Registered Nurses' Perceptions of Patient Safety Culture: The Influence of Nursing Unit Leadership

by

Deleise S. Wilson

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Nursing)
in The University of Michigan
2011

Doctoral Committee

Professor Richard W. Redman, Co-Chair
Assistant Professor Akke Neeltje Talsma, Co-Chair
Professor Kathleen M. Sutcliffe
Clinical Assistant Professor Michelle L. Aebersold

Dedication

To

My parents,

Len and Daphne Cole

and

My family

Colwick Mervyn, Chidinma Malise, and Corliss Marissa Wilson

Acknowledgements

This dissertation was a journey. Along the way I gathered incredible knowledge and scientific skills that laid the foundation to answer many questions about the important work of nurses in the provision of quality and compassionate care for the sick in the healthcare organizations. I could not have made this journey without the support of family, friends, peers, and professors. Mentioned below are those who worked tirelessly to support me through along this journey.

Richard Redman, PhD, RN

In so many ways, this journey was made possible by your insightful and perceptive attention to the aspirations of your students. More importantly, it is your wisdom in providing guidance, mentorship, challenges, and support that guaranteed my timely completion of all of the requirements for this doctoral program. Your comprehensive leadership of all aspects of my dissertation has certainly enriched and refined its contribution to the scientific community. Your expertise as an advisor is truly a model of succession planning for growing the next generation of nurse scientists. You have set a solid base for my development as a nurse scientist and I am forever indebted to you for all of my future successes. It is uncontested that you accomplished your goal to attend to my academic growth. However, you went beyond this and demonstrated constant concern for the well-being of my family. To my kids and Colwick, your name is forever etched and positively associated with their memories of my accomplishment. We thank you for facilitating me as I grew under your direct supervision. You are the advisor every student deserves. Thank you ever so much!

Akke Neeltje Talsma, PhD, RN

Thank you ever so much for being my guide from the day I walked in the door. You are like a mentor on steroids. You not only drove me from deadline to deadline, which proved to be the secret of success, but you were a healing balm to my inflamed, downtrodden spirits many times. Your expertise on staffing and patient safety was invaluable. Thanks for your patience with my "daily 9:15 a.m. calls." After each call I felt energized and reassured that I would accomplish my goals. Without the daily dose of the AkkeNeeloids "how's it going!" and "you are ahead of the game," I would have been totally lost. I am extremely grateful for your extensive support.

Kathleen Sutcliffe

Your mentorship and expertise about the safety culture behaviors is greatly appreciated. You were very critical in helping me create a precise theoretical underpinning for the behavior of frontline nursing leaders. This scholarship is very much needed in nursing and you helped me to make that contribution. I cannot measure in words my admiration for your model of interdisciplinary collaboration and success. I am therefore inspired to an academic career that will forge partnerships across relevant disciplines. As such, you have influenced me for life. Thank you ever so much.

Michelle Aebersold, PhD, RN

You were a wonderful combination of peer mentor and advisor. You were never too busy to listen to my neophyte ideas which you tactfully refined. Your suggestion about choosing charge nurses as my study population was tantamount to finding gold. My appreciation for your wisdom and support knows no end.

My family

My parents, Leonard and Daphne Cole, are the initial and constant sources of motivation for this journey. Their aspiration, love, and confidence were woven together with determination, perseverance, and discipline to form the lifeline that stretched from the beginning to the finishing line. I held on to that cord of strength even when I could not see during the long dark days and nights.

Lissie was always encouraging me with maxims that belied her tender years. She would leave notes for me with such words like, “never give up,” and “you can do this.” Lissie, there was no pressure when you wrote in your essays that your mommy had a PhD in nursing. I just had to make sure I did it at some point. Chidi, how can I forget when you told me that I have gone too far to turn back, so I might as well just finish. You were very understanding and mature in giving up so much for me. You demonstrated so much understanding, and it will only serve you well in the future. Colwick, you are the quintessential husband. You remained my friend and constant support. You became my advisor, intellectual sounding board, and consultant. You facilitated a chance of a lifetime. My gratitude has no bounds.

To each and every one of my eight siblings, their spouses, my nieces, and nephews, this is also for you! Heather, thank you for the daily support and encouragement. You really helped me to keep moving towards and across the finishing line. Your continual expressions of confidence did not go unnoticed. I drew on your unique strengths to keep going in spite of all the challenges. Together, you all have given me so much laughter, hugs, love, and happiness that this journey seemed like it was part

of who we are as a family, and not an undertaking to complete so that we can be a family again. There is no greater peace than knowing your family is with you all the way.

Table of Contents

Dedication ii

Acknowledgements iii

List of Figures x

List of Tables xi

List of Appendices xiii

Abstract xiv

Chapter

I. Introduction 1

Statement of the Problem 4

Research Questions 4

Theoretical Framework 5

Significance 8

Organization of the Dissertation 8

References 10

II. Perceptions of Patient Safety Culture: Comparisons between Charge and Non-charge Nurses 12

Background 13

Theoretical Framework 22

Research Question and Hypotheses 28

Method 29

Measures 30

Data Analysis 35

Results 36

Hypothesis Testing 45

Discussion 55

Conclusion 61

References 64

III. The Association of Collective Safety Organizing Behaviors with Perceptions of Patient Safety Cultures 71

Background 72

Theoretical Framework 82

Research Question and Hypotheses 86

Method 86

Measures 87

Data Analysis 92

Results 93

Hypothesis Testing 94

Discussion 103

Conclusion 109

References 111

IV. The Association of Unit Leadership with Perceptions of Patient Safety Culture: The Impact of Charge Nurse Mix 120

Background 121

Theoretical Framework 129

Research Questions and Hypotheses 133

Method 133
Measures 135
Data Analysis 138
Results 139
Hypothesis Testing 142
Discussion 154
Conclusion 160
References 162
V. Summary, Conclusions and Recommendations 170
Summary 171
Limitations 176
Recommendations 177
Conclusion 179
References 181
Appendices 182

List of Figures

Figure 1.1. Role of the Charge Nurse (RCN) Model 7

Figure 2.1. Partial RCN model: Individual Context in Relation to Perceptions of Patient Safety 27

Figure 3.1. Partial RCN model: Collective Context in Relation to Perceptions of Patient Safety 85

Figure 4.1. Role of the Charge Nurse (RCN) Model 132

Figure 5.1. Role of the Charge Nurse (RCN) Model *(Revised)* 175

List of Tables

Table 2.1. Sample Characteristics 38

Table 2.2. Charge Nurse Characteristics 39

Table 2.3. RS-14 Total and Subscale Scores 40

Table 2.4. Inter-Correlations between RS-14 Subscales 40

Table 2.5. AHRQ Perception of Patient Safety Culture Continuous Variables Total and Subscales 41

Table 2.6. Inter-Correlations between AHRQ Subscales 42

Table 2.7. AHRQ Categorical Variables Frequency and Percent 43

Table 2.8. Chi-Square for Shift Normally Worked and Charge Nurse Experience 45

Table 2.9. Correlations between Resilience and AHRQ Perceptions of Patient Safety Culture Dimensions 47

Table 2.10. T-Tests for Charge Nurse Experience and AHRQ Perception of Patient Safety Culture 48

Table 2.11. Chi-Square for Charge Nurse Experience and Number of Events Reported in the Past 12 Months 49

Table 2.12. T-Tests for Charge Nurse Experience and AHRQ Perception of Patient Safety Culture 50

Table 2.13. ANOVA for Percentage of Shifts in Charge During the Past Month and AHRQ Perception of Patient Safety Culture 51

Table 2.14. ANOVA for Number of Years as Charge Nurse and AHRQ Perception of Patient Safety Culture 53

Table 2.15. ANOVA for Shifts Normally Worked and AHRQ Perception of Patient Safety Culture 54

Table 2.16. Summary of Hypotheses Tests Results 54

Table 3.1. Similarities between Electrical Power Plant Operators and Charge Nurses 79

Table 3.2. Aggregation Tests for Unit-Level Survey Variables 89

Table 3.3. SOS Item Mean, Standard Deviation and Reliability Scores 95

Table 3.4. Inter-item Correlations between SOS items 96

Table 3.5. Correlations between SOS and Perceptions of Patient Safety Culture 97

Table 3.6. Standardized Regression Coefficients for Nurse Characteristics, Individual Context, Units, Safety Organizing Behavior and Perceptions of Patient Safety Culture 101

Table 4.1. Calculation of Unit Charge Nurse (CN) Mix..... 136

Table 4.2. Categorization of Units Using Charge Nurse (CN) Mix Index 136

Table 4.3. Chi-Square for Charge Nurse Mix and Length of Time as RN 139

Table 4.4. Chi-Square for Charge Nurse Mix and Education..... 140

Table 4.5. Chi-Square for Charge Nurse Mix and Shift Worked 140

Table 4.6. Chi-Square for Charge Nurse Mix and Length of Time as Charge Nurse 140

Table 4.7. Chi-Square for Charge Nurse Mix and Percentage of Shifts in Charge Within the Last Month 141

Table 4.8. Chi-Square for Charge Nurse Mix and Unit Level Shadow-Charge Orientation 142

Table 4.9. Correlations for Predictor and Perceptions of Patient Safety Culture Variables 143

Table 4.10. Standardized Regression Coefficients, *F* Statistic and R^2 for Safety Behavior and Perception of Safety Dimensions 145

Table 4.11. Standardized Regression Coefficients, *F* Statistic and R^2 for Low Charge Nurse Mix and Perception of Safety Dimensions..... 148

Table 4.12. Standardized Regression Coefficients, *F* Statistic and R^2 for Charge Nurse Mix and Safety Behavior Interaction with Perceptions of Patient Safety Outcomes 151

Table 4.13. Summary of Tests Results for Hypotheses 1 and 2 153

List of Appendices

Appendix A – Initial Study Approval 182

Appendix B – Charge Nurse Study Questionnaire 184

Sections A-G. AHRQ Perceptions of Safety Culture Scale 184

Section H. Safety Organizing Scale 187

Section I. Waginald-Young Resilience Scale (RS-14) 188

Appendix C – Letter of Support 191

Appendix D – Consent for Research Study 192

Abstract

Registered Nurses' Perceptions of Patient Safety Culture:
The Influence of Nursing Unit Leadership

by

Deleise S. Wilson

Co-Chairs: Richard W. Redman and Akke Neeltje Talsma

Healthcare leaders often report more positive perceptions of patient safety culture than other employees within organizational structures. However, charge nurses have not been differentiated from staff nurses as unit leaders in their perceptions of patient safety culture. This study compared the perceptions of patient safety culture between nurses with some and no charge nurse experience and the influence of nursing unit leadership (ratio of nurses with more than five years of charge experience to the total number of nurses within the units).

A cross-sectional design was used in this study. The key independent variables were resilience, charge nurse experience, shift worked, collective safety behaviors, and unit leadership. The measures used in this study were the Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture, Safety Organizing Scale, and Wagnild-Young Resilience-14 scale. Institutional review board approval was obtained prior to data collection from a convenience sample of 381 nurses from eleven adult medical-surgical units in an acute care hospital in Southeast Michigan.

The findings indicated that nurses with no charge experience were more positive about overall perception of safety compared to nurses with some charge experience [t (374) = 2.86, p = .005]. While controlling for key confounding variables, compared to units with greater percentage of charge nurses, the units with lesser percentage of charge nurses were less positive about manager actions promoting safety (B = -.21, p < .001), feedback about errors (B = -.13, p < .01), and staffing (B = -.14, p < .05). There was no interaction effect between the charge nurse characteristics and unit leadership in relation to perceptions of patient safety culture.

This study is an important departure from other empirical findings. Charge nurses-frontline unit leaders, are less positive than staff nurses about perceptions of safety culture. Charge nurses are usually more experienced clinically and have a broader perspective about patient safety. Therefore, charge nurses may be more accurate than staff nurses in their assessment of patient safety culture. Future studies should include larger sample sizes in multiple healthcare organizations and utilize a refined measure to capture charge nurse expertise.

Chapter I

Introduction

A number of research reports demonstrate significant relationships between nurse staffing and patient outcomes (Aiken, Clarke, Sloane, Sochalski, & Silber, 2002; Needleman, Buerhaus, Mattke, Stewart, & Zelevinsky, 2002; Page, 2004; Seago, Ash, Spetz, Coffman, & Grumbach, 2001). Specifically, the evidence shows that patients are dying in hospitals from preventable incidents, some of which are sensitive to nursing-related measures. The Institute of Medicine (IOM) report, *Keeping Patients Safe: Transforming the Work Environment of Nurses*, was commissioned to address the increased incidences of errors in the nurse environment (Page, 2004). The report recommended that healthcare organizations (HCO) embrace strategies that are aimed at comprehensive safety reform, such as improving the culture of how patient care is provided (Page, 2004). In this vein, the IOM report strongly suggests that an emphasis on the creation of safety cultures within healthcare organizations should include the development of transformational leadership for nurse managers and nurse executives (Hinshaw, 2008; Page, 2004). More recently, another IOM report, *The Future of Nursing: Leading Change, Advancing Health*, also emphasized the importance of transforming nursing leadership. This report focused on development of leadership competency across the spectrum of nursing duties from bedside to boardroom (Institute of Medicine, 2011). Because the emphasis on nursing leadership has been on the upper echelons of nursing management, charge nurses, a pivotal subset in the management of nursing staff and units, have been omitted from these IOM reports and ensuing discussions. These

omissions overlook the fact that charge nurses are often central to the delivery of patient care at the unit level, and they are expected to play a significant leadership role within this setting. With greater than 60% of the nursing workforce in practice at the bedside, there are many opportunities for the creation of innovative leadership models for charge nurses.

