample and sampling techniques, human subject protection, in addition to, the study procedures, and data analysis.

Research Design

Factorial survey was the method used to develop the vignettes for this study. In the next section of this paper factorial survey and the study instrument were described.

Factorial Survey

A Factorial Survey is a composition of multivariate experimental design and sample survey procedures (Rossi & Anderson, 1982). The experimental design of factorial survey method allows for the random insertion of levels of the independent variables in the vignettes so that they can be tested for their effect on the dependent
variable (Ludwick & Zeller, 2001; Ludwick et al., 2004; and Rossi & Anderson, 1982). Vignettes have been found to be an effective research method for eliciting comments about difficult topics (Ludwick & Zeller, 2001) (such as medication errors), provide for an environment in which participants can make decisions that will not jeopardize patient safety, and finally, to quickly and cost effectively generate large amounts of data for analysis (Hughes & Huby, 2002). Factorial surveys capture, in part, the complexity of real life and circumstances related to human choices and decisions (Rossi & Anderson, 1982).

The effect of the independent variables (patient and workplace factors) influencing decisions to prevent medication errors was identified using statistical analysis (Ludwick & Zeller, 2001; Ludwick et al., 2004; Rossi & Anderson, 1982). This analysis was possible because the factorial survey relies on approximate factor orthogonality, which is often difficult, if not impossible, to control in studies of clinical decisions in day to day practice. Using the factorial survey method allowed each variable to be examined independently from other variables to determine the factors that had the greatest influence on nurses’ decision-making (Ludwick & Zeller, 2001; Ludwick et al., 2004; Rossi & Anderson, 1982).

Currently, the factorial survey method is used most often in social science research (Rossi & Anderson, 1982; Wallander, 2009); however, there is a growing body of studies that have been conducted in healthcare. See Appendix A for a list of published healthcare studies using the factorial survey method.
Study Instrument

The survey was developed using information gathered from research in medication management, nurse decision-making, this researcher's nursing experience and the factorial survey method. The survey had three parts. In Part A nurses described the last time they called a prescriber to question a medication order. In Part B, two “give away” vignettes and four unique, randomly-generated vignettes were presented using a variety of patient and workplace factors to portray a situation in which medication management decisions were made (factorial survey). Part C collected demographic information on nurses’ personal and professional characteristics. A sample survey form can be found in Appendix B. Each section is discussed in greater detail in the following paragraphs.

*Part A – Last case.*

In Part A of the survey nurses responded briefly to recall the most recent experience they had questioning a medication order. Using a combination of closed-ended and forced choice questions, this section of the survey began by asking about patient and workplace factors present at the time of the incident. This line of questioning confirmed content validity for the vignettes (Lai, 2007; Ludwick, O’Toole, O’Toole, & Webster, 1999; McNett, 2008). The responses nurses gave were similar to what was contained in the study vignettes (See Appendix B).

*Part B – Vignettes.*

Factorial survey vignettes were presented in Part B of the survey. Factorial survey method is based on the use of vignettes and these contain the research variables of interest (Ludwick & Zeller, 2001). Vignettes are short stories that are developed to question participants about their opinion or knowledge about a specific topic (Hughes &
Huby, 2002; Polit & Beck, 2006). The vignettes in this research study asked registered nurses to respond to three questions about medication management using a Likert Scale of 0-10 (See Appendix B).

The vignettes in this study were composed of two categories of variables: patient and workplace. There are seven patient factors with the following levels: age (8), acuity (2), level of cognition (4), medical diagnosis (3), drug category (2), dose (3), and route (3) (See Table 3.1). The patient variables were selected from the review of the decision-making and medication error literature as described in Chapter Two.
### Table 3.1

Vignette Variables: Patient Factors

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Values of Independent Variables</th>
<th>Levels</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient age</td>
<td>25, 35, 45, 55, 65, 75, 85, 95</td>
<td>8</td>
<td>&gt; 65 years old increases risk of errors. Medication doses may be adjusted to patient’s age and complexity of care. (Classen, Pestotnik, Evans, Lloyd, &amp; Burke, 1997; Gallagher, Barry, Ryan, Hartigan, &amp; O’Maloney, 2008; Picone et al., 2008; Rothschild et al., 2006).</td>
</tr>
<tr>
<td>Patient Acuity</td>
<td>Stable, Unstable</td>
<td>2</td>
<td>Increase in acuity increases complexity of care (Balas, Scott &amp; Rogers, 2004; Classen, Pestotnik, Evans, Lloyd, &amp; Burke, 1997; Scott, Rogers, Hwang, &amp; Zhang, 2006)</td>
</tr>
<tr>
<td>Level of cognition</td>
<td>Alert and oriented, Comatose, Confused, Drowsy</td>
<td>4</td>
<td>Patient’s cognition may affect the route of the medication and also the complexity of care (Jenks, 1993; Lehne, 2004; Vincent &amp; Coulter, 2008).</td>
</tr>
<tr>
<td>Medical Diagnosis</td>
<td>Patient with pneumonia, Patient who is one day post auto accident with a skull fracture, Patient who is one day post-surgery for bowel resection for cancer</td>
<td>3</td>
<td>Medical diagnoses commonly using narcotic analgesics and antibiotics; Medical diagnosis contributes to complexity of care and can assist the nurse in developing a focused plan of care. (Cioffi, 2000; Fanikos, Cina, Baroletti, Fiumara, Matta, &amp; Goldhaber, 2007; Nebeker, Hoffman, Weir, Bennett, &amp; Hurdle, 2005; Picone et al., 2008)</td>
</tr>
<tr>
<td>Drug category</td>
<td>Morphine, Ceftriaxone</td>
<td>2</td>
<td>Antibiotics and narcotic analgesics are medication categories frequently involved in errors. (Calabrese, Erstad, Brandl, Barletta, Kane, &amp; Sherman, 2001; Cullen et al., 1997; Lesar, Briceland, &amp; Stein, 1997; Nebeker, Hoffman, Weir, Bennett, and Hurdle, 2005; Picone et al., 2008; Rothschild, Landrigan, Cronin, Kaushal, Lockley, Burdick, et al., 2005; Tang, Sheu, Yu, Wei, &amp; Chen, 2007).</td>
</tr>
<tr>
<td>Dose (normal range)</td>
<td>High (Morphine 13 mg. IV push; Morphine 50 mg. oral; Ceftriaxone 6 g), Normal (Morphine 4 mg. IV push; Morphine 20 mg. oral; Ceftriaxone 2 g), Low (Morphine 0.5 mg. IV push; Morphine 5 mg. oral; Ceftriaxone 50 mg.)</td>
<td>3</td>
<td>Doses of particular drugs may vary in amount when given intravenously versus orally (Lehne, 2004).</td>
</tr>
<tr>
<td>Route</td>
<td>Intravenous push, Intravenous piggyback, Oral</td>
<td>3</td>
<td>Drugs must be administered via the route that is appropriate for the formulation and concentration of each medication (Lehne).</td>
</tr>
</tbody>
</table>
There were five workplace factors with the following levels: prescriber (2); familiarity with the prescriber (2); knowledge of the patient (2); time of day (4); and type of order (4). Lewis (1997) identifies task complexity and the context in which it occurs as increasing the demands on nurses’ decision-making. The selection of each of the workplace variables added to the complexity of the decision as described in Chapter Two (See Table 3.2).
Table 3.2

Vignette Variables: Workplace Factors

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Values of Independent Variables</th>
<th>Levels</th>
<th>Rationale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescriber</td>
<td>Attending Physician Resident</td>
<td>2</td>
<td>Physician prescribing practices vary by level of experience and knowledge of medications. (Coombes, Stowasser, Coombes &amp; Mitchell, 2008; Farnan, Johnson, Meltzer, Humphrey, &amp; Arora, 2008; Garbutt, DeFer, Highstein, McNaughton, Milligan, &amp; Fraser, 2006; Wakefield, Ward, Groath, Schwichtenberg, Magdits, Brokel, et al., 2008; Wilson et al., 1998)</td>
</tr>
<tr>
<td>Nurse familiarity with prescriber</td>
<td>Prescriber is familiar to nurse Prescriber is not familiar to nurse</td>
<td>2</td>
<td>Familiarity with prescriber can affect medication decisions (Donchin et al., 1995; Eisenhauer, Hurley &amp; Dolan, 2007; Henneman, Blank, Gawlinski, &amp; Henneman, 2006; Kaplan, Ancheta, &amp; Jacobs, 2006; Leape et al., 1995; Wakefield et al., 2008)</td>
</tr>
<tr>
<td>Nurse’s knowledge of patient</td>
<td>New to nurse Known to nurse</td>
<td>2</td>
<td>Nurses’ knowledge of a patient assists in decision-making and error recognition. (Beuscart-Zephir, Pelayo, Anceaux, Maxwell &amp; Guerlinger, 2007; Bucknall, 2000; Chase, 1995; Cioffi, 2000; Eisenhauer, Hurley, &amp; Dolan, 2007; Henneman, Blank, Gawlinski, &amp; Henneman, 2006; Leape et al., 1995; McBride-Henry, &amp; Pourcre, 2007; Nichols, Copeland, Craib, Hopkins, &amp; Bruce, 2008; Tanner, Benner, Chesla, &amp; Gordon, 1993; Tang, Sheu, Yu, Wei, &amp; Chen, 2007; Wakefield et al., 2008)</td>
</tr>
<tr>
<td>Time of day</td>
<td>9 AM 4 PM 9 PM 4 AM</td>
<td>4</td>
<td>7 AM -11 AM are time of day at highest risk for error. (Donchin et al., 1995; Davydov, Caliendo, Mehl &amp; Smith, 2004; Fahimi et al., 2008; Fanikos, Cina, Barolleti, Fiumara, Matta, &amp; Goldhaber, 2007; Rogers, Hwang, Scott, Aiken, &amp; Dinges, 2004)</td>
</tr>
<tr>
<td>Type of order</td>
<td>Verbal Phone Written Computer</td>
<td>4</td>
<td>Computer orders are a permanent, accurate record of what has been prescribed. (Bates, Leape, Cullen, Laird, Petersen, Teich, et al., 1998; Evans, Petotnik, Classen, Clemmer, Weaver, Orme, et al., 1998; Crane &amp; Crane, 2006; Kuperman, Teich, Gandhi, &amp; Bates, 2001)</td>
</tr>
</tbody>
</table>
Ludwick, Wright, Zeller, Dowding, Lauder, and Winchell (2004) suggest that 10 to 15 independent variables and two to three dependent variables can be managed in the vignette. Each independent variable to be studied has multiple levels. Each level is randomly assigned to the vignette, thus resulting in literally thousands of unique vignettes (Ludwick et al., 2004). The vignette is economically reproduced (Hughes & Huby, 2002; Zeller, 2003) and allows the researcher to examine many factors that may impact the topic of interest (Ludwick et al., 2004). The variables with their levels created a $8 \times 2 \times 4 \times 3 \times 2 \times 3 \times 2 \times 2 \times 4 \times 4$ factorial design resulting in a factorial universe containing 442,368 cells. Each respondent received four unique vignettes sampled from this universe.

Essential to the success of using the factorial survey method is building a realistic vignette (Ludwick et al., 2004; Ludwick & Zeller, 2001). Using the following sample vignette format (Figure 3-1) and a program developed by Winchell the levels of the independent variables were randomly inserted into the vignette (Ludwick, Wright, Zeller, Dowding, Lauder, & Winchell, 2004) (Figure 3.2). Each level of the independent variable has an equal opportunity for inclusion resulting in a unique vignette.

You are preparing to administer medications at (time of day). Your patient is a (age) year old who is (level of cognition) and is (medical diagnosis). This patient is (nurse’s knowledge of patient) and is in (acuity) condition. The (prescriber), who is (nurse’s familiarity with the prescriber) had given a (type of order) order for (medication name\route\dose) that you are scheduled to administer now.

Figure 3.1 Sample Vignette Format
You are preparing to administer medications at 9 AM. Your patient is a 65 year old who is drowsy and has pneumonia. This patient is known to you and is in stable condition. The attending physician, who is not familiar to you, had given a phone order for Morphine 13 mg IV push that you are scheduled to administer now.

Figure 3.2 Sample of Variable Levels Inserted into a Vignette

Each nurse participant responded to two 'give away' vignettes and four unique, randomly generated vignettes. The first of the 'give away' vignettes was a 'worst case' scenario with anticipated result of a moderate score on conflict, a low score on administering the medication, and a high score on contacting the prescriber. The second giveaway vignette was a 'best case' scenario with an anticipated response of a moderate score on conflict, high score on administering the medication and a low score on contacting the prescriber. All surveys contained identical 'give away' vignettes. Ludwick, O’Toole, O’Toole and Webster (1999) recommended the use of 'give away' vignettes as study participants begin to read and respond to study materials. The use of the 'give away' vignettes allowed the participant to be familiar with survey format. Additionally, the 'give away' vignettes "decreases the bias or a mind-set that might result from reading the first vignette" (Ludwick, O’Toole, O’Toole, & Webster, 1999, p. 183).

Part B - Dependent Variables.

There are three dependent variables. The first dependent variable asked the registered nurse to what level they experienced conflict in determining whether or not to question the prescriber about an order. The second dependent variable question asked the nurse how likely they were to administer the medication as prescribed. The third dependent variable addressed the likelihood of the nurse contacting the prescriber to question the order. Each dependent variable was measured using a Likert-like scale from
zero to ten. After reading the vignette the participant was asked to answer the three dependent variable questions. Participants circled the appropriate number that reflected their decisions. The three questions served as the dependent variables in this study and are listed in Figure 3.3

<table>
<thead>
<tr>
<th>Question</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. To what level are you experiencing conflict in determining whether or not to question this order?</td>
<td>Very low conflict 0 1 2 3 4 5 6 7 8 9 10 Very high conflict</td>
</tr>
<tr>
<td>2. How likely are you to administer this medication as prescribed to this patient?</td>
<td>Very unlikely 0 1 2 3 4 5 6 7 8 9 10 Very likely</td>
</tr>
<tr>
<td>3. How likely are you to contact the prescriber to question this order?</td>
<td>Very unlikely 0 1 2 3 4 5 6 7 8 9 10 Very likely</td>
</tr>
</tbody>
</table>

Figure 3.3 Dependent Variables

The purpose of any study is to account for the variance in the dependent variables (Ludwick et al., 2004). Each dependent variable must therefore demonstrate sufficient variance to meet this goal (Ludwick & Zeller, 2001), thus the use of zero to ten for the Likert-like scale.

