THE RELATIONSHIP AMONG NURSE MANAGER LEADERSHIP STYLE, SPAN OF CONTROL, STAFF NURSE PRACTICE ENVIRONMENT, SAFETY CLIMATE, AND NURSE-SENSITIVE PATIENT OUTCOMES

by

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ABSTRACT

Despite the compelling need for strong nursing leaders who establish vision and create an evidence-based environment that fosters quality and safety, many hospitals have increased responsibilities of nurse managers, potentially compromising leadership at the bedside. The aim of this study was to elucidate relationships among safety climate, staffing, education level, manager leadership styles, practice environment, and patient outcomes. This study also compared two methods to measure nurse manager span of control.

A correlational study was conducted in nine hospitals in a healthcare system. The instruments—Hospital Unit Safety Climate Survey, Practice Environment Scale, Multifactor Leadership Questionnaire, and a demographic survey—were distributed electronically to 1,579 registered nurses working in adult inpatient departments. Nurse-sensitive patient outcomes, staffing measures, and department demographics were obtained from hospital databases. Managers also completed The Ottawa Hospital Clinical Management Span of Control Tool, a 17-item instrument resulting in a total department complexity score. Data analysis was conducted at the unit level ($N = 41$). Questionnaires were received from 466 nurses (29.5%) and 41 managers (82%).

Nurses reported a moderate to high unit safety climate. Nurses' perceptions of safety climate did not predict nurse-sensitive patient outcomes. Nurse staffing variables

and department type were significantly associated with patient fall rates (R^2 =.387) and healthcare-acquired pressure injuries (R^2 = .342).

Relationships among safety climate, nurse manager leadership styles, and practice environment were identified by department type. In critical care departments, there was a positive relationship between practice environment and transformational leadership style and a negative relationship between laissez-faire leadership style and practice environment. In noncritical care departments, transformational leadership style was positively associated with safety climate.

In a comparison of high, medium, and low span of control using two methods of classification, 41.5% of the departments were categorized differently using the number of direct reports compared to department complexity score.

These findings suggest efforts to promote transformational leadership in nurse managers and minimize laissez-faire leadership may impact patient safety climate in hospitals. Future research on nurse manager span of control is warranted.

This dissertation is dedicated to my best friend and husband, Robert, who believes in me and makes it all possible. To my children, Nathaniel, Elizabeth, and Jonathan, who endlessly put up with Mom on the computer at baseball, swimming, and all their various events and prayed for my continual success. To my mother, who brought us dinner every week. To my dog, Maggie, who brightens my day and follows me everywhere.

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CHAPTER 1

INTRODUCTION

Healthcare costs, quality, and access have been a strong focus recently in the United States. Several studies have investigated the hours of nursing care provided by acute care registered nurses (RNs) and the relationship with patient outcomes. These studies have found that as the number of RNs increases, quality increases and errors decrease (Blegen, Goode, & Reed, 1998; Cho, Ketefian, Barkauskas, & Smith, 2003; Potter, Barr, McSweeney, & Sledge, 2003). A landmark publication, *To Err is Human: Building a Safer Health System* by the Institute of Medicine (IOM), reported that between 48,000 and 98,000 Americans die each year from medical errors (Kohn, Corrigan, & Donaldson, 2000).

The issue of quality nursing care, however, goes beyond staffing. According to Kohn et al. (2000), the IOM reported that in addition to staffing, organizational management practices and work design were key factors to patient safety. The organizational structure, including the nurse manager, provides essential support for RN performance (Advisory Board Company, 2004, 2005; Upenieks, 2003). The nurse manager has direct accountability for the quality of care on the unit, patient, and nurse satisfaction, physician relationships, financial considerations, and regulatory compliance (Advisory Board Company, 2005).

Several studies have documented the need for strong leadership in nursing (Canadian Nursing Advisory Committee, 2002; Doran et al., 2004). Recommendations made by the IOM call for leaders who will change the work environment and increase patient safety by shaping practices and beliefs through transformational leadership and evidence-based management (Kohn et al., 2000). The American Nurses Credentialing Center (ANCC, 2005) Magnet Recognition Program® identified that organizations that have received Magnet recognition have nursing leaders who create a supportive environment through being visible, accessible, and committed to effective communication with staff.

Despite the need for strong nursing leadership, hospitals have made dramatic restructuring changes over the past two decades, resulting in a wider span of control of nurse managers and reduced visibility of the nurse manager at the unit level. Doran et al. (2004) reported that as the number of nurses reporting to a manager increased, patient and nursing satisfaction decreased. They also studied leadership styles and found that no leadership style will overcome having a large number of staff reporting to the manager. There are few research studies that directly address the impact of nurse manager leadership on patient safety outcomes. The long-term goal of this program of research to improve quality and patient safety in hospitals through the development and promotion of unit-based nursing leadership.

Study Purpose

The purpose of this study was to determine whether leadership style affects the staff nurse practice environment, unit safety climate, and nurse-sensitive patient outcomes, and to determine the relationships between safety climate, staffing, and

outcomes. It was further the purpose to describe unit nurse manager span of control and complexity of the unit and compare two different methods to measure span of control (number of direct reports and department complexity score).

Specific Aims

The specific aims and research questions of the study were

1. Explore the relationships among safety climate, nurse staffing, nurse education level, and nurse-sensitive patient outcomes.
    a. How do staff nurses rate their unit safety climate with respect to their unit manager support, socialization/training of new staff, safety emphasis, blameless system, reporting and use of safety data, pharmacist support, and worker safety?
    b. What are the relationships among hospital unit safety climate, nursing education level, and nurse-sensitive patient outcomes?
    c. To what extent do nurse staffing, nurse education level, and unit safety climate explain nurse-sensitive patient outcomes?
2. Identify the amount of variance in patient safety outcomes (patient falls, healthcare-acquired pressure ulcers, catheter-associated urinary tract infections, and medication errors) explained by leadership style, practice environment, and safety climate.
    a. How do staff nurses describe their nurse managers' leadership style in regards to transformational, transactional, and laissez-faire leadership?
    b. How do staff nurses rate their practice environment related to nurse participation in hospital affairs, nursing foundations for quality of care,

nurse manager ability, staffing and resource agency, and collegial nurse–physician relations?

c. What are the relationships among nurse manager leadership style, practice environment, unit safety climate, and nurse-sensitive patient outcomes?

d. To what extent do nurse manager leadership style, practice environment, and unit safety climate explain nurse-sensitive patient outcomes?

3. Compare two different methods to measure span of control, department complexity score, and number of direct reports.

   a. What is the relationship between the department complexity score measured by The Ottawa Hospital Clinical Management Span of Control Tool and the number of personnel who directly report to the nurse manager?

   b. Do the department complexity scores and number of direct reports vary by unit type?

   c. Do department complexity scores and number of direct reports result in different classification of span of control?

   d. What are the relationships among department complexity score, number of direct reports, availability of assistance to the manager, and Magnet recognition status?

Significance

Nurse managers are the leadership at the unit level. They play a pivotal role in creating a positive safety climate. The manager is accountable for fostering this climate through participatory decision making, a negotiating management style, and encouraging

a sense of the big picture beyond individual patient care issues (Ruchlin, Dubbs, & Callahan, 2004). Nursing structure and processes that are influenced by nurse managers, such as nurse-to-patient ratios, staffing, turnover, and satisfaction, have been associated with quality in the hospital (Kelly, 2007; Page, 2004; Thompson, Navarra, & Antonson, 2005; Upenieks, 2002). The significant influence that nurse managers have on the direct care nurse underscores the need for research on leadership and its influence on quality and patient safety.

There is currently little empirical evidence to link nursing leadership with a decrease in medical errors and patient safety. More than 10 years after the landmark publication *To Err is Human: Building a Safer Health System,* only small strides have been made in improving patient safety in hospitals (Wachter, 2010). Many questions remain unanswered. This study provides insight into the role of the nurse manager in creating a positive safety climate and improving patient safety and the effect of nurse manager span of control. The results may also lead to future research on leadership, span of control, safety climate, and prevention of medical errors. This research informs hospitals and academic institutions of the relationship between nurse manager leadership style and patient safety climate. Improvement programs targeting nurse manager leadership style may result in increased patient safety climate and decreased preventable errors.

Overview of the Dissertation

The dissertation is divided into seven chapters, three of which (Chapters 4, 5, and 6) have been prepared for publication as distinct manuscripts. This first chapter introduced the demographic and scientific imperatives for research specific to nurse

manager leadership style, patient safety and manager span of control, and the specific aims of this research. Chapter 2 reviews the background and literature specific to nurse manager leadership style, patient safety climate, practice environment, nurse-sensitive patient outcomes, and nurse manager span of control. Chapter 3 presents the study design and methods used for the following three results chapters. Chapter 4 is intended for publication in the *Journal of Patient Safety* and details the results of the hospital unit safety climate, nurse staffing, and nurse-sensitive patient outcomes. Chapter 5 is intended for publication in the *Journal of Nursing Leadership* and includes the results of the effect of nursing leadership style on safety climate, practice environment, and patient safety outcomes. Chapter 6 is intended for publication in the *Journal of Nursing Administration* and includes the results of the department complexity as a measure of nurse manager span of control. Chapter 7 summarizes and synthesizes the research results and presents implications for future research and nursing practice.

CHAPTER 2

REVIEW OF THE LITERATURE

This review of the literature examines the effect of nurse manager leadership style on patient outcomes, nursing practice environment, and safety climate. Leadership theories are investigated with an emphasis on full-range leadership theory, which is particularly useful in describing staff nurses' perceptions of their managers' leadership styles in the healthcare setting. Nurse manager span of control is examined as it impacts the manager's leadership style and effectiveness.

The review also evaluates patient-centered outcomes that have been identified to be sensitive to nursing care and provides an appraisal of the literature related to nurses' perceptions of their patient safety climate and practice environment.

The Role of Leadership

Leadership is a complex term with multiple definitions. Leadership has been associated with power, influence, and prosperity. A leader guides, directs, or shows the way to those they lead. Leaders are instrumental in guiding successful group processes and attaining goals (Bass, 1990). Successful leaders have been recognized for motivating their followers to reach their full potential (Avolio & Bass, 2004). Leaders differ by the types of groups they lead and by the individual behaviors or characteristics they exhibit.

Leadership style is defined as the behaviors or characteristics that a leader possesses. A job description differs from leadership style. A job description is a set of assigned duties or expectations defined by the organization and used to measure performance. A prescriptive job description that dictates a manager's action or requires the manager to be unavailable to his or her staff may affect the manager's ability to exhibit an effective leadership style.

Effective leadership style has been well studied in both business and health care. While several different leadership theories are described in the literature, there are many similarities among them. A brief history of leadership theory and a summary of a few theories are described as follows.

Theories of Leadership

What makes leaders lead is an interesting question that many have tried to answer. Most early theories surrounded the concept called the *great man theory*. Military leaders, corporate leaders, and political figures are historically cited as great men and important leaders (Bass, 1990). Florence Nightingale, Clara Barton, and Dorothea Dix are considered some of the great nursing leaders.

The great man theory was followed by trait theories. In trait theory, a great leader was defined by specific traits or characteristics. Although trait leadership fell into disfavor during the 1950s, several leadership traits populate modern leadership theory.

First described by Hersey and Blanchard, situational leadership theory hypothesized that leadership is dependent upon situations rather than traits. Situations such as war or group dynamics bring out leadership traits that would otherwise remain hidden (Bass, 1990).

Interaction and social learning theories attempted to explain the leader–follower relationship by describing the leader's traits or characteristics as well as the followers' needs, attitudes, and values, along with the situation. These theories marked the beginning of more complex leadership theories and considered the organization as a whole, the inputs and outputs of the system, along with the leaders and followers in that system (Bass, 1990; Bass & Riggio, 2006; Klakovich, 1994).

Theory of Clinical Microsystems

In microsystem theory, the healthcare system is defined by macrosystems and microsystems. The outcomes of the macrosystem can be no better than those of the microsystem. Nelson et al. (2002) defined a *clinical microsystem* as a small group of people who regularly work together to provide care to specific types of patients. In an observational study of 20 high-performing clinical microsystems, nine success characteristics were identified: leadership, culture, organizational support, patient focus, staff focus, interdependence of the care team, information technology, process improvement, and performance pattern. In a successful microsystem, leaders empower their staff and hold them accountable while balancing the complexities of the setting and reaching collective goals (Nelson et al., 2002).

Kanter's Structural Theory of Power

In the landmark publication *Men and Women of the Corporation*, Kanter (1993) claimed that work behaviors are responses to work conditions, not personality traits. Kanter identified three structures (power, opportunity, and proportions) that influence work effectiveness. According to Kanter, power is found in a visible job that allows for

decision making, and individuals get power from relationships. Work environments that empower their employees provide access to information, support, and an opportunity for growth. As a result, employees are more satisfied and committed to the organization.

Opportunity is a key influence on work satisfaction. When employees are given the opportunity to improve their knowledge and skills, they exhibit a proactive approach to problem solving and become change agents. Individuals who have little opportunity often feel stuck in their job and are powerless (Kanter, 1993; Laschinger, 1996; Laschinger, Finegan, & Shamian, 2001).

Laschinger (1996), who extensively studied Kanter's theory in relationship to nursing, hypothesized that successful nursing leadership is related to staff empowerment. In multiple research studies, Laschinger and associates reported that as powerful managers shared their power with their staff, work productivity increased. Additionally, nurses who felt empowered were more committed to the organization, more satisfied with their job, and reported better patient safety outcomes. There was also a strong positive relationship between nurses who felt empowered and nurse manager leadership characteristics (Laschinger et al., 2001; Laschinger & Havens, 1996; Laschinger & Leiter, 2006).

Full-Range Leadership Theory

In a descriptive study of political leaders, Burns (1978) identified three leadership styles he termed *transformational–transactional theory*. Burns reported transformational leaders are proactive and convince their associates to strive for higher levels of performance. These leaders are admired and respected, instill pride and purpose, motivate

others, stimulate followers to be innovative and creative, and pay attention to individual needs for achievement.

Full-range leadership theory, based on the initial work of Burns, was developed to further explain and measure leadership (Avolio & Bass, 2004; Bass & Riggio, 2006). This theory identifies three leadership styles, each of which is described as follows.

Transformational Leadership

Transformational leaders influence others by creating an awareness of what is important. Transformational leaders are proactive and convince their associates to strive for higher levels of performance. These leaders are admired and respected, instill pride and a strong sense of purpose, motivate those around them, stimulate followers to be innovative and creative, and pay attention to individual needs for achievement (Avolio & Bass, 2004). Four key aspects of transformational leadership include inspirational motivation, intellectual stimulation, individualized consideration, and idealized influence.

Leaders who exhibit inspirational motivation motivate through enthusiasm and optimism. They talk about the future in a positive manner and articulate a compelling vision. A leader who questions assumptions and seeks different approaches to solving problems stimulates his or her employees intellectually to offer innovative solutions to problems. Transformational leaders also consider the accomplishments of each individual and help coach and mentor followers (McDaniel & Wolf, 1992; McGuire & Kennerly, 2006).

Idealized influence can be separated into two categories: idealized attributes and idealized behaviors. Idealized attributes is a more abstract concept in which the leader exhibits a power and confidence and acts in a manner that builds respect of others.

Idealized behaviors are more concrete and are exhibited when the leader talks about his or her values and beliefs and specifically states his or her goals and mission (Avolio & Bass, 2004; Bass, 1990; Bass & Riggio, 2006).

Transactional Leadership

Transactional leaders display behavior with constructive and corrective transactions. Transactional leaders re those who lead through social exchange. There are two key methods used in transactional leadership: contingent reward and active management by exception.

Leaders who use contingent reward reward their followers for productivity and deny rewards for lack of productivity. While contingent reward has been shown to work in many circumstances, its effect is limited unless combined with additional transformational leadership characteristics (Morrision, Jones, & Fuller, 1997).

Management by exception is a corrective active approach that is less effective than contingent reward. The corrective action can be either active or passive. Transactional leaders exhibit active management by exception by actively seeking out errors and mistakes and taking corrective actions as needed. This active approach may be important for high-risk safety issues (Morrision et al., 1997).

Laissez-Faire Leadership

Laissez-faire leadership is the most ineffective type of leadership. It is essentially absence or avoidance of leadership. Laissez-faire leadership is characterized by passive management by exception. These leaders often wait until a problem is serious and chronic before giving it attention. The passive approach is sometimes found in managers

who have a large number of staff reporting to them or when managers have job descriptions that result in continual absence from the department (Bass & Riggio, 2006).

Measurement of Full-Range Leadership

Bass developed a method to measure full-range leadership through use of the Multifactor Leadership Questionnaire (MLQ). The instrument, used in multiple research settings, contains 45 items and measures nine leadership components and three outcomes of leadership. The Cronbach's alpha for the 12 components ranged from 0.70–0.84 when tested in 12,118 persons rating their leader (Avolio & Bass, 2004).

Consistent evidence has shown superiority of transformational over transactional and laissez-faire leadership styles (Avolio & Bass, 2004). In the business literature, transformational leadership has been shown to affect perceived safety climate, safety consciousness, and safety-related events (Barling, Weber, & Kelloway, 1996). Zohar (2002) found that transformational leadership predicted injury rates and suggested a path leading to safety climate.

Effect of Leadership on Healthcare Outcomes

In a nursing study to test the full-range leadership theory in nursing, Kanste, Miettunen, and Kyngas (2007) sampled 601 nurses in an initial study and 78 in a follow-up study and determined that transformational leadership promoted perceptions of leader effectiveness and satisfaction with their leader. In further research, leadership style was linked with positive employee productivity, acceptance of change, job performance, turnover, and employee empowerment (Klakovich, 1994; Laschinger et al., 2001; Loke, 2001; McNeese-Smith, 1997; Upenieks, 2003). Transformational leaders, as opposed to

task-oriented leaders, have been found to have staff who are more satisfied with work in general, relationships at work, health, and well-being, work environment, productivity, and effectiveness (Cummings et al., 2010; McGuire & Kennerly, 2006).

Laschinger and Leiter (2006) reported that nurses self-reported better patient safety outcomes when nursing leadership played a role in creating a positive work environment. A recent study by Squires, Tourangeau, Laschinger, and Doran (2010) tested a model to detect relationships among the quality of nurse leaders and their staff nurses' work environment, safety climate, and nurse outcomes. This was the first study to report a link between safety climate and leadership. Further studies are needed to validate these findings.

Practice Environment

Nursing work is complex and unpredictable. It includes relationships among nurses, patients, families, physicians, and other interdisciplinary members. According to Lake (2002), the practice environment is a complex construct used to define the organization of nursing work. *Practice environment* is defined as a set of work characteristics that either promote or hinder professional nursing practice. Nursing leadership is a key component of the practice environment because it is responsible for the climate of decision making, coordination, and delegation of work (Lake, 2002).

Job satisfaction, while closely linked with the practice environment, is generally defined as the feelings workers have about their jobs. Nurses are reported to be more satisfied with their job when they have a positive practice environment. When nurses are satisfied with their job, they perform better and are more likely to stay (Doran, 2003).

The practice environment is of particular interest during a nursing shortage. One of the most notable efforts in this regard is the original 1983 Magnet recognition study funded by the American Academy of Nursing. Researchers studied 163 hospitals to determine why some hospitals, despite a nursing shortage, were able to recruit and retain nurses. They identified 41 of the 163 hospitals as *magnet* hospitals because of their ability to attract and retain nurses. These hospitals exhibited 14 specific characteristics later termed the *forces of magnetism*. These characteristics included three broad categories of administration, professional practice, and professional development. The administrative aspects included quality of nursing leadership, management style, participatory decision making, and an organizational structure that promotes visibility of the leadership (McClure & Hinshaw, 2002).

The Nursing Work Index (NWI) was developed to measure work environment, job satisfaction, and quality care during early research comparing Magnet Recognized and non-Magnet hospitals (Kramer & Hafner, 1989). Based on literature review and expert opinion, the index was revised (NWI–R) to include autonomy, control over nursing practice, nurse–physician communication, and organizational support. Several studies using the NWI or NWI–R reported improved nursing satisfaction and retention in Magnet Recognized vs. non-Magnet hospitals (Capuano, Bokovoy, Hitchings, & Houser, 2005; McClure & Hinshaw, 2002; J. G. Scott, Sochalski, & Aiken, 1999; Upenieks, 2003). In 2002, factor analysis was used to further refine the NWI, resulting in the development of the Practice Environment Scale of the Nursing Work Index (PES–NWI; Lake, 2002). The final subscales of the PES–NWI include (a) nurse participation in

hospital affairs, (b) nursing foundations for quality of care, (c) nurse manager ability, (d) staffing and resource agency, and (e) collegial nurse–physician relations.

Several studies in the United States and internationally using large databases have been conducted measuring practice environment and various outcomes. Practice environment subscales have been associated with nurse-assessed quality of care, patient satisfaction, nurse-to-patient ratio, clinical grade mix, temporary staff, and sickness absence. Practice environments have also been associated with nurse staffing levels but not hospital bed size (Adams & Bond, 2003a, 2003b; Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Aiken, Sloane, Lake, Sochalski, & Weber, 1999; Friese, Lake, Aiken, Silber, & Sochalski, 2008; Laschinger et al., 2001; McCusker, Dendukuri, Cardinal, Laplante, & Bambonye, 2004; Van Bogaert, Clarke, Vermeyen, Meulemans, & Van De Heyning, 2009).

Patient Safety and Error

Patient safety is a term used to define a condition in which patients are protected from medical accidents or other preventable harms during their healthcare experience (Morath & Turnbull, 2005). In the late 1990s, several reports were published that addressed serious concerns with patient safety. In one of the most notable reports, *To Err is Human: Building a Safer Health System*, a committee reviewed 30 publications over a 10- to 12-year period, identifying that as many as 98,000 hospitalized patients died each year from medical errors and that preventable errors caused more deaths than motor vehicle accidents, breast cancer, and AIDS, and cost the United States $17–$29 billion each year (Kohn et al., 2000).

According to Reason (2000), errors occur for two reasons: active failure or latent conditions. Active errors are errors that are committed by direct care givers. These errors include mistakes, procedure violations, and forgetfulness. One active failure rarely causes a chain of further errors to occur because inherent system defenses usually prevent an active error from reaching the patient. Latent errors are those that are inevitable due to problems within the system. Examples of system problems include design flaws, management decisions, and inadequate or inappropriate policies. Latent errors create a breakdown in the defense system, resulting in unsafe conditions. Nearly all errors are the result of a combination of active and latent failures. Because managers are the ones who resolve systems issues, they play a key role in prevention of latent errors. Figure 2.1 illustrates the application of Reason's theory of understanding how errors develop in a hospital (Reason, 2000).

Error management has been extensively studied in high-risk industries such as nuclear power and military operations. Organizations that are high risk and yet show a lower rate of errors are called *resilient* or *high reliability organizations* (Reason, 2000). These organizations expect errors and train their workforce to look for them and recover

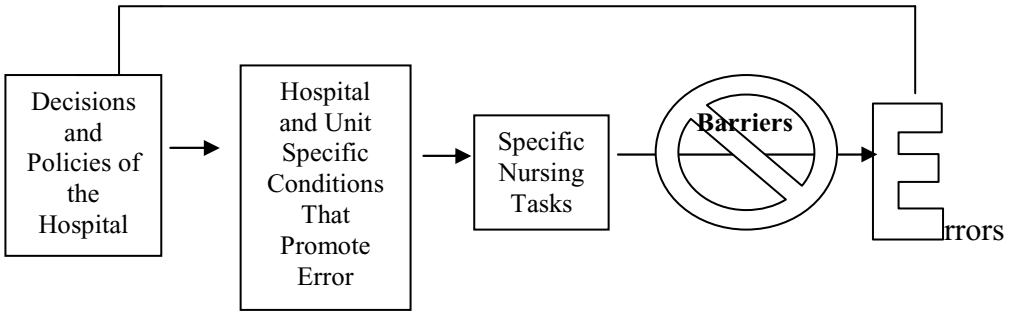

Figure 2.1. Understanding how errors occur in the hospital.

from them. Instead of isolating error, they generalize it and make system reforms instead of local reforms (Reason, 2000). High-reliability organizations report having a supportive environment, people who trust one another, credibility, attentiveness, resilience, creativity, and a focus on goals (Ruchlin et al., 2004). Some limited studies in healthcare have identified that high safety climate was associated with decreased errors and lower rates of adverse occupational outcomes (Gershon et al., 2007; Shortell et al., 1994; Zohar, Livne, Tenne-Gazit, Admi, & Donchin, 2007).

The IOM has supported the systems-based theoretical framework as a key ingredient to a successful patient safety program. According to the IOM, a system with a strong patient safety climate, appropriate leadership, simplification of work flows, and interdisciplinary teamwork are all essential elements of the successful system (Committee on Quality Health Care in America, 2001).

Safety Climate

The concept of a safety climate is relatively new to health care. *Culture* and *climate*, often used interchangeably, are similar but distinct concepts. The Agency for Healthcare Research and Quality (AHRQ) defined safety culture as group attitudes, perceptions, competencies, and behavior related to performance of safety in an organization (Clarke, 2006). In a concept analysis identifying patient safety culture in nursing, safety culture was identified as a subset of organizational culture with four subdimensions: system, personal, task-associated, and interaction (Feng, Bobay, & Weiss, 2008).

In industry, safety climate is linked to better outcomes and less error. In healthcare, the connection between safety climate and nurse outcomes (job satisfaction,

turnover, intent to leave, and worker safety) has been well established. However, the relationship of safety climate in hospitals to patient outcomes remains less clear (MacDavitt, Chou, & Stone, 2007). This is likely due to the fact that safety climate is a relatively new research field in health care, and there are multiple challenges regarding the measurement of safety climate.

Several authors have reviewed available safety culture and climate instruments (Colla, Bracken, Kinney, & Weeks, 2005; Flin, Burns, Mearns, Yule, & Robertson, 2006; Gershon, Stone, Bakken, & Larson, 2004; T. Scott, Mannion, Davies, & Marshall, 2003). Most of the instruments used Likert scales to measure safety attitudes of individuals and aggregated the scores for an organizational score. Psychometric properties of these instruments varied, and common limitations were related to scope, respondent burden, scientific properties, and level of analysis. Major weaknesses were absence of a reported theoretical base for development of the instrument, and few instruments had construct validity established related to the theoretical association between climate and patient outcomes. The authors concluded that the choice of instrument to measure patient safety climate should be based on a theoretical foundation, the purpose of the research, and appropriate level of analysis (Colla et al., 2005; Flin et al., 2006; Gershon et al., 2004; T. Scott et al., 2003).

The Hospital Survey on Patient Safety Culture (HS–PSC) was developed for the AHRQ in 2004. It is a 42-item survey that measures 12 safety dimensions and subsequent setting-specific versions, such as a nursing home patient safety survey, have been developed. Because this instrument is cost-free to administer, was designed for the entire organization (clinicians and nonclinicians), has established validity and reliability, and

has an online comparison database for benchmarking, the HS–PSC is one of the most widely used patient safety tools in acute care settings (AHRQ, 2010; Blegen, Gearhart, O'Brien, Sehgal, & Alldredge, 2009). The theoretical framework used in development of the HS–PSC was not identified.

The instrument used in this study, the Hospital Unit Safety Climate Survey (HUSC), is a 33-item survey that measures six safety dimensions and one worker safety dimension (Blegen, Pepper, & Rosse, 2005). The HUSC was developed for inpatient nursing units of acute care hospitals with the specific purpose of understanding safety climate from a nursing perspective, with emphasis on the medication delivery processes. The theoretical base for the instrument was Reason's (2000) theory of human error. The development process included a comprehensive literature review, content expert review, and field testing in two hospitals, to derive seven dimensions using factor analysis: (a) manager support (support from the unit manager), (b) socialization/training (socialization of new staff and ongoing training in patient safety), (c) safety emphasis (emphasis on safety measures), (d) blameless system (environment focuses on process improvement rather than individual blame), (e) use of safety data (safety data used to improve practices), (f) pharmacist support (involvement with the clinical pharmacist in medication information and support), and (g) worker safety (presence of measures and policies that promote worker safety). Each dimension has three to six items, with at least one item worded negatively. The responses to each question are rated on a 5-point Likert scale (1 = *strongly disagree/never*, 3 = *neither/sometimes*, 5 = *strongly agree/always*). After correcting for reverse coding, a mean subscale score is calculated. The initial study

reported reliability coefficients (Cronbach's alpha) for each of the seven dimensions ranging from 0.68–0.84 (Blegen et al., 2005).

The HUSC instrument has not been widely used; however, its emphasis on unit climate and particular attention to medication delivery provide a useful measurement for safety related to nurse-sensitive patient outcomes.

Nurse-Sensitive Patient Outcomes

In 1994, the American Nurses Association (ANA) launched a nursing safety and quality initiative. They identified 10 indicators that are tracked by the National Database for Nursing Quality Indicators (NDNQI), a proprietary database of the ANA. Patient outcomes identified as nurse-sensitive by the ANA are those indicators that "focus on how patients, and their conditions are affected by their interaction with the nursing staff" (Doran, 2003, p. vii).

In 2003, the National Quality Forum (NQF), as part of a Robert Wood Johnson grant, embarked on the development of Nursing Care Performance Measures. The NQF determined that to be classified as *nurse-sensitive*

> The measure had to directly measure some element of nurse staffing that has been associated with better quality care or be quantifiably influenced by nursing personnel, although the relationship did not need to be shown to be causal or exclusive to nursing. (Needleman, Kurtzman, & Kizer, 2007, p. 19)

The NQF study group recommended 15 nurse-sensitive indicators that had enough empirical evidence and were concretely measurable in the following categories: patient-centered, nurse-centered, and system-centered (see Table 2.1).