The lack of attention to the role of charge nurses in the IOM reports is not surprising given that the empirical literature is bereft of information on the contribution of the charge nurse to nurse staffing and patient outcomes. To date, there is no known empirical study about the role of charge nurses in relation to perceptions of patient safety culture. Therefore, this dissertation seeks to understand charge nurses' perceptions of patient safety culture as well as the influence of the charge role on perceptions of safety culture within nursing units. In this study, charge nurses are defined as frontline unit leaders who make shift-by-shift decisions about staffing, personnel, and unexpected events that impact patient care.

Charge nurses function at the juxtaposition of management and practice to provide quality care to patients (Miner-Williams, Connelly, & Yoder, 2000). It is well established that charge nurses are widely used in the management role within healthcare organizations (Mahlmeister, 2006). However, the National Labor Relations Board (NLRB) does not recognize charge nurses as managers because making nursing assignments is not considered an exercise of independent judgment (Mahlmeister, 2006). There have been many interpretations of the NLRB's ruling because there are multiple variations in the leadership role and responsibilities of charge nurses across units and organizations. Indeed, the description of the role of a charge nurse tends to fluctuate

based on the structure and needs of the healthcare organization (Connelly, Yoder, & Miner-Williams, 2003). Charge nurse duties may include supervision of nurses involved in direct care, evaluation of staff, ordering supplies, bed management, or patient assignment (Sattarian et al., 2008). In many instances the leadership role may be provided in conjunction with direct patient care.

The charge nurse role is often the first exposure staff nurses have to a position of leadership. However, preparation for the charge nurse role is highly variable. Training has traditionally been organizationally sponsored and typically involves a didactic session about hospital policies plus an experiential component that may only involve shadowing a charge nurse for a few shifts. Charge nurse classes are not standardized, and shadow experiences are heavily influenced by the attitudes and competency of the charge nurse preceptor. Many methods of charge nurse orientation serve the objective of preparing the charge nurse to ensure twenty-four hour unit coverage rather than emphasizing training for the unit leadership skills required of the role.

In addition to underscoring the leadership potential of charge nurses in reference to patient safety culture, the charge nurse role deserves special recognition because charge nurses lead at the unit level where many patient care errors occur. Despite the fact that most of the errors in hospitals occur during routine care in patient care units, the majority of studies about nurse staffing and patient outcomes are conducted only at the hospital level (Blegen, 2006). Moreover, many of the research measures about healthcare providers' performance and outcomes tend only to capture the effects of the organizational culture or structure at either the macro or the micro level, although the observed phenomenon may also be occurring at the meso level (Kane, 2006). The

relatively few studies of unit-level outcomes are inconsistent and at times run counter to the findings from hospital-level research (Blegen, 2006; Talsma, Bahl, & Campbell, 2008). Overall, it remains unclear how unit structure and implementation of the charge nurse role influences perception of patient safety culture. Thus the field stands to benefit from more targeted unit-level research.

Statement of the Problem

One area that has not been addressed in the literature is the charge nurses' specific role in the daily management of units and their influence on perceptions of patient safety cultures. As suggested earlier, the role of charge nurses in the management of nursing units is often unrecognized and underestimated. The charge nurse's role in safely staffing patient care units is critical in detecting, reducing, and preventing errors in patient care. Charge nurses are in opportune positions to influence the nature of hospital cultures and safe practice environment. Yet no study has been identified that examines the role and structure of charge nurses in relation to perceptions of patient safety. This dissertation examined the relationships among contextual and structural organizational factors of the charge nurse role and the perception of safety within nursing units. The purpose of this study was to examine the relationship of the charge nurse role and unit structure on the perception of patient safety culture of acute care units.

Research Questions

This research addressed the three following questions:

Q1. Are select contextual factors of charge nurses' role associated with perception of patient safety culture?

Q2. Are select nursing unit structural factors of the charge nurses' role associated with perception of patient safety culture?

Q3. Are the effects of selected contextual factors of the charge nurses' role moderated by identified structural factors in relationship to perception of patient safety culture?

Theoretical Framework

Lawrence and Lorsch's Structural Contingency Theory posits that environment shapes the structures of an organization (Scott, 2003). Differentiation of sub-units within an organization is based on the environmental needs, and organizational effectiveness depends on the ability of the organization to cope with its environment and integration of its sub-units. Organizations that are successful maintain a balance between the adaptation of the sub-units and their integration into the whole organization. Organizations' interaction with the environment is affected by the features of its sub-units (Scott, 2003).

The environmental factors upon which the structure of the organization is contingent were originally listed as *tasks* and *technology* by Lawrence and Lorsch (Scott, 2003). Environmental factors can include organizational size, geographical location, cultural differences, individual predispositions of participants, and uncertainty. The structures of organizations refer to formal units designed for specific tasks (Scott, 2003). Examples of such units in a plastics manufacturing company are the production and research and development departments. In healthcare organizations, examples of such structures include diagnostic departments, clinics, and nursing units.

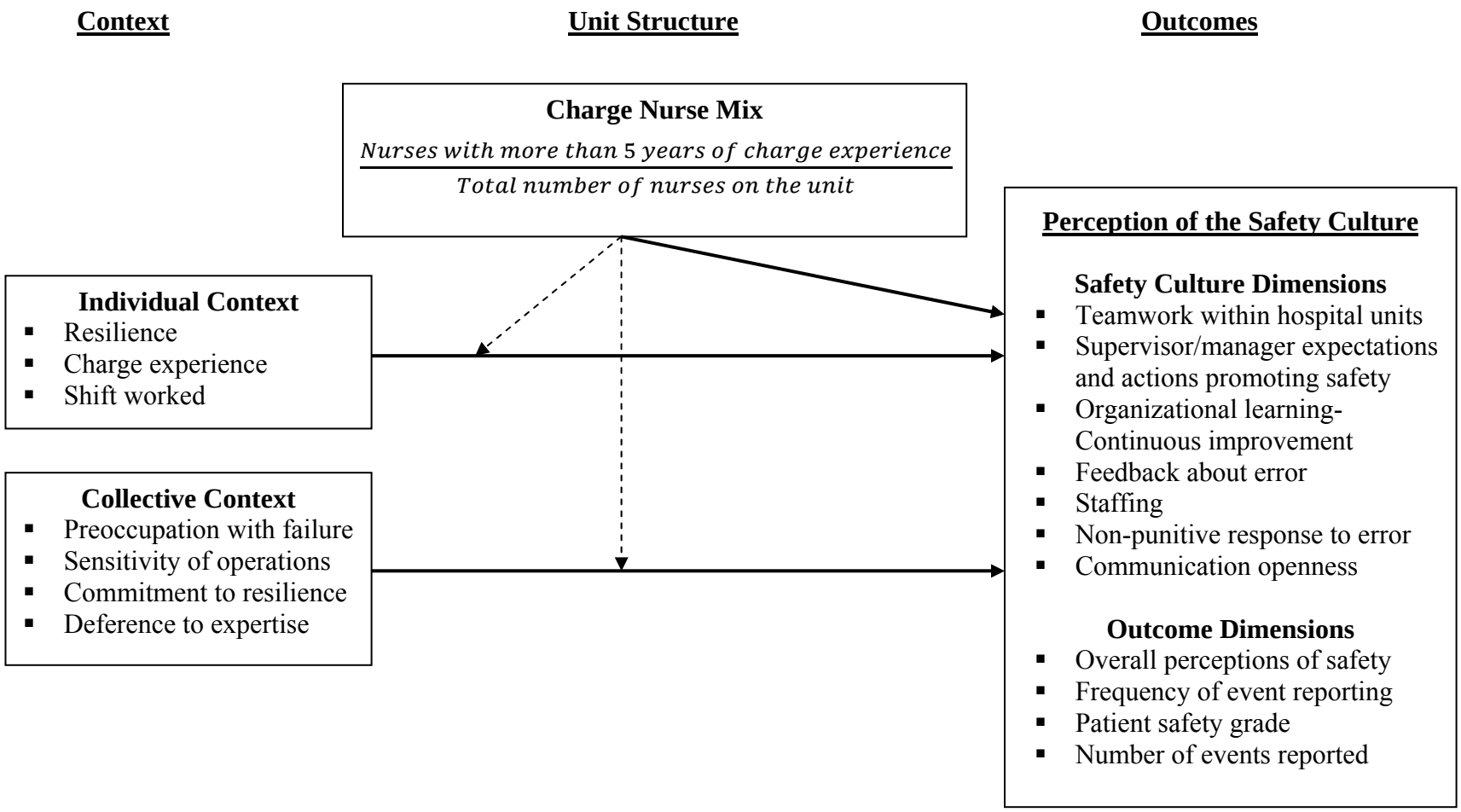
This study is guided by Galbraith's modified version of the Structural Contingency Theory (Scott, 2003). Galbraith posits the following: 1) there is no one best

way to organize; 2) any way of organizing is not equally effective; and 3) the best way to organize depends on the nature of the environment in which the organization functions. In Galbraith's adaptation, the environment is characterized by its degree of complexity and uncertainty. Galbraith's contribution acknowledges that a variety of organizational tasks and structures may have an influence on performance. In essence, an environment that is uncertain presents different challenges than one that is calm. Organizational success depends on the ability to match the structural features with the specific environment context with which it relates (Scott, 2003).

Mark, Slayer, and Smith (1996) critiqued that most of the nursing and health services research examine outcomes with either structural characteristics or organizational context. For example, nursing research on patient and administrative outcomes examines only the relationships among structural characteristics and outcomes without the organization's context while health services research examines only the organization's context and outcomes without the structural characteristics. Mark and colleagues (1996) concluded that in order for healthcare systems to make effective changes in patient outcomes, the structural characteristics and organizational context must be examined together. Studies conducted using only single constructs have yielded results with insufficient evidence of the effect of organizational factors on patient safety.

In this dissertation, the *Role of the Charge Nurse* (*RCN*) model was developed to simultaneously include charge nurse context and the structure of the charge nurse role in the examination of patient safety outcomes (see Figure 1.1).

Figure 1.1. Role of the Charge Nurse (RCN) Model



Theoretical Framework: Adapted from the Modified Version of the Structural Contingency Theory (Mark, Salyer & Smith, 1996)

The *RCN* model illustrates relationships among the charge nurse context *i.e.*, (charge nurse characteristics), organizational structure *i.e.,* (the unit structure of the charge nurse role), and selected safety outcomes *i.e.,* (perception of the safety culture).

Significance

Clarity of charge nurses' perceptions about patient safety is needed to better understand and support the role of charge nurses in the cultivation of reliable practice environments. The findings from this study will provide a better understanding of the contextual and structural factors associated with the role of charge nurses and contribute to the small but growing body of literature on the impact of the practice environment on the responsibilities and roles of charge nurses. With greater than 60% of nurses working in the acute care setting, the majority of these nurses are very likely to have some charge nurse experience within two years of job entry. This study may contribute to the evidence-base that can be used in the development of specialized interventions to prepare staff nurses for the charge nurse role – thus heeding to the repeated and urgent calls for evidenced base improvements for nursing management. Overall, this study will help to inform and enhance the development of patient safety cultures by explicating the role of charge nurses in quality of care.

Organization of the Dissertation

This dissertation is divided into five chapters. The chapters include the introduction, three empirical papers, and a conclusion. The current chapter, the introduction, provides a brief background, statement of the problem, theoretical framework, research questions, and significance of the study. Chapter 2 is the first paper, which addresses the relationship among the nurses' resilience, charge nurse experience,

shift worked, and perceptions of patient safety culture for work area. Chapter 3 is the second paper, which addresses the findings about the relationship between the collective context and perceptions of safety culture for the work area. Chapter 4 presents the third paper which examined research question two, the relationship between the structural characteristics of the charge nurse role and perceptions of safety. It also examined the moderating effects of the structural characteristics of the charge nurse role on the contextual features of the role in relation to perceptions of safety culture of work area. Chapter 5 presents the conclusion and recommendations for future research.

References

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. *The Journal of the American Medical Association*, *288*(16), 1987-1993.

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

Connelly, L.M., Yoder, L. H., & Miner-Williams, D. (2003). A qualitative study of charge nurse competencies. *Medical Surgical Nursing*, *12*(5), 298-305.

Hinshaw, A. S. (2008). Navigating the perfect storm: Balancing a culture of safety with workforce challenges. *Nursing Research,* 57(1), 4-10.

Kane, R. L. (Ed.). (2006). *Understanding health care outcomes research* (2nd ed.). Sudbury, MA: Jones and Bartlett Publishers.