*Part C - Demographic Data.*

In Part C of the survey, each nurse participant was asked to complete information that would describe their personal and professional characteristics (See Appendix B). The level of education and years of experience as a registered nurse were two of the characteristics that were analyzed for their effect on the dependent variables. Additional demographic information was collected for the description of the sample (age, gender, racial/ethnic background, primary specialty area, average number of hours worked per
week, the shift that is generally worked, nursing certifications and professional nursing organization memberships).

Sample and Sample Size

Nurses working in medical/surgical or intensive care units were asked to participate in the study. The sample and sample size are discussed in this section.

Sample

A convenience sample of nurses working on medical/surgical or intensive care units caring for adult patients were asked to participate in this study. Three acute care facilities located in Northwest Ohio were involved in the study.

Sample size

In order to estimate the minimum number of vignettes needed for an appropriate analysis of the effect of the independent variables on the dependent variables in the primary study the computer program Sample Power 1.0 was used. The results calculated a sample of 400 vignettes that would be needed for a power of 0.82 with a moderate effect size of 0.07 of the variance. At least one hundred nurses would need to complete four unique vignettes.

For the three hospitals, 748 surveys (Hospital A - 208; Hospital B - 182; and Hospital C - 358) were given to nurse managers following the study protocol with 115 surveys returned by mail (15.4% return rate). The nurses completed 456 out of 460 (99% completion rate) randomly generated vignettes. This number was found to be sufficient for data analysis (See Chapter Four of this document).
Human Subject Protection Procedures

The study met all of the requirements of the Institutional Review Boards (IRB) of Kent State University (both pilot and primary study), ProMedica Health Systems and the Sisters of Mercy Northern Region (See Appendices C, D, and E). The studies were endorsed by the Chief Nursing Officer at each hospital and by the nurse managers of each unit. Per protocol of each system's IRB, a co-investigator was named to facilitate contacting the nurse managers and answer questions about the hospital. Each IRB approved the protocol for written consent being waived. When the individual registered nurse chose to return the completed survey this was interpreted as the consent for participating in the study.

Procedures

Procedures for the research included a pilot study and the primary study. The pilot study, like the primary study was conducted in Northwest Ohio. The purpose of the pilot study was to identify any problems with the study design, the survey materials, and to estimate the time it would take to complete the survey. Since no problems occurred it was determined to proceed with the primary study. Two nursing units were identified by the co-investigator (medical-surgical unit and one intensive care unit). Survey materials were placed into registered nurses’ mailboxes and after two weeks a reminder letter was also placed in mailboxes to once again ask nurses to participate in the study. It had been predetermined that 30 nurses were needed to complete four unique vignettes for the pilot study, but the minimum number of vignettes was not collected. Thus after IRB approval, pilot was expanded to other nursing units within the same facility and nurses attending competency marathons (annual nursing skills testing) were included in the pilot.
The primary study sample was registered nurses currently working on medical, surgical or intensive care units caring for adult patients in three acute care facilities in Northwest Ohio (the primary study hospitals were not a part of the pilot study sample). This was an essential criterion because the vignettes had descriptions of patient diagnoses in addition to medication dosages that would be appropriate only for adult populations. Since the cost of mailing and retrieving responses from each nurse in these organizations was prohibitive, research materials were placed in each eligible nurse’s mailbox on the nursing unit.

Initial contact to determine interest in participating in the studies was made by the principal investigator. Once assigned, the co-investigator identified the nursing units that met the study criteria. After approval from the appropriate IRB committees the nurse managers of the selected medical/surgical and intensive care units were contacted to explain the study procedures.

A sufficient number of study materials were given to the nurse managers to place in the mailboxes of registered nurses meeting the study criteria. The study materials included: a letter explaining the study (Appendix F and G), the survey, a self-addressed stamped envelope, and a small notepad (as an incentive) which could be kept whether or not the nurse participated in the study. Also given to the nurse managers was a box that was placed near the mailboxes so nurses who did not wish to complete the survey could return the study materials. The principal investigator attended as many unit meetings as possible to announce the study, explain the protocol, and enlist participation in the study. Colorful posters were also displayed in staff areas to remind nurses that the surveys were in their mailboxes. Periodic visits to the nursing units were made to remind nurses of the
study and collect any survey materials that were not completed by nurses. After two weeks a reminder was distributed to prompt nurses who had not completed the survey to please consider doing so. Since it was not known who had responded to the survey all nurses received the reminder.

Data Analysis

As the study surveys were returned information was entered into the computer program by the principal investigator. The data was managed through the use of a software program Statistical Package for the Social Sciences (SPSS 17.0). All data was coded and checked twice for accuracy. Both data from the pilot study and the primary study were analyzed separately using the processes described in the following paragraphs.

Part A of the survey asked the nurse to recall the last time they questioned a medication order. Specifically the nurses responded to multiple choice questions (cognitive status, patient stability, prescriber, and whether the prescriber was contacted) and fill in responses (patient age, primary diagnosis, drug questioned, time of day, why drug was questioned, were there concerns about questioning the medication and an area that allowed the nurse to give any additional information to explain the situation). The analysis of the multiple choice data used descriptive statistics to report findings. The fill in responses were summarized and common themes for each category were described. This information was examined to determine if the vignette variables used in this research study were representative of actual practice (establishes content validity). Any additional qualitative data (fill in questions) that nurses shared could be used to explain findings for the current study and provide information for investigation in future research.
Part B of the survey contained six vignettes. Each vignette constituted a unit of analysis for this study using factorial survey method (Ludwick & Zeller, 2001). Recall that the first two vignettes given to the study participants were not unique, that is, the vignettes were the same for each survey ('give away'). Means and standard deviations were run on the dependent variables for each of the two 'give away' vignettes (Lauder et al., 2006). As previously described the expectation was that the first of the 'give away' vignettes was a 'worst case' scenario with anticipated result of a high score on conflict, a low score on administering the medication, and a high score on contacting the prescriber. The second 'give away' vignette was a 'best case' scenario with an anticipated response of a low score on conflict, high score on administering the medication and a low score on contacting the prescriber.

The next four vignettes were randomly generated and each was unique. Patient and workplace variables found in the vignettes were analyzed for their effect on the three dependent variables (conflict to question medication order, administration of medication as ordered, and contacting prescriber). Specifically, multiple regressions were used to examine the influence of each patient and workplace factor on the dependent variables. Multiple regressions explain the variances, effect sizes and the significance of the study factors to the dependent variables (Ludwick & Zeller, 2001).

Dummy coding was done for all of the independent variables that were categorical and non-continuous. All sets of the dummy variables were used to predict the outcome variables (Ludwick et al., 2004; McNett, 2008). The regression used each level of independent variable minus one to predict the outcome measures. The statistical analysis program produced regression coefficients for each level of the independent
variable. These were evaluated through examination of the multiple correlation
regression coefficient $R^2$ (Ludwick & Zeller, 2001; Ludwick et al., 2004) and then the independent variables that have a significant effect on the dependent variable were identified. The significant independent variables were then analyzed using one way analysis of variance and post hoc testing to determine how different levels of each variable influenced nurses’ decisions (Ludwick & Zeller, 2001; Ludwick et al., 2004).

The third section of the survey collected nurse demographic information to describe the sample returning the surveys (age, gender, race/ethnic background, highest degree held, number of years working as a registered nurse, primary practice area, average number of hours worked per week, shift worked, certifications held and professional nursing organization memberships). Two variables (degree earned and years of practice) collected from the demographic information were analyzed for their effect on the dependent variables using multiple regression. Those nurse variables found to be significant were analyzed with one-way analysis of variance and post hoc tests. An additional analysis using two-step multiple regression was conducted to determine how the two nurse characteristics (degree held and years of experience) contributed to the expected variance. The additional demographics collected used descriptive statistics to describe the nurse sample responding to the survey.

Summary

Factorial survey uses an experimental design with the strength of a survey to find the factors influencing decisions for registered nurses’ medication management. Unique vignettes were developed from 12 independent variables with multiple levels describing a
medication management situation. This was a unique approach to study the experience of conflict in questioning medication orders and decisions that nurses make in medication management.
CHAPTER IV

RESULTS

Introduction

The purpose of this study was to identify factors (patient, workplace and nurse characteristics) influencing conflict and decisions in registered nurses' medication management. Specifically nurses were asked to review vignettes that described a medication management situation and respond to the level of conflict experienced when questioning the order, the likelihood that the medication would be administered as ordered, and the likelihood of the nurse contacting the prescriber to question the order. Registered nurses caring for adult patients in medical/surgical units and intensive care units in acute care hospitals in Northwest Ohio were asked to participate. This chapter briefly describes the results of the pilot study, followed by the data collected from the primary study that included and detailed the analysis of the last case and the vignettes.

Pilot Study

The purpose of the pilot study was to identify any problems with the research design, the survey materials, and to estimate the time that it would take to complete the survey. The individuals invited to participate were registered nurses working on medical/surgical or intensive care units in an acute care facility in Northwest Ohio. A total of 118 registered nurses received the survey materials with 30 (25%) surveys
returned. Nurses' responses to the survey were analyzed using the same procedures as the primary study. There were no unexplained issues with the pilot study results and a determination was made to proceed with the protocol for the primary study as described in Chapter Three of this document.

Primary Study

Registered nurses in three acute care facilities in Northwest Ohio were asked to participate in the primary study. These three institutions employ over 900 nurses meeting the study criteria of caring for adult patients in either a medical-surgical or intensive care unit. A convenience sample of nursing units was selected to receive the study materials. Seven hundred forty-eight study packets were distributed to registered nurses with 115 (15.4%) surveys returned. The individual return rate for each hospital was as follows: Hospital A, 208 registered nurses, 31 surveys returned (14.9%); Hospital B, 182 registered nurses, 31 surveys returned (17%); and Hospital C, 358 registered nurses, with 53 surveys (14.8%) returned.

Nurse Demographics

Nurses completing the study materials were asked to document demographic information regarding their personal and professional characteristics. A summary of this data can be found on Table 4.1. The ages of the nurses participating in the study were well-distributed across the four age categories. Nearly 60% of the nurses responding had an Associate's degree or a diploma as their highest degree. For 67% of respondents their primary practice area was a medical-surgical unit working greater than 36 hours per week (80.3%). The majority of respondents (53.9%) had greater than ten years experience as a
registered nurse (M = 13.9 years), 32 (28.8%) were certified in a nursing specialty and 24 (21.6%) were members of a professional organization.

Table 4.1

Summary of Nurse Demographic Data

<table>
<thead>
<tr>
<th>Nurse Characteristic</th>
<th>N</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20-30 years</td>
<td>28</td>
<td>24.8%</td>
</tr>
<tr>
<td>31-40 years</td>
<td>29</td>
<td>25.8%</td>
</tr>
<tr>
<td>41-50 years</td>
<td>28</td>
<td>24.8%</td>
</tr>
<tr>
<td>&gt; 51 years</td>
<td>28</td>
<td>24.8%</td>
</tr>
<tr>
<td><strong>Highest Degree</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Associate's Degree</td>
<td>52</td>
<td>45.2%</td>
</tr>
<tr>
<td>Diploma</td>
<td>15</td>
<td>13%</td>
</tr>
<tr>
<td>Bachelor's in Nursing</td>
<td>43</td>
<td>37.4%</td>
</tr>
<tr>
<td>Bachelor's in another area</td>
<td>4</td>
<td>3.5%</td>
</tr>
<tr>
<td>Master's in Nursing</td>
<td>1</td>
<td>0.9%</td>
</tr>
<tr>
<td><strong>Primary Practice Area</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medical/Surgical</td>
<td>75</td>
<td>67%</td>
</tr>
<tr>
<td>Intensive care</td>
<td>37</td>
<td>33%</td>
</tr>
</tbody>
</table>
Table 4.1

Summary of Nurse Demographic Data (cont.)

<table>
<thead>
<tr>
<th>Years as RN</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>0-2 years</td>
<td>115</td>
<td>17.4%</td>
</tr>
<tr>
<td>3-5 years</td>
<td>20</td>
<td>12.2%</td>
</tr>
<tr>
<td>6-10 years</td>
<td>14</td>
<td>16.5%</td>
</tr>
<tr>
<td>&gt; 10 years</td>
<td>62</td>
<td>53.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hours Worked Per Week</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 36</td>
<td>112</td>
<td>19.6%</td>
</tr>
<tr>
<td>&gt; 36</td>
<td>90</td>
<td>80.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Shift Worked</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>7 AM - 3 PM</td>
<td>8</td>
<td>7.1%</td>
</tr>
<tr>
<td>3 PM - 11 PM</td>
<td>1</td>
<td>.9%</td>
</tr>
<tr>
<td>7 AM - 7 PM</td>
<td>62</td>
<td>55.4%</td>
</tr>
<tr>
<td>7 PM - 7 AM</td>
<td>41</td>
<td>36.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Certifications</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>111</td>
<td>71.2%</td>
</tr>
<tr>
<td>Yes</td>
<td>32</td>
<td>28.8%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Member Nursing Professional Organization</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>87</td>
<td>78.4%</td>
</tr>
<tr>
<td>Yes</td>
<td>24</td>
<td>21.6%</td>
</tr>
</tbody>
</table>
Registered nurses were asked to recall the last time they questioned a medication order. Out of the 115 nurses responding to the survey, 96 (83.5%) completed all or part of the data on the last case. Of the 19 nurses not completing the last case, five wrote they could not recall an instance in which they questioned a medication order.