While some research studies have documented that nursing care is associated with patient outcomes, results are inconsistent and conflicting (Whitman, Kim, Davidson,

Table 2.1

Nurse-Sensitive Indicators Summary

American Nurses Association	National Quality Forum
Mix of RN, Licensed Practical Nurses, and unlicensed staff caring for patients in acute care settings	Skill mix
Nursing care hours per patient day	Nursing care hours per patient day
	Voluntary turnover
Pressure ulcers	Pressure ulcer prevalence
Patient falls	Falls prevalence
	Falls with injury
Nurse staff satisfaction	Practice Environment Scale of the Nursing Work Index
Nosocomial infection rate: bacteremia related to central lines	Central line catheter-associated bloodstream infection (intensive care/nursery)

Table 2.1 continued

American Nurses Association	National Quality Forum
Patient satisfaction with pain management	Death among surgical inpatients with treatable serious complications
Patient satisfaction with educational information	Restraint prevalence
Patient satisfaction with overall care	Urinary catheter-associated urinary tract infection (intensive care)
Patient satisfaction with nursing care	Ventilator-associated pneumonia (intensive care/high-risk nursery)
	Smoking cessation counseling for acute myocardial infarction, pneumonia, and heart failure

Wolf, & Wang, 2002). Dose of nursing care has proven a strong predictor of patient safety; however, there are no research-based recommendations for the ideal nurse staffing ratios (Ridley, 2008). Systematic literature reviews of studies at the hospital and nursing unit level have identified an association between higher RN-to-patient ratio and reduction in mortality, failure to rescue, length of stay, unplanned extubation, hospital-acquired pneumonia, and nosocomial bloodstream infections (Blegen, 2006; Flynn & McKeown, 2009; Griffiths, 2009b; Kane, Shamliyan, Mueller, Duval, & Wilt, 2007; Manojlovich & Sidani, 2008; Ridley, 2008). In a recent study of 13 military hospitals, the relationship among nurse staffing, patient falls, medication errors, and other outcomes was explored. The research identified that RN skill mix, total nursing care hours, and experience were associated with shift-level adverse events (Patrician et al., 2011). Further, in an Australian longitudinal study of 286 nursing units across 27 hospitals, a relationship between falls and medication errors was identified in medical surgical units (Duffield et al., 2010). These recent studies with large data sets underscore the importance of nurse staffing and patient outcomes.

In addition to staffing, education, and experience are key nursing factors that may affect outcomes. Education level of RNs has been associated with improved quality and safety outcomes (Aiken et al., 2003). In a secondary data analysis, after controlling for acuity and staffing level, nursing departments with more experienced nurses had lower medication error and patient fall rates; however, there were no differences in departments with more baccalaureate-prepared nurses (Blegen, Vaughn, & Goode, 2001). In an integrated literature review of 24 studies, Ridley (2008) claimed that information on the effect of nurse education level on patient outcomes is still lacking.

National nursing specialty certification has been increasing, and certified nurses are considered highly qualified and competent nurses. Only a few studies investigating nursing certification and outcomes have been reported. One study on 866 nurses working in 25 intensive care units did not find a significant relationship between certification and nurse-sensitive patient outcomes (Krapohi, Manojlovich, Redman, & Zhang, 2010), while another study of 48 intensive care units from 29 hospitals found an inverse relationship between certification rates and falls (Kendall-Gallagher & Blegen, 2010). Further, in a study regarding oncology nursing certification, nurses who were certified were more knowledgeable and more likely to follow evidence-based protocols (Coleman et al., 2010). Nursing certification is a relatively new area of study in nursing research, and the relationship between certification and nurse-sensitive patient outcomes needs to be more thoroughly investigated.

There have been several systematic reviews of nurse-sensitive outcomes reported in the literature (Bolton, Donaldson, Rutledge, Bennett, & Brown, 2007; Doran, 2003; Naylor, 2007; Needleman et al., 2007; Riehle, Hanold, Sprenger, & Loeb, 2007). These reviews identified barriers in collecting and reporting outcomes and the importance of validity and reliability of the measurements. According to Blegen (2006), the inconsistencies of nurse-sensitive outcome data are in part due to varying level of analysis (hospital, patient, unit). The authors emphasized the importance of standard data collection at the unit level. Information technology is particularly important in creating standardized methods of data collection and retrieval in a way that bedside staff can utilize to improve care.

The nurse-sensitive patient outcomes used in this study (patient falls, pressure ulcers, catheter-associated urinary tract infection [CA-UTIs], and medication errors) were chosen specifically because of the endorsement by the NQF and NDNQI. These measures cross the span of most adult inpatient nursing units. Standardized definitions, data collection, and reports have been established locally and nationally for these particular measures.

Span of Control

Research on span of control has been reported extensively in the literature. Graicunas demonstrated a mathematical formula positing that as the number of subordinates increases, the number of staff interactions with the manager increases exponentially, concluding that a manager could supervise no more than six or seven employees effectively (Pabst, 1993). This analysis considered not only the number of individuals but also the impact of the relationship between a manager, his or her staff, and the staff's direct reports.

In a concept analysis of span of nursing management, Meyer (2008) defined the following underlying elements of span: supervisor capability, reporting structure, closeness of contact by the manager, managerial scope, and work group size. Meyer argued that span of control reported as a ratio of staff per manager disregards the complex environment of health care, and that a span measure should include the purpose, amount, context, resources, and outcomes of managerial activity. Additionally, Meyer claimed that the number of individuals in the work group did not address the effectiveness of the interactions, cohesiveness, and coordination within the group, nor the amount of assistance to the manager. For example, a manager who is responsible for both

education and management of staff has a very different job description than a manager who has access to collaborate with a clinical educator (Meyer, 2008).

Hattrup and Kleiner (1993) identified advantages and disadvantages of narrow span of control. They found that narrow span of control (managers with too little responsibility) led to close supervision and fast communication from manager to staff but also resulted in micromanaging staff. Narrow span also increased the layers within the organizational hierarchy; decreased communication from the highest levels; slowed decision making; and diluted the mission, vision, and values of the organization.

In an effort to counteract the effects of increased organizational layers and cut costs, hospitals have increased individual manager responsibility and decreased the number of middle managers. In business, some reports have indicated that increasing manager responsibilities (widening their span of control) resulted in increased autonomy, satisfaction, and growth opportunities for staff when the manager clearly defined expectations (Ouchi & Dowling, 1974). In nursing studies, however, the impact of wide span of control was found to be conflicting. Most nursing research on the topic of span of control indicates that as the number of staff who report to a manager increases, employee engagement and nursing and patient satisfaction decrease, while nursing turnover increases (Cathcart et al., 2004; McCutcheon, Doran, Evans, Hall, & Pringle, 2009). These authors concluded that no manager, despite his or her transformational leadership style, can overcome the negative effects of a wide span of control (McCutcheon et al., 2009). However, in one recent study, investigating the link between leadership and safety outcomes in hospitals suggested that large spans of control empower nurses in their

practice, allowing them more participation in unit leadership and, therefore, may have a positive influence on nurse retention (Squires et al., 2010).

Most nursing manager span of control studies have used the number of direct reports as a metric (Altaffer, 1998; Doran et al., 2004; McCutcheon et al., 2009; Tzirides, 1993). Two nursing studies measured span using a more complex methodology. In order to organize nursing services more effectively in a 480-bed long-term care hospital, Alidina and Funke-Furber (as cited in Altaffer, 1998) developed a model for span of control. They used nine key factors that determine span of control to reassign nurse managers' responsibilities. Morash, Brintnell, and Rodger (2005) developed The Ottawa Hospital (TOH) Clinical Manager Span of Control Tool using the following methodology: review of the literature and expert opinion from 28 hospitals in the United States and Canada to identify the scope of practice for a nurse manager. Based on these results, they pilot tested the instrument with nurse managers across five different hospitals in The Ottawa Hospital system. Following the pilot test, the authors used additional focus groups to add weighting and refine the instrument. The final Department Complexity instrument had 17 items (three subscales and one overall Department Complexity score; Morash et al., 2005). The authors did not conduct validity and reliability statistics. However, they recommended validation and verification of the weighting and development of measures to assess the impact of assistance to the manager. Table 2.2 summarizes the key variables identified in the literature related to span of control.

Table 2.2

Studies Measuring Span of Control

Author	Summary	Variables
Udell, 1967	Interviews with 67 chief executives in marketing. Tested 15 hypotheses for span of control. Found significant relationships between geographic dispersion and span of control; however, it was positive rather than negative (greater space between location resulted in less span of control).	Assistance to the manager, geographical location, similarity of functions, need for coordination, need for close supervision, formalized policies and procedures, time available for supervision, competency of the manager, competency of the subordinate
Alidina & Funke-Furber, 1988	In a study in a 480-bed long-term care hospital in Canada, authors developed a model of span of control in order to organize environmental factors of nursing services more effectively.	Patient profile, nursing care program, geographical contiguity, manager profile, employee profile, job-related factors, support systems, organizational factors

CHAPTER 3

METHODS

Theoretical Framework

The framework for this study was based on Gershon et al.'s (2007) conceptual model of quality hospital work-life domains. They proposed that three work-life domains—organizational characteristics, individual characteristics, and working conditions—have a strong influence on hospital outcomes. These domains collectively shape organizational climate and inform the principles, values, and norms of the hospital.

Figure 3.1 illustrates how the variables in this study were conceptually organized within Gershon's constructs. The model was interpreted for this study to include organizational culture, Magnet recognition, nurse managers' leadership style, span of control, hospital size, and complexity of the department in the organizational domain. Individual characteristics of the nurse managers and staff nurses studied were age, highest nursing degree, and experience. It should be noted, however, that organizational characteristics, individual characteristics, and working conditions are not exclusive determinants of patient outcomes. Other factors such as process design and human factors also contribute but were not necessarily addressed in this study.

Working conditions were measured by five Practice Environment subscales and nurse staffing. However, the practice environment included some aspects (autonomy, decision making) that are often included in nursing satisfaction, which in Gershon's

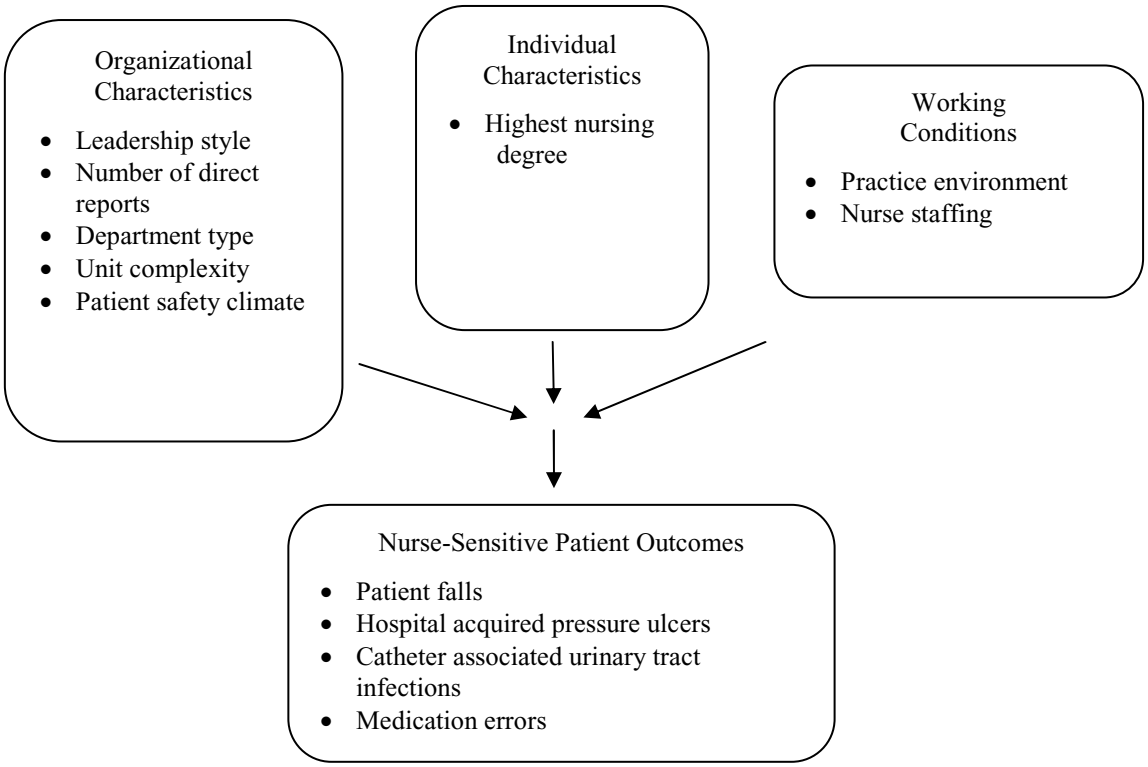

Figure 3.1. Application of Gershon's conceptual model for the study of the relationship among nursing leadership, hospital unit safety climate, and practice environment with nurse-sensitive patient outcomes.

model was considered a hospital outcome. The nurse-sensitive patient outcomes measured were patient falls, hospital-acquired pressure ulcers (HAPUs), CA-UTIs, and medication errors.

Significance

There is currently negligible empiric evidence from healthcare research to link leadership with a decrease in medical errors and patient safety. More than 10 years since the landmark publication *To Err is Human: Building a Safety Health System*, only small strides have been made in improving patient safety in hospitals (Kohn et al., 2000; Wachter, 2010). This study provides insight into the perceptions of the RN nursing staff

of their patient safety environment and the role of the nurse manager in creating a positive safety climate. Further, it investigated the effect of manager span of control and leadership styles. This research may inform hospitals and academic institutions of the relationship between nurse managers and patient safety climate. Improvement programs for nurse managers may result in increased patient safety climate and decreased preventable errors. The results may prompt future research on leadership, span of control, safety climate, medication error prevention, and improvement of patient outcomes.

Research Design and Methods

Design

This exploratory study utilized a descriptive correlational design. Information was collected at the individual nurse level and the department level. Information collected at the individual level was aggregated to the nursing department level, so the level of analysis for the study was the nursing department.

Sample and Setting

The setting included nine hospitals within an integrated not-for-profit healthcare system. The initial sample included 51 adult inpatient nursing department managers from the following department types: medical, surgical, combined medical/surgical, intensive care, step down, rehabilitation, and transitional care. Following Institutional Review Board Approval (IRB; Appendix A) and consent of the nurse managers, individual nurses were approached to participate in the study through the internal e-mail system. Forty-two nurse managers consented to participate (82% response rate), resulting in the eligibility of 1,579 RNs for the study. Initially, 523 staff nurses (33% response rate) from 42

departments responded to the electronic survey. Following data verification and cleaning, the final sample included 466 (29.5% response rate) participants from 41 departments (80% response rate). The large loss of subjects can be attributed to the large number of respondents who failed to complete more than 50% of the items on the survey.

Data Collection/Measurement and Instruments

Instruments

The instruments utilized in this study are summarized in Table 3.1. Psychometric properties for each instrument are further discussed in the narrative. Nurse managers were given an electronic survey in the third quarter of 2009 that included TOH Clinical Manager Span of Control Tool, demographic information, and the number of hours per week the manager was assisted in their duties. The manager survey took approximately 10 minutes to complete. Staff nurses were given an electronic survey also in the third quarter of 2009 that included hospital unit safety climate, leadership style of their nurse manager, and demographic information. The staff nurse survey took approximately 20 minutes to complete. Additional data were obtained retrospectively from databases from July 1, 2008, through June 30, 2009; staffing variables, nurse-sensitive patient outcomes, and Practice Environment scores were not available in all 41 departments. Table 3.1 summarizes the instruments and number of departments represented in the data.

Hospital Unit Safety Climate Survey

The Hospital Unit Safety Climate Survey is a 33-item survey that measures six safety dimensions, one worker safety dimension, and a total safety climate score. The dimensions include (a) manager support (support of safety from the department

Table 3.1

Summary of Instruments/Outcome Variables

Instrument	Subjects	Collected	Reported
HUSC	Staff nurses' ratings of their perceptions of the department climate	Electronic survey, 3rd quarter 2009	Mean score for each dimension and total safety climate score from 41 departments
PES–NWI	Staff nurses' rating of their perceptions of their practice environment	NDNQI, October 2008	Total mean Practice Environment score and mean scores for each subscale from 38 departments
MLQ–5XS	Staff nurses' perceptions of leadership style of their direct manager	Electronic survey, 3rd quarter 2009	Mean score for each of the three leadership styles for each manager from 41 departments
Staff and manager demographics	Staff nurses' and nurse managers' self-report of their age, education, and years of experience.	Electronic survey, 3rd quarter 2009	Means and frequencies from 41 departments

Table 3.1 continued

Instrument	Subjects	Collected	Reported
Nursing Unit and Hospital Characteristics	Type of nursing department, hospital size, Magnet recognition status, number of staff reporting to manager	Hospital databases, 3rd quarter 2009	Frequencies of categories of nursing unit types, hospital size, Magnet recognition status from 41 departments
Nurse staffing indicators	The number of productive total nursing, RN, Licensed Practical Nurse, and unlicensed assisted personnel hours; percent of RN care	NDNQI, 7/1/2008–6/30/2009	Hours per 1,000 patient days and percent of RN care by department from 37 departments
TOH Clinical Manager Span of Control Tool	Managers' description of unit complexity	Electronic survey, 3rd quarter 2009	Mean score for each department span of control from 41 departments

Table 3.1 continued

Instrument	Subjects	Collected	Reported
Number of direct reports to the manager	Number of personnel reporting to the manager	Electronic survey, 3rd quarter 2009	Total number of personnel reporting to the manager from 41 departments
Assistance to the manager	Number of hours per week that manager reported assistance by an educator, staff, secretary, or other	Electronic survey, 3rd quarter 2009	Mean number of assistance to the manager by type of assistance from 41 departments
Patient fall rate	Patients in each department who have a reported fall	NDNQI, 7/1/2008–6/30/2009	Rate of falls per 1,000 patient days in each department from 37 departments

Table 3.1 continued

Instrument	Subjects	Collected	Reported
HAPU prevalence rate	Patients in each department determined to have an HAPU	NDNQI, 7/1/2008–6/30/2009	Prevalence of hospital acquired pressure ulcers per number of patients in the department at the time of the prevalence study from 32 departments
Medication errors	Reported medication errors in each department	Event database, 7/1/2008–6/30/2009	Number of errors per 1,000 patient days in each department from 37 departments
CA-UTIs	Patients in each department who are reported to have acquired a urinary tract infection that is associated with a urinary catheter	Infection control database, 7/1/2008–6/30/2009	Rate of CA-UTIs per urinary catheter days from 30 departments

manager); (b) socialization/training (socialization of new staff and ongoing training in patient safety); (c) safety emphasis (practices that promote patient safety); (d) blameless system (environment focuses on process improvement rather than individual blame); (e) use of safety data (safety data used to improve practices); (f) pharmacist support (involvement of pharmacists in medication information and support); and (g) worker safety (practices and policies that promote worker safety). One item regarding physician support of patient safety from the socialization and training dimension was inadvertently deleted from the survey, resulting in a 32-item scale for this study. Each dimension had three to six items, with at least one item worded negatively (see Table 3.2). The responses to each question were rated on a 5-point Likert scale (1 = *strongly disagree/never*; 3 = *neither/sometimes*, 5 = *strongly agree/always*). The results for each dimension were obtained by calculating a mean of the responses relating to the dimension (after correcting for reverse coding).

A copy of the survey instrument is in Appendix B. (Appendix B provides an example of some of the questions of the MLQ–5XS. Due to copyright considerations, the instrument cannot be reprinted in its entirety.) Although the HUSC is not widely used, its emphasis on an outcome of the study (safe medication delivery), nursing staff as the focal population, the nursing unit as the unit of reference, and theoretical underpinnings justified its use in this study.

Practice Environment Scale of the PES–NWI

The PES–NWI was developed by Lake (2002) from the NWI. It includes 31 items with five subscales: (a) nurse participation in hospital affairs (9 items), (b) nursing foundations for quality of care (10 items), (c) nurse manager ability (5 items), (d) staffing

Table 3.2

Description of Hospital Unit Safety Climate Subscales

Subscale	No. items	Number negatively worded	Sample item	Mean[a] (1–5 scale)	α[a]
Manager support	5	1	Manager praises staff who report medication errors.	3.63	.84
Socialization/ training	6*	1	New nurses learn that it is okay to skip some medication rules.	3.82	.80
Safety emphasis	5	2	Administrations goal is to ensure patient safety.	3.27	.77
Blameless system	5	2	Most staff believe that someone who commits an error is incompetent.	3.59	.78

Table 3.2 continued

Subscale	No. items	Number negatively worded	Sample item	Mean[a] (1–5 scale)	α[a]
Use of safety data	4	1	Staff members use adverse event data to identify problems and improve care.	3.34	.74
Pharmacist support	3	1	The pharmacy makes sure we have recent drug information.	3.45	.75
Worker safety	5	1	My colleagues do not take guidelines such as Standard Precautions seriously.	3.81	.68
Total safety climate	33	9		Not reported	Not reported

[a]From Blegen, Pepper, & Rosse, 2005.
*One item focused on physician relationships was inadvertently omitted from this dimension in this study.

and resource agency (4 items), and (e) collegial nurse–physician relations (3 items). The subscales are scored on a 4-point Likert scale (1 = *strongly disagree*, 4 = *strongly agree*). A mean subscale score greater than 2.5 indicates agreement and a score less than 2.5 was interpreted to indicate disagreement.

The initial development of the PES–NWI subscales was structured using exploratory factor analysis. The mean subscale scores were calculated for each nurse and each hospital. Internal consistency reliability using Cronbach's alpha was 0.80. Mean rater reliability was calculated by interclass correlation. Construct validity was conducted by comparing Magnet Recognized and non-Magnet hospitals. The PES–NWI has been used by over 92,293 RNs nationally and internationally with a reported Cronbach's alpha ranging from 0.860–0.891 for each of the five subscales (NDNQI, 2010). The PES–NWI is one of 15 nurse-sensitive measures endorsed by the NQF (2007), a not-for-profit membership organization created to develop and implement a national strategy of healthcare quality measurement and reporting.

The PES–NWI data used in this study were collected from 38 departments in October 2008 via an electronic annual nursing satisfaction survey conducted by NDNQI for the healthcare system. Data were collected from individual nurses, then aggregated by NDNQI and distributed to the healthcare system at the nursing department level. The Composite Practice Environment Scale was comprised of a mean of all subscale scores (see Table 3.3). When aggregated, the unit level data represent the mean of all unit RN scores.

Table 3.3

Description and Reliability Coefficients From Initial Development of the Practice Environment Scale of the Nursing Work Index

Subscale	No. items	Sample item	Mean[a] (1–5 scale)	*SD*[a]	α[a]
Nurse participation in hospital affairs	9	Career development, staff participation in policy decisions	2.76	0.47	.83
Nursing foundations for quality of care	10	Active quality assurance, high standards of nursing care	3.09	0.39	.80
Nurse manager ability	5	Nurse manager backs up nurses' decisions	3.00	0.59	.84
Staffing and resource agency	4	Enough RNs to get things done	2.88	0.62	.80
Collegial nurse–physician relations	3	A lot of teamwork between MD and RN	2.99	0.52	.71
Composite Practice Environment Scale	31	All scores	2.95	0.40	.82

[a]From Lake, 2002.

Multifactor Leadership Questionnaire

The Multifactor Leadership Questionnaire 5X short form (MLQ–5XS) was used to measure transformational, transactional, and laissez-faire leadership styles. The instrument contains 45 survey items with 12 subscales that result in scores for transformational (5 subscales), transactional (2 subscales), laissez-faire (2 subscales), and overall leadership outcomes (3 subscales). The overall leadership outcomes were not used in this study. The staff nurses used a 5-point Likert scale to rate the degree to which they perceived their manager exhibited each leadership characteristic. The rating scale for leadership characteristics was (0 = *not at all* to 4 = *frequently, if not always*). The results were scored by taking the sum of the items in each subscale and dividing it by the number of items that made up that scale. If an item was left blank, the sum was divided by the number of items answered. To calculate a score for each leadership style, the subscale means were added together and divided by the number of subscales related to that leadership style, for a range of 0 to 4. The subscales and the leadership style they represent are summarized in Table 3.4.

Individual staff nurse responses were aggregated to the unit level, resulting in three overall scores for each manager for transformational, transactional, and laissez-faire leadership styles. These results represent the degree to which staff nurses perceive their nursing manager exhibits these leadership styles.

The MLQ–5XS instrument has been used in multiple research settings. The Cronbach's alpha for the components in previous studies ranged from 0.70–0.84 when tested in 12,118 persons rating their leader (Avolio & Bass, 2004). Appendix B provides

Table 3.4

Description and Reliability Coefficients From Initial Development of the MLQ–5XS[a]

Subscales	Sample item	No. items in scale	Mean (0–4 scale)	α[a]
Transformational				
Idealized influence (attributed)	Instills pride in others. Goes beyond self-interest and builds respect.	4	2.94	.75
Idealized influence (behavioral)	Talks about followers' important values and about a sense of purpose.	4	2.77	.70
Inspirational motivation	Talks optimistically of the future. Compelling vision. Expresses confidence.	4	2.92	.83
Intellectual stimulation	Reexamines critical assumptions. Seeks different perspectives.	4	2.78	.75
Individualized consideration	Spends time teaching and coaching. Treats others as individuals and considers their needs.	4	2.85	.77

Table 3.4 continued

Subscales	Sample item	No. items in scale	Mean (0–4 scale)	α[a]
Transactional				
Contingent reward	Assists in exchange for efforts. Discusses who is responsible for goals.	4	2.87	.69
Management by exception (active)	Focuses attention on mistakes. Keeps track of all mistakes.	4	1.67	.75
Laissez-faire				
Management by exception (passive)	Fails to interfere until problems become serious. Believes "if it isn't broke, don't fix it."	4	1.03	.70
Laissez-faire	Avoids getting involved. Absent when needed. Avoids making decisions.	4	.65	.71

[a]From Avolio & Bass, 2004.

an example of some of the questions of the MLQ–5XS. Due to copyright considerations, the instrument cannot be reprinted in its entirety.

Demographic and Staffing Information

Basic demographic information was collected from the nurse manager and staff nurses. Manager and staff nurses' demographics included age, highest nursing degree, years of RN experience, years on the nursing department, type of nursing department, hospital, years the manager has been in place in that department. Staffing indicators were provided by the healthcare system for 37 departments. The variables were based on productive RN, Licensed Practical Nurse (LPN), and Unlicensed Assistive Personnel (UAP) hours per patient day (HPPD); and skill mix (percent of RNs). Nonproductive hours, such as education or orientation, were not included in these calculations.

Span of Control Measurement

There is currently no validated instrument to measure span of control. TOH Clinical Manager Span of Control Tool developed by Morash et al. (2005) was used to collect span of control information. This instrument includes the following indicators: (a) volume of staff, (b) skill level/autonomy of the staff, (c) staff stability, (d) diversity of the staff, (e) diversity of services provided, (f) budget, (g) complexity of the department, and (h) material management (see Table 3.5).

Managers were given a definition for each scale component. They indicated which most closely described their nursing department. For example, one item in the instrument was "hours of operation." The manager was asked to identify one answer from the following choices: weekdays only 8–4, extended hours, or 24/7 services. Answers

Table 3.5

The Ottawa Hospital Clinical Manager Span of Control Tool

Question	Score	Definition	Weight	Possible range
		Unit-focused measures		
Hours of operations	1	Weekdays	2	2–6
	2	Extended Hours		
	3	Operations 24/7		
Department needs	1	Never or rarely (0–1 times per week)	3	3–9
extra staff	2	Sometimes (2–5 times per week)		
	3	Frequently (> 5 times per week)		
Department exceeds	1	Never or rarely (0–1 times per week)	2	2–6
capacity	2	Sometimes (2–5 times per week)		
	3	Frequently (> 5 times per week)		
Litigation	1	All other departments	2	2–6
	2	Surgical departments		
	3	Obstetrical departments		
Risk management	1	< 2.5 hours per week	2	2–6
	2	2.5–5.5 hours per week		
	3	5.5 hours per week		

Table 3.5 continued

Question	Score	Definition	Weight	Possible range
		Unit-focused measures		
Materials management	1	< 4 hours per week	2	2–6
	2	4–8 hours per week		
	3	> 8 hours per week		
		Staff-focused measures		
Volume of staff	1	< 30	5	5–20
	2	31–70		
	3	71–100		
	4	> 101		
Percent novice nurses	1	< 5%	3	3–9
	2	5–15%		
	3	> 15%		
Percent nonprofessional staff	1	< 10%	3	3–9
	2	10–20%		
	3	> 20%		
Turnover	1	< 10	3	3–9
	2	10–20		
	3	> 20		

Table 3.5 continued

Question	Score	Definition	Weight	Possible range
		Staff-focused measures		
Absenteeism	1	0–6 per month	2	2–6
	2	7–14 per month		
	3	>14 per month		
Employee types (job codes that report to manager)	1	1–3	2	2–6
	2	4–6		
	3	>6		
		Program-focused measures		
Number of people manager reports to	2	1	2	4–9
	3	> 1	3	
Number of services provided by department	2	1–2	3	6–9
	3	> 2		
Number of departments managed	2	1	4	8–16
	4	> 1 (if yes) a. Side by side = 0 b. Not side by side = 2		0–2

Table 3.5 continued

Question	Score	Definition	Weight	Possible range
		Program-focused measures		
Budget	1	< 2 million	2	2–6
	2	2–4 million		
	3	4 million		

Note. From "A Span of Control Tool for Clinical Managers," by R. Morash, J. Brintnell, and G. L. Rodger, 2005, *Nursing Leadership, 18*(3), pp. 90–93. Copyright 2005 by Longwoods Publishing Corp. Reprinted with permission.

were then given a score by this researcher on a 3- or 4-point Likert scale depending on the number of options for that question. The initial score for each question was multiplied by a predetermined weight based on the study by Morash et al. (2005). The weighted scores were added together to result in a total Department Complexity score. The possible range for the Department Complexity score is 0–130 (Morash et al., 2005).