Mahlmeister, L. R. (2006). Best practices in perinatal nursing: Professional role development for charge nurses. *Legal Issues and Risk Management,* April-June, 122-124.

Mark, B. A., Slayer, J., & Smith, C. S. (1996). A theoretical model for nursing systems outcomes research. *Nursing Administration Quarterly, 20*(4), 12-27.

Miner-Williams, D., Connelly, L.M., & Yoder, L. H. (2000). Taking Charge. *Nursing*, *30*(3), Retrieved from http://www. Springnet.com.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002). Nurse-staffing levels and the quality of care in hospitals. *The New England Journal of Medicine, 346*(22), 1715-1722.

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

Sattarian, M., Shesser, R., Sikka, N., Salazar, L., Jacobs, B., & Howard, R. (2008). Variability among emergency charge nurses in the efficiency of patient bed assignment [Abstract]. *Annals of Emergency Medicine, 52*(4), 132.

Schulman, P. R. (2004). General attributes of safe organizations. *Quality and Safety in Health Care, 13*(Suppl. 2), 39-44.

Scott, W. R. (2003). *Organizations: Rational, natural and open systems*. New Jersey: Prentice Hall.

Seago, J. A., Ash, M., Spetz, J., Coffman, J., & Grumbach, K. (2001). Hospital registered nurse shortage: Environmental, patient and institutional predictors. *Health Services Research, 36*(5), 831-852.

Tachibana, A., & Nelson-Peterson, D. L. (2007). Implementing the clinical nurse leader role using the Virginia Mason Production system. *Journal of Nursing Association, 37*(11), 477-479.

Talsma, A., Bahl, V., & Campbell, D. (2008). Exploratory analyses of the "failure to rescue" measure - evaluation through medical record review. *Journal of Nursing Care Quality, 23*(3), 202-210.

Chapter II

Perceptions of Patient Safety Culture: Comparisons between Charge and Non-charge Nurses

Perceptions of safety culture have been consistently linked to the status of the worker within and across organization structures in multiple settings (Singer et al., 2003; Sorra, Famolaro, Dyer, Nelson, & Khanna, 2008). Notably, leaders are often associated with having more positive perceptions of the safety culture than frontline workers (Huang et al., 2007; Sexton et al., 2006; Singer et al., 2007). Within the healthcare delivery system, managers and physicians generally report higher levels of positive perceptions of safety as compared to nurses (Singer et al., 2007; Singer et al., 2009). However, nurses are not a monolithic group of healthcare workers and, as such, have varying levels of leadership within healthcare settings. Nurse leadership roles include vice presidents, directors, managers, supervisors, and charge nurses. Specifically, charge nurses function as shift-by-shift frontline unit leaders as compared to vice presidents who serve at the organizational level. Most studies about perceptions of patient safety culture have not differentiated across the different status or leadership roles of nurses. Therefore, little is known about the extent to which perceptions of patient safety culture vary by the role of the nurse within a nursing unit.

The purpose of this paper was to compare the perceptions of nursing units' safety culture between charge nurses and staff nurses. For this study, the charge nurse is defined as a frontline unit leader who makes shift-by-shift decisions about staffing, personnel,

and unexpected events that impact patient care. In contrast, the staff nurse is defined as a direct patient care provider who has never had charge nurse experience.

Background

Role of Charge Nurses

The terms used in the literature to define unit-level nursing leadership roles are varied. Nursing unit leaders are alternately described as head nurse, assistant nurse manager, supervisor, charge nurse, and team leader (Kennedy, 2008). The job descriptions are also varied. For example, the charge nurse role is discussed in the context of responding to patient and family needs (Costello-Nickitas, 1997); decision-making (Connelly, Yoder, & Miner-Williams, 2003); budgeting (Doherty, 2003); and as a general assistant to nurse managers (Krugman & Smith, 2003). Charge nurses can be part-time, permanent, or "relief" in the absence of a designated charge person (Ambrose, 1995; Krugman & Smith, 2003). They are often the anchor for code teams that respond to unit and hospital wide emergencies (Mahlmeister, 2006). In many instances, the leadership role of charge nurse is provided in conjunction with direct patient care. Typically, a nurse who is in the leadership position for the unit performs multiple duties (Malcom & Stewart, 2008).

A staff nurse typically becomes a charge nurse after the completion of at least one year on the unit. Charge nurses are usually the most senior persons on the unit, and they tend to be the most clinically experienced and are most likely to be certified in the unit's specialty (Connelly et al., 2003). However, the most experienced nurses do not necessarily desire to be in charge. Nurses may opt out of charge nurse duties, and they are often reluctant to even apply for the position for fear of not being successful in the role

(Deppoliti, 2008). Nurses may also have a preference to develop specialized clinical skills (Kennedy, 2008). The staff nurse who is an expert clinician is not necessarily better at leading the unit (Cartier, 1995), and it is common for the charge nurse to have the least amount of leadership ability (Connelly et al., 2003; Kennedy, 2008).

The lack of preparation of nurses for charge nurse duties is widely recognized (Grossman, 2007; Sherman, 2005). Traditional charge nurse training programs are usually tailored to meet organizational needs. For example, after a qualitative assessment of charge nurse competencies needed at the University of Colorado Hospital, Krugman and Smith (2003) developed a charge nurse training program for the organization. Kennedy (2008) observed that the importance of preparing charge nurses for their role may have been subsumed by the restructuring of healthcare management during the last decade that broaden the scope of nurse managers as part of cost cutting strategies. Charge nurses have less educational preparation compared to preparation for other leadership roles in nursing (Ambrose, 1995; Connelly et al., 2003; Fulks & Thompson, 2008). To date, there is no known certification for the charge nurse role. Some formal charge nurse preparation may involve only a one day seminar (Arzoomanian & Keys, 2008). Typically, a nurse may not know she is in charge until a short time before a shift starts (Costello-Nickitas, 1997). Overall, the emphasis for charge nurse competence is largely based on unit-based experience, seniority, education level, and/or clinical competence with much less attention, if any, given to preparedness to lead in a healthcare environment.

Connelly and Yoder (2003) examined many personal, interpersonal, and organizational facilitators and barriers to the effective functioning of charge nurses. In

the personal and interpersonal domains, charge nurses confronted relationship challenges in commanding respect from nurse managers, staff nurses, aides, and physicians. At the organizational level, charge nurses needed an awareness of the larger organizational issues when making their decisions about staffing, policies, and procedures (Connelly et al., 2003). It has been observed that some charge nurses appeared to function effectively given these barriers while others expressed disdain for the role (Connelly et al., 2003).

Miner-Williams, Connelly, and Yoder (2000) stated that the change in patient acuity and length of stay in hospitals has increased the importance of the role of charge nurses in acute care settings. One of the major functions of charge nurses that gained more significance since the publication of the IOM reports on patient safety is the daily balance of available nursing staff with intra-shift changes in patients' acuity and needs. Kane, Shamliyan, Mueller, Duval, and Wilt (2007) noted that the patient-acuity based staffing formulas focus on patient morbidities but did not include the effects of the actual shift-to-shift fluctuations in registered nurses' availability. Charge nurses are particularly essential for balancing the daily staffing of a patient care unit (Connelly et al., 2003; Wilson et al., 2011). This intra-shift variation is also implicated in the quality of patient outcomes (Ashcraft, 2004; Kalisch, 2006).

The process of staffing a patient care unit is usually done by the use of forecasting formulas that utilize staffing patterns and patient census from a previous year or financial period. The use of forecasting formulas is rooted in a study by Hadley (1978) on the methods of studying nurse staffing. The formulas produce models of nurse-patient ratios that are called hours per patient day (HPPD) and registered nurse mix. Ashcraft (2004) and Kalisch (2006) stated that many patient care needs that were not accounted for in the

pre-shift calculation of a unit's acuity and census might not get addressed due to inadequate management from charge nurses and or unit managers. This adjustment of pre-calculated HPPD involves balancing admissions, discharges, and transfers; matching patient acuity level with properly skilled nurses; accommodating changes in patient's contagious disease status; and ensuring timeliness with all planned and emergent procedures. The juggling of organizational and patient factors is required to provide quality patient care and is usually assigned to the nurse in charge of the shift. Balancing available competent nurses with demands of patient care is an important part of the description of the charge nurse role.

To better understand the role of charge nurses in staffing, a recent qualitative study was conducted with nurses from several acute medical-surgical patient units. The purpose of the study, "Mindfulness: A Qualitative Description of the Behaviors Charge Nurses Enact to Safely Staff Patient Care Units" was to describe the behaviors of charge nurses who were effective in making intra-shift decisions to safely staff nursing units (Wilson, Talsma, & Martyn, 2011). Twenty four nurses (7 managers, 11 charge nurses, and 6 staff nurses) participated in the study. Several important findings emerged.

First, the study validated that a main responsibility of charge nurses is the intra-shift balancing of available nurse staffing and skills with needs of patients. The Joint Commission on Accreditation of Healthcare Organizations (JCAHO) guidelines for charge nurses state that charge nurses are responsible for tasks and patients that are assigned to nurses (2002). Charge nurses in the study reported spending 50-95% of their shift making staffing decisions that affect patient outcomes (Wilson et al., 2011). The charge nurses were confronted with issues such as staff sick calls, variations in staff

nurses' level of experience, fluctuations in patient acuity or census, need for specialty beds, and patient room assignments. Those decisions were usually made to enhance the monitoring of patients or relieve the nurses' workload in administering care.

Second, the study revealed the charge nurse is the "go-to person" of the unit. As such, she/he is the most visible and accessible leader. She or he is the resource person for patients, family, staff nurses, nurse managers, physicians, and other members of the multidisciplinary team. As go-to persons, charge nurses act as the frontline of the leadership team and help to cultivate and sustain the culture of safety on nursing care units. Mahlmeister (2006) describes the charge as being the first in the chain of command for unit issues about patient safety. Their behaviors impact how effectively potential mistakes are caught and catastrophes are effectively averted. Such characteristics of frontline workers are fundamental features of any safety culture (Weick & Sutcliffe, 2001).

Third, the charge nurses who were effective in staffing a unit demonstrated flexibility or resilience. Resilience is defined as the capability of a human to recover rapidly from emotional shock (Merriam-Webster's Collegiate Dictionary, 2003). Flexibility, a synonym for resilience, was identified as one of the dominant behaviors of the effective charge nurse. Similarly, resilience has been identified as the single most important characteristic of high reliability professionals (Schulman, 2004). In high reliability theory, commitment to resilience is conceptualized as the development of capabilities to detect, contain, and bounce back from errors that have already occurred before they worsen and cause more harm (Vogus & Sutcliffe, 2007a; Weick et al., 2001). The study revealed that when charge nurses are resilient, they could quickly make

adjustments to imbalances in staffing and changes in patients' acuity or census. Charge nurses who are resilient are better able to plan for unexpected admissions and discharges. They were also able to readily make changes to staff assignments, adjust to intra-shift changes and were constantly looking at the factors that could have negatively affected the nurse-patient ratio and skill mix. Moreover, charge nurses who are resilient were more effective in reducing chaos on the patient units (Wilson et al., 2011).

Lastly, the behaviors of the charge nurse tended to influence the "tone" of the shift. Charge nurses who were generally calmer in the face of difficult situations set a positive tone for the unit. The charge nurse's ability to manage unexpected events and large demands from staff dictated the level of calmness during the shift. The ability of the charge nurse to be resilient and remain calm is even more critical if she or he is the first line of administration for reporting adverse events.

In their study of charge nurses, Connelly et al. (2003) reported that during episodes of sudden changes in the patients' conditions or difficulty with workload, staff nurses seek out the charge nurses for resolution of problems. Staff nurses in the qualitative study reported that they were less likely to share information about patient difficulties if the charge nurses were judgmental, unapproachable, and disinterested in what was happening on the unit.

Frequency of event reporting is a critical aspect of any safety culture (Edmondson, 1996, 1999). The charge nurse is usually the first management member made aware of any potential for errors or occurrence of mistakes (Connelly et al., 2003; Wilson et al., 2011). Vogus and colleagues (2007b) found that trust in leadership made unit-level employees feel safe to report errors and close calls. If the charge nurse was

perceived by the staff nurses to be fair and supportive, there was more cooperation and solidarity. Trust was especially crucial for newer staff nurses who felt that charge nurses were the most accessible members of the management team (Wilson et al., 2011).

In summary, there is a paucity of empirical information about the role of charge nurse leadership in relation to patient safety culture. Charge nurses are very critical for the shift-by-shift management of the patient care unit. They balance the complexities of the flow of patients and assignment of staff nurses to provide safe care. Their decisions impact the work environment, and therefore, it is important that their role in promoting the culture of patient safety is clearly understood.

Perceptions of Patient Safety Culture

Perception of patient safety cultures is fundamental in the process of improving patient care. The presence of many disciplines in healthcare organizations has necessitated the inclusion of the viewpoints of all workers, from managers to technicians. The perceptions of patient safety culture within organizations have also spanned many components of the delivery of care including job performance, satisfaction, pressure, and threat (Hall & Doran, 2007); event reporting (Kim, An, Kim, & Yoon, 2007); and work environments (Hughes, Chung, & Mark, 2009; Pronovost et al., 2003).