The average age of the patient involved in the last case was 61 years (range: 17-90 years old). Patient diagnoses were classified according to medical specialties with the top five reported as: gastrointestinal/urinary (24 cases, 25%); cardiac (16 cases, 16.7%); respiratory (11 cases, 11.5%); orthopedic (10 cases, 10.4%); and neurologic (10 cases, 10.4%). The majority of the patients were alert and oriented (n = 58; 60.4%) and were reported as being in stable condition (n = 82; 85%). The drugs being questioned most frequently by the nurses were listed in the following categories: cardiac (n=28, 29.1%); narcotic/analgesics (n=18, 18.8%); antipsychotics (n=14, 9.4%); anticoagulants (n=9, 8.3%); antibiotics (n=8, 8.3%); and insulin (n=8, 8.3%). Attending physicians' orders (n=51, 53.1%) were questioned more frequently than residents' orders. Seventy-two out of 96 nurses did call the prescriber to question the order. Nurses who did not call the prescriber reported contacting another department (pharmacy, radiology) to clarify orders, holding the medication for the day shift to clarify the order, following a protocol that had been previously established, using nursing judgment to hold the medication and one nurse documented the prescriber was not available to clarify the order.

Nurse respondents were asked to give rationale to explain why the order was questioned. Reasons for questioning medications were as follows: patient assessment findings negated the use of the drug or patient needed a higher dose of the medication
(41), unusual dose of medication or dosing schedule (37), route of the drug was not appropriate (8), results of abnormal laboratory reports (4), allergy to the ordered medication (2), and medication was not typically given on that unit (1).

Nurses were asked to describe concerns they had when questioning the medication. Approximately half of the respondents gave detailed explanations as to the rationale for calling. One nurse responded she did not have a concern because "we often question orders to ensure the best care for our patients". Another participant stated "If I would have given it (the medication) my patient's blood pressure could have dropped more and they could have had a cardiac arrest" and a third nurse stated "I caught it [the error] because I looked up a drug that was unfamiliar to me". Two nurses expressed concern with having to contact the prescriber because "the doctor would have an attitude due to the late call". Nurses also spoke positively about instances when after their rationale was shared the prescriber acknowledged the decision to call and changed or cancelled the medication order. Additionally, nurses described situations when the prescriber took the time to explain why the dose was ordered the way it was.

'Give Away' Vignettes

As previously described, the first two vignettes in the survey were 'give away' vignettes and were the same in each survey. Nurses were asked to respond to the questions (dependent variables) following the vignettes using a Likert Scale of zero to 10. Means and standard deviations were calculated on the dependent variables for each of the two 'give away' vignettes (Lauder et al., 2006). The expectation was that the first of the 'give away' vignettes was a 'worst case' scenario with anticipated result of a moderate
mean on conflict, a low mean on administering the medication, and a high mean on contacting the prescriber. The second 'give away' vignette was a 'best case' scenario with an anticipated response of a moderate mean on conflict, high mean on administering the medication and a low mean on contacting the prescriber. Table 4.2 Analysis of 'Give Away' Vignette Scores gives a summary of the responses to the dependent variables for the first two vignettes. The registered nurses responded as expected to the 'worst case' and 'best case' scenarios except for the level of conflict. Results of the 'give way' vignettes allowed nurses to become familiar the rating scale and make judgments about medication management.
Table 4.2

Analysis of 'Give Away' Vignette Scores

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Worst Case Vignette</th>
<th>Best Case Vignette</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conflict to Question</td>
<td>N = 115</td>
<td>N = 113</td>
</tr>
<tr>
<td></td>
<td>Mean = 7.84</td>
<td>Mean = 1.21</td>
</tr>
<tr>
<td></td>
<td>SD = 3.822</td>
<td>SD = 2.055</td>
</tr>
<tr>
<td>Administer Medication</td>
<td>N = 115</td>
<td>N = 115</td>
</tr>
<tr>
<td></td>
<td>Mean = 0.34</td>
<td>Mean = 8.90</td>
</tr>
<tr>
<td></td>
<td>SD = .907</td>
<td>SD = 1.921</td>
</tr>
<tr>
<td>Contact Prescriber</td>
<td>N = 115</td>
<td>N = 115</td>
</tr>
<tr>
<td></td>
<td>Mean = 9.86</td>
<td>Mean = 1.26</td>
</tr>
<tr>
<td></td>
<td>SD = .605</td>
<td>SD = 2.213</td>
</tr>
</tbody>
</table>

Correlations for Independent and Dependent Variables

When using the factorial survey method the vignette is the level of the analysis (Ludwick & Zeller, 2001). It is important to first establish that the independent variables in the vignette are not correlated. In order to show this statistically, correlation studies were run on all 12 independent variables (Appendix H). The results of this analysis showed no strong correlations between the patient and workplace vignette variables.
A second correlation analysis was performed on the dependent variables. Table 4.3 illustrates a moderate negative correlation between conflict to question the prescriber and administering the medication; and a moderate positive correlation between conflict to question and contacting the prescriber. There was a high negative correlation between administering the medication and contacting the prescriber. Although this finding can be interpreted that not giving a medication lead to the likelihood the prescriber would be contacted the reverse can also be true. Recall that 24 nurses in this study did not call the prescriber, but instead questioned other members of the health care team as to the appropriateness of the medication, followed an established protocol for medication administration, held the medication or deferred the follow-up to the nurses on the next shift.

Table 4.3

Correlations for Dependent Variables

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Conflict to question</td>
<td></td>
<td>-0.615**</td>
<td></td>
</tr>
<tr>
<td>2. Administer Medication</td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>3. Contact Prescriber</td>
<td></td>
<td>0.615**</td>
<td>-0.871**</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)

Introduction to Analysis of the Study Vignettes

As previously described, each registered nurse responded to four unique, randomly generated vignettes. A total of 456 vignettes were analyzed. Nurses
documented their answers to three questions (dependent variables) using a scale of zero to 10 as they would when making a decision in this situation.

The effect of the independent variables in the vignettes for each of the dependent variables was analyzed using multiple regressions. The categorical variables were dummy coded. Table 4.4 outlines the regression models used to analyze the independent and dependent variables associated with each hypothesis. If the regression model was significant (F statistic) an analysis of variance (ANOVA) was conducted on the factors with significant results. If the analysis of variance was significant post hoc comparisons using Fischer’s Least Significant Difference (LSD) was performed to compare each level mean.

Table 4.4
Models Analyzing the Independent and Dependent Variables with Associated Hypotheses

<table>
<thead>
<tr>
<th>Model</th>
<th>Independent Variable</th>
<th>Dependent Variable</th>
<th>Hypothesis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patient and Workplace Factors</td>
<td>Conflict to question</td>
<td>1a and 1b*</td>
</tr>
<tr>
<td>2</td>
<td>Patient and Workplace Factors</td>
<td>Administer medication</td>
<td>1a and 1b*</td>
</tr>
<tr>
<td>3</td>
<td>Patient and Workplace Factors</td>
<td>Contact prescriber</td>
<td>1a and 1b*</td>
</tr>
<tr>
<td>4</td>
<td>Nurse Characteristics</td>
<td>Conflict to question</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>Nurse Characteristics</td>
<td>Administer medication</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Nurse Characteristics</td>
<td>Contact prescriber</td>
<td>2</td>
</tr>
</tbody>
</table>

* 1a patient factors, 1b workplace factors
The next section of this paper documented the research questions and hypotheses for this study and described the statistical analysis of the unique, randomly generated vignettes and the relationship of the findings to the study hypotheses.

Research Questions, Hypotheses and Data Analysis

The purpose of this study was to identify the factors (patient, workplace and nurse characteristics) that influence the experience of conflict to question and registered nurses' decisions in medication management. Specifically the research questions and hypotheses were stated as follows:

Research Question One: What patient and workplace factors influenced conflict to question a medication order, registered nurses' decisions about the likelihood of administering the medication, and the likelihood of contacting the prescriber to question the order?

Hypothesis 1A stated when the following patient factors are present: age less than 55 years, stable condition, alert and oriented, post-op, and receiving normal doses of narcotics or antibiotics via any route the registered nurses experienced a moderate amount of conflict to question the order, increased the likelihood the medication was administered as ordered, and decreased the likelihood of contacting the prescriber to question the order.

Hypothesis 1B stated when the following workplace factors are present: Attending physician was familiar to the nurse, patient was known to the nurse, medication administration was on the evening and night shifts, and there was a computer generated medication order, registered nurses experienced a moderate amount of conflict to
question the order, increased the likelihood of administering the medication as ordered, and decreased the likelihood of contacting the prescriber to question the order.

*Model One.*

Multiple regression analysis was conducted on all independent variables (patient and workplace) to determine the effect on the dependent variable, level of conflict to question the prescriber. Note that independent variable patient age was recoded to clearly reflect the age range in the hypothesis (patient age 25 - 55 = level one; 65 - 95 = level two). Model one was significant (R=.370; R^2=.137; R^2_{adj}=.097; F (20, 434)=3.448, ρ=.000). In Table 4.5 two values of the vignette variables were found to be significant. All other variables were not significant.
Table 4.5
Model One: Multiple Regressions for Independent Variables and Conflict to Question

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>B</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>5.544</td>
<td>.894</td>
<td>6.201</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>age2(65-95)</td>
<td>-.602</td>
<td>.367</td>
<td>-.074</td>
<td>-1.641</td>
<td>.102</td>
</tr>
<tr>
<td>acuity2(unstable)</td>
<td>.545</td>
<td>.368</td>
<td>.067</td>
<td>1.479</td>
<td>.140</td>
</tr>
<tr>
<td>cognition2(coma)</td>
<td>.543</td>
<td>.516</td>
<td>.060</td>
<td>1.053</td>
<td>.293</td>
</tr>
<tr>
<td>cognition3(Confused)</td>
<td>-.648</td>
<td>.544</td>
<td>-.067</td>
<td>-1.192</td>
<td>.234</td>
</tr>
<tr>
<td>cognition4(Drowsy)</td>
<td>.542</td>
<td>.523</td>
<td>.059</td>
<td>1.036</td>
<td>.301</td>
</tr>
<tr>
<td>diagnosis2(Fx)</td>
<td>.062</td>
<td>.467</td>
<td>.007</td>
<td>.133</td>
<td>.894</td>
</tr>
<tr>
<td>diagnosis3(CA)</td>
<td>-.285</td>
<td>.452</td>
<td>-.034</td>
<td>-.631</td>
<td>.528</td>
</tr>
<tr>
<td>prescriber2(Resident)</td>
<td>.367</td>
<td>.370</td>
<td>.045</td>
<td>.992</td>
<td>.322</td>
</tr>
<tr>
<td>familiarity2(not)</td>
<td>.390</td>
<td>.372</td>
<td>.048</td>
<td>1.048</td>
<td>.295</td>
</tr>
<tr>
<td>knowledge1(new)</td>
<td>-.051</td>
<td>.374</td>
<td>-.006</td>
<td>-.137</td>
<td>.891</td>
</tr>
<tr>
<td>time1(9AM)</td>
<td>-.141</td>
<td>.529</td>
<td>-.016</td>
<td>-.267</td>
<td>.790</td>
</tr>
<tr>
<td>time2(4PM)</td>
<td>-.494</td>
<td>.538</td>
<td>-.053</td>
<td>-.919</td>
<td>.359</td>
</tr>
<tr>
<td>time4(4AM)</td>
<td>-.264</td>
<td>.535</td>
<td>-.028</td>
<td>-.493</td>
<td>.623</td>
</tr>
<tr>
<td>order1(Verbal)</td>
<td>.122</td>
<td>.510</td>
<td>.013</td>
<td>.239</td>
<td>.812</td>
</tr>
<tr>
<td>order2(phone)</td>
<td>-.411</td>
<td>.541</td>
<td>-.042</td>
<td>-.760</td>
<td>.448</td>
</tr>
<tr>
<td>order3(written)</td>
<td>.158</td>
<td>.517</td>
<td>.017</td>
<td>.305</td>
<td>.760</td>
</tr>
<tr>
<td>dose1(high)</td>
<td>2.204</td>
<td>.457</td>
<td>.255</td>
<td>4.822</td>
<td>.000</td>
</tr>
<tr>
<td>dose3(low)</td>
<td>.195</td>
<td>.453</td>
<td>.023</td>
<td>.430</td>
<td>.667</td>
</tr>
<tr>
<td>route1(IVP)</td>
<td>-.689</td>
<td>.453</td>
<td>-.081</td>
<td>-1.521</td>
<td>.129</td>
</tr>
<tr>
<td>route2(IVPB)</td>
<td>-2.172</td>
<td>.458</td>
<td>-.254</td>
<td>-4.740</td>
<td>.000</td>
</tr>
</tbody>
</table>

The regression showed that the following variables were significant: high dose (B = 2.204, ρ = .000) and the IVPB route (B = -2.172, ρ = .000). A one-way analysis of variance was then conducted for each of the significant, independent variables.

There were three levels of the medication dose: High, normal and low. A one way analysis of variance conducted on the three levels of drug dose was significant F (2, 452)
The highest level of conflict (mean = 6.82) was experienced when the order was for the high dose of the medications.

A post hoc test Fisher's Least Significant Difference (LSD) was conducted to compare the means of each level of the variable dose. Analysis of the data showed that the experience of conflict was significantly different with high doses of the medications when compared to the normal and low doses of the medications. There was no difference in conflict between the normal and low doses of medications.