Patient Safety Outcomes

There is a wide variety of patient outcomes; however, few have been specifically identified to be sensitive to care provided by RNs. The following patient outcomes were included in this study because they are endorsed as nurse-sensitive, collected and reported using consistent methodology, and applicable across adult inpatient settings.

Patient Falls

The rate of falls for each nursing department (number of falls per 1,000 patient days) was provided from July 1, 2008, through June 30, 2009, by the healthcare system for 37 departments. Falls were reported by the healthcare provider witnessing the fall. Employees were educated regarding the use of the electronic event database in new employee orientation and periodically through the patient relations and quality department. No validity and reliability information is available on the accuracy of the event database information. A patient fall was defined as an unplanned descent to the floor (or extension of the floor, e.g., trash can or other equipment) with or without injury to the patient, and occurs on an eligible reporting nursing department. All types of falls were included whether they result from physiological reasons (fainting) or environmental reasons (slippery floor). Assisted falls (when a staff member attempts to minimize the

impact of the fall) were also included. Falls were not included if they occurred in visitors, students, staff members, and patients not on the eligible department at time of the fall (e.g., patient falls in radiology department).

Healthcare-Associated Pressure Ulcers

Pressure ulcers were measured through a quarterly prevalence survey. The number of all stages of HAPU divided by the number of patients on that department at the time of the survey was reported quarterly from July 1, 2008, through June 30, 2009, by the healthcare system for 32 departments. A designated day once per quarter was set by the healthcare system to collect the pressure ulcer information. Each nursing department had a dedicated wound specialist who had been trained by the wound care department. Standardized training and interrater reliability was completed by all department-based wound specialists. Each patient on the nursing department had a complete skin assessment on the preset prevalence date. A pressure ulcer was defined as a localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction. They were categorized in Stages 1–4 based on severity. A pressure ulcer was considered healthcare acquired if it was not present on admission (as identified in the patient record) and was present on the prevalence survey date.

Catheter-Associated Urinary Tract Infection

The CA-UTI rate was calculated by the number of urinary tract infections attributed to urinary catheters per urinary catheter days. This information was provided by the healthcare system from July 1, 2008, through June 30, 2009, from 30 departments.

Healthcare-acquired CA-UTIs were identified using the Centers for Disease Control definition for urinary tract infections related to urinary catheters (Horan & Gaynes, 2004). The definition of a CA-UTI included an inpatient with an indwelling catheter and a urine culture of $> 10^5$ colonies/ml of urine with no more than two species of organisms that was not present on admission and the patient exhibited one of the following: fever, urgency, frequency, dysuria, or suprapubic tenderness (Garner, 1988). The process for identification of UTIs included a laboratory triage system. As part of the routine standard of care, the healthcare provider ordered urine cultures if he or she suspected a UTI. Positive urine cultures in patients who had been hospitalized ≥ 48 hours were sent to the infection control surveillance nurse to determine if they met the definition. If the definition was met, the information was entered into the infection control database. Reports were generated from the patient data and provided to this researcher at the nursing department level.

Medication Errors

Medication errors were calculated as the number of errors per 1,000 patient days and reported from July 1, 2008, through June 30, 2009, by the healthcare system for 37 departments. A medication error was defined as any event involving a medication that causes or could lead to patient harm. Medication errors included additional doses, errors in charting or administering medications, missed doses, wrong dose, inappropriate administration (e.g., allergy, wrong route), wrong administration, wrong patient, and wrong time. Adverse drug events (adverse events associated with the medication delivery) were included as medication errors if the reported incident met the previous definition. Events such as reactions to medication that were prescribed and given as

ordered were not considered medication errors. Medication errors were identified and entered into the electronic event database by the healthcare provider either associated with or who discovered the error. Reports were generated from the data at the nursing department level.

Procedures

Recruitment

Nurse managers were approached about this study through their work e-mail system. Names and e-mail addresses of the eligible 51 nurse managers were provided to this investigator by an authorized healthcare system administrator. The initial communication sent to nurse managers explained the purpose of the study and provided basic information. The managers then received a follow-up e-mail that contained a link to SurveyMonkey to complete the short consent that preceded the survey. Responses were used only if the subject clicked "yes" on the consent portion of the survey. Staff nurses were recruited after their department manager consented to the study and completed the manager survey.

The 1,579 staff nurses of the participating departments were recruited through an initial work e-mail that contained a SurveyMonkey link. The e-mail was sent on behalf of this investigator by the nurse manager or designee. This investigator did not have access to the e-mail addresses of the individual nursing department staff. A 4-week time period was set for completion of the electronic survey. A weekly reminder to complete the survey was sent using the same procedure, and posters were placed in the department by this investigator to remind nurses to check their e-mail and complete the survey. The number of responses for each department was known by this investigator; however, no

names or Internet Protocol (IP) addresses were collected. Consent and instruments for the study are located in Appendices B and C.

Inclusion and Exclusion Criteria

Nurse managers of adult inpatient nursing departments across nine hospitals in an integrated healthcare system were included in the study. All RNs who worked more than 3 months on the nursing unit and reported directly to an inpatient nursing department manager who had agreed to participate in the study were included in the sampling frame. RNs who had worked on the nursing department 3 months or less were excluded from the study (not sent the e-mail link) based on the rationale used by the NDNQI that nurses who are on the department 3 months or less do not have an adequate time to assess their manager's leadership style or safety climate.

Subjects Who Did Not Wish to Participate

The preliminary communication to the subjects informed them of the objectives, procedures, and possible risks involved in the study. A short consent preceded the study. Only data from participants who clicked "yes" to the consent were included.

Data Security and Confidentiality

The data were downloaded by this investigator and stored in a password-protected file on a portable flash drive. When not in use, the file was kept in a locked cabinet. Existing database information was provided electronically to this investigator and stored in a password-protected file on the healthcare system server. To protect the confidentiality of the nursing departments and their managers, each nursing department

was assigned a unique code known only to this investigator. Data were reported only out at the department type level (intensive care, step down, medical, etc.).

Analysis

Data Inclusion Criteria

Individual responses were reviewed and surveys excluded if participants had completed fewer than half of the items on the survey. Following exclusion of incomplete surveys, the data were checked for outliers and data entry errors. Departments were included in data analysis if there were four or more staff nurse responses from the department (5% response rate).

Statistical Tests

This study examined the following unit-level predictor variables: leadership style, practice environment, safety climate, nurse staffing, and nursing education level. Four outcome variables were measured: patient falls, HAPUs, CA-UTIs, and medication errors, all of which were reported as continuous rates or percentages.

Level of Analysis

The level of analysis for this study was the nursing department/patient care department. Scores reported by each subject were aggregated to derive mean nursing department scores for each scale or dimension resulting in a sample size of 41 for most variables. Individual demographic data were aggregated to a mean or percent nursing department score (e.g., mean age or percent baccalaureate degree). Hospital data (patient outcomes, staffing, and education) were collected at the nursing department level.

Exploratory Data Analysis

This investigator used SPSS 18 for Windows to analyze the data. A summary of demographic information for the entire study population, by nursing department and department type, was completed.

Initially, 42 nurse managers (82%) and 523 staff nurses (33%) responded to the electronic survey. Six of the nurse managers provided a reason for declining to participate. Reasons for declining included the presence of an interim manager (position vacant) or they were in their position ≤ 3 months. Of the staff nurses who responded to the survey, five respondents declined participation, including three of those who declined to participate but answered the survey questions. These five were excluded from analysis. The remaining nurse managers (42) and staff nurse responses (518) were reviewed for completeness. There were no missing data from the nurse manager responses. Staff nurse cases with less than 50% of the survey completed were deleted from the corresponding analysis. A total of 51 staff nurse responses were excluded due to missing data. Department response rate was then assessed. One department did not have four or more staff nurse responses per department (5% response rate) and was excluded from the analysis, resulting in the deletion of one department manager response and one additional staff nurse case. The final sample included 41 departments (80% response rate) and 466 participants (29.5% response rate) in the analysis. Descriptive data were aggregated to seven unit types and hospital size as defined by the NDNQI. To facilitate inferential analysis and because some nurse-sensitive outcomes were significantly different by department type, nursing departments were then aggregated to two levels (critical care and noncritical care).

Descriptive statistics and box plots were completed and variables assessed for normality of distribution. Several study variables showed significant skewness to the degree that they violated the assumption of normality. Base-10 logarithmic transformations were conducted and used in further data analysis. Staffing variables, nurse-sensitive patient outcomes, and Practice Environment scores were not available in all 41 departments but were included in the analysis when available. The number of departments included in each of the statistical analyses is indicated in the results tables.

Bivariate Analysis

Bivariate analysis (Pearson *r* correlation) was computed on the predictor and outcome variables measured at the interval level to identify direction and degree of association between the variables. Correlations were also used to determine the association between Department Complexity score, number of direct reports, and hours of assistance to the manager. A one-way analysis of variance (ANOVA) was used to identify mean differences by unit type, staff nurse education level (percent bachelor's degree), staff nurse experience, national nursing certification, and Magnet recognition. An ANOVA was also used to determine if the Department Complexity score and number of direct reports varied by nursing department type. Although some of the variables were dichotomous (e.g., Magnet recognition status), ANOVA was chosen for consistency in data presentation. Figure 3.2 summarizes the relationships between the variables for the univariate analysis.

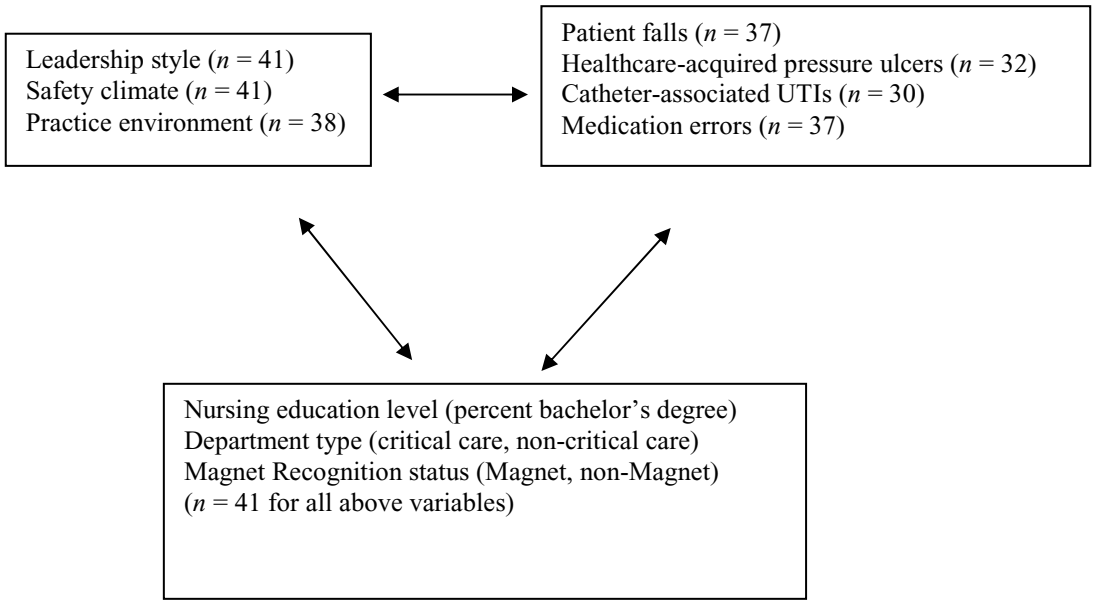

Figure 3.2. Relationship between variables for univariate analysis.

Multivariate Analysis

A backwards stepwise regression procedure was used to determine how well the predictor variables explained the outcome variables. A separate backwards stepwise regression was run for each outcome (falls, CA-UTIs, HAPUs, and medication errors).

An additional backwards stepwise regression analysis was used to determine the extent to which leadership style explained patient safety climate. Four separate regression analyses were performed for each safety climate subscale (manager support, socialization/training, blameless system, and pharmacist support).

Multilevel analysis was then completed on the leadership styles/patient safety climate data to analyze the nested structure of the data (nurses within departments). Using linear regression alone underestimates the standard errors and overestimates the *p* value, which may result in a Type I error (Park & Lake, 2005). The three leadership styles were each analyzed separately with four safety climate subscales (manager support,

socialization/training, blameless system, and pharmacist support). Because of the exploratory nature of the study, the *p* value was set at .05 and not adjusted for multiple tests. Figure 3.3 provides a diagram of the multivariate analysis.

Protection of Human Subjects

Risks

This study was approved by the IRB of the University of Utah and this study's healthcare system (Appendix A). This study was no more than minimal risk; however, employees may be considered a vulnerable population, particularly when the investigator

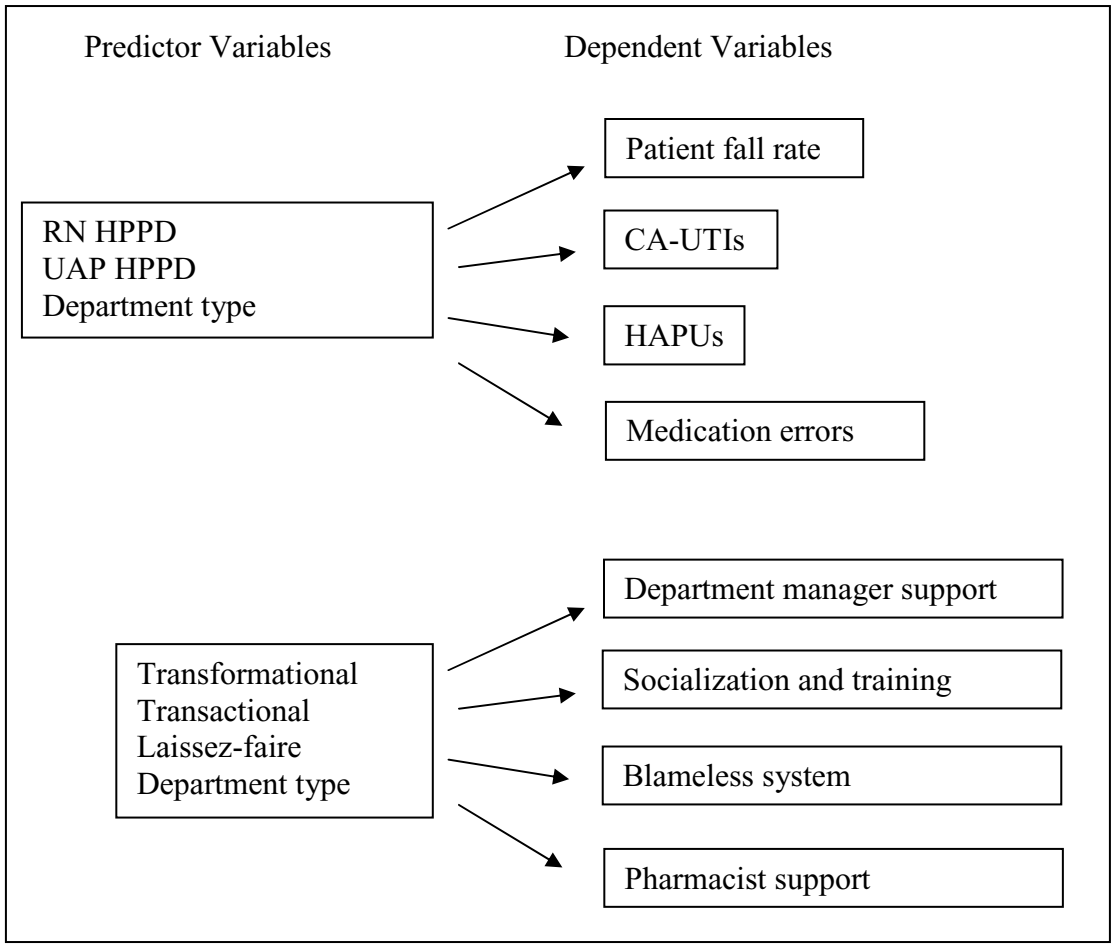

Figure 3.3. Predictor and dependent variables for multivariate analysis.

is in a position of authority in the organization. To mitigate the risk of breach of confidentiality, each department was provided a unique code by the investigator to de-identify it. While this research required that nurse manager names and e-mail addresses be known by the investigator, no names or IP addresses of individual staff nurses were collected. Data were reported only by department type (e.g., critical care, medical, etc.).

Benefits

The research may involve a long-term benefit to patients who receive care from members of the nursing profession and to the nursing staff themselves. The study may provide a benefit of generalizable knowledge of job satisfaction, patient safety, and span of control related to nurse manager leadership, and how these impact nurse-sensitive outcomes.

Risk–Benefit Ratio

The risks for this study were considered no more than minimal with benefits of generalizable knowledge. Therefore, the risks of the study did not outweigh the benefits to doing the study. The risk–benefit ratio was judged acceptable by the IRB.

Funding

This study was funded in part by the Utah Organization of Nurse Leaders and Sigma Theta Tau International Gamma Rho Chapter.

Conflict of Interest

This investigator has no conflict of interest associated with any product or test used in the study. This investigator was employed full time within the healthcare system

participating in the study and received tuition reimbursement from the company totaling $3,000 per year. This investigator was also a member of the IRB at the healthcare system and abstained from participation in any decisions regarding this research.

CHAPTER 4

HOSPITAL UNIT SAFETY CLIMATE, NURSE STAFFING, AND NURSE-SENSITIVE PATIENT OUTCOMES

Abstract

Safety climate has been a main focus of the healthcare dialogue over the past decade. However, there is little empirical evidence that links safety climate to nurse-sensitive patient outcomes. The objectives of this study were to describe nurses' ratings of their hospital unit safety climate and explore the relationships among safety climate, nurse staffing, nurse education level, and nurse-sensitive patient outcomes.

An exploratory descriptive correlational study was conducted in nine hospitals in a not-for-profit healthcare system. The instruments—the Hospital Unit Safety Climate Survey and a demographic survey—were distributed electronically. Nurse-sensitive patient outcomes (patient falls, healthcare-acquired pressure ulcers, catheter-associated urinary tract infections, and medication errors), staffing measures (hours per patient day), and department demographics were obtained from hospital databases. Data analysis was conducted at the unit level. Questionnaires were received from 466 employees (29.5% response rate) across nine hospitals and 41 departments.

Individual staff nurses reported a moderate to high total safety climate (M = 3.8 on a 5-point scale; range = 2.4–5.0; SD = .42). Nurses' perceptions of their safety climate did not explain nurse-sensitive patient outcomes. However, RN hours per patient day and

department type (critical care vs. noncritical care) explained 38.7% of the variance in patient falls and 34.2% of the variance in healthcare-acquired pressure injuries.

The link between safety climate and outcomes remains inconclusive. Staffing remains an important indicator of patient outcomes. Further research on the impact of safety climate and nurse-sensitive patient outcomes is warranted.

Key words were safety, climate, outcomes, falls, medication errors, pressure ulcer, urinary tract infections, infection.

Introduction

Safety climate has been a major focus of the patient safety dialogue since the initial IOM report *To Err is Human: Building a Safety Health System* (Kohn et al., 2000). Researchers have studied the relationships between nurse staffing, nurse education, work environment, and patient outcomes, but in spite of the widely accepted theory, few studies have empirically measured safety climate and outcomes and, in particular, outcomes sensitive to the interaction with nursing care. Since nursing staff are the last line of defense at the sharp end of many hospital processes, demonstrating the link between safety climate and outcomes sensitive to nursing care is particularly important.

The aims of this study were to describe nurses' ratings of the hospital unit safety climate and to explore the relationship among type of nursing department, safety climate, nurse staffing, nurse education level, and nurse-sensitive patient outcomes.

Background

The hospital is a high-risk environment where failure to address safety may result in serious injury, including death. Healthcare-related errors are one of the leading causes

of death in the United States, and organizations successfully manage these potentially fatal errors by creating a climate in which safety is integrated into the culture of the organization (Kohn et al., 2000).

Healthcare safety climate, defined as the employees' perceptions of how a healthcare organization values safety at a particular point in time, is an important measure of an organization's ability to respond to and mitigate error (Blegen et al., 2005; Clarke, 2006; Mark et al., 2007). Aspects of safety climate in health care include leadership behaviors, the use of data, response to errors, teamwork, and the emphasis of safety by the organization (Blegen et al., 2005; Mark et al., 2007).

Considerable theoretical and empirical evidence across industries supports safety climate as a powerful determinant of safety in an organization. In health care, the connection between safety climate and nurse outcomes (job satisfaction, turnover, intent to leave, and worker safety) has been well established. However, the relationship between safety climate in hospitals and nurse-sensitive patient outcomes remains less clear (MacDavitt et al., 2007). This is likely due to the fact that safety climate is a relatively new research focus in health care and there are multiple challenges regarding safety climate measurement.

Nurse-Sensitive Patient Outcomes

Outcomes that are sensitive to nursing care are defined by the ANA as those indicators that "focus on how patients, and their conditions are affected by their interaction with the nursing staff" (Doran, 2003, p. vii). In 1994, the ANA launched a nursing safety and quality initiative resulting in the formation of the NDNQI. The NDNQI is a database that benchmarks 10 nurse-sensitive indicators. In addition to the

NDNQI, the NQF, as part of a Robert Wood Johnson grant, embarked on the development of Nursing Care Performance Measures, resulting in 15 nurse-sensitive indicators in three categories (patient-centered, nurse-centered, and administrative system-centered). The nurse-sensitive patient outcomes used in this study (patient falls, HAPUs, and CA-UTIs) were chosen specifically because of the endorsement by the NQF and NDNQI. Medication errors were included because of their relationship to patient safety and the healthcare system's focus on improving and measuring these errors. These measures are applicable to most adult inpatient nursing units. Standardized definitions, data collection, and reports have been established locally and nationally for these particular measures.

While some research studies have documented that nursing care variables are associated with patient outcomes, results are inconsistent and conflicting (Whitman et al., 2002). Nurse dose or staffing has proven a strong predictor of patient safety; however, despite many mandated nurse–patient ratios, there are no research-based recommendations for the ideal nurse staffing ratio (Ridley, 2008). Systematic literature reviews at the hospital and nursing department level have identified an association among RN-to-patient ratio and reduction in mortality, failure to rescue, length of stay, unplanned extubation, hospital-acquired pneumonia, and nosocomial bloodstream infections (Blegen, 2006; Flynn & McKeown, 2009; Griffiths, 2009b; Kane et al., 007; Manojlovich & Sidani, 2008; Ridley, 2008). In a recent study of 13 military hospitals, the relationship between nurse staffing, patient falls, medication errors, and other outcomes was explored. The research identified that lower RN skill mix, total nursing care hours, and experience were associated with an increase in shift-level adverse events (Patrician et al., 2011).

Further, in an Australian longitudinal study of 286 nursing units across 27 hospitals, low staffing and high workload were associated with a higher rate of falls and medication errors on medical surgical units (Duffield et al., 2010). These recent studies with large data sets underscore the significant impact of nurse staffing on patient outcomes.

In addition to staffing, education and experience are key nursing factors that may affect patient outcomes. Education level of RNs has been associated with improved quality and safety outcomes (Aiken et al., 2003). In a secondary data analysis, after controlling for acuity and staffing level, nursing departments with more experienced nurses had lower medication error and patient fall rates; however, there were no differences in departments with more baccalaureate-prepared nurses (Blegen et al., 2001). In an integrated literature review of 24 studies, Ridley (2008) claimed that information on the effect of nurse education level on patient outcomes is still lacking.

Safety climate has been identified as a useful proxy for safety outcomes in industry. Over the past decade, hospitals have concentrated on safety climate to help improve patient outcomes and decrease error. Few studies have assessed the link between safety climate and nurse-sensitive patient outcomes. The purpose of this study was to describe hospital unit safety climate from a staff nurse perspective and explore the relationship between staffing, education, and nurse-sensitive patient outcomes.

Methods

Sample and Setting

IRB approval for all study sites was obtained prior to data collection. Data were included in the analysis only for those subjects who responded “yes” to a consent question that preceded the survey. This study was an exploratory descriptive correlational

design conducted at nine hospitals in a not-for-profit integrated healthcare system. A link to the HUSC and a demographic questionnaire was distributed electronically through SurveyMonkey to 1,579 RNs working in 51 adult inpatient departments across the hospitals during the third quarter of 2009. Additional department-level information for the period July 1, 2008, through June 30, 2009, was obtained from hospital databases and included nurse-sensitive outcomes, staffing measures, and department demographics.

Theoretical Framework

The framework for this study was based on Gershon's theoretical model of quality of work life and hospital-related outcomes (Gershon et al., 2007). In this framework, three work-life domains—organizational characteristics, individual characteristics, and working conditions—have a strong influence on hospital outcomes. These domains collectively shape organizational climate and inform the principles, values, and norms of the hospital. Figure 4.1 illustrates how the variables in this study were conceptually organized within Gershon's constructs. The individual characteristic of the staff nurses studied was education level. The outcomes measured were patient falls, HAPUs, CA-UTIs, and medication errors. It should be noted, however, that organizational characteristics, individual characteristics, and working conditions are not inclusive indicators of patient outcomes. Other factors such as process design and human factors also contribute but were not necessarily addressed in this study.

Instruments

This study included a 32-item version of the HUSC, demographic questionnaire, nurse staffing, medication errors, patient falls, CA-UTIs, and HAPUs. The demographic

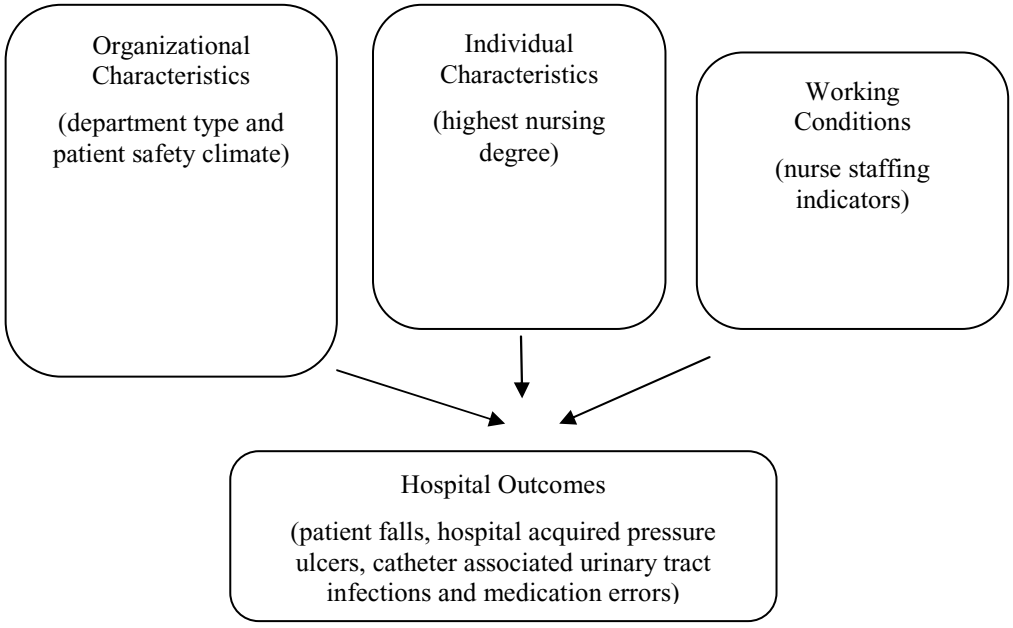

Figure 4.1. Application of Gershon's conceptual model for the study of hospital unit safety climate and nurse-sensitive indicators.

questionnaire included age, gender, level of education, years of experience, and national nursing certification. The healthcare system provided data for staffing, medication errors, patient falls, CA-UTIs, and HAPUs consistent with corresponding definitions from the NDNQI, Centers for Disease Control, and The Joint Commission for Accreditation of Healthcare organizations (ANA, 2007; Horan & Gaynes, 2004). Staffing variables, nurse-sensitive patient outcomes, and Practice Environment scores were not available in all 41 departments. The number of departments represented is identified in each table (Tables 4.1 & 4.2).

The HUSC was developed for inpatient nursing departments of acute care hospitals with the specific purpose of understanding safety climate from a nursing perspective, with emphasis on the medication delivery processes. The theoretical base for the instrument was Reason's (2000) theory of human error. The initial development of

Table 4.1

Nurse Staffing Indicators[a] (*n* = 37)

Staffing variable	Definition
UAP HPPD	Number of UAP productive[a] hours divided by the number of patient days
LPN HPPD	Number of LPN productive[a] hours divided by the number of patient days
RN HPPD	Number of RN productive[a] hours divided by the number of patient days
Total nursing HPPD	Total number of productive[a] hours for UAP, LPNs, & RNs divided by the number of patient days
Percent RN care	Percent of the staff who are RNs

[a]Productive hours include only hours where direct patient care is given and excludes orientation or education hours.

Table 4.2

Definition of Nurse-Sensitive Patient Outcomes

Outcome/measurement	Definition
Patient falls: Number of falls per 1,000 patient days	An unplanned descent to the floor with or without injury to the patient, and occurs in the nursing department (n = 37)[a]
HAPUs: Number of all stages of HAPU divided by the number of patients on the unit at time of survey	A localized injury to the skin and/or underlying tissue usually over a bony prominence, as a result of pressure, or pressure in combination with shear and/or friction. Categorized in Stages 1–4 based on severity (n = 32)[a]
CA-UTIs: Number of UTIs attributed to urinary catheters per urinary catheter days	Inpatient with an indwelling catheter and urine culture of $> 10^5$ colonies/ml with no more than two organisms that were not present on admission and the patient exhibited one of the following: fever, urgency, frequency, dysuria, suprapubic tenderness (n = 30)[b]
Medication errors: Number of errors per 1,000 patient days	Any event involving a medication that causes or could lead to patient harm, including wrong dose, wrong administration, wrong patient, wrong time, etc. (n = 37)

[a]American Nurses Association, 2007; Horan & Gaynes, 2004. [b]Horan & Gaynes, 2004.

the instrument included comprehensive literature review, content expert review, and field testing in two Colorado hospitals, to derive the following seven dimensions: (a) manager support (support of safety from the department manager; 5 items), (b) socialization/training (socialization of new staff and ongoing training in patient safety; 6 items), (c) safety emphasis (practices that promote patient safety; 5 items), (d) blameless system (environment focuses on process improvement rather than individual blame; 5 items), (e) use of safety data (safety data used to improve practices; 4 items), (f) pharmacist support (involvement of pharmacist in medication information and support; 3 items), and (g) worker safety (practices and policies that promote worker safety; 5 items). Each of these dimensions has three to six items each with at least one item worded negatively. The responses to each question are rated on a 5-point Likert scale (1 = *strongly disagree/never*, 3 = *neither/sometimes*, 5 = *strongly agree/always*). After reverse coding of negatively worded items, a mean subscale score was calculated.