Singer et al. (2003) conducted hospital wide surveys in 15 hospitals on staff attitudes towards patient safety. The study evaluated variations of the safety cultures within organizations across job and clinical status. The study sample was comprised of 65% clinical staff, which included physicians, nurses, pharmacists or other clinical staff. The rest of the sample was made up of 31% non-clinicians and 4% senior executives. Results indicated that there was an aggregate of problematic response to the safety

culture (18%), indicating concerns about patient safety. Patient safety was problematic due to fear of punishment, the burden of work, and loss of experienced personnel. Managers were more positive about the safety culture than non-managers whereas nurses were more likely to give problematic responses. Differences between organizations were seen in response to the willingness of workers to report unsafe behavior and asking for help where it was perceived as a sign of incompetence (Singer et al., 2003).

Sorra and Nieva (2004) studied the perceptions of healthcare workers as an assessment of the safety culture of hospitals and hospital units using the Agency for Healthcare Research and Quality (AHRQ) Hospital Survey on Patient on Patient Safety Culture. The areas of emphasis were patient safety issues, medical errors, and event reporting. The sample included all classes of ancillary hospital workers, clinical and non-clinical staff, technicians, physicians, supervisors, and managers. The survey had a total of 42 items with 12 dimensions. The dimensions were communication openness; feedback and communication about error; frequency of event reporting; handoffs and transitions; management support for patient safety; non-punitive response to error; organizational learning; overall perceptions of patient safety; staffing; supervisor/ manager expectations and actions promoting safety; teamwork across units; and teamwork within units. The Cronbach alphas for the dimensions ranged from .72 to .84 (Sorra & Nieva, 2004).

Among nurses, 48% graded the work unit as very good. Perceptions of patient safety ranged from beliefs that unit patient safety problems exist and patient safety is never sacrificed (57%), serious mistakes are avoided merely by chance (59%), and procedures and systems are good at preventing errors from happening (65%). More than

90% reported that their mistakes are held against them or when an event is written up it feels like the person and not the problem is the focus. Only 43% felt there were positive, non-punitive responses to error. The frequencies of reporting of mistakes were 48% for mistakes that are caught and corrected, 59% for mistakes with no potential to harm the patient, and 76% for mistakes that could cause harm but did not.

Kim et al. (2007) surveyed only nurses on their perceptions of error reporting and patient safety culture. The study used the Korean version of the AHRQ survey (AHRQ-kr). The Cronbach alphas for the six sub-scales ranged from .67 to .84. A total of 960 nurses from eight hospitals completed the survey. The sample of nurses included 84.4% staff nurses, 9.8% charge nurses, and 5.7% head nurses. Their study focused on the frequency of error reporting for near misses and harmless but potentially harmful errors; nurses' perceptions of patient safety culture in their unit and hospital; and association of nurses' perceptions with work experience, position, age, working hours, and type of unit.

The study found that two-thirds of nurses reported mistakes that resulted in patient harm, and 17% reported mistakes with no potential to harm. Half of the nurses knew what type of error to report while only 5% were not afraid to report errors. About 50% of the nurses were afraid to communicate about errors and the majority (66%) felt their suggestions to improve patient safety were ignored. The majority of nurses (83%) strongly agreed or agreed that it was only by chance that more serious errors did not happen on their units. Work experience and work position were significantly associated with perceptions of the patient safety culture. There was a more positive report from nurses who worked on a unit or hospital for more than 10 years. The worst safety culture perceptions were among nurses who worked for 1 to 5 years.

In the study, significant associations were found in the following areas related to nurse characteristics. First, head nurses evaluated the hospital or unit culture more positively than charge or staff nurses. Additionally, the frequency of reporting errors was more likely done by head nurses than staff nurses. Moreover, differences in perceptions about communication openness, cooperation between units, and overall hospital culture were observed across work positions, working hours, and work units. These results demonstrated that nurse characteristics impact perception of the patient safety culture and frequency of event reporting. Although this study included charge nurses, the results presented did not distinguish them as a separate group.

In summary, studies about perceptions of patient safety cultures have primarily examined the variations across hospitals, work areas, job titles, and job status. The comparison of perceptions among nurse leaders has focused on executive leaders, managers, and supervisors. Staff nurses in perception of safety studies were usually compared across work areas, educational levels, age, gender, and length of service. Notwithstanding, differences of perceptions of unit-level patient safety between staff and charge nurses have not been explored.

Theoretical Framework

This study is guided by Galbraith's modified version of the structural contingency theory that posits the following: 1) there is no one best way to organize, 2) any way of organizing is not equally effective, and 3) the best way to organize depends on the nature of the environment in which the organization functions. Within this framework the context and structure of an organization influences its effectiveness. The structure of the charge nurse role has historically relied on the use of the most clinically competent or the

most senior nurse. However, the increased acuity and complexity of patient care challenges the use of nurses who are not properly trained for leadership. Application of the structural contingency theory facilitates the examination of the charge nurse role in the evolving healthcare organizational environment. In this paper, the relationship between the individual context of the charge nurse role and perception of patient safety culture is examined as represented in the model. The individual context of the *Role of the Charge Nurse* (*RCN*) model is operationalized by charge nurse resilience, charge nurse experience, and shift worked. These constructs are described below and illustrated in Figure 2.1.

Charge nurse resilience. One of the findings from the qualitative study about charge nurses' effective behaviors was that effective charge nurses were described as being very flexible, which is a synonym for resilience. When charge nurses are resilient, they can quickly make adjustments to imbalances in available staffing and changes in patient's acuity or census. Resilience has been identified as the single most important characteristic of high reliability professionals (Schulman, 2004). Commitment to resilience means developing capabilities to detect and bounce back from errors (Weick et al., 2001). The goal of high reliability organizing is to prevent errors, but in the event of failure, the system should be committed to resilience (Schulman, 2004; Weick et al., 2001).

Resilience as a construct is mostly found in the social sciences literature. Garmezy (1991) conceptualized resilience as recovery and adaptive behaviors in response to a retreat from a stressful event. Rutter (1987) identified three characteristics of resilience: 1) a sense of self-esteem; 2) belief in one's own self-efficacy; and 3) a skill-set

of social problem-solving strategies. Resilience was defined as, "a personality characteristic that moderates the negative effects of stress and promotes adaptation" (Wagnild et al., 1993, p. 23). The application of the construct ranges from individuals such as adolescents to organizations like high reliability organizations.

Ahern (2006) applied the evolutionary model of concept analysis to conceptualize resilience in adolescents as the product of risk, protection, and interventions. Thus Ahern defined resilience in adolescence as the "process of adaptation to risk that incorporates personal characteristics, family and social support, and communities" (Ahern, 2006, p. 181). More recently, Ahern, Ark, and Byers (2008) examined the inclusion of resilience assessment in pediatric health screening. The study indicated that although it is known that resilience levels vary among adolescents and impact their decisions, pediatric nurses rarely included resilience as part of the adolescent history. The authors concluded that for pediatric nurses to provide appropriate care, they should be knowledgeable about adolescents' health risk behaviors, coping strategies, and levels of resilience.

Wagnild and Young's (1993) qualitative study identified five characteristics of resilience among twenty-four Caucasian women who adjusted to major losses. The characteristics were: 1) equanimity, the ability to balance life's experiences and be realistic about extreme events; 2) perseverance, a willingness to struggle towards one's goals despite adversity; 3) self-reliance, a belief in one's self and abilities; 4) meaningfulness, acceptance that life has value; and 5) existential aloneness, the acknowledgment that some experiences are shared yet some are unique.

Charge nurse characteristics. In this study setting being in charge is not mandatory, and this allowed nurses to self-select into the role. Several nurses in a recent

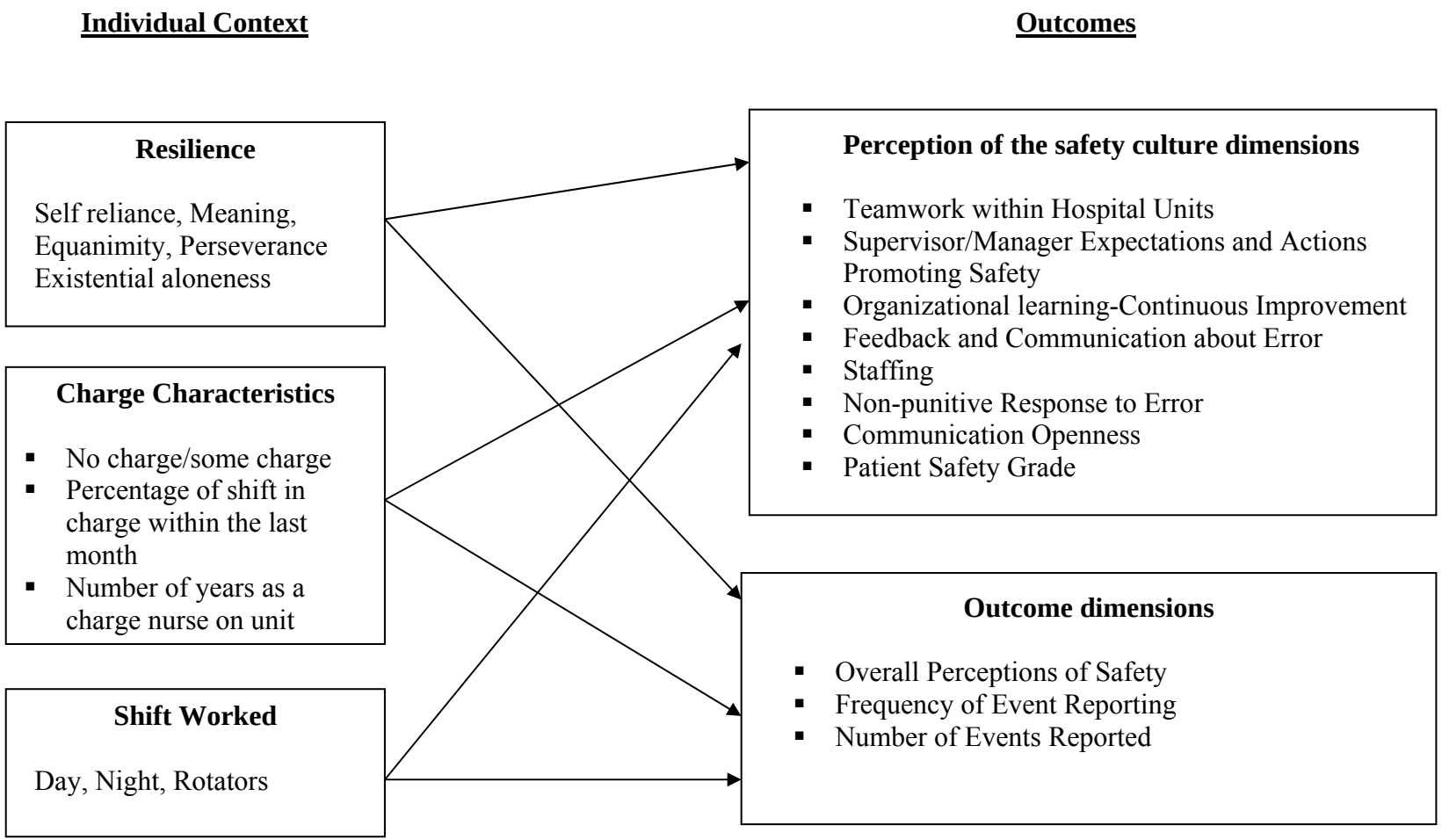
qualitative study reported that they performed better as a charge nurse if they did not have to alternate between being in charge and staffing the unit (Wilson et al., 2011). Charge nurse characteristics were operationalized as some or no charge experience; percentage of charge hours worked performing leadership duties; number of years of charge nurse experience; and shadow-charge orientation.

Shift worked. The 24-hour work cycle adds a layer of difficulty in providing charge nurses for each shift. The position of charge nurse may not be budgeted, shifts tend to be more short staffed, and mostly newer hires work on the night shift (Wilson et al., 2011). The charge nurse position is more likely to be supported for an eight hour day shift (Hughes and Kring, 2005). Charge nurse coverage for each unit is usually more structured for the day shift during the work week than in the evening and weekends (Wilson et al., 2011). Over the last two decades, healthcare has become more complex and the off-shift may require just as many nursing hours (Mark, 2002; Rogers, Hwang, Scott, Aiken &, Dinges, 2004). Therefore, the charge nurses who work the night and weekends tend to also have a patient assignment (Wilson et al., 2011). The off-shift charge nurses reported that they were also the most experienced nurses working on the shift. If they had to choose between being in charge and taking care of patients, they easily gave up the charge pager as the patients were a priority because they felt anyone could answer the phones (Wilson et al., 2011).

Hospital Survey on Patient Safety Culture: Subjective data about the perception of the unit's safety culture were captured using the Agency for Healthcare Research and Quality (AHRQ) scale (see Appendix B). The scale has four outcome dimensions: overall perceptions of safety; frequency of event reporting; safety grade for work area; number of

events reported; and seven unit-level safety culture dimensions: teamwork; supervisor/manager expectations and actions promoting patient safety; organizational learning-continuous improvement; feedback and communication about error; communication openness; staffing; non-punitive response to error.