Table 4.6
Results of One Way Analysis of Variance for Dose and Conflict to Question

<table>
<thead>
<tr>
<th>Independent Variable Dose</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High dose</td>
<td>148</td>
<td>6.82</td>
<td>3.948</td>
</tr>
<tr>
<td>Normal dose</td>
<td>154</td>
<td>4.86</td>
<td>3.885</td>
</tr>
<tr>
<td>Low dose</td>
<td>153</td>
<td>4.86</td>
<td>4.025</td>
</tr>
</tbody>
</table>

F (2, 452) = 12.371, \( \rho = .000 \)

There were three routes of administration for the medications: Intravenous push (IVP), Intravenous piggyback (IVPB), and oral. A one way analysis of variance conducted on the three levels of the drug route was significant F (2, 452) = 9.890, \( \rho = .000 \) (Table 4.7). The highest level of conflict (mean = 6.43) was experienced when the order was for the oral route of the medications.

The post hoc test Fisher's Least Significant Difference (LSD) was conducted to compare the means of each level of the variable route. Analysis of the data showed that the experience of conflict was significantly lower for medications given IVPB as
compared to medications given IVP or orally. Medications given IVP or orally experienced similar levels of conflict.

Table 4.7

Results of One Way Analysis of Variance for Route and Conflict to Question

<table>
<thead>
<tr>
<th>Independent Variable Route</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intravenous Push</td>
<td>159</td>
<td>5.73</td>
<td>3.68</td>
</tr>
<tr>
<td>Intravenous Piggyback</td>
<td>155</td>
<td>4.41</td>
<td>4.34</td>
</tr>
<tr>
<td>Oral</td>
<td>141</td>
<td>6.43</td>
<td>3.86</td>
</tr>
</tbody>
</table>

F (2, 452) = 9.890, ρ = .000

*Model Two.*

A multiple regression analysis was conducted on all independent variables to determine the effect on the dependent variable, likelihood of administering medication. The results showed this model was significant (R=.521; R²=.272; R² adj=.238; F (20, 435)=8.114, ρ=.000). In Table 4.8 three values of two vignette variables were significant. All other variables were not significant.
Table 4.8

Model Two: Multiple Regressions for Independent Variables and Administer Medication

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>B</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>2.747</td>
<td>.773</td>
<td>.021</td>
<td>3.551</td>
<td>.000</td>
</tr>
<tr>
<td>age2(65-95)</td>
<td>.160</td>
<td>.317</td>
<td>-.024</td>
<td>-.505</td>
<td>.614</td>
</tr>
<tr>
<td>acuity2(unstable)</td>
<td>-.181</td>
<td>.318</td>
<td>-.074</td>
<td>-1.408</td>
<td>.160</td>
</tr>
<tr>
<td>cognition2(coma)</td>
<td>-.627</td>
<td>.445</td>
<td>-.024</td>
<td>-.569</td>
<td>.570</td>
</tr>
<tr>
<td>cognition3(Confused)</td>
<td>.441</td>
<td>.470</td>
<td>.048</td>
<td>.937</td>
<td>.349</td>
</tr>
<tr>
<td>cognition4(Drowsy)</td>
<td>-.305</td>
<td>.453</td>
<td>-.035</td>
<td>-.674</td>
<td>.501</td>
</tr>
<tr>
<td>diagnosis2(Fx)</td>
<td>.672</td>
<td>.403</td>
<td>.082</td>
<td>1.669</td>
<td>.096</td>
</tr>
<tr>
<td>diagnosis3(CA)</td>
<td>.710</td>
<td>.391</td>
<td>.090</td>
<td>1.816</td>
<td>.070</td>
</tr>
<tr>
<td>prescriber2(Resident)</td>
<td>-.553</td>
<td>.320</td>
<td>-.073</td>
<td>-1.729</td>
<td>.085</td>
</tr>
<tr>
<td>familiarity2(not)</td>
<td>.014</td>
<td>.321</td>
<td>.002</td>
<td>.044</td>
<td>.965</td>
</tr>
<tr>
<td>knowledge1(new)</td>
<td>.176</td>
<td>.323</td>
<td>.023</td>
<td>.544</td>
<td>.587</td>
</tr>
<tr>
<td>time1(9AM)</td>
<td>-.138</td>
<td>.458</td>
<td>-.016</td>
<td>-.301</td>
<td>.763</td>
</tr>
<tr>
<td>time2(4PM)</td>
<td>.764</td>
<td>.465</td>
<td>.087</td>
<td>1.642</td>
<td>.101</td>
</tr>
<tr>
<td>time4(4AM)</td>
<td>.221</td>
<td>.462</td>
<td>.025</td>
<td>.478</td>
<td>.633</td>
</tr>
<tr>
<td>order1(verbal)</td>
<td>-.462</td>
<td>.441</td>
<td>-.054</td>
<td>-1.048</td>
<td>.295</td>
</tr>
<tr>
<td>order2(phone)</td>
<td>.245</td>
<td>.468</td>
<td>.027</td>
<td>.523</td>
<td>.601</td>
</tr>
<tr>
<td>order3(written)</td>
<td>-.225</td>
<td>.447</td>
<td>-.026</td>
<td>-.504</td>
<td>.614</td>
</tr>
<tr>
<td>dose1(high)</td>
<td>-3.096</td>
<td>.394</td>
<td>-.380</td>
<td>-7.855</td>
<td>.000</td>
</tr>
<tr>
<td>dose3(low)</td>
<td>-.539</td>
<td>.391</td>
<td>-.067</td>
<td>-1.377</td>
<td>.169</td>
</tr>
<tr>
<td>route1(IVP)</td>
<td>1.749</td>
<td>.392</td>
<td>.219</td>
<td>4.462</td>
<td>.000</td>
</tr>
<tr>
<td>route2(IVPB)</td>
<td>3.539</td>
<td>.395</td>
<td>.441</td>
<td>8.952</td>
<td>.000</td>
</tr>
</tbody>
</table>

The regression showed that the following variables were significant: High dose (B = -3.096, ρ < .000), IVP route (B = 1.749, ρ < .000), and IVPB route (B = 3.539, ρ < .000).

A One Way Analysis of Variance was then conducted for each significant variable.
A one-way ANOVA conducted for the variable dose was significant F (2, 453) = 24.542, \( \rho = .000 \) (Table 4.9). High doses of medications were less likely to be administered (Mean = 1.87).

The post hoc test Fisher's Least Significant Difference (LSD) was conducted to compare the means of each level of the variable dose. Analysis of the results showed that high doses of medications were less likely to be administered and differed significantly from normal and low doses in the likelihood of being administered. The likelihood of normal and low doses of medications being administered was similar.

Table 4.9
Results of One Way Analysis of Variance for Dose and Administer Medication

<table>
<thead>
<tr>
<th>Independent Variable Dose</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>148</td>
<td>1.87</td>
<td>2.951</td>
</tr>
<tr>
<td>Normal</td>
<td>155</td>
<td>4.54</td>
<td>3.826</td>
</tr>
<tr>
<td>Low</td>
<td>153</td>
<td>4.27</td>
<td>4.005</td>
</tr>
</tbody>
</table>

F (2, 453) = 24.542, \( \rho = .000 \)

A one-way ANOVA conducted for route of the medication was significant F (2, 453) = 28.524, \( \rho = .000 \) (Table 4.10). The oral medications were least likely to be administered (Mean = 1.91).

The post hoc test Fisher's Least Significant Difference (LSD) was conducted to compare the means of each level of the variable route. Analysis of the data showed that each route differed significantly in the likelihood of being administered.
Table 4.10

Results of One Way Analysis of Variance for Route and Administer Medication

<table>
<thead>
<tr>
<th>Independent Variable Route</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intravenous Push</td>
<td>159</td>
<td>3.60</td>
<td>3.549</td>
</tr>
<tr>
<td>Intravenous Piggyback</td>
<td>156</td>
<td>5.08</td>
<td>4.280</td>
</tr>
<tr>
<td>Oral</td>
<td>141</td>
<td>1.91</td>
<td>2.740</td>
</tr>
</tbody>
</table>

F (2, 453) = 28.524, \( \rho = .000 \)

*Model Three.*

Multiple regression analysis for the third model was conducted on all independent variables to determine the effect on the dependent variable, likelihood of contacting the prescriber. The results showed this model was significant (\( R^2=.479; \ R^2_{adj}=.194; \ F(20, 434)=6.463, \ \rho=.000 \)). In Table 4.11 four values of three of the vignette variables were found to be significant. All other variables were not significant.
Table 4.11
Model Three: Multiple Regressions for Independent Variables and Contact Prescriber

<table>
<thead>
<tr>
<th>Independent Variables</th>
<th>B</th>
<th>SE</th>
<th>Beta</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>7.295</td>
<td>.826</td>
<td>.8830</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>age2(65-95)</td>
<td>.085</td>
<td>.339</td>
<td>.011</td>
<td>.251</td>
<td>.802</td>
</tr>
<tr>
<td>acuity2(unstable)</td>
<td>.343</td>
<td>.340</td>
<td>.043</td>
<td>1.009</td>
<td>.314</td>
</tr>
<tr>
<td>cognition2(coma)</td>
<td>.601</td>
<td>.475</td>
<td>.068</td>
<td>1.265</td>
<td>.207</td>
</tr>
<tr>
<td>cognition3(Confused)</td>
<td>-.357</td>
<td>.504</td>
<td>-.037</td>
<td>-.708</td>
<td>.479</td>
</tr>
<tr>
<td>cognition4(Drowsy)</td>
<td>.269</td>
<td>.483</td>
<td>.030</td>
<td>.556</td>
<td>.579</td>
</tr>
<tr>
<td>diagnosis2(Fx)</td>
<td>-.481</td>
<td>.431</td>
<td>-.057</td>
<td>-1.117</td>
<td>.265</td>
</tr>
<tr>
<td>diagnosis3(CA)</td>
<td>-.845</td>
<td>.418</td>
<td>-.103</td>
<td>-2.023</td>
<td>.044</td>
</tr>
<tr>
<td>prescriber2(Resident)</td>
<td>.481</td>
<td>.342</td>
<td>.061</td>
<td>1.407</td>
<td>.160</td>
</tr>
<tr>
<td>familiarity2(not)</td>
<td>.141</td>
<td>.343</td>
<td>.018</td>
<td>.412</td>
<td>.680</td>
</tr>
<tr>
<td>knowledge1(new)</td>
<td>.046</td>
<td>.346</td>
<td>.006</td>
<td>.133</td>
<td>.894</td>
</tr>
<tr>
<td>time1(9AM)</td>
<td>.067</td>
<td>.489</td>
<td>.008</td>
<td>.138</td>
<td>.891</td>
</tr>
<tr>
<td>time2(4PM)</td>
<td>-.667</td>
<td>.497</td>
<td>-.073</td>
<td>-1.342</td>
<td>.180</td>
</tr>
<tr>
<td>time4(4AM)</td>
<td>-.617</td>
<td>.495</td>
<td>-.067</td>
<td>-1.247</td>
<td>.213</td>
</tr>
<tr>
<td>order1(verbal)</td>
<td>.577</td>
<td>.472</td>
<td>.065</td>
<td>1.222</td>
<td>.223</td>
</tr>
<tr>
<td>order2(phone)</td>
<td>-.392</td>
<td>.500</td>
<td>-.041</td>
<td>-.784</td>
<td>.434</td>
</tr>
<tr>
<td>order3(written)</td>
<td>.204</td>
<td>.478</td>
<td>.023</td>
<td>.428</td>
<td>.669</td>
</tr>
<tr>
<td>dose1(high)</td>
<td>2.861</td>
<td>.422</td>
<td>.339</td>
<td>6.785</td>
<td>.000</td>
</tr>
<tr>
<td>dose3(low)</td>
<td>.455</td>
<td>.419</td>
<td>.054</td>
<td>1.088</td>
<td>.277</td>
</tr>
<tr>
<td>route1(IVP)</td>
<td>-1.334</td>
<td>.419</td>
<td>-.161</td>
<td>-3.181</td>
<td>.002</td>
</tr>
<tr>
<td>route2(IVPB)</td>
<td>-3.328</td>
<td>.422</td>
<td>-.399</td>
<td>-7.881</td>
<td>.000</td>
</tr>
</tbody>
</table>

The regression showed that the following variables were significant: Medical diagnosis (patient one day post bowel resection for cancer) ($B = -.845$, $p = .044$), high dose ($B = 2.861$, $p = .000$), IVP route ($B = -1.334$, $p = .002$), and IVPB route ($B = -3.328$, $p = .000$). One-way ANOVAs were then conducted for all three of the independent variables.
There were three levels for medical diagnosis: a patient with pneumonia; patient that was one day post auto accident with a skull fracture; and a patient who was one day post-surgery for bowel resection for cancer. A one-way ANOVA conducted for medical diagnosis was not significant $F(2, 452) = 1.869, \rho = .155$. Because the results of the one-way ANOVA were not significant no post hoc tests were conducted. Although one of the medical diagnoses was found to be significant in the multiple regression analysis (patient who is one day post bowel resection for cancer) further testing identified that knowledge of the medical diagnosis did not influence the likelihood of contacting the prescriber in this study.

A one-way ANOVA conducted for the variable dose was significant $F (2, 452) = 19.658, \rho = .000$ (Table 4.12). Results indicated that prescribers were more likely to be contacted for high doses of medications (Mean = 8.45).

The post hoc test Fisher's Least Significant Difference (LSD) was conducted to compare the means of each level of the variable dose. Analysis of the results showed that high doses of medications were significantly different from normal and low doses in the likelihood of the prescriber being contacted. Additionally, normal and low doses of medications were similar to each other in the likelihood that the prescriber would be contacted.
Table 4.12

Results of One Way Analysis of Variance for Dose and Contacting Prescriber

<table>
<thead>
<tr>
<th>Independent Variable Dose</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>148</td>
<td>8.45</td>
<td>3.009</td>
</tr>
<tr>
<td>Normal</td>
<td>154</td>
<td>6.01</td>
<td>4.020</td>
</tr>
<tr>
<td>Low</td>
<td>153</td>
<td>6.11</td>
<td>4.253</td>
</tr>
</tbody>
</table>

F (2, 452) = 19.658, p = .000

A one-way ANOVA conducted for route of the medication was significant F (2, 452) = 23.416, p = .000 (Table 4.13). Prescribers were significantly more likely to be contacted for medications given orally (Mean = 8.30).