The initial study reported reliability coefficients (Cronbach's alpha) for each of the seven dimensions ranging from 0.68 to 0.84 (Blegen et al., 2005) In this study, one question, related to physician support for patient safety, was inadvertently deleted. The HUSC measures six safety dimensions and one worker safety dimension.

While the HUSC instrument has not been widely used, it measures department climate and focuses on medication delivery, which is useful in the study of the relationship between safety climate and nurse-sensitive outcomes. The instrument has sound psychometric properties and was designed with a strong theoretical underpinning specifically for RNs.

Data Analysis

Level of Analysis

The level of analysis for this study was the nursing/patient care department. Safety climate scores reported by each subject were aggregated to derive mean nursing department scores for each subscale dimension and a total mean safety climate score. Individual demographic data were aggregated to a mean or percent nursing department score (e.g., mean age or percent baccalaureate degree, percent nationally certified). Hospital data (i.e., patient outcomes, staffing, and education) were collected at the nursing department level.

The aggregated nursing department safety climate measures and demographic data were matched to the corresponding nursing department level staffing and outcome data. Each nursing department was given a unique code known only by this investigator. The information was kept in a password-protected file.

Exploratory Data Analysis

Initially, 523 staff nurses from 42 departments responded to the electronic survey. Respondents who declined participation (n = 5) were excluded from analysis. The remaining 518 cases were reviewed for completeness. Individual cases with more than 50% of the data missing were deleted from the corresponding analysis. A total of 51 individual cases were excluded due to missing data. Data were aggregated to the nursing department level. One additional department case was excluded because the department did not have four or more responses (5% response rate). The final sample included 466 cases (29.5% response rate) from 41 departments. The large loss of subjects can be

attributed to a large number of respondents who failed to complete more than 50% of the items on the survey.

This investigator used SPSS 18 for Windows to analyze the data. Descriptive data were aggregated and reported by two department types (critical care and noncritical care) because some of the nurse-sensitive patient outcomes were significantly different by department type. Descriptive statistics and box plots were completed and variables identified for normality of distribution. Several study variables showed significant skewness to the degree that they violated the assumption of normality. Therefore, base-10 logarithmic transformation was undertaken for each of the outcome variables, and these were entered into the analysis.

Bivariate Analysis

Bivariate correlational analysis (Pearson *r* correlation) was computed on the predictor and outcome variables measured at the interval level to identify direction and degree of association between the variables. The predictor variables for the study were nursing department safety climate scores, staffing measures, and education data. The outcome variables included nursing department rate of patient falls, prevalence of HAPUs, medication errors, and rate of CA-UTIs. Because staffing and nurse-sensitive patient outcomes were confounded with department type, predictor and outcome variables were reported by critical care and noncritical care department type.

A one-way ANOVA was used to determine if there was a difference in safety climate and patient outcomes across nursing department types (critical care and noncritical care) and nurse education level. Tukey post hoc analysis was planned for significant results when data had more than two groups.

Multivariate Analysis

A backwards stepwise regression procedure was used to determine how well the predictor variables explained the outcome variables. This method of analysis is an efficient, structured method to determine the strongest predictors of the dependent variables. The strongly correlated variables, RNs and UAP hours per patient day, were entered into a regression with department type (critical care, noncritical care) as predictor variables to determine whether nurse staffing explained nurse-sensitive patient outcomes. A separate regression was run for each outcome (patient falls, CA-UTIs, HAPUs, and medication errors). Because of the exploratory nature of this study, the *p* value was set at .05 and not adjusted for multiple tests.

Results

The final sample consisted of 41 nursing departments in nine hospitals with the unit safety climate and demographics aggregated across the nursing unit. Department response rate ranged between 5% and 45% (M = 12%, SD = 7.35). The typical nurse represented in this study was a woman with an associate's degree who worked full time. About one third of the nurses worked in critical care (36%); most were in noncritical care departments (64%). Most hospitals were Magnet Recognition hospitals (65.8%) and teaching hospitals (57.9%), with the average number of hospital beds reported as 218 (range 30–440). Nurses in critical care departments were more likely (62.3%) to report having a bachelor's degree or higher than nurses in noncritical care departments (39.5%). Demographic information and hospital characteristics are provided in Tables 4.3–4.5 and Appendix C.

Table 4.3

Descriptive Statistics for Safety Climate Survey
Staff Nurse Respondents (n = 466)

Variable	*M*	*Mdn*	Range	*SD*
Age	39.0	37.0	21–68	11.4
Years RN	11.8	8.0	0–45	10.6
Years Hospital	7.4	3.8	0–38	8.0
Hours Worked per Week	35.9	36.0	2–80	11.6
	N	%		
Female	367	78.9		
Education				
Associate's degree	234	50.3		
Bachelor's degree	206	44.3		
Master's degree	8	1.8		
Nationally certified	82	17.6		
Day shift	230	49.5		
12-hour shifts	426	91.6		
Department type				
Critical care	168	36.0		
Noncritical care	298	64.0		

Table 4.4

Hospital Characteristics (n = 9)

Variable	*N*	%
Hospital size		
< 100 beds	3	33.0
101–299 beds	3	33.0
300 beds	3	33.0
Magnet recognized	6	65.8
Teaching hospital	5	57.9

Table 4.5

Descriptive Statistics for Education, Years RN, and Certification by Department Type

	Critical care departments (n = 14)		Noncritical care departments (n = 27)	
	M	*SD*	*M*	*SD*
Percent bachelor's or higher	62.3**	18.3	39.5**	17.4
Years RN	11.4	3.9	11.7	4.7
Percent nationally certified	24.9	18.8	18.3	20.9

**ANOVA; F = 15.2, df = 39, p = .000.

Safety Climate and Hospital Unit Characteristics

The mean total safety climate score was 3.8, with an individual item score range of 2.4–5.0 (5-point scale). Among the subscales, the lowest mean score was the use of safety data subscale (M = 3.5), followed by blameless system (M = 3.6) and safety emphasis (M = 3.6). The highest mean subscale score was socialization and training of new nurses and training related to safety (M = 3.9). Safety climate subscales were similar across unit types with the exception that critical care departments reported lower socialization and training scores (M = 3.9) than noncritical care departments (M = 4.0). Cronbach's alpha for the HUSC scores computed for this study ranged from .729–.866 (see Appendix C).

Safety Climate and Patient Outcomes

Patient falls were the most frequent nurse-sensitive patient outcome, followed by HAPUs. Because risk factors and outcome rates differ by department type, nurse-sensitive patient outcomes were compared by critical care and noncritical care department type (Currie, 2006; Langemo, Anderson, & Volden, 2003; Lucero, Lake, & Aiken, 2009; Patrician et al., 2011). Patient fall rates were significantly higher in noncritical care than critical care (M = 4.8 and 1.7, respectively) departments. CA-UTIs were also followed this same pattern (noncritical care, M = .75; critical care, M = .48; see Appendix C).

The bivariate analysis identified a significant moderate negative relationship between medication errors and the safety emphasis subscale (r = –.434, p = < .030) and between patient fall rate and pharmacist support (r = –.418, p = < .042) in noncritical care departments. No significant relationship between critical care departments, patient

safety outcomes, and patient safety climate scores were identified. However, in critical care departments, a strong positive correlation coefficient between several safety climate measures and CA-UTIs was identified and a few correlations with safety climate and patient falls. These did not reach statistical significance most likely due to the small sample size of critical care departments (n = 11–13; see Table 4.6).

Safety Climate and Staffing Indicators

The majority of the noncritical care departments utilized an RN/UAP model, with 72% of care provided by RNs and 25% by UAP. Only 2.8% of the care was provided by LPNs. As would be expected, RN hours were greater and LPN and UAP hours were fewer in critical care departments than in noncritical care departments (see Appendix C). LPNs were dropped from further analysis because of the presence of the strong RN/UAP model.

The bivariate analysis identified a strong negative relationship between the pharmacist support subscale and total nursing hours per patient day (NHPPD) in critical care departments (r = –.677, p = .011). In noncritical care departments, a significant positive relationship was identified among total NHPPD and manager support (r = .445, p = .029), safety emphasis (r = .560, p = .004), and total safety climate (r = .420, p = .041). Other strong negative correlations among total NHPPD, three patient safety subscales, and total safety climate were identified in critical care departments. However, the small sample lacked power to establish significance (see Table 4.7).

Table 4.6

Correlations for Safety Climate and Patient Outcomes by Department Type (Critical Care [CC]/ Noncritical Care [NCC])

	CA-UTIs		HAPUs		Medication errors		Patient fall rates	
	CC	NCC	CC	NCC	CC	NCC	CC	NCC
Subscale	*n* = 12	*n* = 18	*n* = 11	*n* = 21	*n* = 12	*n* = 25	*n* = 13	*n* = 24
Manager support	.533[a]	.183	.122	.261	.070	–.178	.371	–.248
Socialization/training	–.013	.267	.058	–.116	–.222	–.295	.101	.073
Safety emphasis	.388	.216	.220	–.096	.014	–434[d]	.334	.316
Blameless system	.397	.074	.064	.129	–.194	–.206	.307	–.217
Use of safety data	.567[b]	.341	.228	–.288	.434	–.116	.421	.087
Pharmacist support	.548[c]	–.189	.332	.165	.297	.091	.511[a]	–.418[e]
Worker safety	–.100	.207	.038	.038	–.331	–124	.245	–.156
Total safety climate	.474	.177	.243	.243	.080	.080	.430	–.184

Note. Base-10 logarithmic transformation for patient outcomes prior to analysis.
[a]$p = .075$. [b]$p = .055$. [c]$p = .065$. [d]$p = .030$. [e]$p = .042$.

Table 4.7

Correlations for Staffing Variables and Safety Climate by Department Type (Critical Care [CC], *n* = 13/ Noncritical Care [NCC], *n* = 24)

	UAP HPPD		RN HPPD		Total NHPPD		% RN care	
Subscale	CC	NCC	CC	NCC	CC	NCC	CC	NCC
Manager support	–.164	.057	–.228	.374[a]	–.422	.445[b]	.104	.233
Socialization/training	–.195	.220	.211	.170	.001	.369[c]	.291	–.048
Safety emphasis	.246	.276	–.456	.131	–.457	.560[d]	–.273	–.212
Blameless system	–.299	.190	.015	.128	–.244	.293	.244	–.011
Use of safety data	–.157	.241	–.236	.158	–.370	.512[e]	.069	–.140
Pharmacist support	–.126	–.101	–.401	.041	–.677[f]	–.221	.072	.240
Worker safety	.103	.017	–.179	.127	–.150	.209	–.098	.055
Total safety climate	–.120	.183	–.251	.218	–.453	.420[g]	.081	.020

[a]$p = .072$. [b]$p = .029$. [c]$p = .076$. [d]$p = .004$. [e]$p = .010$. [f]$p = .011$. [g]$p = .041$.

Patient Outcomes and Staffing Variables

The relationship between patient outcomes and staffing variables was assessed by department type. A strong negative relationship between patient fall rates and nurse staffing was identified for both critical care and noncritical care departments (see Table 4.8). There was no statistically significant association in CA-UTIs, HAPUs, or medication errors, and nurse staffing variables among critical care or noncritical care departments. However, a nonsignificant but moderate negative correlation coefficient between medication errors and staffing that approached statistical significance was identified in critical care departments ($r = –.532$, $p = .075$ and $r = –.522$, $p = .081$, respectively).

Table 4.8

Correlations for Patient Outcomes and Staffing Variables by Department Type (Critical Care [CC]/ Noncritical Care [NCC])

Nurse-sensitive patient outcomes	RN HPPD		Total NHPPD		% RN care	
	CC	NCC	CC	NCC	CC	NCC
CA-UTIs	–.135	–.024	–.374	.208	.271	–.177
HAPUs	.129	.217	.134	.260	.276	.110
Medication errors	–.532[a]	–.062	–.339	–.167	–.522[e]	.094
Patient fall rate	–.764[b]	–.438[c]	–.753[d]	.021	–.401	–.625[f]

Note. Base-10 logarithmic transformation for patient outcomes prior to analysis.
[a] $p = .075$. [b] $p = .002$. [c] $p = .037$. [d] $p = .003$. [e] $p = .081$. [f] $p = .001$.

Backwards stepwise multiple regression was conducted to determine how staffing variables and department type contributed to nurse-sensitive outcomes. Four separate regression analyses were completed and are reported in Tables 4.9–4.12. In each regression, RN and UAP HPPD were entered into the regression because of the high RN/UAP model used in the healthcare system. Department type (critical care and noncritical care) was entered as a dummy variable to control for differences in staffing levels by department type. The results for all models generated are reported.

Table 4.9

Multivariate Analysis for Patient Falls and Staffing Variables

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .390)					
RN HPPD	–.417	.051	–.843	–8.219	.000
UAP HPPD	–.146	.102	–.083	–1.429	.154
Department type	1.007	.577	.176	1.746	.082
Model 2 (R^2 = .387)					
RN HPPD	–.398	.049	–.805	–8.114	.000
Department type	1.160	.568	.203	2.043	.042

Note. Dependent variable entered: Patient fall rate. Predictor variables entered: RN HPPD, UAP HPPD, and department type (critical care/ noncritical care).

Table 4.10

Multivariate Analysis for Pressure Ulcer Prevalence and Staffing Variables

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .346)					
RN HPPD	.231	.082	.325	2.810	.005
UAP HPPD	.255	.170	.098	1.500	.134
Department type	2.896	.936	.347	3.094	.002
Model 2 (R^2 = .342)					
RN HPPD	.195	.079	.275	2.475	.014
Department type	2.678	.926	.321	2.892	.004

Note. Dependent variable entered: Pressure ulcer prevalence. Predictor variables entered: RN HPPD, UAP HPPD, and department type (critical care/noncritical care).

Table 4.11

Multivariate Analysis for CA-UTIs and Staffing Variables

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .228)					
RN HPPD	–.057	.011	–.640	–5.085	.000
UAP HPPD	–.153	.023	–.472	–6.613	.000
Department type	–.079	.124	–.077	–.637	.525
Model 2 (R^2 = .227)					
RN HPPD	–.063	.006	–.706	–10.000	.000
UAP HPPD	–.151	.023	–.465	–6.596	.000

Note. Dependent variable entered: CA-UTIs. Predictor variables entered: RN HPPD, UAP HPPD, and department type (critical care/noncritical care).

Table 4.12

Multivariate Analysis for Medication Errors and Staffing Variables

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .011)					
RN HPPD	–.012	.010	–.164	–1.265	.207
UAP HPPD	.026	.020	.097	1.312	.190
Department type	.182	.111	.207	1.636	.103
Model 2 (R^2 = .007)					
RN HPPD	.032	.019	.122	1.710	.088
UAP HPPD	.066	.063	.075	1.049	.295
Model 3 (R^2 = .004)					
UAP HPPD	.018	.013	.066	1.387	.166

Note. Dependent variable entered: Medication error rate. Predictor variables entered: RN HPPD, UAP HPPD, and department type (critical care/ noncritical care).

In the final model for patient falls, RN HPPD and department type accounted for 38.7% of the variance in patient falls and 34.2% of the variance in HAPUs. Staffing did not appear to contribute greatly to medication errors; however, RN and UAP HPPD accounted for 22.7% of the variance in CA-UTIs.

Discussion

The staff nurses in this study reported a fairly high unit safety climate (M = 3.8 on a 5-point scale). Safety climate scores were similar across nursing department types,

although critical care departments reported lower socialization and training ($M = 3.9$) than noncritical care departments ($M = 4.05$). These findings may be explained by this study's particular integrated health care system's approach to patient safety. Over the past 5 years, a standardized patient safety program was developed that included annual safety climate measurements and required staff education and unit-based process improvement strategies. However, the results may also represent a social desirability bias or concerns about anonymity of the results. No information was available about the nonresponders who, had they completed the survey, may have responded differently.

The use of safety data to improve safety is an important tenet of quality improvement in health care. In this study, the lowest safety climate subscale reported was the use of safety data to improve patient safety ($M = 3.5$). A moderate negative correlation coefficient was also identified with the use of safety data in noncritical care departments; however, this was not statistically significant ($r = –.359$, $p = .06$). A correlation between the use of safety data and nurse-sensitive patient outcomes was also identified. A moderate to strong positive correlation was noted between use of safety data and patient falls, medication errors, and CA-UTIs in critical care departments ($r = .421$, .434, and .567, respectively). While these correlations were not statistically significant, they would be clinically meaningful in an adequately powered study. Nurses play a large role in the improvement of quality at the unit level. Safety climate and all its components, including engaging staff nurses in the use of safety data to improve safety, creates a solid foundation for this important work (Draper, Felland, Liebhaber, & Melichar, 2008).

Medication Errors and Pharmacist Support

One of the most frequent activities in which nurses engage is medication delivery. Medication delivery is a complex process, making it particularly vulnerable to error. Errors have been linked to workload, hours worked, patient acuity, staffing, experience, time of day, and department type (Carlton & Blegen, 2006). In this study, a moderate negative relationship was identified with safety emphasis and medication errors in noncritical care departments. Medication errors were not associated with staffing variables.

While medications are mainly administered to the patient by RN nursing staff, the entire medication delivery process has an interdisciplinary component, making nurse and pharmacist collaboration essential for error-free medication delivery. Kaushal (2008) identified that an addition of a full-time pharmacist in the pediatric intensive care unit resulted in a fourfold decrease in medication errors. Guy, Persaud, Davies, and Harvey (2003) also found that the addition of pharmacist support resulted in a 30% higher success rate in getting the physician to rectify orders when an error was identified.

Despite evidence in the literature that pharmacist collaboration decreases errors, many nurses perceive that pharmacy is an obstacle in medication delivery (Gurses & Carayon, 2007). In this study, critical care departments, which are usually known for their interdisciplinary teamwork, reported lower pharmacist support and a negative relationship between staffing and pharmacist support. This means that as critical care staffing ratios increased, perception of pharmacist support decreased. The explanation for these particular findings is unclear; however, critical care departments are generally considered to be more autonomous. When critical care nurses are provided with enough

staff, they may not feel the need for additional interdisciplinary involvement from the pharmacist.

Staffing, Safety Climate, and Outcomes

Nurse staffing has been found in multiple studies to be associated with some patient outcomes, although these studies vary in the outcomes measured and methods of measurement of nurse staffing. Higher nurse-to-patient ratios have also been attributed to job dissatisfaction and turnover. Few studies have looked specifically at safety climate and nurse staffing (Griffiths, 2009b). In this study, total NHPPD was strongly positively related with safety emphasis in noncritical care departments. However, in critical care departments, the inverse relationship was identified. It is unclear why a negative relationship between most patient safety climate measures and nurse staffing was identified in critical care departments.

Nurse staffing was found to be associated with nurse-sensitive patient outcomes. Patient fall rates were significantly associated with RN staffing variables in both critical care and noncritical care departments. The final regression model indicated that RN HPPD and department type accounted for 38.7% of the variance in patient falls. This indicates that over one third of the variability in patient fall rates can be explained by RN staffing and department type. It is also important to note that UAP was not found significant in the final model. Efforts in fall reduction programs have focused on fall scores, awareness campaigns, and other process improvement strategies. Many hospitals have increased staffing of UAPs to provide better observation and therefore decrease falls. This study, however, suggests this strategy may not be the sole contributor to fall

reduction. Without appropriate staffing of RNs, fall reduction programs may not be entirely successful.

Limitations

Although there was a relatively large number of nurses participating in the study, the aggregation at the unit level and the need to consider critical care and noncritical care departments decreased the sample size and the power to detect statistical significance in clinical meaningful associations. A lack of data for some of the predictor and outcome variables further decreased power. While overall response rate was 29.5%, individual department response rates ranged from 5–45%. Managers sent the link to the survey to each nurse, which may have also resulted in selection bias and response rate. The study was conducted in an integrated health system with standard staffing ratios for medical surgical units 1:5 or 1:6, step down departments 1:2 or 1:3, and intensive care units 1:1. These ratios may make it difficult to detect staffing differences between nursing departments and their contribution to patient outcomes. In addition, there are no validity and reliability measures available for nurse-sensitive patient outcomes. Measurement of pressure ulcers was the most valid outcome in this study, as this study's health care system has a standardized training program and interrater reliability has been established. However, it is collected as a quarterly prevalence rate. CA-UTIs are identified by culture results and may be underreported if cultures are not routinely utilized for diagnosis. Falls and medication errors are self-reported measures. It is unknown in this study how many errors or falls are not reported; however, it is suspected that falls with injury are more likely to be reported and may be a more robust measurement. Previous research has shown that identified medication errors and falls are reported only 47–77% of the time

and only a small percent of medication errors are actually identified (Barker, Flynn, Pepper, Bates, & Mikeal, 2002; Blegen et al., 2004). Underreporting can attenuate the strength of correlations, making identification of important relationships difficult. Further, some moderate correlations were identified with staffing and medication errors and CA-UTIs, but these did not reach significance. This warrants further study and may be the result of small sample size. Based on a post hoc analysis of statistical power, 23 nursing departments in both department types would have been needed to detect a strong correlation (r = .5) with 80% power and alpha of .05.

Conclusion

Safety climate is the foundation upon which to build process improvements that impact patient safety outcomes (Goodman, 2003; Huang et al., 2007; Ruchlin et al., 2004; Singer et al., 2003; Yates et al., 2005; Zohar et al., 2007). A strong safety climate counteracts both active and latent failures by having an infrastructure that provides a safety foundation and leaders in the organization who instill the vision and values of patient safety at the bedside. The findings in this study suggest that hospital process improvement strategies toward safety climate can be infused throughout the organization; however, these strategies should be tailored to work areas and disciplines (Singer, Lin, Falwell, Gaba, & Baker, 2009).

Measures to promote safety, including executive walk rounds, patient safety training, and provision of equipment and protocols have resulted in improved nurse perceptions of safety climate (Ginsburg, Norton, Casebeer, & Lewis, 2005; Thomas, Sexton, Neilands, Franek, & Helmreich, 2005). Implementation of organization-wide patient safety programs, however, requires commitment and perseverance and can only

be accomplished by involvement at all levels, including the individual nursing department (Frankel, Gandhi, & Bates, 2003). Strategies to improve blame-free reporting, consistent definitions, data collection, and implementation of safety measures are key to reducing errors (Brady, Malone, & Fleming, 2009).

Changing the safety climate in a hospital is a journey that takes time and consistent reinforcement. Institutional memory may be long, making the development of a blameless system an evolving process that can be easily thwarted when managers or directors are not consistent in their approach to error identification and reduction strategies. An environment with open communication is essential to increasing a blameless system and the use of safety data to improve safety. Safety emphasis and an understanding of safety outcomes data empower nurses who, amidst many other competing priorities, are then able to prioritize their practice to promote optimal safety for their patients.

Nursing and pharmacy departments need to seek out a collaborative environment. Such collaboration perhaps starts at the top with the director of pharmacy and chief nursing officer. However, staff nurses may include pharmacists in unit-based rounds or care conferences and seek individual patient consultations. Pharmacists need to involve nurses in committees and decisions that involve medication delivery and patient safety issues.

The link between patient safety climate and patient outcomes remains elusive in part due to varied methods of measurement and definitions, as well as issue with the unit of analysis resulting in small samples. This study identified a few relationships between patient safety climate and patient safety outcomes; however, RN staffing remains a key

predictor of some nurse-sensitive outcomes, such as patient falls. Programs to reduce nurse-sensitive patient outcomes, particularly falls, need to consider RN staffing as a potential improvement strategy.

Further research needs to concentrate on other aspects of quality nursing care that may contribute or confound nurse-sensitive patient outcomes, such as implementation of evidence-based practice protocols and patient acuity. Standardized definitions and methods of measurement for patient safety climate and outcomes are essential to conducting nursing outcomes research. Consistent methods of defining, abstracting, and reporting nurse-sensitive data remain a barrier. When safety climate is assessed, interactions between the nurse and the interdisciplinary team, particularly the role of the pharmacist in prevention of medication errors, should be assessed.

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CHAPTER 5

THE EFFECT OF NURSING LEADERSHIP STYLE ON SAFETY CLIMATE, PRACTICE ENVIRONMENT, AND PATIENT SAFETY OUTCOMES

Abstract

The objective of this study was to explore the relationship between nurse manager leadership styles and patient safety outcomes. There is currently little empirical evidence to link nursing leadership style with positive patient outcomes, greater safety, or fewer medical errors.

Descriptive correlational design using electronic surveys of safety climate, practice environment, and nurse manager leadership style. A sample of 466 RNs (29.5% response rate) in 41 departments in nine hospitals with data analyzed at the unit level.

Relationships among safety climate, leadership style, and practice environment were identified by department type. There was no association between leadership style and patient safety outcomes. Regression analysis identified that transformational and laissez-faire leadership explained perception of manager and pharmacist support (62.3% and 24.2%, respectively). Laissez-faire leadership and department type explained a small amount of variance in perception of whether the system was blame-free and socialization for safe practices (27.2% and 20.9%, respectively).

Nursing leadership plays an important role in shaping the patient safety climate in hospitals.

Introduction

Studies have documented the need for strong leadership in nursing (Canadian Nursing Advisory Committee, 2002; Doran et al., 2004). Recommendations made by the IOM call for leaders who will change the work environment and increase patient safety by shaping practices and beliefs through transformational leadership and evidence-based management (Kohn et al., 2000). The Magnet Recognition Program developed by the ANCC (2005) identified that organizations that have nursing leaders who create a supporting environment through being visible, accessible, and committed to communicating effectively with staff attract nurses even in periods of shortage. In 2008, Magnet recognition standards were updated to include 19 nationally benchmarked outcome measures with an expectation that Magnet Recognized hospitals would outperform the mean, median, or other benchmark statistics. Nursing department managers are expected to not only lead their department but also maintain a safe environment that results in high quality care (ANCC, 2008; Meredith, Cohen, & Raia, 2010). However, there is currently little empirical evidence to link leadership style with quality outcomes, patient safety, or medical errors.

Purpose of the Study

The aim of this study was to explore the relationship between nurse manager leadership styles and nurse-sensitive patient outcomes (patient falls, HAPUs, CA-UTIs,

and medication errors) and to what extent leadership style, practice environment, and safety climate explain patient safety outcomes. The specific research questions were

1. How do staff nurses describe their nurse managers' leadership style in regard to transformational, transactional, and laissez-faire leadership?
2. How do staff nurses rate their practice environment related to participation in hospital affairs, quality of care, nurse manager ability, leadership and support of nurses, staffing and resource agency, and collegial nurse–physician relations?
3. What are the relationships among nurse manager leadership style, practice environment, unit safety climate, and nurse-sensitive patient outcomes?
4. To what extent does nurse manager leadership style explain unit safety climate?

Review of the Literature

Leadership

Leadership is a complex term with multiple definitions. A leader has been defined as a person who guides, directs, and plays a critical role in attainment of goals (Bass, 1990). Successful leaders motivate their followers to reach their full potential (Avolio & Bass, 2004). However, leadership is not a one-size-fits-all approach. Leaders are different from one another by the types of groups they lead and by the individual behaviors or characteristics they exhibit.

Most early leadership theories addressed the concept called the *great man theory*. Great man theorists proposed that leaders are born, not made. Great men were identified

as extraordinary leaders or heroes (Bass, 1990). Florence Nightingale, Clara Barton, and Dorothea Dix are often reported as some of the great nursing leaders.

Trait theory, an extension of great man theory, identified specific traits or characteristics common to great leaders. Although trait leadership fell into disfavor during the 1950s, several of the characteristics of leaders identified still populate today's leadership theory. In situational leadership theory, leadership is dependent upon situations rather than traits. Leaders in specific situations, such as war or group dynamics, have been observed to behave in ways that would otherwise remain hidden (Bass, 1990).

These interaction and social learning theories attempted to explain the leader–follower relationship and marked the beginning of more complex leadership theories. Leadership is considered not in isolation but within the organization as a whole, including the inputs and outputs of the system, along with the leaders and followers in that system (Bass, 1990; Bass & Riggio, 2006; Klakovich, 1994).

In a descriptive study of political leaders, Burns identified three leadership styles he termed *transformational–transactional theory*. Transformational leaders are proactive and convince their associates to strive for higher levels of performance. These leaders are admired and respected, instill pride and purpose, motivate others, stimulate followers to be innovative and creative, and pay attention to individual needs for achievement (Avolio & Bass, 2004). Transformational leaders talk about the future in a positive manner and articulate a compelling vision (McDaniel & Wolf, 1992; McGuire & Kennerly, 2006).

Transactional leaders are those who lead through social exchange using two key methods to motivate their followers: contingent reward and active management by exception. Each of these are briefly described as follows. When rewards given by leaders

are contingent on productivity and achievement of goals, employees are not engaged and committed to the organization. Management by exception is a corrective action approach that is less effective than contingent award. Leaders using management by exception actively seek out errors and mistakes and take corrective actions as needed. This active approach may be important for high-risk safety issues; however, it fails to ensure long-term commitment to safety processes.

Laissez-faire leadership is characterized by passive management by exception. Leaders who take a passive approach wait to intervene until problems are serious, and often a problem becomes chronic before it gets attention. The passive approach is sometimes found in managers who have a large number of staff reporting to them or those with a job description that requires them to be away from the department (Bass & Riggio, 2006). Laissez-faire leadership is identified as the most ineffective type of leadership and is essentially absence or avoidance of leadership.