Figure 2.1. Partial RCN model: Individual Context in Relation to Perceptions of Patient Safety



Theoretical Framework: Adapted from the Modified Version of the Structural Contingency Theory (Mark, Salyer & Smith, 1996)

Research Question and Hypotheses

This paper seeks to test the individual context of the *Role of the Charge Nurse* (*RCN*) model. The following research questions (Q) and hypotheses (H) were generated:

Q1. Are select contextual factors of charge nurses' role associated with perception of patient safety culture?

Q1a: Is the resilience of the nurse associated with perceptions of patient safety culture?

H1a: The higher the resilience of the nurse, the more positive will be the perception of safety.

Q1b: Is charge nurse experience associated with perceptions of patient safety culture?

H1b(i): There will be a difference in perception of safety culture between staff nurses with no charge experience and staff nurses with some charge experience.

H1b(ii): Perceptions of the patient safety culture will be influenced by the percentage of shifts worked as charge nurse during the past month.

H1b(iii): Perception of safety culture will be influenced by the number of years worked as a charge nurse.

Q1c: Is shift worked associated with perceptions of patient safety culture?

H1c: Perceptions of patient safety culture will be influenced by the shift the nurses normally work (i.e., day, night, evening, rotating).

Method

Design

A descriptive correlation design (Brink & Wood, 1998) was used to examine the variables identified in the *Role of the Charge Nurse (RCN)* model. This study was cross sectional in that the subjects enrolled were surveyed at a single time point.

Setting

The nursing units participating in this study were drawn from a large teaching medical center in the Midwest with 30 inpatient units and a total bed capacity of 550 beds. To be eligible, the nursing units needed to have a mixture of nurses with some charge and no charge nurse experience. Intensive care units were excluded because the nurses in those units were generally more experienced and were more likely to have had some previous charge experience. The adult medical-surgical units were chosen because the older patient population in these settings tends to be more susceptible to falls, have multiple diagnoses, report increased length of stay, and use multiple medications (Mahoney, 1998; Perell et al., 2001; Rothschild, Bates, & Leape, 2000; Tzeng, Ketefian, & Redman, 2002). Pediatric units were excluded due to less likelihood of falls (Hughes, 2008), while maternal units were excluded on account of the shortened hospital stay of patients (Liu, Dow & Norton, 2004).

Subjects

A convenience sample of registered nurses (RNs) who were staff and charge nurses was recruited to participate in this study. Although the focus of the study was on the role of the charge nurse, staff nurses were included to triangulate data about the role of charge nurses. The charge nurse sample was comprised of nurses who had been in the

role at least once for either an 8- or 12-hour shift on the eligible units. The staff nurse sample included RNs currently working on the eligible unit with no charge nurse experience. Licensed practical nurses (LPNs) and licensed vocational nurses (LVNs) were excluded.

Prior to data collection, power calculations were conducted to provide an adequate sample size. To detect small to moderate effect size (r =.20), level of statistical significance at .05, and a power of .80, 150 subjects were required. A total of 710 eligible registered nurses from the adult medical surgical nursing units met the study criteria.

Procedures for Data Collection

Following the approval of the institutional review board (IRB) of the medical center, a modified Dillman method was used to recruit nurses (Dillman, 2000). There was strong support from nurse managers and executive leaders for the study. The units were also aware from the inception of the study that at the completion of the data collection pizza lunch incentives would be given to units that returned 60% or more of surveys and snack incentives to all other participating units.

Measures

Independent Variables

Charge nurse resilience. Resilience is defined as the ability to successfully cope with change and misfortune (Wagnild et al., 2009). Charge nurse resilience is an individual level variable and was measured using the 14 item, Resilience Scale (RS-14) (see Appendix B), that measures self-reliance, meanings, equanimity, perseverance, and existential aloneness. Responses are scored on a seven-point rating scale ranging from (1)

strongly disagree to (7) strongly agree with higher score representing higher levels resilience. The Cronbach's alpha for the total scale is .93 (Wagnild et al., 2009).

The independent variable charge nurse resilience was measured using the Resilience Scale (RS-14). The RS-14 is based on five characteristics of resilience: self-reliance, meaning, equanimity, perseverance, and existential aloneness. Self-reliance is belief in oneself, and recognizing and relying on one's personal strength and capabilities. It also includes past successes, which influence future decisions. Meaning is defined as the realization that there is purpose to life and acceptance that life is worth living. Equanimity provides balance between positive and negative life events. Perseverance is the willingness to persist despite difficulties and challenges. Existential aloneness is defined as the realization that each individual is unique. It acknowledges that some experiences are shared while some must be endured alone (Wagnild et al., 1990, 1993).

Scoring. The RS-14 uses a seven-point Likert scale to rate individual responses. The range is from 1 (strongly disagree) to 7 (strongly agree). The scale uses a total summative score and is not broken into subscales for each of the five characteristics. The higher the total score, the higher the resilience. The total possible scores range from 14 to 98. Scores 90 and above indicate high resilience. Scores from 61 to 89 represent moderately-low to moderate levels of resilience. Scores 60 and less indicate low resilience (Wagnild et al., 2009).

Charge nurse characteristics. The charge nurse characteristics were captured using four items from the demographic survey: charge nurse experience, percentage of charge hours worked, length of time as a charge, and shadow charge orientation. Charge nurse experience is a dichotomous variable: some charge/no charge. The five response

categories used for percentage of charge hours worked were: never; less than 25% of shifts worked; 50% to 75% of shifts worked; and more than 75% of shifts worked. The number of years a nurse has worked in charge response categories were: less than one year, 1 to 5 years, 6 to10 years, 11 to 15 years, 16 to 20 years, and more than 21 years. Charge nurse orientation included the options of none, 1 to 2 shifts, 3 to 4 shifts, and 5 or more shifts.

Shift worked: Shift worked is a categorical variable with three options: day, night, and rotators.

Other key variables: The demographic variables for the study are level of highest degree, length of time in current unit, and professional framework development level. The educational level options are: 1) diploma and associate's degree; 2) baccalaureate degree; and 3) master's degree. Length of time in current unit response categories were: 1) less than 1 year; 2) 1 to 5 years; 3) more than 5 years.

Dependent Variables

There were eleven dependent variables in the study representing the subscales of the AHRQ Hospital Survey on Patient Safety Culture survey (Sorra & Nieva, 2004). The eleven variables are divided into unit level safety perception and patient outcome variables. There are seven unit level variables: teamwork with units, supervisor/manager expectations and actions promoting patient safety, organizational learning-continuous improvement, feedback and communication about error, staffing, non-punitive response to error, and communication openness. The patient outcome variables were overall perception of patient safety, frequency of event reporting, patient safety grade, and number of events reported.

Hospital Survey on Patient Safety Culture. The dependent variable perception of the patient safety culture was measured using the AHRQ Hospital Survey on Patient Safety Culture. This tool places an emphasis on patient safety and error and event reporting. This self- reported tool is best suited for direct clinical care providers such as nurses, non-direct care providers such as lab technicians, and physicians, managers, and administrators. The areas of safety culture assessments include background variables, outcome measures, unit level safety assessment, and hospital wide safety dimensions. This tool was developed for public use by any hospital interested in assessing its own safety culture.

Psychometrics. The AHRQ survey has a total of 42 items (see Appendix B). Among these are four patient outcomes, three hospital-level safety culture dimensions, and seven unit-level dimensions. The four patient outcomes include overall perception of safety; frequency of event reporting; patient safety grade; and number of events reported. The overall perception of safety is comprised of 4 items and is measured on a 5-point Likert scale ranging from 1=strongly disagree to 5=strongly agree. The frequency of events reported, which included 3 items, is measured on the 5-point Likert scale ranging from 1=never to 5=always. Patient safety grade is a single item that has the responses excellent, very good, acceptable, poor and failing. In addition there is one item that asks the respondents for the number of events reported in the last 12 months with responses ranging from a=no event reports to f =21 event reports or more.

The seven unit-level dimensions include supervisor/manager expectations; organizational learning; team work within units; communication openness, feedback, and communication about errors; non-punitive response to errors; and staffing. The three

hospital-level dimensions are hospital management support for patient safety; teamwork across hospital units; and hospital handoffs and transitions. All of these dimensions are measured using a 5-point Likert scale ranging from 1=strongly disagree to 5=strongly agree. The correlations among dimensions ranged from 0.23 between non-punitive responses to error and staffing or frequency of error reporting to 0.66 between hospital management support of patient safety and overall perceptions of safety. Correlations were conducted between the 12 culture and two outcomes dimensions. The highest inter-correlation was between overall perceptions of safety and patient safety grade [$r = .66$ ($p < .001$)]. The second highest inter-correlation between overall perceptions of safety and management support for patient safety [$r = .60$ ($p < .001$)]. The highest inter-correlation for frequency of event reporting was with feedback and communication about error [$r = .48$ ($p < .001$)]. The lowest correlation with frequency of event reporting was with non-punitive response to error [$r = .23$ ($p < .001$)] (Sorra & Nieva, 2004).

The tool is designed to be shortened for applicability to different hospital settings. The reliability and validity remain intact only when the survey is reduced by dimensions and not single items. In this study, the hospital-level subscales were omitted, which reduced the number of items to 33. The AHRQ tool normally takes 10-15 minutes to complete. The reduction of the number of items for this study made the time for completion even shorter. The background items were modified to reflect the uniqueness of the sample for this study. The tool was administered in paper and pen format.

Scoring. The instrument is scored on 5-point Likert scale with scores ranging from 1 to 5 (1 = a low score and 5 = a high score). The items of the survey are positively

and negatively scored. The 17 negatively scored items are reverse coded so that across all items a higher score means a more positive response (Sorra & Nieva, 2004).

Data Analysis

The statistical package for the social sciences (SPSS) software version 18.0.3 was used to run analyses of the data in this study. At the completion of data collection and cleaning of the data, descriptive statistics were conducted. The *RCN* model was then tested for correlations between each independent and dependent variable.

Missing Data

All the variables included in this study were deemed necessary and therefore it was important to assess for missing data prior to data analysis. Missing data diagnostics were employed at various levels. During data entry the surveys were examined for completeness. Seven hundred and ten surveys were distributed and 381 were returned. However, 6 random participants returned incomplete surveys with more than 10% missing data. There was no demographic information on the non-completers that could have linked them to any sub-group of nurses (McKnight, McKnight, Sidani, & Figuerdo, 2007). Therefore, the cases were deleted and were not included in this study, thus the total number of surveys was 375.

At the completion of data entry there was less than 5% of missing items at the variable level across items. Following the guidelines of McKnight et al. (2007), this is below the 10% threshold. Therefore, the items were not deleted and were included in data analysis.

Response Bias

To attend to response bias, comparison of the sample nurses from this study was done with all of the nurses in the adult medical-surgical units included in the study. In the larger population of the adult medical-surgical units, more than half (53%) of the nurses worked during the day shift, 36% worked night shift, and only 11% worked the evening shift. A somewhat similar trend was observed with the study sample: 31% of the nurses worked days, 30% worked nights, and 10% worked evenings. Within both the population and sample most of the nurses worked either the day or night shifts, with just about 10% reporting they worked the evening shift. Although these results may be compared along a single variable, the sample group does possess some of the characteristics of the population whereby the results may be generalized, at least, to the setting. When the study sample was compared to the defined population of the study an interesting pattern was observed with highest level of education obtained. In the larger population of adult medical-surgical nurses, 52% had either a diploma or associate's degree and 46% had a bachelor's degree as highest educational level, whereas 55% of the nurses in the study sample had a bachelor's degree and 38% had either a diploma or associate's degree. Therefore, the generalizability of these results to other healthcare organizations may be limited.

Results

Sample

Over a 3-month period, a total of 381 nurses returned completed questionnaires and signed consent forms. The response rate was 54% and is consistent with that of similar published studies (Singer et al., 2003; Singer et al., 2009; Vogus et al., 2007). A

national study of 309 hospitals conducted by AHRQ yielded an average response rate of 54%.

The nurses worked in a variety of clinical settings: step-down, rehabilitation, hematology, neurology, trauma-orthopedic, internal medicine, transplant, gastro-intestinal, and gynecology. These settings had a combination of 8-hour, and 12-hour shifts. As shown in Table 2.1, the participating nurses were almost equally distributed between the day (34%) and night (34%) shifts. There were many variations in the combinations of shifts the nurses rotated through. For example, some of the nurses reported working day-night or day-evening combos. One hundred and six (32%) nurses chose more than one shift normally worked, and these made up the group of rotators. The nurses who were never in charge worked mainly as rotators (46%) with the least (17%) working the day shift and 37% working the night shift. A somewhat opposite pattern was noted in the nurses with some charge experience: 47% worked during the day; 31% at night; and 22% percent worked as shift rotators.

Fifty-nine percent of the nurses were on their units from one to five years. Approximately one-third (32%) were on the units for greater than six years, and less than 10% worked less than one year. Cross-tabulation between the nurses who were in charge and years of experience on the current unit indicated that of the charge nurses less than 1% had only worked on the unit for a years or less. Most of the nurses (52%) were on the unit for 1 to 5 years, with the remainder (47%) more than five years.