The post hoc test Fisher's Least Significant Difference (LSD) was conducted to compare the means of each level of the variable route. Analysis of the data showed that each route differed significantly from each other in the likelihood of the prescriber being contacted.

Table 4.13

Results of One Way Analysis of Variance for Route and Contacting Prescriber

<table>
<thead>
<tr>
<th>Independent Variable Route</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intravenous Push</td>
<td>158</td>
<td>7.03</td>
<td>3.634</td>
</tr>
<tr>
<td>Intravenous Piggyback</td>
<td>156</td>
<td>5.31</td>
<td>4.601</td>
</tr>
<tr>
<td>Oral</td>
<td>141</td>
<td>8.30</td>
<td>2.802</td>
</tr>
</tbody>
</table>

F (2, 452) = 23.416, p = .000
Hypothesis 1a is partially supported because the normal doses of drugs contributed to moderate levels of conflict (mean = 4.86). Post hoc tests identified that nurses experienced similar levels of conflict when making decisions about normal and low doses of medications and medications that were given IVP and orally. Hypothesis 1a was not supported because the patient variables: age, acuity, level of cognition, and medical diagnosis were not significant.

Hypothesis 1a was partially supported because the normal doses of medication had a higher likelihood of being administered. Normal and low doses of medications had similar likelihood of being administered. Each route of medication differed significantly in the likelihood of being administered. None of the other patient variables were significant.

Hypothesis 1a was partially supported given that nurses were less likely to contact the prescriber for normal doses of medications than higher doses. However, normal and low doses of medication were similar to each other in the likelihood of the prescriber being contacted by the nurses. Although the variable medical diagnosis (post surgery patient with cancer) was significant in the regression model, further testing found it not to contribute to the likelihood of the prescriber being contacted. Prescribers were more likely to be contacted for oral medications. The remaining patient vignette variables were not significant.

Hypothesis 1b was not supported because workplace factors (prescriber, knowledge of patient, knowledge of prescriber, time of day and type of order) were not significant for the experience of conflict, likelihood of administering medication, and likelihood of contacting the prescriber.
Regression models four through six addressed the second research question and hypothesis. The second research question was: What registered nurses’ characteristics influenced the level of conflict to question an order, the likelihood a medication would be administered as ordered, and the likelihood of contacting the prescriber to question the order? Hypothesis Two stated registered nurses with the following characteristics: a baccalaureate degree or higher and greater than five years of nursing experience will have a moderate level of conflict in questioning the order, increase the likelihood of administration of the medication as ordered, and decrease the likelihood of contacting the prescriber to question the order. This next section of the document tested the effect of two of the nurse demographic criteria on the dependent variables.

*Model Four.*

Multiple regression analysis was conducted for two of the nurses' demographic criteria (years working as a registered nurse and degree held) to determine the effect on the dependent variable, experience of conflict to question the order. The variable degree held was re-coded to reflect nurses without a baccalaureate degree (Associate Degree and Diploma nurses) as level one and nurses with a baccalaureate degree and higher as level two. This was done to better explain the prediction in Hypothesis Two. The results showed this model was significant ($R=0.184$; $R^2=0.034$; $R^2_{adj}=0.030$; $F (2, 452)=7.942$, $p=0.000$).
Table 4.14

Model Four: Multiple Regressions for Nurse Characteristics (Years of Experience and Degree Held) and Experience of Conflict

<table>
<thead>
<tr>
<th>Nurse Characteristic</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>ρ</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>6.483</td>
<td>.354</td>
<td>18.293</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>years working as RN</td>
<td>-.029</td>
<td>.018</td>
<td>-.074</td>
<td>-1.592</td>
<td>.112</td>
</tr>
<tr>
<td>rndeg2</td>
<td>-1.413</td>
<td>.380</td>
<td>-.172</td>
<td>-3.722</td>
<td>.000</td>
</tr>
</tbody>
</table>

The regression showed that the following variable was significant: Baccalaureate degree and higher (B = -1.413, ρ = .000). An ANOVA was then conducted for degree held.

A one-way ANOVA was conducted with the results found to be significant F (1, 453)=13.306, ρ=.000. Table 4.15 identified there was a significant difference between the conflict experienced with non-baccalaureate prepared nurses and nurses with a baccalaureate degree or higher. Nurses in this sample with baccalaureate degrees or higher have a lower level of conflict with questioning a medication order (Mean = 4.69).

Table 4.15

Results of One Way Analysis of Variance for Nurse Characteristic Degree Held and Conflict to Question

<table>
<thead>
<tr>
<th>Highest Degree Held</th>
<th>N</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Associate/diploma</td>
<td>265</td>
<td>6.08</td>
<td>4.070</td>
</tr>
<tr>
<td>Baccalaureate and Higher</td>
<td>190</td>
<td>4.69</td>
<td>3.893</td>
</tr>
</tbody>
</table>
**Model Five.**

Multiple regression analysis was conducted for years working as a registered nurse and highest degree held to determine the effect on the dependent variable, likelihood of administering the medication. The results showed this model was not significant ($R=.101$; $R^2=.010$; $R^2_{adj}=.006$; $F (2, 453)=2.335, p=.098$). In Table 4.16 years of experience as a registered nurse and degree held were not influencing factors for the decision to administer a medication in this study.

Table 4.16

Model Five: Multiple Regressions for Nurse Characteristics (Years of Experience and Degree Held) and Administration of Medication

<table>
<thead>
<tr>
<th>Nurse Characteristic</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>3.874</td>
<td>.338</td>
<td>11.472</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>years working as RN</td>
<td>-.032</td>
<td>.017</td>
<td>-.087</td>
<td>-1.867</td>
<td>.063</td>
</tr>
<tr>
<td>rndeg2</td>
<td>.363</td>
<td>.361</td>
<td>.047</td>
<td>1.006</td>
<td>.315</td>
</tr>
</tbody>
</table>

**Model Six.**

Multiple regression analysis was conducted for ‘years working as a registered nurse’ and ‘degree held’ to determine the effect on the dependent variable, likelihood of contacting the prescriber. The results showed this model was not significant ($R=.054$; $R^2=.003$; $R^2_{adj}=.001$; $F (2, 452)=.661, p=.517$). In Table 4.17 years of experience as a registered nurse and degree held in this sample of nurses were not influencing factors for deciding to contact a prescriber.
Table 4.17

Model Six: Multiple Regressions for Nurse Characteristics (Years of Experience and Degree Held) and Contacting the Prescriber

<table>
<thead>
<tr>
<th>Nurse Characteristics</th>
<th>B</th>
<th>SE</th>
<th>β</th>
<th>t</th>
<th>ρ</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Constant)</td>
<td>6.678</td>
<td>.352</td>
<td>18.969</td>
<td>.000</td>
<td></td>
</tr>
<tr>
<td>years working as RN</td>
<td>.018</td>
<td>.018</td>
<td>.046</td>
<td>.985</td>
<td>.325</td>
</tr>
<tr>
<td>rndeg2</td>
<td>-.206</td>
<td>.377</td>
<td>-.026</td>
<td>-.547</td>
<td>.585</td>
</tr>
</tbody>
</table>

Summary.

Hypothesis Two stated: Registered nurses with the following characteristics: a baccalaureate degree or higher and greater than five years of nursing experience will have a moderate level of conflict in questioning the order, increase the likelihood of administration of the medication as ordered, and decrease the likelihood of contacting the prescriber to question the order. Hypothesis Two was partially supported in that the nurse characteristic degree held was found to be significant for experience of conflict in questioning the medication order. Specifically, nurses with a baccalaureate degree or higher experienced conflict significantly differently than nurses with an Associate’s Degree or diploma. Although both education levels for degree held experienced moderate levels of conflict, the nurses with baccalaureate degrees or higher experienced lower levels of conflict. The demographic characteristic years of experience was found to have no effect on the level of conflict. The nurse demographic categories of years of experience as a registered nurse and degree held were found not to influence the likelihood of administering a medication or contacting the prescriber.
Two-step Regressions for Vignette Variables and Nurse Demographics

Two-step regressions were conducted to determine if the two demographic categories of 'years of experience as a registered nurse' and 'degree held' added to the explained variance for patient and workplace factors and their effect on the three dependent variables (conflict to question, administering medication and questioning the prescriber). The next section of this document describes the results of this analysis for each dependent variable.

A two-step multiple regression was conducted entering the regression data from Model One (Table 4.5, patient and workplace factors) in the first block and the nurse demographic categories (years of experience as a registered nurse and degree held) in the second block to determine the variance for conflict to question. The results of the first block were the same as Table 4.5 ($R=.370; R^2=.137; R^2_{adj}=.097; F (20, 434)=3.448, \rho=.000$) with the patient and workplace variables explaining 9.7% of the variance in the experience of conflict to question a medication order. The nurse demographic variables added in the second block were found to significantly increase the explained variance for the dependent variable conflict to question by 3.3% (Table 4.18).
Table 4.18

Two-step Regression with Years as a Registered Nurse and Degree Held Added for Conflict to Question

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>F Change</th>
<th>$\rho$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.370</td>
<td>.137</td>
<td>.109</td>
<td>.137</td>
<td>3.448</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>.413</td>
<td>.171</td>
<td>.128</td>
<td>.033</td>
<td>8.722</td>
<td>.000</td>
</tr>
</tbody>
</table>

(Step 1: $F(20, 434) = 3.448; \rho = .000$; Step 2: $F(22, 432) = 4.039; \rho = .000$)

A two-step multiple regression was conducted entering the data from regression Model Two (Table 4.8) into block one and adding the nurse demographic criteria into block two to determine the variance for administration of medication. The results of the first step regression were the same as Table 4.8 ($R = .521; R^2 = .272; R^2_{adj} = .238; F(20, 435) = 8.114, \rho = .000$). The results of adding the nurse demographics to the first step (Table 4.19) showed although there was an increase in the variance explained for the likelihood administering the medication, this result was not statistically significant ($\rho = .158$).

Table 4.19

Two-step Regression with Years as a Registered Nurse and Degree Held Added for Administer Medication

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>$R^2$</th>
<th>Adjusted $R^2$</th>
<th>$R^2$ Change</th>
<th>F Change</th>
<th>$\rho$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.521</td>
<td>.272</td>
<td>.238</td>
<td>.272</td>
<td>8.114</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>.527</td>
<td>.278</td>
<td>.241</td>
<td>.006</td>
<td>1.853</td>
<td>.158</td>
</tr>
</tbody>
</table>

(Step 1: $F(20, 435) = 8.114; \rho = .000$; Step 2: $F(22, 433) = 7.573; \rho = .000$)

A two-step multiple regression was conducted entering the regression data from regression Model Three (Table 4.11) into block one and adding the nurse demographic
criteria into block two to determine the variance of contacting the prescriber. The results of the first model were the same as Table 4.11. \((R=.479; R^2=.229; R^2_{\text{adj}}=.194; F(20, 434)=6.463, \rho=.000)\). The results (Table 4.20) showed that although the nurse demographic criteria increased the variance explained in contacting the prescriber this result was not statistically significant \((\rho=.698)\).

Table 4.20

Two-step Regression with Years as a Registered Nurse and Degree Held Added for Contacting Prescriber

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>(R^2)</th>
<th>Adjusted (R^2)</th>
<th>(R^2) Change</th>
<th>F Change</th>
<th>(\rho)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.479</td>
<td>.229</td>
<td>.194</td>
<td>.229</td>
<td>6.463</td>
<td>.000</td>
</tr>
<tr>
<td>2</td>
<td>.480</td>
<td>.231</td>
<td>.192</td>
<td>.001</td>
<td>.359</td>
<td>.698</td>
</tr>
</tbody>
</table>

(Step 1: F(20, 434)=6.463; \(\rho=.000\); Step 2: F(22, 432)=5.891; \(\rho=.000\))

Two nurse characteristics (years as a registered nurse and degree held) were added to the regression models for patient and workplace variables (Models One thru Three). Nurses' characteristics contributed to the explained variance for all dependent variables (experience of conflict to question the prescriber, likelihood of administrating the medication and contacting the prescriber), however, only one model was significant. Nurse characteristic (degree held) contributed significantly to the experience of conflict to question the medication.

Summary for Hypothesis Testing

Regression Models One through Six focused on answering two research questions. Question one asked what patient and workplace factors influence the conflict to question a medication order, administer a medication and contact a prescriber (dependent
variables). Question two asked how two nurse demographic factors (years as a registered nurse and degree held) influence these same dependent variables. Table 4.21 summarized the results of the analysis of the vignette variables and the nurse characteristics. Further discussion of the results of this analysis can be found in Chapter Five of this document.
Table 4.21
Summary of Hypotheses in Relation to the Vignette Variables and Nurse Characteristics

<table>
<thead>
<tr>
<th>Dependent Variables →</th>
<th>Conflict to Question</th>
<th>Administer Medication</th>
<th>Contact Prescriber</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Independent Variables ↓</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hypothesis 1A</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Acuity</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Cognition</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Medical Diagnosis</td>
<td>NS</td>
<td>NS</td>
<td>NS*</td>
</tr>
<tr>
<td>Drug</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Dose</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
</tr>
<tr>
<td>Route</td>
<td>PS</td>
<td>PS</td>
<td>PS</td>
</tr>
<tr>
<td>Hypothesis 1B</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Workplace Factors</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Prescriber</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Familiarity with prescriber</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
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<tr>
<td>Knowledge of patient</td>
<td>NS</td>
<td>NS</td>
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</tr>
<tr>
<td>Time of day</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Type of order</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Hypothesis 2</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Nurse Characteristic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Years as registered nurse</td>
<td>NS</td>
<td>NS</td>
<td>NS</td>
</tr>
<tr>
<td>Degree Held</td>
<td>S</td>
<td>NS</td>
<td>NS</td>
</tr>
</tbody>
</table>

S-supported; NS-not supported; PS – partially supported  
*Significant in regression, but ANOVA and post hoc tests NS
CHAPTER V
DISCUSSION

Introduction

The purpose of this study was to identify factors (patient, workplace, and nurse characteristics) influencing registered nurses’ judgments and decisions for medication management. The study was guided by the Conflict Theory of Decision-making and contributed to the knowledge of the experience of conflict and the decisions made in medication management. This section of the paper was organized for the discussion of general study findings, the use of factorial survey method for hypotheses testing and the Conflict Theory, the significance (nursing knowledge, education and method), limitations and implications for further research.