Consistent evidence has shown superiority of transformational over transactional and laissez-faire leadership styles (Avolio & Bass, 2004). In the business literature, a strong positive relationship among transformational leadership and safety climate, safety consciousness, and safety-related events was reported (Barling et al., 1996). Zohar (2002), however, found that transformational leadership in hospital leaders predicted employee injury rates and suggested a path leading to safety climate.

Leadership Style and Outcomes

The relationship between leadership style and nurse outcomes (job satisfaction, turnover) has been well studied. The relationship of leadership style with nurse-sensitive patient outcomes, however, is not as well documented. Kanste et al. (2007) found in two

separate studies that staff nurses were more satisfied with their managers and perceived them as more effective if the manager exhibited a transformational leadership style. In further research, leadership style was linked with positive employee productivity, acceptance of change, job performance, turnover, and employee empowerment (Klakovich, 1994; Laschinger et al., 2001; Loke, 2001; McNeese-Smith, 1997; Upenieks, 2003). Transformational leaders, as opposed to task-oriented leaders, have been found to have staff who are more satisfied with work in general, relationships at work, health and well-being, work environment, productivity, and effectiveness (Cummings et al., 2010; McGuire & Kennerly, 2006).

Laschinger and Leiter (2006) identified that nurses reported better patient safety outcomes when nursing leadership played a role in creating a positive work environment. A recent study by Squires et al. (2010) tested a model to link the quality of nurse leaders and staff nurse relationships between work environment, safety climate, and nurse outcomes. This was the first study to report a link between safety climate and leadership. Further studies are needed to validate these findings.

Safety Climate

Safety climate is a relatively new area of study in hospitals. Safety climate refers to employees' perceptions of the culture of an organization and includes values, attitudes, behaviors, and commitments of the organization toward health and safety (Blegen et al., 2005; Nieva & Sorra, 2003). A healthcare organization and its senior leadership may value patient safety; however, if these values are not actualized at the level of direct patient care, the organization will continue to struggle with patient safety. The nurse manager is the link between the culture of the organization and the climate at the unit

level. Mark et al. (2007) identified four key dimensions that affect safety climate: (a) managerial behaviors, (b) balance between production and safety, (c) information flow, and (d) response to unsafe behavior. Despite the fact that the nurse manager has repeatedly been discussed as a factor contributing to hospital patient safety, there is little empirical evidence to link the nurse manager's leadership style to patient safety outcomes (Hoff, Jameson, Hannan, & Flink, 2004; Wong & Cummings, 2007).

Practice Environment

In addition to safety climate, nursing leadership plays an important role in the staff nurse practice environment. The practice environment is a complex construct used to define the organization of the nursing work. It reflects aspects of the nursing work environment, such as decision making, nurse-to-patient ratios, collegial relationships, and expectations of quality (Lake, 2002).

Several studies in the United States and internationally using large databases have been conducted measuring practice environment and various outcomes. Practice environment subscales have been associated with nurse-assessed quality of care, patient satisfaction, nurse–bed ratio, clinical grade mix, temporary staff, and sickness absence. Practice environment characteristics have also been associated with nurse staffing levels but not hospital bed size (Adams & Bond, 2003a, 2003b; Aiken et al., 2002; Aiken et al., 1999; Friese et al., 2008; Laschinger et al., 2001; McCusker et al., 2004; Van Bogaert et al., 2009).

Nursing leadership has become a strong focus in quality improvement and patient safety. While the literature has identified a relationship between leadership and nurse outcomes such as job satisfaction and turnover, little information is known about the

relationship among nurse manager leadership, patient safety climate, and nurse-sensitive patient outcomes. The purpose of this study was to explore the relationship between nurse manager leadership styles and nurse-sensitive patient outcomes (patient falls, HAPUs, CA-UTIs, and medication errors) and to investigate to what extent leadership style, practice environment, and safety climate explain patient safety outcomes.

Methods

Sample and Setting

This study was a descriptive correlational design. IRB approval and consent were obtained prior to participation. This study was conducted in nine hospitals in a not-for-profit healthcare system. SurveyMonkey was used to send an e-mail link to 1,579 RNs working in 51 adult inpatient nursing departments during the third quarter of 2009. The hospital provided department-level practice environment scores obtained from their participation in an October 2008 electronic NDNQI survey and additional nursing department-level information for the period July 1, 2008–June 30, 2009.

Theoretical Framework

An adapted theoretical model of quality of work life and hospital-related outcomes was used for this study (Gershon et al., 2007). Hospital outcomes, according to Gershon et al., are attributed to organizational characteristics (leadership style, safety climate), individual characteristics (education), and working conditions (practice environment).

Figure 5.1 depicts how the variables in this study were conceptualized, guided by the model of Gershon et al. (2007). Organizational characteristics included the nurse

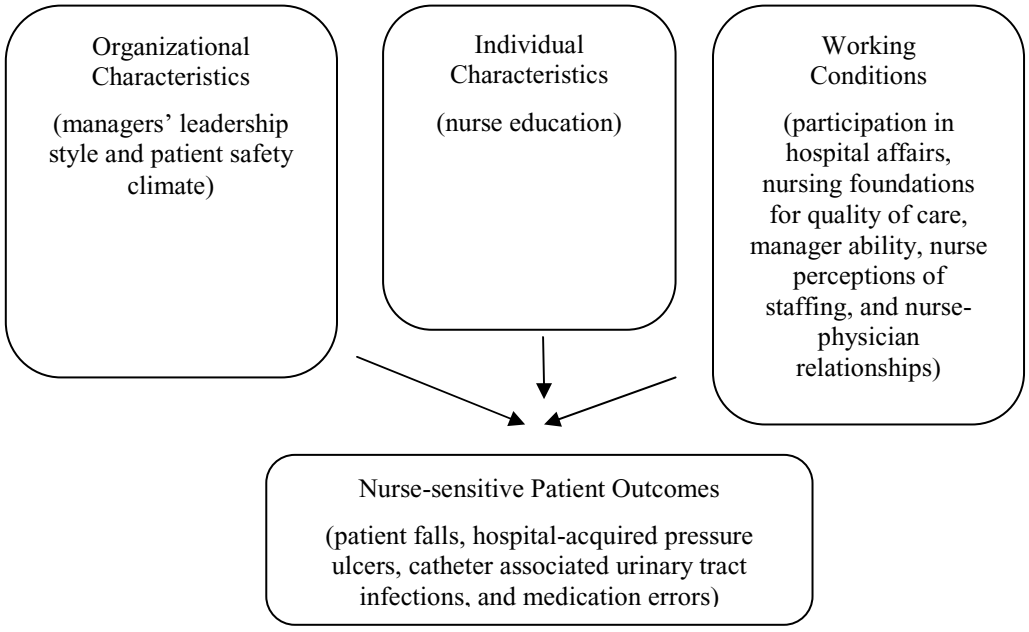

Figure 5.1. Conceptual model for the effect of nursing leadership, patient safety climate, and practice environment on nurse-sensitive patient outcomes.

managers' leadership style and patient safety climate. The individual characteristic of the nurse managers and staff nurses studied was highest nursing degree. Working conditions were measured by five practice environment subscales. The outcomes measured were patient falls, HAPUs, CA-UTIs, and medication errors. This study did not take into consideration other factors that may contribute to patient outcomes, such as process design and human factors.

Instruments

The staff nurse subjects completed separate instruments measuring safety climate (HUSC) and leadership style (MLQ–5XS) as well as a demographic questionnaire in the fall of 2009. Managers completed some basic demographic information as part of another portion of the study. To ensure confidentiality, names and IP addresses were not

collected. Information was provided by the healthcare system at the nursing department level for medication errors, patient falls, CA-UTIs, and HAPUs for the four quarters preceding the study, and practice environment score (PES–NWI) was gathered as part of an annual nursing satisfaction survey in October 2008. Patient outcome data were not available for every department. The number of departments represented in the sample was identified in each of the results tables. Definitions for these measures were consistent with corresponding definitions from the NDNQI, Centers for Disease Control, and the Joint Commission for Accreditation of Healthcare Organizations (ANA, 2007; Horan & Gaynes, 2004).

Safety climate. The HUSC is a 33-item survey measuring six safety dimensions and one worker safety dimension. Initially developed by Blegen et al. (2005) through a review of the literature, expert opinion, and field testing, the psychometrics of this instrument were described in a previous publication. The instrument measures the following subscale dimensions: (a) manager support (support of safety from the department manager; 3 items), (b) socialization/training (socialization of new staff and ongoing training in patient safety; 6 items), (c) safety emphasis (practices that promote patient safety; 5 items), (d) blameless system (environment focuses on process improvement rather than individual blame; 5 items); (e) use of safety data (use of safety data to improve practices; 4 items), (f) pharmacist support (involvement of pharmacist in medication information and support; 3 items), and (g) worker safety (practices and policies that promote worker safety; 5 items). Responses to each question are rated on a 5-point Likert scale (1 = *strongly disagree/never*, 3 = *neither/sometimes*, 5= *strongly agree/always*). The mean of scores for items in the dimension represents the dimension

score (after correcting for reverse coding). In this study, one item was inadvertently deleted from the socialization and training subscale; therefore, the HUSC had 32 items. The HUSC was developed for acute care inpatient nursing departments to better understand safety climate with an emphasis on the medication delivery processes. The HUSC instrument has not been widely used; however, the emphasis on medication delivery is particularly helpful when studying nurse-sensitive patient outcomes.

Practice environment. Nursing practice environment was measured by the PES–NWI developed by Lake (2002). It includes five subscales (31 items): (a) nurse participation in hospital affairs (9 items), (b) nursing foundations for quality of care (10 items), (c) nurse manager ability (5 items), (d) staffing and resource agency (4 items), and (e) collegial nurse–physician relations (3 items). Each question is rated on a 4-point Likert scale (1 = *strongly disagree*, 4 = *strongly agree*). Department level data represent the mean for each subscale and mean composite PES–NWI score. In 2006, the PES–NWI survey was used by over 22,000 RNs with a reported Cronbach's alpha 0.845 to 0.881 for each of the five subscales (Lake, 2007). The PES–NWI is one of 15 nurse-sensitive measures endorsed by the NQF (2007), a not-for-profit membership organization created to develop and implement a national strategy of healthcare quality measurement and reporting.

Leadership. The MLQ–5XS was used to measure the following leadership styles: (a) transformational, (b) transactional, and (c) laissez-faire. The tool contains 45 items that identify nine leadership components, which were used in this study, and three outcomes of leadership components that were not used in this study. Each rating item utilized a 5-point Likert scale, scored by summarizing the responses for each subscale

and dividing the total by the number of items in the scale (Avolio & Bass, 2004). The MLQ–5XS has been used in multiple research settings; the 12 components had Cronbach's alpha ranging from 0.70–0.84 when tested in 12,118 persons rating their leaders (Avolio & Bass, 2004). This study included only the measurement of leadership styles and did not include the outcomes of leadership measures.

Nursing Department Demographics

The nursing departments were categorized by department type based upon NDNQI definitions and then further categorized into critical care and noncritical care for analysis because patient outcomes vary widely by department type (ANA, 2007). Demographic information (age, gender, and education level) was self-reported. The healthcare system provided standardized definitions for staffing measures, medication errors, falls, UTIs, and pressure ulcers.

Data Analysis

Level of Analysis

The level of analysis for this study was the nursing department/patient care department. Each individual's scores for safety climate, practice environment, and leadership style were aggregated to derive mean nursing department scores for each subscale and total scores. Demographic data were aggregated to a mean or percent nursing department score. Hospital data (patient outcomes, staffing, and education) collected at the nursing department level were collated with the aggregated nursing department safety climate, leadership style, practice environment, and demographic data.

Analysis

SPSS 18 for Windows was used to analyze the data. Descriptive statistics were completed, and several variables violated the assumption of normality; therefore, base-10 logarithmic transformations were undertaken and utilized in the analysis. A one-way ANOVA was conducted to determine if there were mean differences in the variables by hospital size, Magnet recognition status, department type, level of education, national certification, age, and years of experience. Some of the variables were dichotomous (e.g., Magnet recognition status); however, ANOVA was reported for simplicity in reporting results. A bivariate analysis (Pearson *r*) was conducted to identify the direction and degree of association between the predictor and outcome variables.

Variables that were significant in the bivariate analysis were entered into a backwards stepwise regression to determine how well leadership style predicted hospital unit safety climate. A separate regression was conducted for each dependent variable subscale (manager support, socialization and training, blameless system, and pharmacist support). The four predictor variables (transformational, transactional, and laissez-faire leadership styles, and department type) were entered and removed one at a time until significance was reached. Multilevel analysis was then completed to analyze the nested structure of the data (i.e., nurses within departments). Using multiple linear regression alone underestimates the standard errors and overestimates the *p* value, which may result in a Type I error (Park & Lake, 2005). The intraclass correlation represents the proportion of variances accounted for by variation in department type. Because of the exploratory nature of this study, the *p* value was set at .05 and not adjusted for multiple tests.

Results

In the final sample, 41 nursing departments from nine hospitals were included with the unit safety climate, leadership styles, and demographic variables aggregated across the responses from each department (see Table 5.1). Initially, 523 staff nurses from 42 departments responded to the electronic survey; however, five respondents checked the item indicating they declined participation even though they completed the survey, so they were excluded. The remaining 518 responses were reviewed for completeness. Cases with missing data were deleted from the corresponding analysis, resulting in 466 participants included in the analysis (29.5% response rate) from 41 nursing departments. The department response rate ranged between 5% and 45% (M = 12%, SD = 7.45). The major loss of subjects can be attributed to the large number who did not complete at least 50% of the survey.

The typical subject in the study was a female staff nurse who worked full time in a noncritical care unit with an associate's degree as her highest education. Most hospitals in the study had received Magnet recognition (65%), were teaching hospitals (57%), and had an average hospital size of 218 beds (range 30–440).

A descriptive analysis of the HUSC scores is provided in Table 5.2. The mean total Safety Climate score was 3.8, with a range of department mean scores from 3.5–4.0 (5-point scale). The lowest mean subscale scores was the use of safety data subscale (M = 3.5). Cronbach's alpha for the HUSC scores computed for this study ranged from .729–.866. No significant difference across unit type was identified except in the socialization and training subscale. Nurses in critical care departments reported a slightly lower but

Table 5.1

Staff Nurses' and Managers' Demographics

	Staff nurses (n = 466)			Managers (n = 41)		
	M	Range	*SD*	*M*	Range	*SD*
Age	39.00	21–68.0	11.4	48.45	28–66	8.8
Years of experience	11.80	0–45.0	10.6	8.61	1–32	6.4
Years in department	6.49	0–33.5	7.2	4.92	0–18	4.7
	n	%		*n*	%	
Diploma	8	1.8		--	--	
Associate's	236	50.6		6	14.6	
Baccalaureate	204	43.8		20	48.8	
Advanced degree	17	3.6		15	36.6	
National certification	84	18		11	26.8	

Table 5.2

Hospital Unit Safety Climate Subscales ($N = 466$)

	All departments		Critical care		Noncritical care		
HUSC subscales	*M*	*SD*	*M*	*SD*	*M*	*SD*	α
Manager support	3.9	.303	3.9	0.35	3.9	0.29	.847
Socialization/training	3.9	.493	3.9*	0.17	4.0*	0.22	.762
Safety emphasis	3.6	.616	3.6	0.24	3.7	0.23	.789
Blameless system	3.6	.551	3.6	0.21	3.6	0.25	.783
Use of safety data	3.5	.568	3.5	0.31	3.4	0.22	.768
Pharmacist support	3.9	.624	3.9	0.27	3.9	0.31	.827
Worker safety	3.8	.519	3.7	0.21	3.9	0.20	.729
Total safety climate	3.8	.428	3.7	0.21	3.8	0.16	.866

*ANOVA; $F = 5.1$, $df = 39$, $p = .029$

statistically significant ($p = .029$) socialization and training score than noncritical care departments ($M = 3.9$ and 4.0, respectively; see Appendix C).

The mean practice environment measured 3.0 (4-point scale). Nurse participation in hospital affairs was the lowest scoring scale in the Practice Environment instrument, with a mean of 2.7. Manager support was the highest scoring subscale, with a mean score of 3.19. There was no significant difference in Practice Environment scores by department type (see Appendix D).

The frequency of two nurse-sensitive patient outcomes differed by department type. Noncritical care departments had higher ($F = 2.8$, $df = 35$, $p <. 001$) fall rates per 1,000 patient days ($M = 4.8$, $SD = 3.3$) than critical care departments. Noncritical care departments also had higher ($F = 4.9$, $df = 28$, $p = .034$) rates of CA-UTIs per urinary catheter days ($M = .75$, $SD = .55$) than critical care departments ($M = .48$, $SD = 2.9$). There were no differences by department type in HAPUs or medication errors (see Appendix C).

Leadership Style and Safety Climate

Descriptive statistics for leadership style are reported in Table 5.3. No significant difference in leadership style scores was identified by department type. The overall reliability (Cronbach's alpha) for this study of the MLQ–5XS scale was assessed at .883 (see Table 5.3).

There was a strong positive relationship between the manager support safety climate subscale and transformational and transactional leadership styles. Transformational leadership style was moderately to strongly positively associated with all but two measures of safety climate in noncritical care departments. Similar relationships were also identified in critical care departments, but they failed to reach statistical significance. Transactional leadership style was also moderately to strongly positively associated with some safety climate measures in critical care departments but not in noncritical care departments. Laissez-faire leadership style was moderately to strongly negatively associated with socialization and training, blameless system, worker safety, and total safety climate in noncritical care departments. Critical care departments

Table 5.3

Leadership Style Scores

	All departments			Critical care departments		Noncritical care departments		
Leadership style	*N*	*M*	*SD*	*M*	*SD*	*M*	*SD*	α
Transformational	41	2.97	.35	3.20	.33	2.90	.38	.954
Transactional	41	2.56	.17	2.70	.26	2.50	.19	.681
Laissez-faire	41	.93	.34	.84	.36	.97	.34	.877

Note. Leadership style scale range 0–4.0.

reported similar correlations; however, the associations were weaker and did not reach statistical significance (see Table 5.4).

Leadership Style and Practice Environment

Transformational leadership style was strongly positively associated with the composite Practice Environment Scale in critical care departments ($r = .582$, $p = .037$). Additional moderate correlations among transformational leadership and practice environment subscales in critical care were present but did not reach statistical significance. These relationships were not identified in noncritical care departments. Transactional leadership style was not correlated with the practice environment except for a strong positive relationship between critical care departments and collegial nurse–physician relations ($r = .620$, $p < .05$). Laissez-faire leadership style had a strong negative

Table 5.4

Correlations for Leadership Style and Hospital Unit Safety Climate by Department Type (Critical Care Departments (CC; *n* = 14)/ Noncritical Care Departments (NCC; *n* = 27)

	Transformational leadership style		Transactional leadership style		Laissez-faire leadership style	
Subscale	CC	NCC	CC	NCC	CC	NCC
Manager support	.724**	.766**	.702**	.464*	–.745**	–.678**
Socialization/training	.024	.402*	.310	.197	–.238	.385*
Safety emphasis	.336	.386*	.355	.201	–.593*	–.283
Blameless system	.359	.548**	.623*	.239	–.464	–.567**
Use of safety data	.302	.127	.418	.093	–.383	–.289
Pharmacist support	.510	.484*	.520	.346	–.429	–.278
Worker safety	–.018	.309	.063	.345	–.282	–.430*
Total safety climate	.485	.622**	.615*	.431*	–.634*	–.600**

*$p < .05$. **$p < .01$.

association with nursing foundations for quality care, nurse manager ability, collegial nurse–physician relationship, and the composite Practice Environment Scale in critical care departments (see Table 5.5).

Leadership Style and Nurse-Sensitive Patient Outcomes

There were very few relationships among leadership style and nurse-sensitive patient outcomes identified (see Table 5.6). In critical care departments, CA-UTIs were strongly positively associated with transformational and transactional leadership style.

Comparison of Leadership Scales

The three instruments measuring aspects of nurse manager leadership were analyzed using bivariate analysis to explore their relationships (see Table 5.7). Transformational leadership style (MLQ–5XS) was strongly positively correlated with HUSC manager support and moderately with PES–NWI nurse manager ability (r = .750 and .442, respectively). Transactional leadership style (MLQ–5XS) was strongly associated with HUSC manager support but not PES–NWI nurse manager ability (r = .512 and .076, respectively). Laissez-faire leadership style (MLQ–5XS) was strongly negatively correlated with HUSC manager support and moderately with PES–NWI nurse manager ability (r = –.709 and –.496, respectively). This indicates that although there are some similarities in the various instruments, there are some unique dimensions being measured, particularly in the PES–NWI related to staff nurses' perceptions of their manager, which had the least shared variance with the other instruments.

Table 5.5

Correlations for Leadership Style and Practice Environment Scale by Department Type (Critical Care [CC]; *n* = 13/ Noncritical Care [NCC]; *n* = 25)

	Transformational leadership style		Transactional leadership style		Laissez-faire leadership style	
Subscale	CC	NCC	CC	NCC	CC	NCC
Nurse participation in hospital affairs	.433	–.006	.214	–.241	–.464	.038
Nursing foundations for quality of care	.136	.002	.082	–.125	–.636*	.094
Nurse manager ability	.545*	.406*	.337	.013	–.694**	–.384
Staffing and resource agency	.235	.196	.308	.136	–.398	–.117
Collegial nurse–physician relations	.470	–.027	.620*	–.239	–.612*	–.071
Composite Practice Environment Scale	.582*	.197	.485	–.058	–.793**	–.147

*$p < .05$. **$p < .01$.

Table 5.6

Correlations for Leadership Style and Nurse-Sensitive Patient Outcomes by Department Type (Critical Care [CC]/ Non Critical Care [NCC])

	Transformational leadership style		Transactional leadership style		Laissez-faire leadership style	
Subscale	CC	NCC	CC	NCC	CC	NCC
Fall rate[a]	.005	–.255	–.132	–.223	–.133	–.301
HAPUs[b]	.135	.347	.437	–.002	–.045	–.186
CA-UTIs[c]	.535	.129	.601*	.343	.005	–.172
Medication errors[d]	.012	–.038	–.370	.002	.234	–.107

[a]Number of patient falls/1,000 patient days. [b]Prevalence rate of HAPUs per patients on the unit. [c]CA-UTIs per urinary catheter days. [d]Number of medication errors per 1,000 patient days.
*$p < .05$.

Table 5.7

Correlations for Comparison of Leadership Instruments

Leadership style	Transformational leadership style	Transactional leadership style	Laissez-faire leadership style	Manager support (HUSC)
Transactional leadership style	.671**			
Laissez-faire leadership style	–.692**	–.496**		
Manager support (HUSC)	.750**	.512**	–.709**	
Nurse manager ability (PES–NWI)	.442**	.076	–.496**	.425**

*$p < .05$. **$p < .01$.

Multivariate Results

In the final regression models, transformational and laissez-faire leadership styles ($p = .001$ and .011, respectively) contributed to 63.2% of the variance in the manager support safety climate subscale (see Appendix D). Laissez-faire leadership style and department type (critical care, $p = .04$/noncritical care, $p = .05$) contributed to 20.9% of the variance in the socialization and training subscale (see Appendix D). Laissez-faire leadership style also contributed to 27.2% of the variance in blameless system (see

Appendix D). Transformational leadership style contributed to 24.2% of the variance in the pharmacist support subscale (see Appendix D).

Using linear regression alone underestimates the standard errors and overestimates the *p* value, which may result in a Type I error (Park & Lake, 2005). Therefore, multilevel analysis was completed to determine the effect of the nested structure of the data (i.e., nurses within departments). The multilevel analysis identified the same relationships with the predictor variables (e.g., final model for manager support included transformational and laissez-faire leadership styles). The low intraclass correlations (range .09–.13) indicated that individual responses are independent within the departments, meaning that nurses' responses within each department are not highly correlated.

Multilevel models do not provide R^2 statistics; however, a pseudo-R^2 can be calculated. The pseudo-R^2 was calculated by running two models, one with department type as a dummy variable and one without. The reduction in the variance of the intercept term in the two models was then computed. This determined the effect of adding department type as one of the predictors in the model. In the manager support, blameless system, and pharmacist support subscales, the effect of department type was negligible (0–23%). In the socialization and training subscale, department type changed the variance by 31.7% (see Table 5.8). This result reflects the unique culture-related socialization and training of staff in a critical care department compared to a noncritical care department.

Discussion

One of the major responsibilities of nursing managers is to promote patient safety. A culture of safety is created by establishing an environment in which staff nurses feel

Table 5.8

Multilevel Model of Leadership Style and
Hospital Unit Safety Climate Subscales

Variable	Manager support		Socialization/training		Blameless system		Pharmacist support	
	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*	Coefficient	*SE*
Intercept	2.380**	.160	3.00**	.160	3.17**	.192	3.42**	.220
Transformational leadership style	.541**	.054	.185**	.053	.260**	.064	0.21**	.070
Transactional leadership style	.007	.064	.230**	.064	–.087	.076	–0.03	.090
Laissez-faire leadership style	–.094*	.040	–.118**	.039	–.078	.047	0.00	.050
Department type	.073	.064	–.127*	.062	.039	.075	–.017	.098
Log-likelihood	375		361		480		556	
Intraclass correlation	0.07		0.09		0.07		0.13	
Pseudo-R^2	0.023		0.317		0		–0.011	

Note. Pseudo-R^2 calculated by running model with department type as a dummy variable and the model without and computing the reduction in the variance of the intercept term in the two models as a proportion.
*p <.05. **p < .01.

safe to provide an expert voice and forge important partnerships to provide safe care (Thompson et al., 2005). The results of this study support the hypothesis that the leadership style of the frontline nurse manager contributes to nurses' perceptions of some aspects of safety climate. Strongly positive relationships were identified with transformational and transactional leadership and total safety climate, while strong negative relationships were identified with laissez-faire leadership style. These findings highlight the impact of both positive and negative leadership styles on safety climate in the hospital.

An environment free of blame is a major tenet of creating an environment in which errors are seen as learning opportunities (Ruchlin et al., 2004). In this study, a strong negative relationship between laissez-faire leadership style and a blameless system was identified. Laissez-faire leadership accounted for 27.2% of the variance in the HUSC blameless system subscale. When leaders exhibit laissez-faire leadership style, it reduces their employees' motivation to go the extra mile (Kanste et al., 2007). This may be of particular importance in the complex hospital environment in which nurses are often understaffed. Laissez-faire leadership style was also moderately to strongly negatively associated with most of the Practice Environment measures in critical care departments; however, these relationships were not evident in noncritical care departments. This suggests that laissez-faire leadership in critical care has a strong impact on staff nurses' perceptions of their practice environment.

Transformational leadership not only impacts safety climate but practice environment as well. Staff nurses prefer transformational leaders and report higher job satisfaction when their leaders exhibit those characteristics (Platonova, Hernandez,

Shewchuk, & Leddy, 2006; Sellgren, Ekval, & Tomson, 2006). Transformational leaders create a practice environment in which nurses at the bedside are empowered. In this study, transformational leadership style was moderately to strongly positively associated with many aspects of critical care nurses' practice environment. Transactional leadership style, however, was strongly associated with critical care nurses and their relationships with physicians ($r = .620$, $p < .05$). Most leaders exhibit both transformational and transactional leadership styles. While both of these leadership styles are considered positive, transactional leadership style is limited unless combined with transformational leadership.

The Practice Environment nurse manager ability subscale clearly identifies a significant positive relationship with nurse manager transformational leadership style and a negative association with laissez-faire leadership style, suggesting that the PES–NWI may be a good screening measure for effective nursing leadership. The other measures of practice environment show a limited relationship with nurse manager leadership style. These findings underscore the fact that nurse manager leadership represents only one facet of the nurse practice environment.

These findings are different than those found related to leadership style and job satisfaction, although the PES–NWI is sometimes used as a measure of job satisfaction (Warshawsky & Havens, 2011). This further affirms the fact that practice environment is a distinct concept from job satisfaction. In an integrated review of the literature, Cummings et al. (2010) identified 24 studies that claimed positive leadership styles, such as transformational leadership, resulted in higher nursing satisfaction. While these studies measured leadership, satisfaction, and work environment using different methodologies,

10 of them found that less positive leadership styles, such as transactional and laissez-faire, resulted in lower job satisfaction (Cummings et al., 2010).

In previous studies, a highly rated practice environment was related to positive patient outcomes (Sieloff, 2004; Upenieks, 2002). The relationship between nurse manager leadership style and nurse-sensitive patient outcomes, however, has not been well studied (Wong & Cummings, 2007). Research exploring these relationships reported conflicting results, using different leadership measurements and outcome measures (Boyle, 2004; Houser, 2003). In this study, leadership style was not associated with patient falls, HAPUs, or medication errors.

In the hospital setting, nurses are members of an interdisciplinary team. This team plays an important role in the safe delivery of health care, particularly in the medication delivery. In this study, transformational leadership explained 24% of the variance in the pharmacist support subscale. Thus, nurses who perceived that their managers were transformational also perceived that the pharmacy was helpful in medication delivery. This finding may be a reflection of nurse managers' transformational style that articulates a compelling vision and engages employees. Leaders who create a vision of interdisciplinary collaboration may also foster technological advances, such as medication bar coding administration, that may lead to decreased errors.

Limitations

The limitations of this study include the small size of the sample of units, low response rate, and a sample representing one healthcare system. The data collected from staff nurses were self-reported, and the managers sent them the link to the survey, which may have affected response rate or resulted in a bias to respond positively. The patient

safety climate scores were moderately high with limited variability. This restriction of range may have limited the power to detect relationships among variables. Increasing the sample size, specifically more critical care nursing departments, and increasing the response rate within the departments may have avoided this limitation. The nurse-sensitive patient outcomes for the most part were self-reported and most likely underreported. The rates of adverse outcomes were low and made detection of statistical significance difficult. The practice environment data were collected at an earlier point in time and may not reflect an accurate depiction of the environment at the time when the safety climate data were collected. Further, some moderate correlations were identified, but these did not reach significance as a result of the small sample size. A post hoc power analysis indicated that 23 nursing departments would have been required to detect a strong correlation (r = .5) with 80% power and alpha of .05.