The highest degree obtained by the majority of nurses (55%) is a baccalaureate degree. Thirty-eight percent had a nursing diploma or associate's degree as their highest degree. The sample was comprised of staff nurses who were mainly direct care providers,

and therefore, it was not surprising that a very low percentage (7%) had a master's degree. Analysis of highest educational degree obtained by the nurses according to their charge experience (data not shown) indicated that the nurses with no experience (60%) were more likely to have a bachelor's degree compared to the nurses with some experience (50%) while those with some experience (44%) were more likely to have a diploma or associate's degree as compared to nurses with no experience (31%). Almost an equal amount had a master's degree. Table 2.1 outlines the sample characteristics.

Table 2.1. Sample Characteristics

Variable	Frequency	
	N	%
Shift normally worked (*n*=333)		
Day	114	**34.2**
Night	113	**33.9**
Shift rotators	106	**31.8**
Number of years as registered nurse on current unit (*n*=373)		
Less than 1 year	33	**8.8**
1 to 5 years	220	**59.0**
6 or more years	120	**32.2**
Highest degree obtained (*n*=375)		
Diploma and Associate	144	**38.4**
Baccalaureate	205	**54.7**
Masters	26	**6.9**

Charge nurse characteristics were captured by four variables: charge nurse experience; percentage of shifts in charge within the last month; number of years as a charge nurse on current unit; and shadow charge orientation. The sample was comprised of 215(58%) nurses with some charge nurse experience. Of these, 23(6%) described themselves as permanent charge nurses defined by being in charge for greater than 75% of the shifts worked. One hundred and ninety-one (51.3%) nurses chose the relief charge nurse option, which was defined as being in charge for greater than 50% but less than

75% of individual shifts worked. The remaining 43% of the nurses in the sample self-identified as staff nurses, which is defined as never being in charge.

Table 2.2 presents charge nurse characteristics. When asked how often within the last month they were in charge, approximately 44% of the charge nurses reported less than twenty percent of shifts worked, and 56% were in charge greater than 25% of the shifts worked. The number of years that nurses were in charge ranged from less than 1 year (13%), 1 to 5 years (50%), and more than 5 years 37%. The educational preparation for those who were charge nurses was captured by number of shifts for shadow-charge orientation. Eight percent of the charge nurses stated they had no shadow-charge orientation. The majority (63%) of charge nurses had 1 to 2 shifts, while 29% had 3 or more shifts of shadow charge experience.

Table 2.2. Charge Nurse Characteristics

Variable	*N*	%
Charge nurse experience (*n*=374)		
1. Some charge	215	57.5
A. Permanent charge	23	**6.1**
B. Relief charge	192	**51.3**
2. **No charge (staff nurse)**	159	**42.5**
Percentage shifts worked in-charge in the past month (*n*=207)		
< 25% of shifts worked	92	44.4
>25% of shifts worked	115	**55.5**
Number of years as a charge nurse on current unit (*n*=228)		
Less than 1 year	30	13.2
1 to 5 years	114	50.0
More than 5 years	84	**36.8**
Shadow-charge orientation (*n*= 228)		
None	17	7.5
1-2 shifts	144	**63.2**
3 or more shifts	67	**29.4**

Resilience Scale (RS-14) Instrument

Charge nurse resilience was measured using Wagnild-Young's RS-14 scale. The overall Cronbach's alpha was $\alpha = .94$, $p < 0.001$. The overall Cronbach's alpha was higher than expected since the sample of nurses was from medical-surgical and not intensive care units. The scores for the subscales are presented in Table 2.3. The inter-correlations between the subscales ranged from .60 between perseverance and equanimity to .80 between perseverance and meaning. All other correlations were $\geq .70$. The correlations between the subscales are presented in Table 2.4. In the data analysis, the scale was used a continuous variable given the high median and mean scores across subscales.

Table 2.3. RS-14 Total and Subscale Scores (*n*=375)

Subscales (Number of items)	Mean	*SD*	Mdn	Possible Range	Actual Range	Reliability Coefficient
Self-Reliance (5)	5.9	0.75	6	1-7	1.60-7.0 0	.85
Meaning (3)	6.0	0.78	6	1-7	1.67-7.0 0	.78
Equanimity (2)	5.8	0.88	6	1-7	1.50-7.0 0	.62
Perseverance (2)	6.0	0.82	6	1-7	2.00-7.0 0	.77
Existential Aloneness (2)	5.8	0.94	6	1-7	1.00-7.0 0	.74
Total Scale (14)	**5.9**	**0.70**	**6**	**1-7**	**1.64-7.0**	**.94**

Table 2.4. Inter-Correlations between RS-14 Subscales (*n*=375)

Subscales (Number of items)	1	2	3	4	5
1. Self Reliance (5)	1				
2. Meaning (3)	0.739**	1			
3. Equanimity (2)	0.697**	0.658**	1		
4. Perseverance (2)	0.712**	0.758**	0.551**	1	
5. Existential Aloneness (2)	0.720**	0.752**	0.638**	0.707**	1

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

Hospital Survey on Patient Safety Culture Scale (AHRQ)

Perception of patient safety culture was measured using the AHRQ Hospital Survey on Patient Survey Culture. The reliability scores for this scale ranged from 0.63 to 0.84. The overall Cronbach's alpha was 0.88, however the alpha coefficients for two sub-scales were less than 0.70, organizational learning-continuous improvement (.64) and staffing (.62). However, similar results were obtained for staffing, in the national study the alpha coefficient was 0.63 (Sorra et al., 2008). There were significant inter-item correlations for the scale; however the correlations were weak ranging from 0.16 (between teamwork within hospital units and frequency of event reporting) to 0.52 (between communication openness and feedback and communication about error). The results for the continuous items performance are shown in Tables 2.5 and 2.6.

Table 2.5. AHRQ Perception of Patient Safety Culture Continuous Variables Total and Subscales (*n*=375)

Variables	Mean	SD	Possible Range	Actual Range	Reliability Coefficients
Teamwork within Hospital Units	3.9	0.6	1-5	1.8-5.0	0.80
Supervisor expectations & actions promoting safety	3.9	0.7	1-5	1.0-5.0	0.77
Organizational Learning-Continuous improvement	3.8	0.5	1-5	1.7-5.0	0.64
Overall Perceptions of Safety	3.3	0.6	1-5	1.3-5.0	0.70
Feedback and Communication about Error	3.3	0.7	1-5	1.3-5.0	0.70
Frequency of Event Reporting	3.5	0.7	1-5	1.3-5.0	0.77
Staffing	3.4	0.6	1-5	1.5-5.0	0.62
Non-punitive Response to Error	3.1	0.8	1-5	1.0-5.0	0.80
Communication Openness	3.5	0.6	1-5	1.3-5.0	0.70

Table 2.6. Inter-Correlations between AHRQ Subscales (*n*=375)

Subscale	1	2	3	4	5	6	7	8	9
1. Team work within units	1								
2. Supervisor expectations and actions promoting safety	0.326**	1							
3. Organizational improvement	0.455**	0.458**	1						
4. Overall perceptions of safety	0.335**	0.474**	0.445**	1					
5. Feedback and communication about error	0.288**	0.378**	0.407**	0.394**	1				
6. Frequency of events reports	0.163**	0.256**	0.294**	0.296**	0.357**	1			
7. Staffing	0.252**	0.344**	0.326**	0.493**	0.185**	0.150**	1		
8. Non-punitive response to error	0.221**	0.471**	0.262**	0.330**	0.204**	0.187**	0.273**	1	
9. Communication openness	0.433**	0.448**	0.410**	0.479**	0.516**	0.381**	0.316**	0.361**	1

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

Table 2.7 presents the results for the categorical variables of the AHRQ instrument. Patient safety grade was scored from excellent to poor and failing. In this study, 66% of the nurses gave an excellent or very good grade for patient safety, while 30% gave a grade of acceptable. Only 4% choose poor or failing as a grade. Frequency of events reported within the last 12 months category was also combined to yield three groups. That is, most of the nurses (46%) reported 1 to 2 events, however more than one-third (37%) reported 3 to 21 events. No events were reported by 17% of the study participants. The descriptive statistics for the categorical variables for the AHRQ instrument are presented in Table 2.7. All the subscales of the AHRQ scale were utilized in the following hypothesis tests given that each subscale represented a different aspect of the patient safety culture.

Table 2.7. AHRQ Categorical Variables Frequency and Percent (*n*=375)

Variables	*N*	%
Patient Safety Grade		
Excellent and Very good	242	65.9
Acceptable	109	29.7
Poor and Failing	16	4.4
Number of events reported within the last 12 months		
No events reports	62	16.8
1 to 2 events	170	46.1
3 to 21 events	137	37.1

Bivariate Analyses

Analyses were conducted to test for correlations and differences among the three predictor variables: resilience, shift worked and charge nurse experience; the predictor variable (number of years as a charge nurse on current unit) with number of years as RN on current unit.

Utilizing the t-test there were no differences in resilience between the nurses with no charge experience (M = 82.29, SD =10.28) and some charge experience (M = 82.84, SD = 9.81, t = -0.53, p = .60). T-tests were also done with the resilience subscales and none were significant. Examination of the descriptive statistics for the RS-14 revealed there was very little variance in the scores among the study participants. Across the subscales the mean scores ranged from 5.8 to 6.0. The median score for all of the subscales was 6.0. The mean for the total scale was 5.9 (SD= 0.7) and the range was 1.64 to 7.0. The RS-14 scale indicates that a score greater than 90 means high resilience and scores between 61 to 89 moderately-low to moderate resilience. The high average mean of the total scale (82) suggests that the majority of the sample had moderate to high resilience. There were high correlations among the sub-scales, which suggest the scale

was not able to discriminate for the sub-properties of resilience with this sample. Therefore in this study the scale was used as a one-dimensional tool.

Using chi-square, correlations were analyzed between shift worked. There were significant differences across the shifts for the nurses with or without charge experience. The nurses with no charge experience tended to work twice as much during the night shift and three times as much as rotators. Nurses with some charge experience (80%) mainly worked during the day shift, less at night (54%), and were least likely to be rotators (40%). When compared with each other, four times as many nurses with charge experience (80%) worked the day shift than nurses with no charge experience (20%). The night shift is more equally balanced with more than half (54%) of the nurses having some charge experience. Six in ten of the nurses who rotated through the shifts were nurses with no experience. The results are summarized in Table 2.8.

Table 2.8. Chi-Square for Shift Normally Worked and Charge Nurse Experience Count (row%)

Variable	No charge	Some charge	Total
Day	23 (20.2)	91 (79.8)	114
Night	52 (46.0)	61 (54.0)	113
Rotators	64 (60.4)	42 (39.6)	106
Total	139	194	333

$X^2(2) = 37.791$, $p = .000$

The correlation between number of years as charge nurse and number of years as RN on the unit is 0.71 ($p < 0.01$). An examination of the number of years the nurses who were not in charge on the unit showed that 23% worked in their current unit for less than one year and 72% worked from 1 to 5 years. Ninety-three percent of the nurses who were in charge for less than one year were on the unit for 1 to 5 years. The nurses who were in charge for 1 to 5 years (86%) were on the unit for 1 to 5 years and 28% had a duration of 6 or more years worked. As expected, the nurses (81%) with more than five years of charge experience worked in their current units for 6 or more years.

Hypothesis Testing

Hypothesis testing was done using a correlation model and t-tests to examine the following hypotheses for the relationship between resilience and perceptions of patient safety culture.

Resilience

Hypothesis1a: The higher the resilience of the nurse, the more positive will be the perception of safety.

Hypothesis 1a was partially supported showing higher the resilience scores of the nurses, were partially correlated with more positive the perception of safety. The results

are summarized in Table 2.9. Resilience had positive significant correlations with four dimensions of perception of patient safety culture: overall perceptions of safety (r =.139, $p \leq .01$), feedback and communication about error (r = .170, $p \leq .01$), staffing (r = .118, $p \leq .05$) and non-punitive responses to error (r = .116, $p \leq .05$). These correlations are weak but positive indicating that higher levels of resilience were associated with a positive perception of overall perceptions of safety, feedback and communication about error, staffing, and non-punitive response to error.

Chi-square tests were conducted to examine the relationships between resilience and two categorical outcomes of the AHRQ scale: (a) grade for work area; and (b) frequency of errors reported. The analyses showed there were no significant relationships with the two categorical variables.