General Study Findings

For the purposes of the primary study, 748 survey packets were distributed to staff nurses at three acute care facilities in Northwest Ohio. The return rate for the surveys was 15.4% (N = 115). One would question the reasons for this low return rate. A factor that may have been important in the return rate was the low patient census at one of the acute care facilities (may have occurred at the other institutions also, but was not identified). Two of the five units at one facility were closed during the study period with a resulting decrease in nurse staffing. Although the nurse manager stated that the nurses from the
unit were working in other areas of the facility, they may have not known about the study or had an opportunity to go to their mailboxes on their home nursing unit. Secondly, medication management and specifically the identification of medication errors is a controversial subject. It is surmised that the topic of medication management may have been uncomfortable for some nurses because of the culture of blame that surrounds this issue. The staff nurses were an essential resource for identifying what may have influenced decisions about medication management, but had a choice whether or not to participate in the study. Policies of the institution should reflect that faulty system designs are frequently the cause of medication errors and activities developed should reflect quality improvement in these areas (Cullen, Bates & Leape, 2000; Leape et al., 1995; Tissot et al., 1999; Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth & Kanjanarat, 2004).

The nurses' qualitative responses in the ‘Last Case’ to the reasons for questioning the medication orders reinforced current research findings about the importance of the nurses' role in the medication management process (Beuscart-Zephir, Pelayo, Anceaux, Maxwell, & Guerlinger, 2007; Eisenhauer, Hurley, & Dolan, 2007; Manias, Aitken, &Dunning 2004a). Several nurses took the time to give detailed accounts of their reasons for questioning an order. Their rationale included: Findings that negated the use of the drug; the patient needed a higher dose of the medication; an unusual dose of the medication or dosing schedule; route of the drug was not appropriate; nurses were alerted to abnormal laboratory results; patients had allergies to the ordered medication; and the medication was not typically given on that particular unit. The nurses’ rationales were
similar to the reasons documented for reported medication errors (Winterstein, Johns, Rosenberg, Hatton, Gonzalez-Roth, & Kanjanaret, 2004).

Nurses also identified concerns related to the negative responses of prescribers being questioned about their orders. Two nurses expressed concern about having to contact the prescriber because this would result in a poor attitude by the prescriber for the late call. This was supported by the literature (Arford, 2005; Attree, 2007; Cook, Hoas, Guttmannova, & Joyner, 2004; Chase, 1995; Coombs & Ersser, 2004; Jenks, 1993). Conversely, the current study identified situations where nurses and prescribers shared rationale for decision-making as it relates to medication management with interpersonal communication enhanced and errors prevented (CCNE, 2008; IOM 2000, 2004a, 2004b, 2007).

Factorial Survey, Hypothesis Testing and the Conflict Theory

This study used the factorial survey method to examine factors influencing nurses’ experiences of conflict and decisions in medication management. Two hypotheses were suggested to predict the effect of patient and workplace factors in addition to nurses’ characteristics on the experience of conflict to question an order; the likelihood the medication would be administered; and the likelihood the prescriber would be contacted. Hypothesis One reflected the prediction of patient and workplace vignette variables and Hypothesis Two addressed the nurse characteristics and the effect on the three dependent variables. Significant findings will be discussed in relation to the hypotheses, The Conflict Theory of Decision-making (where appropriate) and the findings from the literature (when available).
Experience of Conflict

The patient vignette variables of dose and route were found to significantly influence the experience of conflict to question the medication order. When nurses were confronted with making a decision about a high dose of medication there was a significantly higher level of conflict experienced than low or normal doses of the medication. The level of conflict experienced for high doses of medication was in the moderate range (M = 6.82) (recall the scale presented in Chapter Two of this document: zero equals no conflict; one to three equals low level of conflict; four to seven equals a moderate level of conflict; and eight to ten equals a high level of conflict). The normal and low doses of medication were similar in the level of conflict experienced (M = 4.86 for both). One might expect that the low and high doses of medication might produce similar levels of conflict since they would not be appropriate dosages for patients. Perhaps in this study nurses were not as aware of the lower range of the drug so as to experience conflict with the dose. Giving a low dose of a medication is a med error. Low doses of an antibiotic would produce low drug therapeutic levels which would not be effective in prophylaxis or active treatment of an infection (Lehne, 2004). Similarly, low doses of pain medication may result in a patient’s pain management needs not being met (Lehne, 2004).

The route of the drug was also found to significantly influence the experience of conflict for the registered nurse. There were three routes for the drugs in the vignettes; intravenous push (IVP), intravenous piggyback (IVPB) and oral. Statistical analysis of the data showed that there was a significant difference in the experience of conflict for IVPB medications as compared to medications given orally or IVP. Both oral and IVP
medications were similar to each other in the experience of conflict for nurses. Although all three means for route were in the moderate range (IVP, M = 5.73; IVPB, M = 4.41; M = 6.43), nurses experienced the lowest level of conflict for medications given IV piggyback and the highest level of conflict for medications given orally. This is a surprising finding since Lehne (2004) identified that intravenous medication can be dangerous if given too rapidly and there is a small margin for error for inappropriate doses. Medications given orally are absorbed slowly because of barriers to absorption and considered to be a safer route of administration (Lehne, 2004). No other patient or workplace factors were found to influence the experience of conflict.

Two nurse characteristics were examined for their influence on the experience of conflict to question the prescriber. The degree held by the nurse was found to be significantly different for non-baccalaureate nurses versus nurses with a baccalaureate degree or higher for the experience of conflict. The latter group experienced a significantly lower level of conflict (M = 4.69) than non-baccalaureate nurses (M = 6.08) with both groups in the moderate range of conflict. Although not specific to medication management alone, Keenan, Cooke and Hillis (1998) reported that nurses with higher degrees were more likely to resolve conflict with a patient’s plan of care. These findings could be related to the difference in the formal education of this group about conflict management.

Nurses’ years of experience was found not to influence the level of conflict to question a medication order. One reason for this could be that the nurse sample in this study had a mean of 13.9 years of nursing experience. Curry, Browne, and Botti (2006)
described inexperienced nurses feel anxiety, fear or nervousness in managing patient care and experienced nurses were challenged.

The data from this study identified that nurses did experience conflict during medication management decisions. The Conflict Theory of Decision-making recognized high and low levels of conflict when making a decision to be maladaptive, that is, the decision would result in a poor outcome (Janis & Mann, 1977). The experience of moderate levels of conflict was explained as adaptive, thus leading to a positive outcome (Janis & Mann, 2007). The theorists further explain that when the decision that faces the individual is thoroughly examined and all the potential alternative choices are realized, the best decision is selected with a moderate level of conflict (Janis & Mann). The findings from the current study seem to support this theory in part because the statistically significant results for dose, route and degree held were in the moderate range for the experience of conflict. As previously stated, the data suggested that registered nurses did experience conflict to question the prescriber which indicates that specific strategies to identify the cause of conflict should be examined.

Administer Medication

Statistical analysis of the vignette variables showed that three levels were significant for administration of medication. The administration of high doses of medication was significantly different from low and normal doses of medication with high doses less likely to be administered (M = 1.87 on a scale of zero to 10 with zero equaling will not administer; and 10 being very likely to be administered). Normal and low doses were found to have statistically similar likelihood of being administered (M =
4.54 and 4.27, respectively). This was an unusual finding in that one would expect that high and low doses of medication should have similar likelihood of being administered since both were inappropriate doses of medication. This result leads to the suspicion that nurses in this study may not have been aware of the low dose for each of the medications. These findings support the need for nursing knowledge of appropriate dose ranges (high and low) for medications.

Route of the medication was also found to have influenced the registered nurses’ decisions to administer medications. Each route differed significantly from each other with oral medications least likely to be administered (M = 1.91). Again this was a surprising finding because Lehne (2004) described the intravenous route as dangerous and the oral route as safer. Thus, one interpretation of this surprising finding was nurses were not as familiar with the oral medications that were cited in the vignette.

No other patient, workplace or nurse characteristics were significant. Hypothesis 1A was partially supported and 1B and 2 were not supported.

Contacting Prescriber

Three of the vignette variables were found to influence the likelihood of contacting the prescriber to question the order. The patient’s medical diagnosis (specifically a patient one day post-op for a bowel resection for cancer) was found to be significant in the regression model, with further analysis showing it not to influence the decision to contact the prescriber in this study.

The dose of the medication was found to influence the decision to contact the prescriber. Patients receiving high doses of medications (M = 8.45, with zero equaling
no contact and 10 very likely to contact) were more likely to have the prescriber contacted than patients with normal or low doses (M = 6.01 and 6.11, respectively). Normal and low doses of medication were similar in the likelihood of prescribers being contacted. Once again, one would have expected that low doses of medications should have been similar to high doses in the likelihood of contacting the prescriber since both were outside of the appropriate dose ranges for the medications (Lehne, 2004).

The route of the drug was a vignette variable influencing the registered nurse contacting the prescriber. All three routes (IVP, IVPB, and oral) were significantly different from each other in their influence for registered nurses’ decisions, with drugs given the oral route as most likely to have had the nurse contact the physician. This may have indicated that perhaps the nurses were not as familiar with the oral medications that were prescribed.

No other patient, workplace or nurse characteristics were found to influence the likelihood of contacting the prescriber in this study. Hypothesis 1A was partially supported. Hypothesis 1B and 2 were not supported.

In summary, the patient factors of dose and route influenced the level of conflict and the likelihood that the drug would be administered and the prescriber would be contacted (Hypothesis 1A partially supported). None of the workplace vignette variables influenced the three dependent variables (Hypothesis 1B not supported). The nurse characteristic ‘degree held’ affected the experience of conflict, but not the administration of medication or contacting the prescriber (Hypothesis 2 partially supported).
Significance

Nurses play an extremely important role in the prevention of medication errors. This study was significant in identifying the factors that were important influences for registered nurses' decision-making in medication management. The next section of this paper describes the significance of the study for nursing service, education and the methods used.

Significance for Nursing Service

Findings of this study pointed to the dose and the route as being the single most important patient factor in the experience of conflict to question a medication order and decision-making for medication management. These results point to the importance of developing strategies to support and enhance the knowledge nurses need in medication management. Statistical findings of this study imply the registered nurses in this sample may not have been familiar with the doses and routes for the medications found in the vignettes.

Although in this study the type of order did not influence nurses’ decisions, new technologies for computer order entry (CPOE) and medication verification systems are being implemented in patient care settings across the country (Bates, Leape, Cullen, Laird, Petersen, Teich, et al., 1998; Crane & Crane, 2006; Evans, Petotnik, Classen, Clemmer, Weaver, Orme, et al., 1998; Kuperman, Gandhi, & Bates, 2001). These programs, when used as they were designed, can alert the nurse and physician to unusually high or low dosages of medications and appropriate routes for the medications. Personal digital assistants (PDAs) can be loaded with current medication software so that
nurses have the latest medication information at their fingertips. Several researchers have
described the complexity of decision-making and the vigilance that is needed for
medication management by nurses (Beuscart-Zephir, Pelayo, Anceaux, Maxwell, &
Guerlinger, 2007; Eisenhauer, Hurley, & Dolan, 2007; Manias, Aitken, & Dunning
2004a). At times nurses needed to extend decision-making to include the identification of
normal dosages of medications (titration) which required knowledge of the drug
(appropriate dose and route) (Eisenhauer et al., 2007; Manias et al., 2004a). The
importance of vigilance was shown in studies that reported nurses’ knowledge
intercepted many prescribing errors made by physicians (Guy, Persuad, Davies, &
Harvey, 2003) and transcription and dispensing errors made by others prior to the
administration of medications (Leape et al., 1995).

This study recognized that conflict was experienced by nurses as they questioned
medication orders. Appropriate policies need to be developed to describe the process for
questioning a medication order. Both nurses and physicians should be aware of their
responsibilities in the process especially if conflict results from the nurse questioning the
prescriber.

Significance for Nursing Education

The findings from this study indicated that nurses need education about the
appropriate doses and routes of medications. Nurses seemed to be aware that high doses
of medications indicated that a medication should not be administered and the prescriber
should be contacted, however, low doses of drugs did not elicit a similar response and
giving a patient a low dose of a medication is a medication error. For example, low doses
of antibiotics may not give the patient the therapeutic ranges needed for prophylaxis or managing an active infection. If a low dose of a narcotic analgesic is administered the patient may still experience pain. Nurses must be informed and familiar with usual dose ranges of the drugs they administer. Education for experienced nurses must be ongoing and effective strategies developed to keep the busy staff nurse informed. Time must be given for nurses to attend educational meetings or complete independent studies so that valuable information can be shared to prevent medication errors.

Nursing educators struggle to design nursing education programs to prepare new nurses for their profession. Basic science courses are developed to meet the foundational needs of the knowledge needed for medication management. The education, however, does not stop with one course in pharmacology, but needs to be integrated into theory and clinical coursework throughout their program of study. Nursing students must be introduced early to the use of the same tools utilized by experienced nurses (PDAs, CPOE and medication verification systems) to support decision-making. Not only do students need to study the basic categories of drugs, but must have the understanding of the dosages that are appropriate for the patient under their care.