Conclusions

The IOM recommended transformational leaders to promote patient safety and evidence-based practice (Kane et al., 2007). In this study, transformational leadership style was identified as an important contributor to some Safety Climate subscales, and laissez-faire leadership was negatively associated. Nursing leaders must concentrate on developing their leadership skills while at the same time diminishing negative leadership styles. Other contributing factors associated with patient safety climate need to be explored, such as staffing, burnout, generational differences, influence of charge nurses and other informal leaders, and other quality improvement processes not addressed in this study.

Nursing leaders also contribute to the nurses' perceptions and work with the interdisciplinary team. Medication delivery is a large component of patient safety. Successful partnerships with the interdisciplinary team, particularly the pharmacist, are important and should be investigated further.

More research is needed on leadership's contribution to nurse-sensitive patient outcomes. Nursing outcomes research is limited by the measurement at the nursing department level. Nursing outcomes researchers would benefit from consistent definitions of nurse manager leadership, nurse-sensitive patient outcomes, and collaborative multicenter research endeavors in order to better understand unit-level outcomes.

CHAPTER 6

DEPARTMENT COMPLEXITY AS A MEASURE OF NURSE MANAGER SPAN OF CONTROL

Abstract

Nurse managers are the leadership at the department level, playing a pivotal role in creating a quality environment. However, many hospitals have made restructuring changes, resulting in a wide span of control and reduced nurse manager visibility. The purpose of this study was to compare two different methods of measuring span of control: department complexity and number of direct reports. Forty-one nurse managers across nine hospitals completed a survey that included TOH Clinical Manager Span of Control Tool (a 17-item instrument measuring department complexity), departmental demographics, and the number of hours the managers received assistance in their role. Bivariate analysis revealed a moderate positive relationship between number of direct reports and department complexity score ($r = .49$, $p = < .01$). A one-way ANOVA identified that the number of direct reports and hours of assistance to the manager were significantly different by department type. Rehabilitation departments had lower number of direct reports than medical surgical units. Tukey post hoc analysis revealed no specific department difference on hours of assistance to the manager. Each department was then coded as having small, medium, or large span of control by dividing the sample into tertiles separately for the number of direct reports and for department complexity score

derived from TOH Clinical Manager Span of Control Tool. While each of the methods to measure span of control had about the same number of departments in each category, almost 44% of the departments were classified differently by the two measures. Intensive care units were most likely to be classified differently by the two measures (57%), followed by medical/surgical departments (38%) and rehabilitation units (33%). The conclusion of this study is that when span of control is defined to include department complexity, it provides a different measure than the number of direct reports, which may reflect the full scope of nurse manager responsibility.

Introduction

Nurse managers have 24/7 accountability for the department and are central in fostering an environment that promotes quality nursing care. Strong nursing leaders attain high-quality outcomes through the development of a positive patient safety culture, implementation of participatory decision making, exhibition of a negotiating management style, and encouragement to look at the big picture beyond individual patient care issues (Ruchlin et al., 2004).

Although there is a great deal of research that supports the need for strong nursing leadership, many hospitals have made dramatic restructuring changes over the past two decades, resulting in a wider nurse manager span of control and reduced visibility of the nurse manager at the department level. Some research suggests that a lack of manager support results in decreased patient and nursing satisfaction, increased nurse-to-patient ratios, decreased quality in the hospital, and increased turnover (Kelly, 2007; Page, 2004; Thompson et al., 2005; Upenieks, 2002).

The question of how much time a nurse manager needs to spend with each employee remains uncertain. No evidence-based guidelines have been identified to determine the appropriate span of control for the frontline nurse manager (Meyer, 2008). In order to determine how much responsibility to give to one nurse manager, nursing administrators must base their decision making on trial and error rather than research and evidence-based practice.

The purpose of this study was to compare two different methods (department complexity and number of direct reports) to measure span of control. The research questions for the study were

1. To what extent does department complexity correlate with the number of personnel who directly report to the nurse manager?
2. Do the department complexity scores and number of direct reports vary by department type?
3. Do department complexity scores and direct reports result in different classifications of span of control?
4. What is the relationship among the amount of managerial assistance provided to the manager, department complexity, number of direct reports, and Magnet recognition status?

Background and Significance

Research on span of control has been reported extensively. Graicunas used a mathematical formula to demonstrate that as the number of subordinates increases, the number of interactions the manager experiences with his or her staff increases exponentially, concluding that a manager could only supervise six or seven employees

effectively (Pabst, 1993). This analysis took into consideration not only the number of individuals but also the impact of the relationships between managers, their staff, and their staff's direct reports.

Hattrup and Kleiner (1993) identified advantages and disadvantages of narrow span of control. They found that narrow span of control (managers with too little responsibility) led to close supervision and fast communication from manager to staff, but also resulted in micromanaging of staff. Narrow span of control also increased the layers within the organizational hierarchy; decreased communication from the highest levels; slowed decision making; and diluted the mission, vision, and values of the organization.

In a concept analysis of span of nursing management, Meyer (2008) defined the following underlying elements of span: supervisor capability, reporting structure, closeness of contact by the manager, managerial scope, and work group size. Meyer argued that span of control reported as a ratio of staff per manager disregarded the complex environment of health care, and contended that span of control measures should include the purpose, amount, context, resources, and outcomes of managerial activity. Additionally, Meyer identified that the number of individuals in the work group did not adequately address the effectiveness of the interactions, cohesiveness, and coordination within the group, nor the amount of assistance to the manager. For example, a manager who is responsible for both education and management of staff may have a very different role than a manager who is supported by a clinical educator (Meyer, 2008).

In an effort to counteract the effects of increased organizational layers and cut costs, hospitals have increased individual nurse manager responsibilities and decreased

the number of middle managers. The reported impact of this widening of nurse manager span of control has been conflicting. Most nursing researchers identified that as the number of staff who reported to a manager increased, employee engagement, satisfaction of nurses and patients decreased, and nursing turnover increased (Cathcart et al., 2004; McCutcheon et al., 2009). However, in one recent study investigating hospital leadership and safety outcomes, a large span of control was associated with nurses who were empowered in their practice, and the authors concluded this may have a positive influence on nurse retention (Squires et al., 2010).

Most nursing manager span of control studies have used the number of direct reports as the metric for measuring span of control (Altaffer, 1998; Doran et al., 2004; McCutcheon et al., 2009; Tzirides, 1993). Two nursing studies have measured span using a more complex methodology. Alidina and Funke-Furber (1988) developed a model for span of control using nine key factors to reassign responsibilities to nurse managers in order to organize nursing services more effectively in a 480-bed long-term care hospital. Morash et al. (2005) developed TOH Clinical Manager Span of Control Tool to measure department complexity. It included three subscales (unit-focused, staff-focused, and program-focused measures) and a total span or unit complexity score.

Research Design

As part of a larger study on leadership style and patient safety outcomes, this descriptive correlational study was conducted in nine hospitals in a not-for-profit integrated healthcare system. This investigator received IRB approval prior to data collection. The names, phone numbers, and e-mail addresses of each nurse manager of adult inpatient departments in the system were provided to the investigator by the

managers' immediate supervisor. Nurse managers from 51 adult inpatient departments were approached individually by this investigator through hospital e-mail and invited to participate in an online survey using SurveyMonkey. Nonresponders received a second e-mail after 2 weeks and one follow-up phone call at 3 weeks to increase the response rate. Although the names and contact information of the participants were known to this investigator, to maintain anonymity, each unit was given a unique code and results were reported only by department type.

Instruments

The survey completed by each nurse manager included basic departmental and manager demographic information (age, education level, years of experience, national certification), TOH Clinical Manager Span of Control Tool, and the number of hours per week the manager estimated he or she received assistance from an educator, staff nurses, secretary, or other individuals for management tasks. The human resources department provided the number of staff who directly report to each manager. A copy of the survey is included in Appendix C.

The instrument, TOH Clinical Manager Span of Control Tool, was initially developed by Morash et al. (2005) through review of the literature and expert opinion from 28 hospitals in the United States and Canada for the purpose of identifying the scope of practice for nurse managers. It was then pilot tested with nurse managers across five different hospitals in The Ottawa Hospital system. Following the pilot test, weighting was added and the instrument refined based on feedback from focus groups. The final instrument has 17 items with three subscales: (a) unit-focused measures, 6 items; (b) staff-focused measures, 6 items; and (c) program-focused measures, 5 items. The authors

did not conduct validity and reliability statistics. However, they recommended validation, verification of the weighting, and development of measures to assess the impact of assistance to the manager. The instrument was used with permission. A summary of key elements are provided in Table 6.1, with a complete description in a previous publication (Morash et al., 2005).

Analysis

This investigator used SPSS 18 for Windows to analyze the data. The mean, standard deviation, and distribution of each variable was determined through descriptive statistics. Small, medium, and large span of control for each measure was identified by dividing the sample into tertiles on each span of control measure. Each department was then coded as having small, medium, or large span based on the number of direct reports and separately by department complexity score. The bivariate relationships were estimated using Pearson *r* correlation to determine the association among number of direct reports, department complexity score, and hours of assistance to the manager.

A one-way ANOVA was used to determine if the number of direct reports and department complexity score varied by nursing department type. Cronbach's alpha was assessed for the subscales based on the weighted scores for each item in the subscale.

Results

Forty-one nurse managers were in the final sample (80% response rate). Six of the 51 managers provided a reason for declining to participate, including being an interim manager (position vacant) or occupying one's position 3 months or less. Nonresponders

Table 6.1

Summary of The Ottawa Hospital Clinical Manager Span of Control Tool

Question	Points and definitions	Assigned weight	Possible range
	Unit-focused measures		
Hours of operations	1. Weekdays	2	2–6
	2. Extended hours		
	3. Operations 24/7		
Department needs extra staff	1. Never or rarely (0–1 times per week)	3	3–9
	2. Sometimes (2–5 times per week)		
	3. Frequently (> 5 times per week)		
Department exceeds capacity	1. Never or rarely (0–1 times per week)	2	2–6
	2. Sometimes (2–5 times per week)		
	3. Frequently (> 5 times per week)		
Litigation	1. All other departments	2	2–6
	2. Surgical departments		
	3. Obstetrical departments		
Risk management	1. < 2.5 hours per week	2	2–6
	2. 2.5–5.5 hours per week		
	3. 5.5 hours per week		

Table 6.1 continued

Question	Points and definitions	Assigned weight	Possible range
	Unit-focused measures		
Materials management	1. < 4 hours per week 2. 4–8 hours per week 3. > 8 hours per week	2	2–6
	Staff-focused measures		
Volume of staff	1. < 30 2. 31–70 3. 71–100 4. >101	5	5–20
Percent novice nurses	1. < 5% 2. 5–15% 3. > 15%	3	3–9
Percent nonprofessional staff	1. < 10% 2. 10–20% 3. > 20%	3	3–9
Turnover	1. < 10 2. 10–20 3. > 20	3	3–9

Table 6.1 continued

Question	Points and definitions	Assigned weight	Possible range
	Staff-focused measures		
Absenteeism	1. 0–6 per month	2	2–6
	2. 7–14 per month		
	3. > 14 per month		
Employee types (job codes that report to manager)	1. 1–3	2	2–6
	2. 4–6		
	3. > 6		
	Program-focused measures		
Number of people manager reports to	1. 1	2	4–9
	2. > 1	3	
Number of services provided by department	1. 1–2	3	6–9
	2. > 2		
Number of departments managed	1. 1	4	8–16
	2. > 1		0–2
	a. Side-by-side = 0		
	b. Not side-by-side = 2		

Table 6.1 continued

Question	Points and definitions	Assigned weight	Possible range
	Program-focused measures		
Budget	1. < 2 million 2. 2–4 million 3. 4 million	2	2–6

were from medical and surgical departments, making the response rates 55% and 58%, respectively, and 100% for all other departments.

The managers were predominantly women educated at a baccalaureate level with a mean age of 48.5 years. The health system set a requirement for all managers to have a bachelor's degree by 2011. Twenty-four percent had additional non-nursing degrees and were nationally certified, with a mean 8.7 years total management experience (see Table 6.2). The managers worked in nine hospitals with anywhere from 30 to 440 beds (M = 218; see Table 6.3).

The nursing departments in the study were all 24/7 operations offering more than four services with a budget of $2–4 million per year. Almost all of the managers were responsible for one nursing department and reported to one supervisor. Managers estimated they spent less than 4 hours per week on materials management and 2.5–5 hours per week on risk management activities. The managers reported that while they frequently needed extra staff, rarely did the department exceed its physical capacity.

Most frequently, managers estimated that 5–15% of the staff were novice nurses (< 1 year experience) and the departments experienced a moderate turnover and low absentee rate (see Table 6.4). Cronbach's alpha for the total scale equaled .838 and for each of the three subscales (unit-focused, staff-focused, and program-focused measures) was .140, .247, and .553, respectively (see Table 6.5). Nurse managers reported the most common assistance with leadership functions was a nurse educator (see Table 6.6).

Descriptive statistics for the number of direct reports and department complexity score for the entire sample and by department type (critical care, medical/surgical, and rehabilitation) are reported in Tables 6.7 and 6.8, respectively. Bivariate analysis revealed

Table 6.2

Nurse Manager Demographics ($N = 41$)

Variable	*M*	*Mdn*	Range	*SD*
Age	48.5	49	28–66	8.89
Years of management experience	8.7	7	1–32	8.40
Experience on this department	4.9	3	0–18	4.70
Number of direct reports	62.2	65	17–107	23.10
	N	%		
Female	31	75.6		
Associate's degree	6	14.3		
Bachelor's degree	20	47.6		
Master's degree	15	38.1		
Degree outside of nursing	10	24.4		
Nationally certified	11	26.2		
Critical care departments	14	34.1		
Medical surgical departments	21	51.2		
Rehabilitation departments	6	14.6		

Table 6.3

Hospital Demographics ($N = 9$)

Variable	Response
Percent teaching hospital	57.9%
Percent Magnet recognition Status	65.8%
Number of beds	
< 100	3 (33%)
101–200	1 (11%)
201–300	2 (22%)
301–400	2 (22%)
> 400	1 (11%)

Table 6.4

Most Frequent Subscale Responses for The Ottawa Hospital Clinical Manager Span of Control Tool

Item	*n*	%
Unit-focused measures		
24/7 operations	41	100
Sometimes needed extra staff	21	51
Never or rarely exceeded department capacity	25	61
2.5–5 hours per week risk management	21	51
< 4 hours per week on materials management	39	95
Staff-focused measures		
Volume of staff = 71–100	19	46
5–15% novice nurses (< 1 year)	17	42
Turnover 10–20 per year	21	51
Absentee rate 0–6 per month	24	59
4–6 different job codes	27	66
Program-focused measures		
Report to 1 individual	32	78
> 4 services provided	19	46
Manage 1 department	36	88
> 2 million budget	34	83

Table 6.5

The Ottawa Hospital Clinical Manager Span of Control Tool

Scale	Sample items	No. items	*M*	Range	*SD*	α
Department-focused	Risk management, exceed department capacity	6	27.4	17–37	4.3	.140
Staff-focused	Volume of staff, novice nurses, nonprofessional staff, turnover	6	32.8	15–47	8.0	.553
Program-focused	Number of direct reports, services provided, number of departments, budget	5	27.5	18–38	4.1	.247
Total complexity	All items	17	87.8	59–114	11.9	.838

Table 6.6

Hours per Week of Assistance to the Manager

Assistance	*M*	Range	*SD*
Nurse educator	11.80	0–40	9.25
Staff assistance	4.89	0–24	5.62
Secretarial support	8.70	0–45	12.46
Other support	.76	0–20	9.79

Table 6.7

Measures of Span of Control by Tertile

Variable	*M*	*SD*	Range	Small span of control	Medium span of control	Large span of control
Department complexity score	87.78	11.95	59–114	≤ 82	83–94	≥ 95
Number of direct reports	62.20	23.10	17–107	≤ 56	57–73	≥ 74

Table 6.8

Department Complexity Score and Number of Direct Reports by Span Category and Department Type

Variable	*M*	*SD*	Range	Small span of control	Medium span of control	Large span of control
Critical care						
Complexity	85.5	11.3	66–104	6	5	3
Direct reports	62.5	24.6	23–107	6	4	4
Medical/surgical						
Complexity	91.6	9.3	77–114	5	7	9
Direct reports	69.2	17.9	17–101	4	6	11
Rehabilitation						
Complexity	79.5	17.4	59–103	4	0	2
Direct reports	37.0	21.2	20–64	4	2	0

Note. Complexity = Department complexity score using TOH Span of Control Tool. Direct reports = Number of direct reports, provided by human resources.

a moderate positive relationship between number of direct reports and department complexity score ($r = .492$, $p = < .01$; see Table 6.9). However, no significant relationships were identified among the two span of control measures and hours of assistance to the manager.

Number of direct reports and hours of assistance to the manager were significantly different by department type, and differences in complexity scores

Table 6.9

Correlations for Total Span of Control (Department Complexity Score), Hours per Week of Assistance to the Manager, and Number of Direct Reports

	Assistance to manager (hrs/week)	Number of direct reports
Number of direct reports	–.118	
Total department complexity score	.167	.492**

**p = .001.

approached significance (see Table 6.10). Rehabilitation departments had a lower number of direct reports than medical surgical units (Tukey post hoc test < .05). Although the ANOVA statistic was significant, Tukey post hoc analysis revealed no differences between different department types on hours of assistance to the manager, although managers on the rehabilitation units averaged 43% more hours of assistance per week than medical surgical department managers.

While each of the methods to measure span of control had about the same number of departments in each category, using the number of direct reports classified the level of span of control differently compared to department complexity score in 18 departments (43.9%; see Tables 6.11 and 6.12). Of those departments classified differently, nine were classified as having higher span of control and nine were classified as having lower span of control compared to the department complexity score. Critical care departments were

Table 6.10

ANOVA for Department Complexity Score, Number of Direct Reports, and Hours per Week of Assistance to the Manager by Department Type

	Rehabilitation		Critical care		Medical surgical			
Variable	*M*	95% CI	*M*	95% CI	*M*	95% CI	*F*	Sig.
Unit complexity	79.5	61.2, 97.7	85.5	79.0, 92.1	91.6	87.3, 95.8	3.04	.059
Number of direct reports	37.0*	14.7, 59.2	62.5	48.2, 76.7	69.2*	61.0, 77.4	5.56	.008
Assistance to the manager	12.5	7.0, 17.9	8.6	7.2, 20.0	6.9	5.3, 8.4	6.30	.004

*Tukey post hoc < .05.

Table 6.11

Span of Control Categories for Number of Direct Reports and Department Complexity Score

Variable	Small span of control	Medium span of control	Large span of control
Number of direct reports	14	12	15
Department complexity	15	12	14

Table 6.12

Differences in Span of Control Classification Using Two Methods by Department Type

Department type	Lower	Same	Higher	Total
Critical care	4	6	4	14
Medical/surgical	3	13	5	21
Rehabilitation	2	4	0	6
Total	9	23	9	41

more likely to be classified differently (57%), followed by medical/surgical (38%) and rehabilitation departments (33%).

Discussion

The number of persons reporting to a manager (direct reports) was used in previous studies as a measure of span of control (Altaffer, 1998; Doran et al., 2004; McCutcheon et al., 2009; Tzirides, 1993). While personnel management is an important part of the manager role and the component best reflected by number of direct reports, additional manager responsibilities include budgeting, supplies, staffing, meetings, documentation, and risk management. In this study, expanding measurement of span of control to include other program-, staff-, and department-focused measures provided a different perspective that may more validly reflect the full scope of nurse manager responsibilities. TOH Clinical Manager Span of Control Tool used as a total score is a reliable index to measure department complexity (Cronbach's alpha = .838). However, the subscales should not be used independently as measures of span of control based on poor reliability statistics (Cronbach's alpha ranged from .140–.553), which are low to moderate at best.

In highly complex departments with a small number of staff, such as critical care units, the number of direct report measure may underestimate span of control. Underestimating a nurse manager's span of control may result in a manager who is overwhelmed and unable to manage the department successfully. However, nurse leaders and staff may attribute this to nurse manager ability or leadership style rather than a problematic span of control. Such nursing departments exhibit decreased nursing

satisfaction and turnover as well as an increase in adverse events (Lucas, Laschinger, & Wong, 2008).

In departments with a low department complexity score and a high number of staff, using number of direct reports as a measurement may overestimate the nurse manager span of control. Overestimating span of control also may have negative consequences, such as manager dissatisfaction, turnover, and a staff who feel micromanaged (Lucas et al., 2008). Managers with a small span of control may benefit from increased involvement in organizational committees and projects (Lee & Cummings, 2008).

To counterbalance a large span of control, some hospitals utilize a self-governance structure that allows staff to participate in decision making while also providing assistance to the manager. Self-governance is one of the basic premises of the Magnet Recognition Program. It allows nursing staff to practice more autonomously and is linked with higher satisfaction and better department outcomes (Kramer et al., 2008). In this study, however, the Magnet Recognized hospitals did not have a higher degree of staff nurse assistance to the manager than non-Magnet Recognized hospitals. This is most likely due to the standardized model used in the health system that provides for expanded roles for staff nurses in leadership, education, and clinical practice.

The role of the nurse manager is complex. Nursing directors and executives must understand that any type of change in nurse manager span of control (increase or decrease) may negatively affect manager and staff satisfaction (Lee & Cummings, 2008). Nursing departments are multifaceted. Changes in the department structure, such as fluctuation in staff experience, change in services provided, or significant hospital

restructuring, should prompt nursing leaders to reevaluate nurse manager span of control. As the complexity of a department increases, the opportunity to promote autonomy and leadership at the staff nurse level may also increase.

Limitations

There are several limitations to this study. Most of the data were self-reported by the nurse managers, which may result in recall bias (i.e., estimates may not reflect the true numbers). The sample size was small (41 managers) on adult inpatient departments within one healthcare system. As a result, these results may not be generalizable to other nursing departments, such as obstetrics, pediatrics, or nonacute care settings. The weighting of the scales of TOH Clinical Manager Span of Control Tool needs to be evaluated statistically to determine if an empirically derived weighting of the components would more accurately reflect span of control.

Conclusions

The results of this study suggested that the number of nurses who report to a manager may not be the only or best span of control measure. While the total number of staff plays an important role, complexity of the department and individualized needs of the staff should be considered. The measurement of span of control is a proxy for how much time the manager needs to fulfill his or her role in order to promote quality care. This may be dependent upon department factors (services provided), staff factors (novice nurses, turnover), hospital/program factors (budget, reporting structure), and assistance to the manager (education and shared governance). Manager characteristics such as

experience, leadership style, and communication skills are also important aspects to consider when measuring nurse manager span of control.

Further Research

This study provides a stepping-stone for future research related to nurse manager span of control. Future opportunities include the need to replicate the study using the instrument on a larger nurse manager population. In addition, comparison of self-reported data from the manager through other sources such as human resources databases would help reduce any bias associated with self-reported data. Priorities for future research include validation of instrument weighting and the role of assistance to the manager.

Acknowledgment

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CHAPTER 7

CONCLUSIONS

Patient safety has been a paramount focus of hospitals, consumers, and regulatory agencies over the last decade. A key recommendation for improving patient safety and hospital quality has been related to the development of strong hospital nursing leaders. Nurse managers are the leadership at the bedside and set the vision and safety climate of the nursing unit. Nurse managers, however, are under increased scrutiny to widen their role while also promoting quality patient care.

The aims of this dissertation research were to describe nurses' ratings of their hospital unit safety climate and to explore the relationships among safety climate, nurse staffing, nurse education level, nurse manager leadership styles, nursing practice environment, and nurse-sensitive patient outcomes. Additionally, two different methods to measure span of control (department complexity score and number of direct reports) were compared.

Specific Aim 1

Explore the relationships among safety climate, nurse staffing, nurse education level, and nurse-sensitive patient outcomes. Using high-risk industry as an example, hospitals have been called upon to measure and improve patient safety climate and decrease preventable errors. Safety climate in high-risk industries, such as aviation and

nuclear power, have been associated with decreased error. A positive safety climate prevents error by encouraging an environment in which questioning superiors is acceptable and encouraged and redundant systems are present to counteract potential human error. But can these results be translated from pilots and airplanes to nurses and patients in the hospital?

In this study, the HUSC instrument was used in 41 nursing departments across nine hospitals in an integrated healthcare system. The safety climate scores found in this study were moderately high (M = 3.5 on a 5-point scale), and similar scores were reported across department types. The safety climate scores in these departments studied may reflect increased scrutiny of the integrated health system whose efforts over the past several years have concentrated on patient safety climate and internal safety culture surveys. These results may also reflect the desire for staff to respond positively to avoid conflicts, due to fear of confidentiality, or desire to provide the right answer. Additionally, some might argue that 3.5 on a 5-point scale is a low rating in an organization that has been concentrating on patient safety efforts for the past several years.

The lowest safety climate subscale reported in this study was the use of safety data (M = 3.5). There were some moderate positive correlations between use of safety data and patient falls, medication errors, and CA-UTIs in critical care departments (r = .421, .434, and .567, respectively); however, these did not reach statistical significance. These findings are consistent with the common tenet of using data to improve quality at the bedside and further underscore the fact that when patient safety data are shared with staff, the staff become engaged in improvement efforts (Draper et al., 2008). Because

nurse-sensitive patient outcomes vary widely by department type, it was necessary to analyze the sample by critical care and noncritical care departments. The sample size for critical care departments of 14 resulted in decreased power to detect associations in spite of high correlations. While some of this could have been anticipated a priori, for example, with patient falls and staffing measures, the other outcome that was significantly different by department type was CA-UTIs, which may not necessarily have been anticipated a priori. Patient outcomes were not available for all departments. The CA-UTI rate was only available for 30 departments (n = 12 critical care, n = 18 noncritical care), decreasing power even more. This was the result of different infection control surveillance methods that concentrate on focused surveillance in specific departments in the hospital rather than whole-house surveillance.

Safety Climate and Nurse Education

An additional research question or subaim of this study was the relationship between safety climate and nursing education level. A moderate negative relationship (r = –.460, p = .016) was identified between safety emphasis and percent bachelor's degree in noncritical care departments. A similar correlation, approaching significance, was identified among percent bachelor's degree, three safety climate subscales, and total safety climate. Despite the fact that these correlations were not statistically significant, there may be some clinical relevance, indicating that in noncritical care departments, higher educated nurses may have some influence over patient safety climate on their unit. This premise is supported by some literature (Aiken et al., 2003; Blegen et al., 2001; Ridley, 2008). It is interesting to note that similar relationships were not identified with RN years of experience, nor were they present in critical care departments. Due to the

exploratory nature of this study setting, a significance level at .10 may have been warranted.

Safety Climate and Medication Errors

Medication errors have been highly publicized as a serious issue in health care. Errors, however, are often not caused by individuals but by systems and processes. While the medication administration process is a primary role of the acute care nurse, there is an interdisciplinary and process component that can enhance or inhibit patient safety. Medication errors have been associated with several process factors, such as acuity, staffing, RN experience, department type, and pharmacist collaboration (Carlton & Blegen, 2006; Guy et al., 2003; Kaushal, 2008). In this study, there was no significant difference in medication errors by department type; however, a moderate negative relationship was identified between medication errors and safety emphasis in noncritical care departments.

Safety Climate and Staffing

A lot of attention has been placed on nurse staffing recently. The relationship between staffing and some patient and nursing outcomes has been reported; however, few studies have studied the relationship between safety climate and nurse staffing (Griffiths, 2009a). In noncritical care departments, a moderate to strong positive relationship was identified among total NHPPD and manager support, safety emphasis, use of safety data, and total safety climate. This relationship suggests that as total staffing hours (UAP and RN) increased, nurses' perceptions of these aspects of safety climate also increased. The

inverse was seen with critical care departments, resulting in almost all of the correlations among total NHPPD and the safety climate measures being negative.

It appears from these findings that staffing in noncritical care departments is more sensitive to nurses' perceptions of their patient safety climate. This may be related to the fact that staffing in these units fluctuates with patient acuity and volume, while critical care units mostly have a 1:1 nurse-to-patient ratio. The environment in critical care is also different. Nurses not only have more autonomy but may also have a narrow view of their unit and its relationship with the hospital in general. Critical care nurses often work in specialized teams and interact with limited departments, such as the emergency room or operating room, while medical surgical departments have an increased diversity. These unique aspects of department type may impact their perceptions of safety climate.

Staffing and Nurse-Sensitive Patient Outcomes

In this study, nurse staffing was found to be associated with patient falls. The final regression model indicated that RN HPPD and department type accounted for 38.7% of the variance in patient falls. An important finding in this study is the lack of UAP in the final model. This omission is particularly interesting because many fall prevention programs rely on UAPs to provide extra support for patients at risk of falling. This study suggests that the RN plays a role in fall prevention, and staffing of RNs in particular should be considered when implementing fall prevention programs.

Other nurse-sensitive patient outcomes (HAPUs, CA-UTIs, and medication errors) were not associated with staffing in this study. Some reasons for these results were discussed previously related to sample size and infection surveillance. Another explanation for these findings includes the validity and reliability of outcome data.

Pressure injuries are measured using a quarterly prevalence study. While the methodology for the prevalence study is sound, it provides information for that specific date and time and may not be representative of the true HAPU rate. Falls and medication errors are reported voluntarily by the staff involved in the incident. Falls with injury are more often reported and perhaps would be a more reliable indicator; however, these rates are historically low, making it difficult to detect significant differences. Voluntary reporting of medication errors is particularly problematic. Recent reports indicate that as many as 47–77% of recognized medication errors go unreported, and most medication errors are unrecognized and therefore cannot be reported (Blegen et al., 2004; Koppel et al., 2008).