Table 2.9. Correlations between Resilience and AHRQ Perceptions of Patient Safety Culture Dimensions

Variables	1	2	3	4	5	6	7	8	9	10
1. Resilience	1									
2. Team work within units	0.031	1								
3. Supervisor expectations promoting safety	0.042	**0.326****	1							
4. Organizational improvement	0.073	**0.455****	**0.458****	1						
5. **Overall perceptions of safety**	**0.139****	**0.335****	**0.474****	**0.445****	1					
6. **Feedback and communication about error**	**0.170****	**0.288****	**0.378****	**0.407****	**0.394****	1				
7. Frequency of events reports	0.100	**0.163****	**0.256****	**0.294****	**0.296****	**0.357****	1			
8. **Staffing**	**0.118***	**0.252****	**0.344****	**0.326****	**0.493****	**0.185****	**0.150****	1		
9. **Non-punitive response to error**	**0.116***	**0.221****	**0.471****	**0.262****	**0.330****	**0.204****	**0.187****	**0.273****	1	
10. Communication openness	0.057	0.433**	0.448**	0.410**	0.479**	0.516**	0.381**	0.316**	0.361**	1

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

Charge Nurse Characteristics

Hypothesis1b utilized correlation models and chi-square tests to examine the relationships between charge nurse experience, percentage of shifts in charge within the last month, number of years as charge nurse on current unit, and the perception of safety.

Hypothesis 1b(i) posits that there will be a difference in perception of safety culture between nurses with no charge and some charge experience.

A two-tailed t-test for independent groups was used to test the hypothesis that the nurses with no charge and some charge experience will have differences in perception of safety. Significant differences were observed with two dimensions of the patient safety culture. The t-test revealed that for nurses with no charge experience the mean (3.46) for overall perception of safety was significantly higher than for the nurses with some charge experience (3.27), [$t(374) = 2.86$, $p = .005$]. Consistent with that finding, for the dimension number of events reported within a 12-month period, the nurses with some charge had a higher mean (2.31) than nurses with no charge experience (2.06), [$t(368) = -3.35$, $p = .001$]. The results are summarized in Table 2.10.

Table 2.10. T-Tests for Charge Nurse Experience and AHRQ Perception of Patient Safety Culture

Outcome*	No charge (*n*=159) Mean (SD)	Some charge (*n*=215) Mean (SD)	*t*-value	p **
Overall perceptions of safety	**3.46(0.61)**	**3.27(0.63)**	**2.86**	**.01**
Number of events reported within the last 12 months	**2.06(0.70)**	**2.31(0.70)**	**-3.35**	**.01**

*Outcome was rated from 1(strongly disagree) to 5(strongly agree)
**Two-tailed p value

Table 2.11 below presents the differences in number of events reported by nurses with no charge experience and those with some charge experience. The nurses with no

charge experience reported fewer events. No events were reported by 21% of the nurses with some charge experience versus 14% of those with no charge experience. Of those who reported 1 to 2 events, 52% were reported by nurses with no charge experience as compared to 42% with some charge experience. As the number of events increased to 3 to 21 events, the nurses with some charge experience (45%) reported more events versus 27% of the nurses with no charge experience.

This is a very important finding in that the charge nurses may be more familiar with the error reporting system or are more aware of the errors occurring on the unit. *Hypothesis 1b(i)* is supported for the safety dimensions of overall perceptions of safety, frequency of events reported, and number of events reported within the past 12 months. Chi-square tests for the patient safety grade for work area and charge nurse experience revealed no significant findings.

Table 2.11. Chi-Square for Charge Nurse Experience and Number of Events Reported in the Past 12 Months

Variable	No Events	1-2 Events	3-21 Events	Total
No Charge	32(20.6)	81(52.3)	42(27.1)	155
Some Charge	29(13.6)	89(41.8)	95(44.6)	213
Total	61	170	137	368

$X^2(2) = 12.189$, $p = .002$

Percentage of Shifts Worked Within the Last Month

Hypothesis 1b(ii) utilized Chi-square and ANOVA to test for relationships between percentage of shifts in charge during the past month and perceptions of patient safety culture.

Hypothesis 1b(ii) posits that perceptions of the patient safety culture will be influenced by the percentage of shifts in charge during the past month.

The Pearson chi-square test was utilized to test the relationship between percentage of shifts in charge during the past month and number of events reported in the past month. Fifty-two percent of the nurses with no charge experience reported 1 to 2 events; 20% reported no events; and 28% reported 3 to 21 events. The nurses with no charge experience were almost equally divided between no events (20%) and 3 to 21 events (28%). The nurses with less than 25% of the shifts worked had the highest percent (47%) reporting 1 to 2 events, which is similar to the nurses with no charge experience. Moreover, 41% reported 3 to 21 events and 12% reported no events. Of the nurses who were in charge for more than twenty-five percent of shifts worked, 37% reported 1 to 2 events; 48% reported 3 to 21 events; and 16% reported no events.

The nurses with no experience (20%) had a higher percentage of reporting no events as compared to the nurses with less than twenty-five percent of shifts in charge (12%) and more than twenty-five percent of shifts in charge (16%). The nurses who were in charge for greater than twenty-five percent of shifts worked reported 3-21 events three times more than they reported no events. In the category of 1 to 2 events, there was a higher percentage of nurses with no charge experience (52%) reporting as compared to the nurses with some experience. The nurses with some charge experience tended to report more events.

Table 2.12. T-Tests for Charge Nurse Experience and AHRQ Perception of Patient Safety Culture

Variable	No Event	1-2 Events	3- 21 Events	Total
None	32(19.9)	84(52.2)	45(28.0)	161
Less than 25%	11(12.2)	42(46.7)	37(41.1)	90
More than 25%	18(15.7)	42(36.5)	55(47.8)	115
Total	61	168	137	366

$X^2(4) = 13.240$, $p = .010$

A one-way ANOVA was used to examine differences in the perceptions of patient safety among nurses with varying percentages of shifts in charge during the past month. Table 2.13 indicates that there were only significant differences in overall perception of safety, [$F(2, 369) = 3.27$, $p < .05$]. There were no other significant differences in the other measures of perceptions of patient safety and percentage of shifts worked. The result of a significant *F* value for the overall perception of patient safety was followed by a post hoc test to determine which specific pairs were significantly different. The post hoc test showed that there were differences between nurses with no charge nurse shifts and those with greater than 25% of shifts in charge in the last month. *Hypothesis 1b(ii)* was partially supported.

Table 2.13. ANOVA for Percentage of Shifts in Charge During the Past Month and AHRQ Perception of Patient Safety Culture

Outcome and Source of Variation	Sum of Squares	df	Mean Square	*F* value	*p*
Overall perceptions of safety					
Between	2.55	2	1.273	3.27	**.04**
Within	143.08	369	0.390		
Total	146.34	271			

Number of Years as a Charge Nurse on Current Unit

Hypothesis 1b(iii) utilized one-way ANOVA and chi-square tests to examine the relationship between the number of years as a charge nurse and perception of safety.

Hypothesis 1b(iii) posited that perception of safety culture will be influenced by the number of years worked as a charge nurse.

A one-way ANOVA was utilized to examine the differences among number of years as charge nurse and the dimensions of perceptions of patient safety culture. The results indicated that there were variations among the number of years as charge nurse for

the perceptions of teamwork within units [$F(3,365) = 3.52$, $p < .01$], overall perceptions of safety, [$F(3, 365) = 4.20$, $p < .05$], safety grade for work area [$F(3, 360) = 2.61$, $p < .05$], and number of events reported within the last month [$F(3, 362) = 3.49$, $p < .05$]. The post hoc test was conducted to determine where the differences were among the groups. For teamwork within hospital units, the nurses with less than one year of experience were more positive than nurses with more than 5 years ($p < .05$). For overall perceptions of safety, the nurses who were never in charge had more positive perceptions of safety than those who were in charge for 1 to 5 years for more than 5 years ($p < .01$). The differences in safety grade for work area were between the nurses with no charge, who were more positive than the nurses with more than five years of charge experience ($p < .05$) and for the number of events reported within the last twelve months the nurses who were never in charge were more positive than those with one to five years of charge experience ($p < .05$). Therefore, *Hypothesis 1b(iii)* was partially supported. The significant results are in Table 2.14.

Table 2.14. ANOVA for Number of Years as Charge Nurse and AHRQ Perception of Patient Safety Culture

Outcome and Source of Variation	Sum of Squares	df	Mean Square	*F* value	*p*
Team work within hospital units					
Between	3.73	3	1.243	3.52	**.02**
Within	129.04	365	0.354		
Total	132.77	368			
Overall perceptions of safety					
Between	4.86	3	1.619	4.20	**.01**
Within	140.73	365	0.386		
Total	145.58	368			
Safety Grade for work area					
Between	2.47	3	0.823	2.61	**.05**
Within	112.78	357	0.316		
Total	115.25	360			
Number of events reported					
Between	5.11	3	1.704	3.49	**.02**
Within	175.55	359	0.489		
Total	180.67	362			

Shift Worked

Hypothesis1c utilized one-way ANOVA to test for relationships between the shift nurses normally work and perceptions of safety.

Hypothesis 1c posits that perceptions of patient safety culture are influenced by the shift the nurses normally work.

Comparison of differences among perceptions of patient safety and shifts normally worked were conducted using the one-way ANOVA. A significant difference was observed for non-punitive response to error, [$F(2, 330) = 3.73$, $p < .05$]. The post hoc test indicated the difference was accounted for between the night shift and rotators. The night shift nurses were more likely to agree that there were non-punitive responses to

error. There was marginal significance between the day shift and rotators. Therefore, *Hypothesis 1c* was also partially supported.

Table 2.15. ANOVA for Shifts Normally Worked and AHRQ Perception of Patient Safety Culture

Outcome and Source of Variation	Sum of Squares	df	Mean Square	*F* value	*p*
Non-punitive response to error					
Between	5.31	2	2.654	3.73	**.03**
Within	234.88	330	0.712		
Total	240.18	332			

Summary of Hypothesis Testing

The summary of the hypothesis tests results are presented in Table 2.16.

Table 2.16. Summary of Hypotheses Tests Results

Hypothesis	Independent variable	Support	Dependent variable
H1a:	Resilience	Partial	Overall perceptions** Feedback** Staffing* Non-punitive response*
	<u>Charge Nurse Experience</u>		
H1b(i):	Some charge/No charge	Partial	Overall perceptions** Number of events reports**
H1b(ii):	Percentage of shifts in charge	Partial	Overall perceptions* Number of events reports**
H1b(iii):	Number of years as CN	Partial	Teamwork* Overall perceptions** Safety Grade* Number of events reports*
H1c:	Shift normally worked	Partial	Non-punitive response*

*p<.05; **p<.01
CN = charge nurse

Discussion

This is the first known study that compares charge and non-charge nurses' perceptions of patient safety culture. It is unlike previous studies that have examined differences in perception of patient safety culture among RNs across characteristics such as work area, age, gender, working hours, and education. Kim et al.'s (2007) study about nurses' perceptions of patient safety included 10% (n = 86) charge nurses, but they did not report findings that compared charge nurse perceptions of patient safety with those of others. Unlike Kim et al., this current research focuses on charge nurses as a discrete group. Other studies about perceptions of patient safety culture included nurses as a monolithic subset among healthcare providers such as physicians, clinical or non-clinical managers, and technicians (Sexton, 2006). In this regard, this current study marks an important departure from other empirical findings about role of leaders in perceptions of patient safety in health care organizations, especially as pertains to nurses. The individual context of the *Role of Charge Nurse (RCN)* model was tested which examined how resilience, charge nurse characteristics, and shift worked influenced perceptions of patient safety culture. The study hypothesized that there would be differences in perceptions of patient safety between charge and non-charge nurses.

Resilience

The results of the hypothesis that examined differences in levels of resilience between charge nurses and non-charge nurses suggest that these two groups of healthcare workers were not significantly different from each other. Additionally, most of the nurses in this study rated themselves as having moderate to high levels of resilience. This finding was interesting given that the sample of nurses was from medical-surgical units.

However, the Wagnild-Young's RS-14 tool used was developed from a sample of community dwellers who had recovered from a major life event. In contrast, the participants in this study worked in a highly hazardous environment, which was a teaching hospital with level one trauma capacity and multiple sub-specialties.

Among these nurses, there were significant positive correlations between resilience and the following: overall perceptions of safety; feedback and communication about errors; staffing; and non-punitive response to error. Resilience as measured here represents one's ability to overcome personal stress and bounce back (Wagnild et al., 2009). Schulman (2004) identified resilience as a core competency of individuals working in high-hazardous work environments. The subscales for which there were positive correlations may reflect the areas of patient safety where the nurses were able to tolerate to have positive perceptions. There is evidence in the literature that nurses develop resilience when they experience difficulties related to their work experiences (Broussard & Myers, 2010); are exposed to constant grief, ethical dilemmas and complex treatment modalities (Zander, Hutton, & King, 2010); and have some experience in their specialty area (Gillespsie, Chadoyer, & Wallis, 2009). The nurses' resilience may have been instrumental in coping with the high stress environment and allowing them to be more tolerant about lapses in staffing, thus demonstrating positive characteristics to help individuals practice safely.

Charge Nurse Characteristics

The majority of the nurses were maneuvering in and out of the charge nurse role. Of those who were in charge only 6% self-identified as being permanent charge nurses. The majority 94% of the charge nurses chose the option of relief charge nurse, meaning

that they were in charge less than 75% of the shifts they worked in the last month. The nurses in the study were almost equally divided between no charge and some charge experience. This was an expected finding given the normal practice of nurses being in charge within 6 months to 18 months of becoming a new graduate. It is not uncommon that once the nurses have completed 12 to 18 months on a given unit, they would be trained to be a charge nurse. Once the minimum requirement for the charge nurse role was met, it provided coverage for the shifts when there were no experienced charge nurses. In the sample, almost all of the nurses with some charge experience (99%) had at least one year of experience on their current unit.