Strategies need to be introduced to address the conflict that nurses experience with medication management activities. Reasons for the conflict must be clearly understood to reduce the conflict. Policies and procedures of the institution must reflect the support of the nurse in questioning a prescriber with the end result the nurse feels valued for the knowledge that she has in providing a positive outcome for medication management. Nurses’ descriptions of the ‘Last Case’ in this study identified that at times prescribers may display unacceptable behaviors when questioned about a drug regimen. Policies of
the institution can reflect consequences for these actions. On a positive note, nurses shared statements of collaboration with prescribers as the nurse and physician discussed objective data about the patient resulting in decisions to change or stop a medication. These examples of strategies to manage feelings of conflict can be shared with other nurses.

Significance of Method

There has been some increase in the use of the factorial survey method in nursing research. However, there have been no nursing studies using factorial survey to identify factors influencing nursing conflict or medication management. This method allowed for the development of a coherent vignette that can be statistically analyzed to identify the factors influencing medication management. Much of the literature about decision-making in nursing used qualitative methods for gathering data. Although these methods contributed greatly to nursing knowledge, using the quantitative method of factorial survey allows for statistical analysis of each of the independent variables for their significance and their effect on the dependent variables.

Many healthcare professionals are hesitant to discuss medication management and specifically the topic of medication errors. The factorial survey vignettes provided a safe, anonymous method of examining decision-making for medication management. Nurses were given an opportunity to identify conflict with the decision to question an order without concern of the prescriber’s response. Additionally, there was no worry that patients would be injured with the decision of whether or not to administer a medication.
or contact a prescriber. The use of Factorial Survey offered a way to address a controversial issue.

Limitations

There are several limitations in this study. The vignettes were created to present real-life scenarios; however, they were hypothetical situations that nurses were given to make decisions. There was limited information given in the vignettes and decisions made in the scenarios may not necessarily reflect what nurses would decide in a real clinical situation. Providing this limited information, however, did resemble the amount of information that can be obtained in a typical shift report. Additionally, the information that was provided by nurses in the descriptions of their ‘last case’ did resemble the independent variables in the vignettes. The vignettes are a cost effective way of gathering information that may be otherwise difficult to observe in a clinical situation (Polit & Beck, 2008).

The participants in the study were a convenience sample of nurses in each acute care facility. Participation in the study was voluntary so response bias could have resulted (Polit & Beck, 2008). Nurses who were uncomfortable with answering questions about their medication management decisions may not have participated in this study, thus this type of individual’s response would not be reflected in the data. Those individual nurses who did not respond may have differences with the experience of conflict and decisions related to administration of medication and contacting the prescriber. It would have been interesting to gather at least demographic data from the nurses that did not respond to the vignettes to identify characteristics of this sample.
A third concern is the generalizability of the study results. Since this study was limited to three acute care institutions in Northwest Ohio it cannot necessarily be said that nurses in other geographic locations or practice settings would experience similar levels of conflict to question a medication order or make similar decisions to manage medications.

Implications for Future Research

The results of this study identify further areas for research. One of the weaknesses in the decision-making and medication management research is the lack of replication studies. This study can be replicated in another geographic location with a similar sample of nurses (medical-surgical and ICU nurses). Other nurse groups could be questioned using a similar format to the current study (licensed practical nurses with medication privileges, student nurses, nurses in ambulatory settings or nurse specialty groups).

Since medication dose and route influenced nurse decision-making for narcotic and antibiotic management other drug categories could be used to determine if similar results would be obtained. As an example, since cardiac medications appeared as medications that were frequently questioned in nurses’ descriptions of their ‘last case’, developing vignettes that focus on this drug category would be of interest.

The sources of conflict for nurses’ decisions related to medication management need to be identified. The vignettes with an addition of a short qualitative segment would allow the nurse to specifically identify the reasons for conflict. Sources of conflict in this specific instance could be randomly introduced into vignettes with nurses responding to the scenario much like they did in the current study.
The use of the factorial survey method shows promise for nursing research. Appendix A gives an ever increasing list of studies using this efficient and economical method for research. Future research activities should utilize this method as a way to identify nursing judgments and decisions in other areas of patient care.

Several patient and workplace factors in this study were not significant in influencing the nursing experience of conflict and decision-making. There is still the need to identify all factors that are essential influences for nurse decision-making and specifically those choices made for medication management.

Conclusion

This study identified the factors influencing registered nurses’ judgments and decisions in medication management. The dose and route of the medication was the single most important influence for conflict to question, likelihood to administer medication and contacting the prescriber. Additionally, there was a significant difference in the conflict experienced by non-baccalaureate nurses and nurses with baccalaureate and higher degrees. This gives nursing service administrators and nursing educators information to develop programs and policies to enhance nursing knowledge and practice.
REFERENCES


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APPENDICES
APPENDIX A
EXAMPLES OF PUBLISHED HEALTHCARE STUDIES USING THE FACTORIAL SURVEY METHOD

<table>
<thead>
<tr>
<th>Author/Year</th>
<th>Topic</th>
</tr>
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<tbody>
<tr>
<td>Brown, Brown, Saunders, Castelaz &amp; Papasouliotis (1997)</td>
<td>Physicians’ decisions to prescribe benzodiazepines for nervousness and insomnia</td>
</tr>
<tr>
<td>Chan, Yang, Zhang, &amp; Reidpath (2007)</td>
<td>Disentangling the stigma of HIV/AIDS from the stigmas of drug use, commercial sex and commercial blood donation: a survey of medical students in China</td>
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<tr>
<td>Corrigan, Watson, &amp; Miller (2006)</td>
<td>Impact of mental illness and drug dependence stigma on family members</td>
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<tr>
<td>Corazzini (2003)</td>
<td>Resource allocation decision for home care programs</td>
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<td>Denk, Benson, Fletcher, &amp; Reigel (1997)</td>
<td>Public attitudes about end-of-life medical decision-making.</td>
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<td>Hennessy (1993)</td>
<td>Case management decision-making in long term-care</td>
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<td>Hennessy, M., MacQueen, K., &amp; Seals, B. (1995).</td>
<td>Designing HIV intervention programs</td>
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<td>Hennessy, Mercier, Williams, &amp; Arno (2002)</td>
<td>Client preferences for STD/HIV prevention programs</td>
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<td>Hennessy, Williams, Mercier, &amp; Malotte (2002)</td>
<td>Designing partner notification programs to maximize client participation</td>
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<td>Killian, &amp; Ganong (2002)</td>
<td>Obligation to assist older persons</td>
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<td>Topic</td>
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<tr>
<td>-------------</td>
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<tr>
<td>Lai (2007)</td>
<td>Queried emergency room registered nurse for their responses to domestic violence</td>
</tr>
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<td>Landsman &amp; Hartley (2007)</td>
<td>Attributing responsibility for child maltreatment when domestic violence is present</td>
</tr>
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<td>Lauder, Scott &amp; Whyte (2001)</td>
<td>Nurses’ social judgments about patients who self-neglect</td>
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<tr>
<td>Ludwick, R. (1993)</td>
<td>Nurses’ response to patients’ confusion</td>
</tr>
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<td>Factors important for nurse decision-making related to application of restraints for confused patients.</td>
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<td>Mazor, Fischer, Haley, Hatem, Rogers, &amp; Quirk (2005)</td>
<td>Factors influencing medical preceptor’s responses to medical errors</td>
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<td>McNett, Doheny, Sedlak, &amp; Ludwick (2009)</td>
<td>Published research article based on results of dissertation</td>
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<tr>
<td>O’Toole, O’Toole, Webster, &amp; Lucal (1994)</td>
<td>Factors affecting recognition of suspected child abuse and official reporting of abuse incidents by nurses (Authors have a series publications)</td>
</tr>
<tr>
<td>Schwappach and Koeck (2004)</td>
<td>Characteristics of medical errors and how the subsequent actions of physicians affected the evaluation of the physician by the patient.</td>
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<tr>
<td>Webster, O’Toole, O’Toole, &amp; Lucal (2005)</td>
<td>Reporting of child abuse by teachers</td>
</tr>
</tbody>
</table>
APPENDIX B

SAMPLE SURVEY FORM

Medication Management Survey

**Directions:** There are three parts to this survey. In Part A you will be asked to answer questions about the last time you questioned a prescriber about a medication order. Please read the question and fill in or circle the appropriate answer and add any information that you would like to share about the situation.

In Part B you are given a series of six different patient vignettes concerning the administration of medications. Please read each vignette and circle the number that reflects your response to each of the three questions using a scale from 0-10.

In Part C there is a series of demographic questions to gather information about you and your experience as a registered nurse. Either circle the appropriate answer or fill in the blank.

The information that you share will assist me in better understanding the judgments nurses make during medication management. Please understand there are no right or wrong answers to the questions in this survey.

When you have completed the survey place it in the stamped envelope and place in the U. S. mail. **Please return the survey to me within two weeks.**

**Reminder:** Do not place your name on any part of the survey.

**Thank you for taking the time to complete this survey!**
Part A: Take a minute and recall the most recent experience you had questioning a medication order. Please read the following questions and fill in or circle the appropriate answer. Add any information that you would like to share about the situation.

1. The age of the patient was ____________.

2. What was the patient’s primary diagnosis?

3. What was the patient’s cognitive status?
   a. Alert and oriented
   b. Drowsy
   c. Confused
   d. Comatose
   e. Other (please list) ____________________________

4. In your opinion was the patient:
   a. Stable
   b. Unstable
   c. Other (please describe) ____________________________

5. Please document the name of medication/dosage/route that was involved in the situation when questioning the medication order.

6. What time of day was it when you questioned the medication order?
7. Who prescribed the medication?
   a. Attending physician
   b. Resident
   c. Other ________________________________

8. Why did you question the medication order?
   _______________________________________________________________________
   _______________________________________________________________________

9. Did you call the prescriber to clarify the order?
   a. No
   b. Yes

10. Did you experience any concerns with your decision to question the order? (Please explain.)
    _______________________________________________________________________
    _______________________________________________________________________
    _______________________________________________________________________
    _______________________________________________________________________

Please share any additional information that may help me to understand this situation.
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________
_________________________________________________________________________

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**Part B:** Please read each vignette carefully and circle the number that best represents your response to each of three questions in each of the six vignettes.

**Vignette One.** You are preparing to administer medications at 9AM. Your patient is a(n) 85 year old who is comatose and is one day post auto accident with a skull fracture. This patient is not known to you and is in unstable condition. The resident, who is not familiar to you, had given phone orders for Morphine Sulfate 13 mg, IV push that you are scheduled to administer now.

1. To what level are you experiencing conflict in determining whether or not to question this order?
   - Very Low Conflict 0 1 2 3 4 5 6 7 8 9 10 Very High Conflict

2. How likely are you to administer this medication as prescribed to this patient?
   - Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

3. How likely are you to contact the prescriber to question this order?
   - Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

**Vignette Two.** You are preparing to administer medications at 4 PM. Your patient is a(n) 35 year old who is alert and oriented and is one day post-surgery for bowel resection for cancer. This patient is known to you and is in stable condition. The attending physician, who is familiar to you, had given a computer order for Morphine Sulfate 4 mg IV push that you are scheduled to administer now.

1. To what level are you experiencing conflict in determining whether or not to question this order?
   - Very Low Conflict 0 1 2 3 4 5 6 7 8 9 10 Very High Conflict

2. How likely are you to administer this medication as prescribed to this patient?
   - Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

3. How likely are you to contact the prescriber to question this order?
   - Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely
Vignette Three. You are preparing to administer medications at 4 AM. Your patient is a(n) 65 year old who is alert and oriented and is newly diagnosed with pneumonia. This patient is known to you and is in stable condition. The attending physician, who is familiar to you, had given a computer order for Ceftriaxone (Rocephin) 2 Grams, IV piggyback that you are scheduled to administer now.

1. To what level are you experiencing conflict in determining whether or not to question this order?  
   Very Low Conflict 0 1 2 3 4 5 6 7 8 9 10  Very High Conflict

2. How likely are you to administer this medication as prescribed to this patient?  
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10  Very Likely

3. How likely are you to contact the prescriber to question this order?  
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10  Very Likely

Vignette Four. You are preparing to administer medications at 4 PM. Your patient is a(n) 75 year old who is alert and oriented and is one day post auto accident with a skull fracture. This patient is new to you and is in unstable condition. The attending physician, who is familiar to you, had given a phone order for Morphine Sulfate 4 mg IV push that you are scheduled to administer now.

1. To what level are you experiencing conflict in determining whether or not to question this order?  
   Very Low Conflict 0 1 2 3 4 5 6 7 8 9 10  Very High Conflict

2. How likely are you to administer this medication as prescribed to this patient?  
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10  Very Likely

3. How likely are you to contact the prescriber to question this order?  
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10  Very Likely
Vignette Five. You are preparing to administer medications at 4 AM. Your patient is a(n) 75 year old who is confused and is newly diagnosed with pneumonia. This patient is known to you and is in stable condition. The Resident, who is not familiar to you, had given a computer order for Morphine Sulfate 5 mg orally that you are scheduled to administer now.

1. To what level are you experiencing conflict in determining whether or not to question this order?
   Very Low Conflict 0 1 2 3 4 5 6 7 8 9 10 Very High Conflict

2. How likely are you to administer this medication as prescribed to this patient?
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

3. How likely are you to contact the prescriber to question this order?
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

Vignette Six. You are preparing to administer medications at 9 AM. Your patient is a(n) 35 year old who is alert and is one day post surgery bowel resection for cancer. This patient is not known to you and is in unstable condition. The attending physician, who is familiar to you, has given a written order for Ceftriaxone (Rocephin) 50 mg IV piggyback that you are scheduled to administer now.