Specific Aim 2

Identify the amount of variance in patient safety outcomes explained by leadership style, practice environment, and safety climate. Nurse managers are the leadership at the department level and as such are essential in making hospitals safe for patients. In this study, staff RNs rated their nurse managers on a 0–4 Likert scale using the MLQ–5XS to measure transformational, transactional, and laissez-faire leadership styles. Each of these leadership styles is identified to some degree in every leader. The mean reported nurse manager leadership style was 2.97 transformational, 2.56 transactional, and .93 laissez-faire. There was no significant difference in leadership style of the nurse manager by department type. These findings are about the 50th percentile, meaning that nurse managers' leadership styles are similar to studies in other industries (Avolio & Bass, 2004).

Leadership Style and Safety Climate

A strong relationship between nurse manager leadership style and patient safety climate was identified in this study. A strong positive relationship was identified with both transformational and transactional leadership styles and patient safety climate relationship, while laissez-faire leadership style had a strong negative relationship with patient safety climate.

Four of the patient safety climate subscales were found significant in the final multilevel modeling: manager support, blameless system, pharmacist support, and socialization and training. Transformational and laissez-faire leadership styles both contributed to the variance in these subscales. Department type, however, only made a significant contribution in the socialization and training subscale.

Socialization and training includes socialization of new staff and ongoing training in patient safety. These findings revealed that new nurses in critical care departments may not feel adequately mentored in patient safety, and while having a transformational leader may partially contribute to patient safety climate, the unique socialization that occurs in critical care departments may overshadow this effect.

Critical care nurses often receive extensive and extended orientation and are only allowed to care for more critical patients after working on the unit for a specified amount of time. While this may seem to be supportive to new staff, it can also be intimidating. New nurse orientation is not synonymous with mentoring and socialization. Further, seasoned critical care nurses may be less likely to adopt changes in patient safety, first, because they want to be convinced of the evidence behind the changes, and second, the nurse must acknowledge that his or her current practice may not be the best practice.

Finally, critical care nurses often practice in a more isolated environment than found in noncritical care departments. They may not work with as many UAP, or a wide variety of therapists and visitors are more restricted than in noncritical care departments. Over the past several years, the critical care environment has moved from open wards to individual rooms. This results in an isolated environment rather than the camaraderie that may occur at a large nurse's station.

Leadership Style and Practice Environment

A positive nursing practice environment supports nurses in their role by fostering autonomous practice, encouraging participation in decision making, and focusing on quality and interaction with colleagues. Some interesting findings arose regarding leadership style and practice environment. There were no statistical differences in practice environment by department type. Yet, in critical care departments, the Composite Practice Environment Scale was strongly positively associated with transformational leadership style, and an even stronger negative association was seen with laissez-faire leadership style. These findings suggest that the nurse manager leadership style may impact practice environment differently in critical care versus noncritical care departments. While nurse manager leadership style did not differ by department type, there may be some factors, such as department complexity, visibility of the manager, and number of staff reporting to the manager, that may impact manager effectiveness. Another explanation is the socialization and training differences manifested between critical care and noncritical care departments.

A great deal of attention has been focused on the development of transformational leaders. Leadership training focuses on these attributes and encourages managers to adopt

these characteristics. Interestingly, the effects of a laissez-faire leader may be even more pronounced than previously realized. All managers exhibit some degree of all three leadership styles. These results underscore the need to concentrate on not only developing transformational characteristics but also minimizing nurse manager laissez-faire tendencies as well.

Leadership Style and Nurse-Sensitive Patient Outcomes

In this study, there were few associations among nurse sensitive patient outcomes and leadership style. While this is not consistent with some of the literature related to outcomes and leadership style, it may be due to other factors, such as staffing, that contribute to patient outcomes.

Comparison of Leadership Measures

The various leadership scales used in this study were analyzed to explore the relationships between the HUSC manager subscale, MLQ–5XS three leadership styles, and the PES–NWI nurse manager ability subscale. The Practice Environment Scale was moderately positively associated with leadership style and Safety Climate manager support subscale. The Safety Climate manager support subscale was strongly negatively associated with transformational and laissez-faire leadership styles. This indicates that although there are some similarities in the various instruments, there are some unique constructs being measured, particularly in the PES–NWI related to staff nurses' perceptions of the abilities of their managers. Each of the instruments provided a unique aspect of manager effectiveness. One instrument based on a comprehensive concept analysis of the nurse manager role may prove helpful in future research.

Specific Aim 3

The third aim of this study was to compare two different methods to measure span of control: unit complexity and number of direct reports. The number of personnel reporting to a manager has been the most utilized metric for measuring nurse manager span of control. This is perhaps due to the fact that the number of direct reports is easily obtained and validated. While the number of direct reports clearly contributes to the burden of a nurse manager, there are many other responsibilities that impact his or her role. Using a measure that incorporates more aspects of the nurse manager role makes both theoretical and intuitive sense. This study identified that a complexity measurement, TOH Clinical Manager Span of Control Tool, yielded different span of control measures than the number of direct reports. The complexity instrument as a whole proved a reliable instrument with a Cronbach's alpha of .838. Its subscales, however, did not prove to be reliable individually. The instrument did not include assistance to the manager or nurse manager skills and abilities, which both may be important factors in nurse manager span of control.

Hospital administrators must use caution when determining nurse manager span of control. Decisions based solely on the numbers of direct reports may not encompass the entire scope of responsibility of nurse managers.

The results of this study open the dialogue for nurse researchers and executives. Care should be taken when choosing metrics to measure nurse manager span of control for research. The number of direct reports should not be unanimously accepted as an appropriate metric. Unit complexity, assistance to the manager, and even manager abilities should be taken into consideration. More research is needed on a span of control

instrument that incorporates manager assistance, skills of the manager, and perhaps leadership style.

Level of Measurement

Level of measurement is an important component of this study. Standard definitions for nurse-sensitive patient outcomes at the unit level of analysis are an essential component to improvement of patient safety at the department level. This is particularly important for nurse managers who struggle with compliance to safety measures in high-risk departments such as intensive care units. However, level of measurement at the department level also requires larger sample sizes across hospitals. For nursing outcomes research to move forward, funding for multisite nursing research, large datasets, and open access to nursing unit outcomes data are needed.

Limitations

Although there was a relatively large number of nurses participating in the study ($N = 466$), the aggregation at the unit level decreased the sample size. Several unit-level outcome variables were not available, resulting in a unit sample size ranging from 11–14 for critical care and 18–27 for noncritical care departments. There were several moderate to strong correlations identified that did not reach statistical significance. This was attributable to sample size. In a post hoc power analysis, 23 nursing departments would have been needed to detect a strong correlation ($r = .5$) with 80% power and alpha of .05.

The response rate for managers was 80.4%. The response rate for RNs participating was 29.5%. A low response rate may introduce selection bias and affect the validity of the study conclusions. Incentives were not offered to the subjects because the

health system felt that participating in research is a professional obligation. Offering an incentive and having direct contact with the staff nurses may have improved the response rate. Response burden is always a concern with staff nurses. The e-mail link was sent to their work address and it may have been difficult to complete the survey at work. These results may not be generalizable to other nursing departments, such as obstetrics, pediatrics, nonacute care settings, or hospitals with different health system configurations.

Conclusions and Recommendations

Over the past several years, reports have emphasized that measurement and improvement of patient safety climate are essential to improving outcomes (Goodman, 2003; Huang et al., 2007; Ruchlin et al., 2004; Singer et al., 2003; Yates et al., 2005; Zohar et al., 2007). However, the link between patient safety climate and patient outcomes remains elusive in part due to varied methods of measurement and definitions, as well as issue with the unit of analysis. This study did not identify a relationship between patient safety climate and outcome; however, some moderate to strong relationships were identified that may be clinically important. Nurse staffing remains a key predictor of some nurse-sensitive outcomes, such as patient falls; however, others, including pressure ulcers, CA-UTIs, and medication errors, may not be as sensitive to staffing levels. Further research needs to concentrate on other aspects of quality nursing care that contribute to nurse-sensitive patient outcomes.

Standardized definitions and methods of measurement for staffing measures, patient safety climate, and outcomes are essential to promoting nursing outcomes research. Consistent methods of defining, abstracting, and reporting nurse-sensitive data

remain a barrier. When safety climate is assessed, interactions between the nurse and the interdisciplinary team, particularly the role of the pharmacist in prevention of medication errors, should be assessed. In addition, the unique critical care environment as it relates to socialization and training of new staff and ongoing safety measures needs to be investigated more fully.

A strong safety climate counteracts both active and latent failures by having an infrastructure that provides a safety foundation and leaders in the organization who instill the vision and values of patient safety at the bedside. Hospital safety literature has identified that measures to promote safety, including executive walk rounds, patient safety training, and provision of equipment and protocols results in improved nurses' perceptions of safety climate (Ginsburg et al., 2005; Thomas et al., 2005). Implementation of organization-wide patient safety programs, however, requires commitment and perseverance and cannot be accomplished only at the hospital level (Frankel et al., 2003). Strategies to improve blame-free reporting, consistent definitions, data collection, and implementation of safety measures are key to reducing errors (Brady et al., 2009).

Finally, nurses at the bedside must be conversant with safety practices and outcome data. Safety emphasis and data empower nurses who, amidst many other competing priorities, are then able to prioritize their practice to promote optimal safety for their patients.

Nurse manager leadership style plays a role in nurse perceptions of unit safety climate. More attention should be placed on development of nurse managers' leadership qualities. This development should concentrate on identifying and development of

transformational leadership, while recognizing laissez-faire leadership styles and minimizing these attributes.

Nursing leaders contribute to the nurses' perceptions and work with the interdisciplinary team. Medication delivery is a large component of patient safety. Successful partnerships with the interdisciplinary team, particularly the pharmacist, should be investigated.

More research is needed on leadership's contribution to patient outcomes. Nurse managers are the leadership at the unit level; however, they do not work around the clock. Other nurse leaders, such as charge nurses, may influence patient safety; this needs to be investigated further.

The results of this study further affirm the fact that the number of nurses who report to a manager is not the only available measure of span of control. While the total number of staff plays an important role, complexity of the department and individualized needs of the staff should also be considered. The measurement of span of control is a proxy for how much time the manager needs to fulfill his or her role in order to promote quality care. This may be dependent upon department factors (services provided), staff factors (novice nurses, turnover), hospital/program factors (budget, reporting structure), and assistance to the manager (education and shared governance). Manager characteristics, such as experience, leadership style, and communication skills, are key factors to consider when measuring nurse manager span of control.

Further Research

This study provides a stepping-stone for future research related to nurse manager span of control. Future opportunities include the need to revise and replicate the study

using TOH Clinical Manager Span of Control Tool on a larger nurse manager population. In addition, comparison of self-reported data from the manager through other sources such as human resources databases would help reduce any bias associated with self-reported data. Priorities for future research include validation of the instrument weighting and adding the role of assistance to the manager.

Patient safety climate is a complex construct. In this study, leadership was shown to contribute to a portion of the variance in patient safety climate. Other contributing factors associated with patient safety climate need to be explored. More research is also needed on leadership's contribution to patient outcomes. The impact of other unit-based nursing leaders, such as charge nurses, needs to be explored further, as does the unique impact of the critical care environment on patient safety climate.

Nursing Implications

There are several nursing implications for patient safety identified in this study. The presence and support of a department-based pharmacist may improve safety climate and decrease medication errors. Nurse managers and educators have a role in fostering interdisciplinary teamwork and emphasizing the pharmacy's valuable role as a resource and patient safety advocate.

Nurse manager leadership style plays a key role in the practice environment and safety climate at the department level. More attention should be placed on development of nurse managers' leadership qualities. This development should concentrate on identifying and development of transformational leadership. Nurse managers need to understand the importance of placing an emphasis on patient safety and an environment free of blame. Data on patient outcomes need to be shared with nursing staff. Nurse

administrators need to recognize the important balance between span of control and the ability for the nurse manager to implement transformational leadership.

Acknowledgments

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APPENDIX A

NURSING LEADERSHIP AND PATIENT SAFETY SURVEY

(Completed by Staff Nurses)

1. What is your gender?
   - □ Male
   - □ Female
2. What is your racial background?
   - □ American Indian/Alaskan Native
   - □ Asian
   - □ Black or African American
   - □ White
   - □ Hawaiian or other Pacific Islander
   - □ Hispanic or Latino
   - □ More than one race
   - □ Other
3. What is your age in years? _____
4. What is your highest nursing degree?
   - □ Diploma
   - □ Associate's
   - □ Bachelor's

- □ Master's
- □ DNP
- □ PhD

5. Do you have a degree other than nursing?
   - □ Yes
   - □ No

   If yes, what is your highest non-nursing degree?
   - □ Associate's
   - □ Bachelor's
   - □ Master's
   - □ DNP
   - □ PhD
6. How many years have you worked as a nurse? _____
7. How long have you worked in this hospital? _____
8. How long have you worked on this unit? _____
9. What shift do you usually work?
   - □ Days
   - □ Evenings
   - □ Nights
   - □ Rotating shifts
   - □ Other: _____
10. What is your typical work schedule?
    - □ Weekdays only

- □ Weekends only
- □ A mix of weekdays and weekends
- □ Other: _____

11. How long is your typical shift?

- □ 8 hours
- □ 10 hours
- □ 12 hours
- □ Other: _____

12. How many hours on average do you work each week? _____

13. Are you certified in your national nursing specialty?

- □ Yes
- □ No

If yes, indicate which specialty

- □ Addictions Nursing
- □ Childbirth Educators
- □ Critical Care Nursing
- □ Diabetes Educators
- □ Emergency Nursing
- □ Gastroenterology
- □ Healthcare Quality
- □ Infection Control
- □ Intravenous Nursing
- □ Maternal Child Nursing
- □ Med Surg Registered Nurse
- □ Nephrology Nursing
- □ Neuroscience Nursing
- □ Nurse Anesthetists
- □ Nurse Midwifery
- □ Occupational Health
- □ Oncology Nursing
- □ Orthopaedic Nursing
- □ Pain Management
- □ Pediatric Nursing

- □ Peri-anesthesia Nursing
- □ Peri-operative Nursing
- □ Plastic and Reconstructive Surgical Nursing
- □ Rehabilitation Nursing
- □ Urology Nursing
- □ Wound, Ostomy, and Continence Nursing
- □ Other: _____

The following information applies to ONE specific nursing department. Check the information that best describes the nursing department. If you work in more than one department, answer for the department that does your payroll.

14. In which hospital is this department located? _____
(name of hospital)

15. What is the name of the department? (If you work on multiple units, indicate the one that does your payroll): _____
(name of department)

The following statements characterize Safety Climate on my unit or in this hospital. Indicate your agreement or disagreement with the following statements

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
The unit manager praises staff nurses who take the time to report medication errors.					
This hospital's administration's primary goal is to ensure patient safety.					

Nurses new to this unit quickly learn that it is okay to skip some rules for administering medications					
Physicians caring for patients on the unit respond constructively to nurse reporting a medication error.					
Staff members on this unit use adverse occurrence data to identify problems and improve care					
The pharmacy department makes sure that we have the most recent information on drugs.					
In this hospital, not enough steps are taken to minimize risk involved in hazardous tasks and procedures.					
The unit manager praises staff whenever he/she sees safety practices being followed properly					
Preceptors of newly hired staff emphasize the importance of following patient safety policies.					
Physicians who work on this unit treat safety as a top priority					

Most staff believe that someone who commits an error that harms a patient is incompetent.					
Staff on this unit think near misses should be reported					
When a medication error occurs because of a dispensing error, pharmacists are open to discussing the problem					
My colleagues on this unit do not take guidelines such as Standard Precautions seriously					
The unit manager treats errors as an opportunity for educating all unit staff.					
In-services on the safe use of new techniques or equipment for patient care are regularly provided					
Hospital administration is not willing to “put its money where its mouth is” when it comes to investments in patient safety					
People on this unit do not blame					

individuals for errors and accidents					
On this unit, we examine patterns of occurrences to determine needed changes in procedures.					
The pharmacists working with this unit tend to blame nurses for medication errors.					
On my unit all necessary equipment and devices to protect the staff from occupational exposures and injuries are available.					
New employees quickly learn that they are expected to report all medication errors.					
Physicians who care for patients on this unit participate in the process of identifying ways to improve patient safety.					
When an error occurs on this unit, the focus is on what caused the error, not who caused the error.					
Staff nurses on this unit are rarely informed about the incidence of					

medication errors.					
Follow up checks are provided to employees with exposures to communicable diseases.					
The unit manager is a poor role model for safe nursing practices.					
Safety is a top priority regardless of how short staffed we are.					
This hospital has state-of-the-art strategies for preventing patient injuries (e.g. falls, skin breakdown)					
Nurses on this unit show understanding and support for staff nurses who are involved in medication errors					
The supervisors here believe that someone who commits an error that harms a patient should be disciplined or fired.					
The manager on my unit readily accommodates nurses needs for special equipment and supplies (e.g. latex free gloves, lifting equipment).					

For each statement, judge how frequently, on average, your manager displays the behavior described.

(Due to copyright this instrument is not printed in its entirety)

My Manager	Not at all	Once in a while	Sometimes	Fairly Often	Frequently or Always
Avoids controversial issues that would produce conflict.					
Allows performance to fall below minimum standards before trying to make improvements					
Focuses attention on irregularities, mistakes, exceptions, and deviations from standards					
Clearly communicates what each member needs to do to complete assignments					
Avoids addressing problems					
Delays taking actions until problems become serious					
Closely monitors the staffs performance for errors.					
Works out agreements about					

what's expected from each other.					
Motivates me to do more that I thought I could do.					
Fails to follow-up requests for assistance.					
Tells me what I've done wrong rather than what I've done right.					
Spends time "putting out fires."					

APPENDIX B

THE OTTAWA HOSPITAL CLINICAL NURSE MANAGER SPAN OF CONTROL TOOL, DEMOGRAPHICS, AND ASSISTANCE TO THE MANAGER

You are being invited to participate in a research study involving the effect of nursing leadership style on the safety climate, practice environment and patient safety outcomes. The purpose of the study is to see if there is a relationship between certain types of leadership styles of the nurse manager and patient safety on their unit. You have been selected to participate because you are a Nurse Manager on one of the following types of units in Intermountain healthcare; medical, surgical, combined medical/surgical, intensive care, step down, rehab, transitional care and cardiac inpatient units. This study is being conducted as part of a dissertation for a PhD in nursing from the University of Utah.

If you agree to participate, you will be asked questions about your nursing unit and some demographic information (age, experience etc.). Each nursing unit that participates will be given a unique code known only by the investigator. Your name will not be associated with your responses. In order to protect your confidentiality, the results will be reported by type of leadership style rather than hospital or unit type. Your RN staff will also be asked to complete an electronic survey that has questions about your leadership style, perceptions of the patient safety climate on the nursing unit and some basic demographic information (age, experience etc.).

The results from the manager and staff nurse surveys will be summarized for each nursing unit and then compared with unit patient safety outcomes (UTIs, Med Errors, pressure injuries and falls) and practice environment scores (nursing satisfaction). This research has been determined to be minimal risk by the Intermountain and University of Utah Institutional Review Boards who have approved this research study. The research may not benefit you directly. However, the results from the study may provide a benefit of generalizable knowledge the effect of nursing leadership and span of control on job satisfaction and patient safety.

The survey will take approximately 10 minutes to complete. You will not be paid to complete the survey. Participation in this research is voluntary. It is up to you to decide if you will participate. If at any time, you decide to stop participating, simply stop answering the questions and close the study. If after you have completed the survey you should decide to withdraw, you may do so by contacting the investigator. The investigator may withdraw you from the study without your consent.

If you have any questions about the study, you may contact the investigator, Katreena Collette Merrill at [redacted] If you have questions regarding your rights as a research subject, or if problems arise which you do not feel, you can discuss with the Investigator, please contact the Intermountain Office of Research at 1-[redacted]

□ Yes, I consent to be in the study

□ No, I do not wish to participate in the study

Study Questions:

1. What is your age? (in years) _____

2. What is your highest NURSING degree?_____

3. Do you have a degree other than nursing? *(Please circle)* Yes No

   a. If yes, What is your highest Non nursing degree? _____

4. How many years of management experience do you have? _____

5. Are you certified in a national nursing specialty? *(Please circle)* Yes No

   a. If yes, What is the name of your certification? _____

6. How many people do you report to?

7. How many nursing departments do you manage?

   a. If you have more than one department, where are they located?
      - □ Side by side
      - □ On different floors of the same hospital
      - □ At different hospitals
      - □ Other (please specify)

The following information applies to ONE specific nursing department. Check the information that best describes this nursing department. If you manage more than one department, you will be asked to supply the same answers for each specific department.

1. What is the name of your nursing department? _____

2. Which hospital is this department located? _____

3. How many years have you managed this nursing unit?_____

4. Describe the departments hours of operation:
   - □ Weekdays 8-5
   - □ Extended hours but not 24/7
   - □ 24/7

5. How often does the department need to obtain extra staff?
   - □ Never or rarely (0-1 per week)
   - □ Sometimes (2-5 per week)
   - □ Frequently (> 5 per week)

6. How often does the department exceed capacity?
   - □ Never or rarely (0-1 per week)
   - □ Sometimes (2-5 per week)
   - □ Frequently (> 5 per week)

7. How many services are provided in your department? (i.e. surgical, medical, oncology, neuro, cardiovascular etc.) _____

8. Which best describes this department's budget?
   - □ < 2 million
   - □ 2-4 million
   - □ > 4 million

9. How many personnel directly report to you? (i.e. you provide their annual evaluation)
   - □ < 30
   - □ 31-70
   - □ 71-100
   - □ >101

10. How many different types of employee job codes (types of staff) do you have reporting to you?
    - □ 1-3
    - □ 4-6
    - □ >6

11. What is the percent of novice nurses in your department? (new graduates less than 1 year OR nurses new to your unit specialty)
    - □ <5%
    - □ 5-15%
    - □ >15%

12. What is the percent of non-nursing staff? (unit secretaries, PCTs, techs etc)
    - □ <10%
    - □ 10-20%
    - □ >20%

13. What is your average Absenteeism rate?
    - □ 0-6 per month
    - □ 7-14 per month
    - □ >14 per month

14. How much time do you spend on risk management or quality improvement activities for this department? (Patient complaints, event reports, CQI etc.)
    - □ < 2.5 hours per week
    - □ 2.5 - 5.5 hours per week
    - □ > 5.5 hours per week

15. How many hours do you spend on materials management for this department? (vendors, equipment, repair, ordering etc)
    - □ < 4 hours per week
    - □ 4-8 hours per week
    - □ > 8 hours per week

Thank you for your time

Please enclose the survey in the envelope provided

If you have an additional department that you manage, please complete the additional department information form.

Additional Department Information
To be completed if you have more than one department that you manage

1. What is the name of your nursing department? _____

2. Which hospital is this department located? _____

3. How many years have you managed this nursing unit? _____

4. Describe the departments hours of operation:
    - □ Weekdays 8-5
    - □ Extended hours but not 24/7
    - □ 24/7

5. How often does the department need to obtain extra staff?
    - □ Never or rarely (0-1 per week)
    - □ Sometimes (2-5 per week)
    - □ Frequently (> 5 per week)

6. How often does the department exceed capacity?
   - □ Never or rarely (0-1 per week)
   - □ Sometimes (2-5 per week)
   - □ Frequently (> 5 per week)

7. How many services are provided in your department? (i.e. surgical, medical, oncology, neuro, cardiovascular etc.) _____

8. Which best describes this department's budget?
   - □ < 2 million
   - □ 2-4 million
   - □ > 4 million

9. How many personnel directly report to you? (i.e. you provide their annual evaluation)
   - □ < 30
   - □ 31-70
   - □ 71-100
   - □ >101

10. How many different types of employee job codes (types of staff) do you have reporting to you?
    - □ 1-3
    - □ 4-6
    - □ >6

11. What is the percent of novice nurses in your department? (new graduates less than 1 year OR nurses new to your unit specialty)
    - □ <5%
    - □ 5-15%
    - □ >15%

12. What is the percent of non-nursing staff? (unit secretaries, PCTs, techs etc)
    - □ <10%
    - □ 10-20%
    - □ >20%

13. What is your average Absenteeism rate?
    - □ 0-6 per month
    - □ 7-14 per month
    - □ >14 per month

14. How much time do you spend on risk management or quality improvement activities for this department? (Patient complaints, event reports, CQI etc.)
    - □ < 2.5 hours per week
    - □ 2.5 - 5.5 hours per week

□ > 5.5 hours per week

15. How many hours do you spend on materials management for this department? (vendors, equipment, repair, ordering etc)
    □ < 4 hours per week
    □ 4-8 hours per week
    □ > 8 hours per week

If you manage more than two departments, you may contact the researcher for on-line or hard copy forms.

APPENDIX C

HOSPITAL UNIT SAFETY CLIMATE

Table C.1

ANOVA for Differences in Education, Experience, and Certification by Department Type

Variable		*SS*	*df*	*MS*	*F*	Sig.
Percent bachelor's degree	Between groups	4810.300	1	4820.300	15.200	.000
	Within groups	12232.900	39	313.600		
	Total	17053.200	40			
Years RN	Between groups	.695	1	.695	.035	.853
	Within groups	776.300	39	19.900		
	Total	777.000	40			
Percent certified	Between groups	391.100	1	391.100	.957	.334
	Within groups	15932.600	39	408.500		
	Total	16323.800	40			

Table C.2

Hospital Unit Safety Climate Subscales ($N = 466$)

Hospital Unit Safety Climate subscales			Critical care		Noncritical care		
	M	*SD*	*M*	*SD*	*M*	*SD*	α
Manager support	3.9	.303	3.9	0.35	3.9	0.29	.847
Socialization/training	3.9	.493	3.9*	0.17	4.0*	0.22	.762
Safety emphasis	3.6	.616	3.6	0.24	3.7	0.23	.789
Blameless system	3.6	.551	3.6	0.21	3.6	0.25	.783
Use of safety data	3.5	.568	3.5	0.31	3.4	0.22	.768
Pharmacist support	3.9	.624	3.9	0.27	3.9	0.31	.827
Worker safety	3.8	.519	3.7	0.21	3.9	0.20	.729
Total Safety Climate	3.8	.428	3.7	0.21	3.8	0.16	.866

*ANOVA; $F = 5.1$, $df = 39$, $p = .029$.

Table C.3

Nurse-Sensitive Outcomes

		All departments		Critical care		Noncritical care	
Outcome	*N*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Patient fall rate[a]	37	3.810	2.980	1.70*	.84	4.80*	3.30
HAPUs[b]	32	5.500	4.100	8.70	4.20	6.00	3.10
CA-UTIs[c]	30	.590	.482	.48**	.29	.75**	.55
Medication errors[d]	37	.281	.351	.33	.46	.35	.36

[a]Number of patient falls/1,000 patient days. [b]Prevalence rate of hospital acquired pressure ulcers per patients on the unit. [c]Catheter Associated Urinary Tract Infections per urinary catheter days. [d]Number of medication errors per 1,000 patient days.
*ANOVA; $F = 28$, $df = 35$, $p < .001$. **ANOVA; $F = 4.9$, $df = 28$, $p = .034$.

Table C.4

Nurse Staffing Indicators

		All departments		Critical care		Noncritical care	
Indicator	*N*	*M*	*SD*	*M*	*SD*	*M*	*SD*
UAP[a] HPPD[b]	37	3.85	1.60	2.5**	1.3	4.5**	1.2
LPN[c] HPPD[b]	37	.439	.773	0.1*	0.2	0.6*	0.9
RN[d] HPPD[b]	37	11.28	5.66	17.5**	3.1	7.4**	2.2
Total HPPD[e]	37	15.6	4.55	20.4**	3.1	12.5**	1.8
Percent RN care	37	72.3%	16.9	86.9**	8.4	58.4**	10.9

[a]Unlicensed Assistive Personnel. [b]Hours per patient day. [c]Licensed Practical Nurse.
[d]Registered Nurse. [e]Total nursing hours per patient day.
*$p < .05$. **$p < .01$.

Table C.5

ANOVA for Staffing in Critical Care and Noncritical Care Departments

		SS	*df*	*MS*	*F*	Sig.
UAP[a] HPPD[b]	Between groups	36.65	1	36.65	24.34	.000
	Within groups	52.69	35	1.50		
	Total	89.35	36			
LPN[c] HPPD[b]	Between groups	2.41	1	2.41	4.42	.043
	Within groups	19.12	35	.54		
	Total	21.54	36			
RN[d] HPPD[b]	Between groups	872.17	1	872.17	134.20	.000
	Within groups	227.40	35	6.49		
	Total	1099.64	36			
Total HPPD[e]	Between groups	522.79	1	522.79	94.75	.000
	Within groups	193.11	35	5.51		
	Total	715.90	36			
Percent RN[d]	Between groups	6828.40	1	6828.40	67.23	.000
care	Within groups	3554.77	35	101.56		
	Total	10383.17	36			

[a]Unlicensed Assistive Personnel. [b]Hours per patient day. [c]Licensed Practical Nurse. [d]Registered Nurse. [e]Total nursing hours per patient day.

APPENDIX D

LEADERSHIP STYLE AND PATIENT SAFETY

Table D.1

Practice Environment Scale ($N = 38$)

Variable	All departments		Critical care		Noncritical care	
	M	*SD*	*M*	*SD*	*M*	*SD*
Nurse participation in hospital affairs	2.78	.22	2.7	.19	2.8	.23
Nursing foundations for quality care	3.07	.21	3.1	.08	3.1	.25
Nurse manager ability	3.19	.23	3.2	.25	3.2	.22
Staffing and resource agency	2.85	.33	3.1	.36	2.8	.36
Collegial nurse–physician relationships	3.09	.19	3.2	.19	3.0	.18
Composite Practice Environment Scale	3.00	.18	3.0	.12	2.9	.19

Note. Practice Environment scores not available for three departments.