1. To what level are you experiencing conflict in determining whether or not to question this order?
   Very Low Conflict 0 1 2 3 4 5 6 7 8 9 10 Very High Conflict

2. How likely are you to administer this medication as prescribed to this patient?
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

3. How likely are you to contact the prescriber to question this order?
   Very Unlikely 0 1 2 3 4 5 6 7 8 9 10 Very Likely

You are almost done—go on to Part C on the next page!
**Part C:** Please complete the following information regarding your personal characteristics and current nursing practice. Either circle the appropriate answer or fill in the blank.

1. Your age in years: ____________

2. Gender:
   a. Male
   b. Female

3. What is your primary racial/ethnic background?
   a. White
   b. African-American
   c. Hispanic
   d. Asian
   e. Other (please specify) _______________

4. What is the highest degree you have completed:
   a. Associate in Nursing
   b. Diploma
   c. Bachelor’s in Nursing
   d. Bachelor’s in another area
   e. Master’s in Nursing
   f. Master’s in another area
   g. PhD in Nursing
   h. PhD in another area

5. Total number of years you have been working as a registered nurse. ________
6. What is your current, primary nursing practice area?
   a. Medical nursing
   b. Surgical nursing
   c. Intensive Care nursing
   d. Other (please list) __________

7. What is the average number of hours you work per week? _______

8. What shift do you currently work the majority of the time?
   a. 7AM - 3 PM
   b. 3 PM - 11 PM
   c. 11 PM - 7 AM
   d. 7AM – 7 PM
   e. 7 PM – 7 AM
   f. Other (please list) _______________________

9. Do you hold any nursing certifications?
   a. No
   b. Yes (If yes, please list ____________________________)

10. Are you a member of any professional nursing organizations?
    a. No
    b. Yes (If yes, please list ____________________________)

Thank you for participating in this study! Please return your completed survey materials to me within two weeks in the stamped envelope via the U. S. Postal Service.
APPENDIX C

KENT STATE INSTITUTIONAL REVIEW BOARD APPROVAL

KSU INSTITUTIONAL REVIEW BOARD

Notice to Investigator of Project Application Review

Investigator’s Name(s): Deborah Vargo
Project Title: Factors Predicting Judgments of Registered Nurses’ Medication Management

Federal and University regulation require that all research involving human subjects be reviewed by the KSU Institutional Review Board, except for specific categories of research which may be approved through an expedited procedure (Level I and Level II). Results of the initial screening of your project application are indicated below. If there are any questions, please contact your reviewer or the Office of Safety and Compliance (ORSC), Division of Research and Graduate Studies (RAGS), 137 Auditorium Building, telephone 330-672-2704. Upon formal approval, a copy of the signature page of your application will be sent to you or to your advisor, if you are a student.

☐ LEVEL III Review:
Your project will be considered by the Institutional Review Board at its meeting to be held in Cartwright Hall, room 141. These meetings are held on alternate Wednesdays from 12:00 to 2:00 p.m. The agenda of the meeting will be sent to you via email approximately one week before the meeting, alerting you to the date and time. Following the meeting, you will be notified in writing of the Board’s action by ORSC, telephone 330-672-2704.

You are strongly encouraged to attend this meeting in order to answer any questions about your project. If you are a student, your faculty advisor is also invited to attend.

☐ LEVEL II Review:
Research that is designated Level II must be reviewed by two reviewers;

First Reviewer: Tele or Email:
☐ Your project will be examined by a second reviewer. I have forwarded it to:

Second Reviewer: Tele or Email:
☐ I have forwarded your application to ORSC. You may begin your research when notified in writing by OSRC.

x☐ LEVEL I Review – Approved 1/18/09 by Carol Sedlak, KSU College of Nursing IRB Reviewer
You may begin your project immediately.

☐ ADDITIONAL INFORMATION IS NEEDED BEFORE APPROVAL CAN BE GRANTED.
(See comments)

COMMENTS:
January 22, 2009

Deborah Vargo
College of Nursing

Re: #09-16: "Factors Predicting Judgments of Registered Nurses' Medication Management"

Dear Ms. Vargo:

I am pleased to inform you that the Kent State University Institutional Review Board has reviewed and approved your Application for Approval to Use Human Research Participants as Level I research. This application was approved on January 18, 2009 and is effective for a twelve-month period, expiring on January 18, 2010.

Kent State University IRB policy requires that research be reviewed at intervals appropriate to the degree of risk, but not less than once per year. The IRB has determined that this protocol requires an annual review and progress report. The IRB will forward an annual review reminder notice to you by email as a courtesy. Please note that it is the responsibility of the principal investigator to be aware of the study expiration date and submit the required materials. Please submit review materials (annual review form and copy of current consent form) one month prior to the expiration date.

HHS regulations and Kent State University Institutional Review Board guidelines require that any changes in research methodology, protocol design, or principal investigator have the prior approval of the IRB before implementation and continuation of the protocol. The IRB must also be informed of any adverse events associated with the study. The IRB further requests a final report at the conclusion of the study.

Kent State University has a Federal Wide Assurance on file with the Office for Human Research Protections (OHRP); FWA Number 00001853.

If you have any questions or concerns, please contact me at 330-672-2704 or tfrederic2@kent.edu.

Sincerely,

Tonya Frederick, R.N., B.S.N.
Research Compliance Administrator

Cc: Ruth Ludwick, Ph.D.
APPENDIX D

PROMEDICA HEALTH SYSTEM INSTITUTIONAL REVIEW BOARD APPROVAL

INSTITUTIONAL REVIEW BOARD
2142 North Cove Blvd.
Conrad Jobst Tower, Suite 900
Toledo, Ohio 43606-3895
419-291-5362/TAX 419-291-4663

December 22, 2008

Deborah Vargo, MSN, RN, CNE
7304 Spring Rye Court
Toledo, OH 43617

RE: IRB #08-090: Factors Predicting Judgments of Registered Nurses' Medication Management

Dear Ms. Vargo:

I have reviewed your 12/11/08 submission of the new study listed above. This anonymous nursing survey study is eligible for expedited review. This is to confirm that I have approved your application.

No identifiable information is collected as part of this study. You must obtain informed consent from all subjects; however, signed written consent is not required. You are granted permission to conduct your study as described in your application effective immediately. The study is subject to continuing review on or before 12/21/09.

Please note that any changes to the study must be promptly reported and approved. Some changes may be approved by expedited review; others require full board review. If you have any questions or require further information, please contact John Psurny, IRB Coordinator, at 419-291-5362, or e-mail: john.psurny@promedica.org.

Sincerely,

John Psurny, M.D., Ph.D.
Chair, Promedica Health System Institutional Review Board

Lauri B. Levison, M.D.
Chair, Promedica Health System Institutional Review Board
APPENDIX E

SISTERS OF MERCY NORTHERN OHIO REGION INSTITUTIONAL REVIEW BOARD APPROVAL

SISTERS OF MERCY NORTHWEST REGIONAL INSTITUTIONAL REVIEW BOARD
2600 Navarre Avenue
Oregon, OH 43616
419-696-7643

December 19, 2008

Deborah Vargo, MSN, RN, CNE
7304 Spring Rye Court
Toledo, OH 43617

Dear Ms. Vargo:

This letter is to inform you that your IRB study titled: “Factors Predicting Judgments of Registered Nurses’ Medication Management” has been received by the Sisters of Mercy Northwest Institutional Review Board. Your study was reviewed at the full board meeting scheduled Dec 18, 2008. At this meeting the IRB approved your study.

The IRB requests all references to the IRB on pages 10, 12 and 14 be changed to reflect the Sisters of Mercy Northwest Regional Institutional Review Board.

A status report will be due in one year (12/18/09) or at the conclusion of the study, whichever comes first. In the event any untoward incidents occur as a result of this study, you are required to notify the Chairperson of the IRB immediately.

Please forward any status reports at the appropriate time to Jill Carlisle at St. Charles Mercy Hospital Administration, so that it may be included in the board’s packet mailed prior to the meeting.

Sincerely,

John Pierce, MD
Chairperson

Cc
Ruth Ludwig
Cathy Wiegand
APPENDIX F

LETTER TO PARTICIPANTS FOR THE PILOT STUDY

Dear Registered Nurse:

You are being asked to participate in this study about medication management because you care for adult patients in medical, surgical or intensive care settings. The purpose of the research is to identify patient, work and workplace factors that predict the judgments registered nurses’ make during medication management in the acute care setting. The study is being conducted as a part of degree requirements for my doctoral study in the Joint PhD in Nursing Program at Kent State University and the University of Akron. My relationship with ProMedica Health Systems includes being a CPR instructor for the organization.

The survey has three parts. Part A asks questions about the last time you questioned a medication order. Part B contains vignettes with questions about medication management. Part C asks for demographic information about your professional characteristics. It is estimated that it will take you 10 minutes to complete the survey.

Enclosed with the survey materials is a memo pad that serves as a small thank you whether you decide to participate in the study or not. Although there is no direct benefit to you, the results of this study will be published so that nurses who work in similar patient care settings can gain knowledge from the findings and patient safety will be impacted. There are no known risks in participating in this study.

The survey is anonymous. Completing and returning the survey materials implies your consent to participate in this study. Please complete the survey materials and mail the completed survey directly to me in the attached stamped envelope via the United States Postal Service within two weeks. You do not have to participate in this study. If you do not wish to participate, simply place the survey materials in the box provided near the mailboxes and the surveys will be recycled by me for future use.

This research has been approved by Institutional Review Boards of Kent State University and ProMedica Health System. Your responses to the questions will remain anonymous and return of the completed documents will serve as your consent to participate. Please return the completed survey materials in the self addressed-stamped envelope via the U. S. Postal Service. Should you have questions about the study please feel free to contact me at 419.843.3823, my advisor Dr. Ruth Ludwick at 330.672.8820 or Dr. John West, Vice-president for Research, Kent State University, Division of Research and Graduate Studies at 330.672.2704. If you have any questions about your rights as a research subject, you may contact the ProMedica IRB Coordinator at 419.291.5362.

Thank you in advance for your participation in this important study!

Deborah Vargo, MSN, RN, CNE
Doctoral Candidate
University of Akron/Kent State University
Joint PhD in Nursing Program
7304 Spring Rye Court
Toledo, Ohio 43617
d.vargo@bex.net
APPENDIX G

LETTER TO PARTICIPANTS FOR THE PRIMARY STUDY

Dear Registered Nurse:

You are being asked to participate in this study about medication management because you care for adult patients in medical, surgical or intensive care settings. The purpose of the research is to identify patient, work and workplace factors that predict the judgments registered nurses’ make during medication management in the acute care setting. The study is being conducted as a part of degree requirements for my doctoral study.

The survey has three parts. Part A asks questions about the last time you questioned a medication order. Part B contains vignettes with questions about medication management. Part C asks for demographic information about your professional characteristics. It is estimated that it will take you 10 minutes to complete the survey.

Enclosed with the survey materials is a memo pad that serves as a small thank you whether you decide to participate in the study or not. Although there is no direct benefit to you, the results of this study will be published so that nurses who work in similar patient care settings can gain knowledge from the findings and patient safety will be impacted. There are no known risks in participating in this study.

The survey is anonymous. Completing and returning the survey materials implies your consent to participate in this study. Please complete the survey materials and mail the completed survey directly to me in the attached stamped envelope via the United States Postal Service within two weeks. You do not have to participate in this study. If you do not wish to participate, simply place the survey materials in the box provided near the mailboxes and the surveys will be recycled by me for future use.

This research has been approved by Institutional Review Boards of Kent State University and the Sisters of Mercy Northwest Region. Your responses to the questions will remain anonymous and return of the completed documents will serve as your consent to participate. Please return the completed survey materials in the self addressed-stamped envelope via the U. S. Postal Service. Should you have questions about the study please feel free to contact me at 419.843.3823, my advisor Dr. Ruth Ludwick at 330.672.8820 or Dr. John West, Vice-president for Research, Kent State University, Division of Research and Graduate Studies at 330.672.2704. If you have questions about your rights as a research subject please call John Pierce, MD, Chair of the Sisters of Mercy Northwest Regional Institutional Review Board at 419-833-4700.

Thank you in advance for your participation in this important study!

Deborah Vargo, MSN, RN, CNE
Doctoral Candidate
University of Akron/Kent State University
Joint PhD in Nursing Program
7304 Spring Rye Court
Toledo, Ohio 43617
d.vargo@bex.net
### APPENDIX H

#### CORRELATIONS FOR INDEPENDENT VIGNETTE VARIABLES

| Independent Variable | 1. Age |  | 2. Acuity | -0.061 | 1 |  | 3. Cognition | -0.019 | -0.017 | 1 |  | 4. Diagnosis | 0.011 | 0.026 | -0.143** | 1 |  | 5. Prescriber | -0.022 | -0.009 | -0.060 | 0.061 | 1 |  | 6. Familiar Prescriber | 0.046 | -0.027 | 0.037 | -0.044 | -0.035 | 1 |  | 7. Know Patient | 0.084 | 0.002 | 0.059 | 0.026 | 0.065 | -0.110* | 1 |  | 8. Time of Day | 0.049 | 0.053 | 0.012 | 0.031 | -0.075 | -0.045 | -0.060 | 1 |  | 9. Type of Order | 0.000 | -0.090 | 0.000 | -0.003 | 0.096* | -0.024 | 0.040 | -0.068 | 1 |  | 10. Drug category | 0.024 | 0.057 | 0.079 | -0.088 | -0.020 | -0.035 | 0.036 | 0.031 | -0.044 | 1 |  | 11. Route | -0.066 | 0.027 | -0.003 | -0.027 | 0.067 | 0.018 | 0.054 | 0.052 | -0.062 | 0.037 | 1 |  | 12. Dose | -0.014 | -0.015 | 0.065 | 0.093* | 0.021 | 0.038 | 0.081 | 0.013 | -0.056 | -0.004 | 0.054 | 1 |

* Correlation is significant at the 0.05 level (2-tailed)
** Correlation is significant at the 0.01 level (2-tailed)