Table D.2

Multivariate Analysis for Leadership Style, Department Type, and Manager Support HUSC Subscale

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .631984)					
Transformational leadership style	.435	.144	.498	3.013	.005
Transactional leadership style	–.003	.247	–.001	–.011	.992
Laissez-faire leadership style	–.332	.128	–.368	–2.600	.013
Department type	.011	.067	.016	.159	.875
Model 2 (R^2 = .632982)					
Transformational leadership style	.434	.121	.497	3.596	.001
Laissez-faire leadership style	–.332	.126	–.368	–2.638	.012
Department type	.011	.065	.017	.164	.870
Model 3 (R^2 = .632171)					
Transformational leadership style	.435	.119	.498	3.651	.001
Laissez-faire leadership style	–.330	.123	–.365	–2.674	.011

Note. Dependent variable entered: Department manager support subscale of HUSC. Predictor variables entered: Transformational, transactional and laissez-faire leadership styles and department type (critical care/noncritical care).

Table D.3

Multivariate Analysis for Leadership Style, Department Type, and Socialization and Training HUSC Subscale

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .216)					
Transformational leadership style	.055	.145	.091	.377	.708
Transactional leadership style	.046	.248	.038	.187	.853
Laissez-faire leadership style	–.141	.128	–.226	–1.096	.280
Department type	–.130	.067	–.292	–1.934	.061
Model 2 (R^2 = .216)					
Transformational leadership style	.069	.121	.115	.570	.572
Laissez-faire leadership style	–.142	.127	–.228	–1.119	.270
Department type	–.132	.066	–.296	–2.010	.052
Model 3 (R^2 = .209)					
Laissez-faire leadership style	–.191	.091	–.308	–2.107	.042
Department type	–.131	.065	–.293	–2.009	.052

Note. Dependent variable entered: Socialization and training subscale of HUSC. Predictor variables entered: Transformational, transactional and laissez-faire leadership styles and department type (critical care/noncritical care).

Table D.4

Multivariate Analysis for Leadership Style, Department Type, and Blameless System HUSC Subscale

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .305)					
Transformational leadership style	.181	.152	.270	1.189	.242
Transactional leadership style	–.042	.260	–.031	–.162	.872
Laissez-faire leadership style	–.240	.134	–.347	–1.785	.083
Department type	–.009	.070	–.018	–.128	.899
Model 2 (R^2 = .305)					
Transformational leadership style	.179	.149	.267	1.198	.239
Transactional leadership style	–.037	.253	–.027	–.147	.884
Laissez-faire leadership style	–.242	.132	–.350	–1.841	.074
Model 3 (R^2 = .304)					
Transformational leadership style	.167	.125	.250	1.333	.190
Laissez-faire leadership style	–.241	.130	–.349	–1.860	.071
Model 4 (R^2 = .272)					
Laissez-faire leadership style	–.361	.095	–.521	–3.815	.000

Note. Dependent variable entered: Blameless system subscale of HUSC. Predictor variables entered: Transformational, transactional and laissez-faire leadership styles and department type (critical care/noncritical care).

Table D.5

Multivariate Analysis for Leadership Style, Department Type, and Pharmacist Support HUSC Subscale

Variable	*B*	*SE B*	β	*t*	Sig.
Model 1 (R^2 = .247)					
Transformational leadership style	.364	.193	.445	1.884	.068
Transactional leadership style	.159	.330	.095	.482	.633
Laissez-faire leadership style	.021	.171	.024	.121	.905
Department type	.004	.090	.006	.040	.969
Model 2 (R^2 = .247)					
Transformational leadership style	.365	.190	.446	1.925	.062
Transactional leadership style	.157	.322	.094	.488	.628
Laissez-faire leadership style	.021	.167	.025	.128	.898
Model 3 (R^2 = .247)					
Transformational leadership style	.351	.155	.430	2.263	.029
Transactional leadership style	.155	.317	.093	.488	.628
Model 4 (R^2 = .242)					
Transformational leadership style	.402	.114	.492	3.529	.001

Note. Dependent variable entered" Pharmacist support subscale of HUSC. Predictor variables entered: Transformational, transactional and laissez-faire leadership styles and department type (critical care/noncritical care).

REFERENCES

Adams, A., & Bond, S. (2003a). Staffing in acute hospital wards: Part 1. The relationship between number of nurses and ward organizational environment. *Journal of Nursing Management, 11*(5), 287–292.

Adams, A., & Bond, S. (2003b). Staffing in acute hospital wards: Part 2. Relationships between grade mix, staff stability and features of ward organizational environment. *Journal of Nursing Management, 11*(5), 293–298.

Advisory Board Company. (2004). *Unlocking unit excellence: Migrating good units to exceptional performance*. Washington, DC: Author.

Advisory Board Company. (2005). *Elevating frontline leadership.* Washington, DC: Nursing Executive Center.

Agency for Healthcare Research and Quality. (2010). *Hospital survey on patient safety culture: 2009 comparative database report.* Retrieved from http://www.ahrq.gov /qual/hospsurvey09/hosp09ch8.htm

Aiken, L. H., Clarke, S. P., Cheung, R. B., Sloane, D. M., Silber, J. H., & Sochalski, J. (2003). Educational levels of hospital nurses and surgical patient mortality. *Journal of the American Medical Association, 290*(12), 1617–1623.

Aiken, L. H., Clarke, S. P., Sloane, D. M., Sochalski, J., & Silber, J. H. (2002). Hospital nurse staffing and patient mortality, nurse burnout, and job dissatisfaction. *Journal of the American Medical Association, 288*(16), 1987–1993.

Aiken, L. H., Sloane, D. M., Lake, E. T., Sochalski, J., & Weber, A. L. (1999). Organization and outcomes of inpatient AIDS care. *Medical Care, 37*(8), 760–772.

Alidina, S., & Funke-Furber, J. (1988). First line nurse managers: Optimizing the span of control. *Journal of Nursing Administration, 18*(5), 34–40.

Altaffer, A. (1998). First line managers: Measuring their span of control. *Nursing Management, 29*(7), 36–40.

American Nurses Association. (2007). *Nursing-sensitive quality indicators for acute care settings and ANA's safety & quality initiative.* Retrieved from http://nursingworld .org/readroom/fssafety.htm

American Nurses Credentialing Center. (2005). *Magnet Recognition Program: Recognizing excellence in nursing services.* Silver Spring, MD: American Nurses Association.

American Nurses Credentialing Center. (2008). *Magnet Recognition Program manual: Recognizing nursing excellence.* Silver Spring, MD: American Nurses Association.

Avolio, B. J., & Bass, B. M. (2004). *Multifactor Leadership Questionnaire* (3rd ed.). Lincoln, NE: Mind Garden.

Barker, K., Flynn, E., Pepper, G., Bates, D., & Mikeal, H. (2002). Medication errors observed in 36 health care facilities. *Archives of Internal Medicine, 162*(16), 1897–1903.

Barling, J., Weber, T., & Kelloway, E. (1996). Effectsof transformational leadership training and attitudinal fiscal outcomes: A field experiment. *Journal of Applied Psychology, 81,* 827–832.

Bass, B. M. (1990). *Bass & Stogdill's handbook of leadership: Theory, research and managerial applications* (3rd ed.). New York, NY: The Free Press.

Bass, B. M., & Riggio, R. E. (2006). *Transformational leadership* (2nd. ed.). Mahwah, NJ: Erlbaum.

Blegen, M. A. (2006). Patient safety in hospital acute care units. *Annual Review of Nursing Research, 24,* 103–125.

Blegen, M. A., Gearhart, S., O'Brien, R., Sehgal, N. L., & Alldredge, B. K. (2009). AHRQ's hospital survey on patient safety culture: Psychometric analyses. *Journal of Patient Safety, 5*(3), 139–144.

Blegen, M. A., Goode, C. J., & Reed, L. (1998). Nurse staffing and patient outcomes. *Nursing Research, 47*(1), 43–51.

Blegen, M. A., Pepper, G. A., & Rosse, J. (2005). Safety climate on hospital units: A new measure. *Advances in Patient Safety: From Research to Implementation, 4,* 429–443.

Blegen, M. A., Vaughn, T. E., & Goode, C. J. (2001). Nurse experience and education: Effect on quality of care. *Journal of Nursing Administration, 31*(1), 33–39.

Blegen, M. A., Vaughn, T. E., Pepper, G., Vojir, C., Stratton, K., Boyd, M., & Armstrong, G. (2004). Patient and staff safety: Voluntary reporting. *American Journal of Medical Quality, 19*(2), 67–74.

Bolton, L. B., Donaldson, N. E., Rutledge, D. N., Bennett, C., & Brown, D. S. (2007). The impact of nursing interventions: Overview of effective interventions, outcomes, measures, and priorities for future research [Supplement]. *Medical Care Research and Review, 64*(2), 123–143.

Boyle, S. (2004). Nursing unit characteristics and patient outcomes. *Nursing Economics, 22*(3), 111–120.

Brady, A. M., Malone, A. M., & Fleming, S. (2009). A literature review of the individual and systems factors that contribute to medication errors in nursing practice. *Journal of Nursing Management, 17*(6), 679–697.

Burns, J. M. (1978). *Leadership.* New York, NY: Harper & Row.

Canadian Nursing Advisory Committee. (2002). *Our health, our future: Creating workplaces for Canadian nurses.* Ottawa, Ontario, Canada: Advisory Committee on Health Resources.

Capuano, T., Bokovoy, J., Hitchings, K., & Houser, J. (2005). Use of a validated model to evaluate the impact of the work environment on outcomes at a magnet hospital. *Health Care Management Review, 30,* 229–237.

Carlton, G., & Blegen, M. A. (2006). Medication-related errors: A literature review of incidence and antecedents. *Annual Review of Nursing Research, 24,* 19–38.

Cathcart, D., Jeska, S., Karman, J., Miller, S. E., Pechacek, J., & Rheault, L. (2004). Span of control matters. *Journal of Nursing Administration, 34*(9), 395–399.

Cho, S., Ketefian, S., Barkauskas, V., & Smith, D. (2003). The effects of nurse staffing on adverse events, morbidity, mortality, and medical costs. *Nursing Research, 52*(2), 8.

Clarke, S. P. (2006). Organizational climate and culture factors. *Annual Review of Nursing Research, 24,* 255–272.

Coleman, E. A., Coon, S. K., Lockhart, K., Kennedy, R. L., Montgomery, R., Copeland, N., . . . Stewart, C. (2010). Effect of certification in oncology nursing on nursing-sensitive outcomes [Supplement]. *Journal of Nursing Administration, 40*(10), S35–S42.

Colla, J. B., Bracken, A. C., Kinney, L. M., & Weeks, W. B. (2005). Measuring patient safety climate: A review of surveys. *Quality and Safety in Health Care, 14*(5), 364–366.

Committee on Quality Health Care in America. (Ed.). (2001). *Crossing the quality chasm: A new health system for the 21st century.* Washington, DC: National Academy Press.

Cummings, G. G., MacGregor, T., Davey, M., Lee, H., Wong, C. A., Lo, E., . . . Raia, L. V. (2010). Leadership styles and outcome patterns for the nursing workforce and work environment: A systematic review. *International Journal of Nursing Studies, 47*(3), 363–385.

Currie, L. M. (2006). Fall and injury prevention. *Annual Review of Nursing Research, 24,* 39–74.

Doran, D. (Ed.). (2003). *Nurse sensitive outcomes: State of the science.* Mississauga, Ontario, Canada: Jones & Bartlet.

Doran, D., McCutcheon, A. S., Evans, M. G., MacMillan, K., Hall, L. M., Pringle, D., . . . Valente, A. (2004, September). Impact of manager's span of control on leadership and performance. *Canadian Health Services Research Foundation,* 38.

Draper, D. A., Felland, L. E., Liebhaber, A., & Melichar, L. (2008). The role of nurses in hospital quality improvement. *Research Briefs,* (3), 1–8.

Duffield, C., Diers, D., O'Brien-Pallas, L., Aisbett, C., Roche, M., King, M., & Aisbett, K. (2010). Nurse staffing, nursing workload, the work environment and patient outcomes. *Applied Nursing Research.* doi:10.1016/j.apnr.2009.12.004

Feng, X., Bobay, K., & Weiss, M. (2008). Patient safety culture in nursing: A dimensional concept analysis. *Journal of Advanced Nursing, 63*(3), 310–319.

Flin, R., Burns, C., Mearns, K., Yule, S., & Robertson, E. M. (2006). Measuring safety climate in health care. *Quality and Safety in Health Care, 15*(2), 109–115.

Flynn, M., & McKeown, M. (2009). Nurse staffing levels revisited: A consideration of key issues in nurse staffing levels and skill mix research. *Journal of Nursing Management, 17*(6), 759–766.

Frankel, A., Gandhi, T. K., & Bates, D. W. (2003). Improving patient safety across a large integrated health care delivery system [Supplement]. *International Journal of Quality Health Care, 15*(1), 31–40.

Friese, C., Lake, E., Aiken, L., Silber, J., & Sochalski, J. (2008). Hospital nurse practice environments and outcomes for surgical oncology patients. *Health Services Research, 43*(4), 1145–1163.

Garner, J. S. (1988). CDC definitions for hospital acquired infections. *American Journal of Infection Control, 16,* 128–140.

Gershon, R. M., Stone, P. W., Bakken, S., & Larson, E. (2004). Measurement of organizational culture and climate in healthcare. *Journal of Nursing Administration, 34*(1), 33–40.

Gershon, R. M., Stone, P. W., Zeltser, M., Faucett, J., MacDavitt, K., & Chou, S. (2007). Organizational climate and nurse health outcomes in the United States: A systematic review. *Industrial Health, 45,* 622–636.

Ginsburg, L., Norton, P. G., Casebeer, A., & Lewis, S. (2005). An educational intervention to enhance nurse leaders' perceptions of patient safety culture. *Health Services Research, 40*(4), 997–1021.

Goodman, G. R. (2003). A fragmented patient safety concept: The structure and culture of safety management in healthcare. *Hospital Topics, 81*(2), 22–29.

Griffiths, P. (2009a). RN + RN = better care? What do we know about the association between the number of nurses and patient outcomes? *International Journal of Nursing Studies, 46*(10), 1289–1290.

Griffiths, P. (2009b). Staffing levels and patient outcomes. *Nursing Management, 16*(6), 22–23.

Gurses, A. P., & Carayon, P. (2007). Performance obstacles of intensive care nurses. *Nursing Research, 56*(3), 185–194.

Guy, J., Persaud, J., Davies, E., & Harvey, D. (2003). Drug errors: What role do nurses and pharmacists have in minimizing the risk? *Journal of Child Healthcare, 7*(4), 277–290.

Hattrup, G. P., & Kleiner, B. H. (1993, November/December). How to establish the proper span of control for managers. *Industrial Management,* 28–30.

Hoff, T., Jameson, L., Hannan, E., & Flink, E. (2004). A review of the literature examining linkages between organizational factors, medical errors, and patient safety. *Medical Care Research Review, 61*(1), 3–37.

Horan, T. C., & Gaynes, R. P. (2004). Surveillance of nosocomial infections. In C. G. Mayhall (Ed.), *Hospital epidemiology and infection control* (3rd ed., pp. 1659–1702.). Philadelphia, PA: Lippincott Williams & Wilkins.

Houser, J. (2003). A model for evaluating the context of nursing care delivery. *Journal of Nursing Administration, 33*(1), 39–47.

Huang, D. T., Clemont, G., Sexton, J. B., Karlo, C. A., Miller, R. G., Weissfeld, L. A., . . . Angus, D. C. (2007). Perceptions of safety culture vary across the intensive care units of a single institution. *Critical Care Medicine, 35*(1), 165–176.

Kane, R. L., Shamliyan, T. A., Mueller, C., Duval, S., & Wilt, T. J. (2007). The association of registered nurse staffing levels and patient outcomes: Systematic review and meta-analysis. *Medical Care, 45*(12), 1195–1204.

Kanste, O., Miettunen, J., & Kyngas, H. (2007). Psychometric properties of the Multifactor Leadership Questionnaire among nurses. *Journal of Advanced Nursing, 57*(2), 201–212.

Kanter, R. M. (1993). *Men and women of the corporation* (2nd ed.). New York, NY: Basic Books.

Kaushal, R. (2008). Unit-based clinical pharmacists' prevention of serious medication errors in pediatric inpatients. *American Journal of Health-System Pharmacy, 65*(13), 1254–1260.

Kelly, D. L. (2007). *Applying quality management in healthcare: A systems approach* (2nd ed.). Chicago, IL: Health Administration Press.

Kendall-Gallagher, D., & Blegen, M. (2010). Competence and certification of registered nurses and safety of patients in intensive care units [Supplement]. *Journal of Nursing Administration, 40*(10), S68–S77.

Klakovich, M. D. (1994). Connective leadership for the 21st century: A historical perspective and future directions. *Advances in Nursing Science, 16*(4), 12.

Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.). (2000). *To err is human: Building a safer health system.* Washington, DC: National Academy Press.

Koppel, R., Leonard, C. E., Localio, A. R., Cohen, A., Auten, R., & Strom, B. L. (2008). Identifying and quantifying medication errors: Evaluation of rapidly discontinued medication orders submitted to a computerized physician order entry system. *Journal of the American Medical Informatics ASsociation, 15*(4), 461–465.

Kramer, M., & Hafner, L. P. (1989). Shared values: Impact on staff nurse job satisfaction and perceived productivity. *Nursing Research, 38*(3), 172–177.

Kramer, M., Schmalenbert, C., Maguire, P., Brewere, B., Burke, R., Chmielewski, L., . . . Waldo, M. (2008). Structures and practices enabling staff nurses to control their practice. *Western Journal of Nursing Research, 30*(5), 539–559.

Krapohi, G., Manojlovich, M., Redman, R., & Zhang, L. (2010). Nursing specialty certification and nursing-sensitive patient outcomes in the intensive care unit. *American Journal of Critical Care, 19*(6), 490–498.

Lake, E. T. (2002). Development of the Practice Environment Scale of the Nursing Work Index. *Research in Nursing & Health, 25*(3), 176–189.

Lake, E. T. (2007). The nursing practice environment: Measurement and evidence. *Medical Care Research and Review, 64*(2), 1045–1228.

Langemo, D. K., Anderson, J., & Volden, C. (2003). Uncovering pressure ulcer incidence. *Nursing Management, 34*(10), 54–57.

Laschinger, H. S. (1996). A theoretical approach to studying work empowerment in nursing: A review of studies testing Kanter's theory of structural power in organizations. *Nursing Administration Quarterly, 20*(2), 2541.

Laschinger, H. S., Finegan, J., & Shamian, J. (2001). The impact of workplace empowerment, organizational trust on staff nurses' work satisfaction and organizational commitment. *Health Care Management Review, 26*(3), 17.

Laschinger, H. S., & Havens, D. S. (1996). Staff nurse work empowerment and perceived control over nursing practice:Conditions for work effectiveness. *Journal of Nursing Administration, 26*(9), 27–36.

Laschinger, H. S., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of Burnout/engagement. *Journal of Nursing Administration, 36*(5), 8.

Lee, H., & Cummings, G. G. (2008). Factors influencing job satisfaction of front line nurse managers: A systematic review. *Journal of Nursing Management, 16,* 768–783.

Loke, J. C. F. (2001). Leadership behaviors: Effects on job satisfaction, productivity and organizational commitment. *Journal of Nursing Administration, 9,* 191–205.

Lucas, V., Laschinger, H. K., & Wong, C. A. (2008). The impact of emotional intelligent leadership on staff nurse empowerment: The moderating effect of span of control. *Journal of Nursing Management, 16,* 964–973.

Lucero, R. J., Lake, E. T., & Aiken, L. (2009). Variations in nursing care quality across hospitals. *Journal of Advanced Nursing, 65*(11), 2299–2310.

MacDavitt, K., Chou, S. S., & Stone, P. W. (2007). Organizational climate and health care outcomes [Supplement]. *Joint Commission Journal of Quality and Patient Safety, 33*(22), 45–56.

Manojlovich, M., & Sidani, S. (2008). Nurse dose: What's in a concept? *Research in Nursing and Health, 31*(4), 310–319.

Mark, B. A., Hughes, L. C., Belyea, M., Chang, Y., Hoffman, D., Jones, C. A., & Bacon, C. T. (2007). Does safety climate moderate the influence of staffing adequacy and work conditions on the nurse injuries. *Journal of Safety Research, 38*(4), 431–446.

McClure, M. L., & Hinshaw, A. D. (Eds.). (2002). *Magnet hospitals revisited: Attraction and retention of professional nurses*. Washington, DC: American Nurses.

McCusker, J., Dendukuri, N., Cardinal, L., Laplante, J., & Bambonye, L. (2004). Nursing work environment and quality of care: Differences between units at the same hospital. *International Journal of Health Care Quality Assurance, 17*(6), 313–322.

McCutcheon, A. S., Doran, D., Evans, M., Hall, L. M., & Pringle, D. (2009). Effects of leadership and span of control on nurses' job satisfaction and patient satisfaction. *Nursing Leadership, 22*(3), 48–67.

McDaniel, C., & Wolf, G. A. (1992). Transformational leadership in nursing service. A test of theory. *Journal of Nusing Administration, 22*(2), 60–65.

McGuire, E., & Kennerly, S. M. (2006). Nurse managers as transformational and transactional leaders. *Nursing Economics, 24*(4), 179–184.

McNeese-Smith, D. K. (1997). The influence of manager behavior on nurses' job satisfaction, productivity, and commitment. *Journal of Nursing Administration, 27*(9), 47–55.

Meredith, E. K., Cohen, E., & Raia, L. V. (2010). Transformational leadership: Application of Magnet's new empiric outcomes. *Nursing Clinics of North America, 45*(1), 49–64.

Meyer, R. M. (2008). Span of management: Concept analysis. *Journal of Advanced Nursing, 63*(1), 104–112.

Morash, R., Brintnell, J., & Rodger, G. L. (2005). A span of control tool for clinical managers. *Nursing Leadership, 18*(3), 83–93.

Morath, J. M., & Turnbull, J. E. (2005). *To do no harm: Ensuring patient safety in healthcare organizations.* San Francisco, CA: Wiley.

Morrision, R. S., Jones, L., & Fuller, B. (1997). The relation between leadership style and empowerment on job satisfaction of nurses. *Journal of Nursing Administration, 27*(5), 27–34.

National Database for Nursing Quality Indicators. (2010). *NDNQI RN survey and scoring guide.* Retrieved from http://www.nursingquality.org/FAQPage.aspx

National Quality Forum. (2007). *The National Quality Forum's consensus development process.* Retrieved from http://www.qualityforum.org/pdf/cdp.pdf

Naylor, M. D. (2007). Advancing the science in the measurement of health care quality influenced by nurses [Supplement]. *Medical Care Research and Review, 64*(2), 144–169.

Needleman, J., Kurtzman, E. T., & Kizer, K. W. (2007). Performance measurement of nursing care: State of the science and the current consensus [Supplement]. *Medical Care Research and Review, 64*(2), 10–43.

Nelson, E. C., Batalden, P. B., Huber, T. P., Mohr, J. J., Godfrey, M. M., Headrick, L. A., & Wasson, J. H. (2002). Microsystems in health care: Part 1: Learning from high-performaing front-line clinical units. *The Joint Commission Journal on Quality Improvement, 28*(9), 472–493.

Nieva, V. G., & Sorra, J. (2003). Safety culture assessment: A tool for improving patient safety in healthcare organizations [Supplement]. *Quality and Safety in Health Care, 12*(2ii), 6.

Ouchi, W. G., & Dowling, J. B. (1974). Defining span of control. *Administrative Science Quarterly, 19*(3), 357–366.

Pabst, M. K. (1993). Span of control on nursing inpatient units. *Nursing Economics, 11*(2), 87–91.

Page, A. (Ed.). (2004). *Keeping patients safe: Transforming the work environment of nurses.* Washington, DC: The National Academies Press.

Park, S., & Lake, E. T. (2005). Multilevel modeling of a clustered continuous outcome: Nurses' work hours and burnout. *Nursing Research, 54*(6), 406–413.

Patrician, P. A., Loan, L., McCarthy, M., Fridman, M., Donaldson, N., Bingham, M., & Brosch, L. R. (2011). The association of shift-level nurse staffing with adverse patient events. *Journal of Nursing Administration, 41*(2), 64–70.

Platonova, E. A., Hernandez, S. R., Shewchuk, R. M., & Leddy, K. (2006). Study of the relationship between organizational culture and organizational outcomes using hierarchical linear modeling methodology. *Quality Managment in Health Care, 5*(3), 200–209.

Potter, P., Barr, N., McSweeney, M., & Sledge, J. (2003). Identifying nurse staffing and patient outcome relationships: A guide for change in care delivery. *Nursing Economics, 21*(4), 158–167.

Reason, J. (2000, March). Human error: Models and management. *British Medical Journal,* 768–771.

Ridley, R. T. (2008). The relationship between nurse education level and patient safety: An integrative review. *Journal of Nursing Education, 47*(4), 149–156.

Riehle, A. I., Hanold, L. S., Sprenger, S. L., & Loeb, J. M. (2007). Specifying and standardizing performance measures for use at a national level: Implications for nursing-sensitive care performance measures [Supplement]. *Medical Care Research and Review, 64*(2), 64–81.

Ruchlin, H. S., Dubbs, N. L., & Callahan, M. A. (2004). The role of leadership in instilling a culture of safety: Lessons from the literature. *Journal of Healthcare Management, 49*(1), 47–58.

Scott, J. G., Sochalski, J., & Aiken, L. (1999). Review of magnet hospital research: Findings and implications for professional nursing practice. *The Journal of Nursing Administration, 29,* 9–18.

Scott, T., Mannion, R., Davies, H., & Marshall, M. (2003). The quantitative measurement of organizational culture in health care: A review of the available instruments. *Health Services Research, 38*(3), 923–945.

Sellgren, S., Ekval, L. G., & Tomson, G. (2006). Leadership styles in nursing management: Preferred and perceived. *Journal of Nursing Management, 14*(5), 348–355.

Shortell, S., Zimmerman, H., Rousseau, D. M., Gillies, R. R., Wagner, D. P., Draper, E. A., . . . Duffy, J. (1994). The performance in ICUs: Does good management make a difference? *Medical Care, 32,* 508–525.

Sieloff, C. L. (2004). Leadership behaviours that foster nursing group power. *Journal of Nursing Management, 12*(4), 246–252.

Singer, S. J., Gaba, D. M., Geppert, J. J., Sinaiko, A. D., Howard, S. K., & Park, K. C. (2003). The culture of safety: Results of an organization-wide survey in 15 California hospitals. *Quality Safety in Health Care, 12,* 112–119.

Singer, S. J., Lin, S., Falwell, A., Gaba, D., & Baker, L. (2009). Relationship of safety climate and safety performance in hospitals. *Health Services Research, 44*(2, Pt. 1), 399–421.

Squires, M., Tourangeau, A. E., Laschinger, H., & Doran, D. (2010). The link between leadership and safety outcomes in hospitals. *Journal of Nursing Management, 18,* 914–925.

Thomas, E. J., Sexton, J. B., Neilands, T. B., Franek, A., & Helmreich, R. L. (2005). The effect of executive walk rounds on nurse safety climate attitudes: A randomized trial of clinical units. *BMC Health Services Research, 5*(1), 28–36.

Thompson, P. A., Navarra, M. B., & Antonson, N. (2005). Patient safety: The four domains of nursing leadership. *Nursing Economics, 23*(6), 331–335.

Tzirides, E. (1993, January). Span of control: A challenge for managers. *Nursing Management,* 80i–86i.

Udell, J. G. (1967). An empirical test of hypothesis relating to span of control. *Administrative Science Quarterly, 12*(3), 420–439.

Upenieks, V. V. (2002). What constitutes successful nurse leadership?: A qualitative approach utilizing Kanter's theory of organizational behavior. *Journal of Nursing Administration, 32*(12), 622–632.

Upenieks, V. V. (2003). The interrelationship of organizational characteristics of magnet hospitals, nursing leadership, and nursing job satisfaction. *Health Care Manager, 22*(2), 83–99.

Van Bogaert, P., Clarke, S., Vermeyen, K., Meulemans, H., & Van De Heyning, P. (2009). Practice environments and their associations with nurse-reported outcomes in Belgian hospitals: Development and preliminary validations of a Dutch adaptation of the Revised Nursing Work Index. *International Journal of Nursing Studies, 46*(54–64).

Wachter, R. M. (2010). Patient safety at ten: Remarkable progress, troubling gaps. *Health Affairs, 29*(1), 165–173.

Warshawsky, N. E., & Havens, D. S. (2011). Global use of the Practice Environment Scale of the Nursing Work Index. *Nursing Research, 60*(1), 17–31.

Whitman, G. R., Kim, Y., Davidson, L. J., Wolf, G. A., & Wang, S. L. (2002). The impact of staffing on patient outcomes across specialty units. *Journal of Nursing Administration, 32*(12), 633–639.

Wong, C. A., & Cummings, G. G. (2007). The relationship between nursing leadership and patient outcomes: A systematic review. *Journal of Nursing Management, 15,* 508–521.

Yates, G. R., Bernd, D. L., Sayles, S. M., Stockmeier, C. A., Burke, G., & Merti, G. E. (2005). Building and sustaining a systemwide culture of safety. *Joint Commission Journal on Quality and Patient Safety, 31*(12), 684–690.

Zohar, D. (2002). Modifying supervisory practices to improve subunit safety: A leadership-based intervention model. *Journal of Applied Psychology, 87*(1), 156–164.

Zohar, D., Livne, Y., Tenne-Gazit, O., Admi, H., & Donchin, Y. (2007). Healthcare climate: A framework for measuring and improving patient safety. *Critical Care Medicine, 35*(5), 1312–1317.