The navigation between charge nurse and staff nurse roles may impede the development of competency within the charge nurse role, as it does not provide constant level of leadership, and may lead to haphazard management of unit issues. The charge nurses who self-identified as relief charge nurses may see being in charge as an extra assignment that does not need acquisition and nurturing of leadership skills. Hughes and Kring (2005) found there was confusion among staff nurses when charge nurses were assigned on a shift-by-shift basis. Each charge nurse implemented the duties differently which led to further frustration. Having a dedicated charge nurse role provided more cohesion between staff and charge nurses (Hughes & Kring, 2005).

When asked about the educational preparation for the charge nurse role, more than half of the study participants knew of the continuing education one-day class offered by the institution, and a third acknowledged the presence of a unit-based charge manual. In this sample, there were educational opportunities to prepare most of the staff nurses for the charge nurse role. Of the nurses who had some charge experience, almost all had

more than one shift of shadow-charge orientation. However, it was indicative from the findings that although oriented to the charge nurse role, there were not enough opportunities to function repeatedly within the role.

Shift Worked

The nurses who were in charge typically worked most during the day or night shifts and least as rotators, while the opposite trend is true for the nurses with no charge experience. In this study setting both 8-hour and 12-hour shifts are available, which provides more opportunity for various combinations within a 40-hour work week. In this sample, many of the nurses who worked the day shift also rotated through the evening and night shifts. It is unlikely that patient safety concerns can be confined to a shift, and if charge nurse coverage is practiced with the assumption that the duties are completed at the end of a shift there may be a lapse in the continuity of unit leadership to address patient safety concerns. Moreover, if patients are involved in any patient safety, the issues may not be fully resolved until the patient is discharged. Hughes et al. (2005) reported that often charge nurses who were randomly assigned to the role did not know of conflicts from the previous day. Therefore, having consistent charge nurses working more than one shift can lead to better follow through with patient safety concerns.

These charge nurse characteristics are consistent with descriptions of the duties of charge nurses who assume many roles and may not work on the shifts that have nurses with the least experience. This finding may provide insight to nurse managers who may think that the charge nurse role is covered with a consistent level of charge ability and equally across shifts. This current practice of random charge nurse coverage may limit the consistency of being in the charge nurse role, which may present challenges to the development of the leadership skill necessary for such an important role.

Perception of Patient Safety Culture

The three key components (i.e., resilience, charge nurse characteristics, and shift worked) of the *RCN* model were hypothesized to be associated with perceptions of patient safety culture. There were significant positive relationships for all three components. However, associations were found for only six of the eleven dimensions of patient safety culture: teamwork within hospital units; overall perceptions of safety; feedback and communication about error; staffing; non-punitive response to error; and number of events reported within the last twelve months.

Nurses with no charge experience had more positive overall perceptions of patient safety, while the nurses with some charge experience had less positive overall perceptions of safety. This finding runs counter to the results from previous studies that indicate there are less positive perceptions of patient safety by frontline nurses in general (Singer et al., 2003; Sorra et al., 2008). The findings in this study about differences across the subgroups of nurses are good. The charge nurse role is separate and distinct from the staff nurse role. Therefore, it is expected that there will be differences of perceptions between the unit leaders and staff nurses.

The percentage of shifts worked in charge in the past month provides more information about the differences observed between the charge and no-charge nurses. The results support differences in overall perception of safety between the nurses with greater than 25% of shifts in charge and with no shifts in charge. This difference may be indicative of a lack of full development by those who are in charge for less than 25% of shifts worked. Therefore, the nurses who move in and out of the charge nurse role and

spend more time as a staff nurse than a charge nurse may share the same perspectives of the patient safety culture as staff nurses who were never in charge.

There were differences observed in perceptions of teamwork within the unit overall perceptions of safety, safety grade for area, and number of events reported within the last twelve months according to the number of years as a charge nurse. Charge nurses with 1 to 5 and more than five years of experience were less positive about teamwork, overall perceptions of safety, safety grade for work area, and number of events reported. The reverse was observed in a previous study that found that registered nurses with more experience and length of time on the unit were more positive about patient safety culture (Kim et al., 2009). In other findings, new graduates document medication administration poorly (Aitken, Manias, & Dunning, 2006) and are perceived to contribute more to errors than older, more experienced nurses (Tang, Sheu, Yu, Wei, & Chen, 2007). Previous studies had shown that new graduates were less positive about their work environment because they are more stressed adjusting to the work environment (Kovner et al., 1998); emotionally exhausted (Laschinger & Leiter, 2006); or overwhelmed (Valdez, 2008). The new graduates may be more positive about perceptions of safety because they may not have received adequate education about patient safety (Johnstone & Kanitsaki, 2007), or they may be more focused developing critical thinking skills (Fero, Witsberger, Wesmiller, Zullo & Hoffman, 2008) on their personal safety practice as against the demands of collective unit responsibility.

Nevertheless, the results from this study correspond to findings from a previous study that showed head nurses and registered nurses more readily report medication errors than licensed practical nurses (Lin & Ma, 2009). Nurses who have more charge

nurse experience may be more familiar with the error reporting system, and this may account for more errors being reported. Charge nurses are also usually more aware of errors since staff nurses tend to seek their advice to validate whether an error was made (Espin, Wickson-Griffiths, Wilson, & Lingard, 2009). Therefore, whether they are in charge and not in charge they may maintain the same error reporting behavior of accountability, which may be manifested by an increase of errors being reported by them.

Only non-punitive response to error was significant for shift nurses normally worked. The nurses on the night shift reported less positive responses to non-punitive response to error. There are no studies that examined the perception of safety across shifts. In this sample, the nurses with less experience are mostly on the night shift. Although there are no known studies that examined new graduates perceptions of non-punitive responses to error, some information may be extrapolated from reports about the treatment of new graduates. Vessey, Demarco, Gaffeney, and Budin (2009) found that new graduates are prone to harsh criticisms by nurse managers, charge nurses, and physicians, which may be manifested by the less positive score for non-punitive response to error. Therefore, perceptions of safety could not be clearly distinguished by shift worked except for the one area of significant findings.

Conclusion

In summary, a key contribution to this study is the finding that charge nurse characteristics (e.g., experience) influence overall perceptions of safety and number of events reported within the last month. In previous studies about perceptions of patient safety culture, there were no distinctions made between charge and non-charge nurses. This study provides baseline empirical information about the differences among nurses

with varying charge experience in relation to staff nurses with no charge experience. Charge nurses are frontline unit leaders whose perspectives on the safety of a nursing unit are critical for the assignment of nurse staffing ratios, changes in patient acuity and census, and the general management of the unit. They are also the assistants to nurse managers, and they are empowered to make decisions that may impact the safety of patients under their care. This is a very important contribution to the national debate about the transformation of nursing leadership.

Implications for Management Practice

Charge nurses are responsible for the shift-by-shift management of nursing units and have frontline perspectives about the state of the patient safety culture. They may be more accurate than staff nurses in their assessment of the safety culture. Resilience, charge experience, and shift worked influence charge nurses' perceptions about patient safety culture. Differences were observed in overall perceptions of safety, teamwork within units, feedback and communication about error, staffing, number of events reported within the last twelve months, and non-punitive response to error. Several implications emerge for nursing management as noted below.

Recognition of the importance of the charge nurse role in the assessment of patient safety culture and leadership of nursing units may serve to improve unit-level patient outcomes. Charge nurses can contribute to the development of quality improvement strategies targeted for their units. Support for the establishment of consistent charge nurse coverage may reduce the percentage of nurses who have to maneuver between charge nurse and staff nurse roles. Management support for more consistent and longer years of charge nurse experience may facilitate better development

of the charge nurse role. Mahlmeister (2006) identified the lack of support for professional role development as one the barriers to being an effective charge nurse. Therefore, there may be more self-selection into the role than a strategic management plan for the development of the charge nurse skill.

Managers who are interested in improving the safety culture in their units may benefit from understanding that differences in perceptions exist between nurses with varying levels of charge nurse experience. The differences across the sub groups of nurses may require tailored approaches to address concerns that are unique to each group. The perceptions of patient safety culture are complex and of interest to organizational management. Most studies have focused on differences across work areas and between varying groups of healthcare professionals. While the studies show that nurses tend to have less positive perceptions than other professionals, nurses are not a monolithic group. Further research about the role and impact of the charge nurse within the context of a permanent position may help to elucidate the extent of the influence of the charge nurse role on the perception of patient safety culture.

In conclusion, the description of the charge nurse role is often subject to collective bargaining negotiations, which are more directly focused on provider outcomes. As evident in the IOM report about the work environment of nurses (Page, 2004), charge nurses were not identified as a distinct subgroup of nurses although they play an integral role in the delivery and management of in-patient nursing care units. Providing staff nurses with adequate preparation and opportunities to function in the charge role could potentially have patient and at least organizational if not national policy implications.

References

Ahern, N. R. (2006). Adolescent resilience: An evolutionary concept analysis. *Journal of Pediatric Nursing, 21*(3), 175-185.

Ahern, N. R., Ark, P., & Byers, J. (2008). Resilience and coping strategies in adolescents. *Pediatric Nursing, 20*(10), 32-36.

Aitken, R., Manias, E., & Dunning, T. (2006). Documentation of medication management by graduate nurses in patient progress notes: A way forward for patient safety. *Collegian, 13*(4), 5-11.

Ambrose, J. M. (1995). Orientation to the charge nurse role. *Nursing Management, 26*(11), 63-64.

Ashcraft, A. (2004). Differentiating between pre-arrest and failure to rescue. *Medical-Surgical Nursing*. *13*(4), 211-215.

Broussard, L., & Myers, R. (2010). School nurse resilience: Experiences after multiple natural disasters. *Journal of School Nursing, 26*(3), 203-211.

Connelly, L.M., & Yoder, L. H. (2003). A qualitative study of barriers and facilitators of the charge nurse role. *Nursing Leadership Forum, 7*(4), 157-164.

Connelly, L.M., Nabarette, S. R., & Smith, K. K. (2003). A charge nurse workshop based on research. *Journal for Nurses in Staff Development*, *19*(4), 203-208.

Connelly, L.M., Yoder, L. H., & Miner-Williams, D. (2003). A qualitative study of charge nurse competencies. *Medical Surgical Nursing*, *12*(5), 298-306.

Costello-Nickitas, D. M. (1997). Get ready to take charge. *American Journal of Nursing. 97*(5), Retrieved from http://www.ajn.org/ajn.

Deppoliti, D. (2008). Exploring how new registered nurses construct professional identity in hospital settings. *The Journal of Continuing Education in Nursing, 39*(6), 255-262.

Dillman, D.A. (2000). *Mail and internet surveys: The tailored design method* (2nd ed.). New York: John Wiley & Sons Incorporated.

Doherty, C. (2003). Modernization: the role of ward sisters and charge nurses. *Nursing Standard*, *17*(52), 33-35.

Edmondson, A. C. (1996). Learning from mistakes is easier said than done: Group and organizational influences on the detection and correction of error. *The Journal of Applied Behavioral Science, 32*(1), 5-28.

Edmondson, A. C. (1999). Psychology safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.

Espin, S., Wickson-Griffiths, A., Wilson, M., & Lingard, L. (2010). To report or not to report: A descriptive study exploring ICU nurses' perceptions of error and error reporting. *Intensive and Critical Care Nursing, 26*(1), 1-9.

Fero, L., Witsberger, C., Wesmiller, S., Zullo, T., & Hoffman, L. (2009). Critical thinking ability of new graduate and experienced nurses. *Journal of Advanced Nursing, 65*(1), 139-148.

Fulks, C., & Thompson, J. (2008). Charge nurses: Investing in the future. Retrieved from http://www.besmith.com/Repository/6/Document/08_Charge%20Nurses%20whitepaper.pdf

Gillipsie, B. M., Wallis, M., & Chadboyer, W. (2008). Operating theater culture: Implications for nurse retention. *Western Journal of Nursing Research, 30*(2), 259-277.

Grossman, S. (2007). Assisting critical care nurses in acquiring leadership skills. *Dimensions of Critical Care*, *26*(2), 57-65.

Hadley, B. J. (Ed.). (1978). *Methods for studying nurse staffing in a patient unit: A manual to aid hospitals in making use of personnel.* Hyattsville, Maryland: United States Department of Health, Education and Welfare.

Hall, L. M. (2003). Nursing intellectual capital: A theoretical approach for analyzing nursing productivity. *Nursing Economics, 21*(1), 14-19.

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

Hughes, C., & Kring, D. (2005). Recruitment & retention report. Consistent charge nurses improve teamwork. *Nursing Management, 36*(10), 16.

Johnstone, M., & Kanitsaki, O. (2007). Clinical risk management and patient safety education for nurses: A critique. *Nurse Education Today, 27*(3), 185-191.

Kalisch, B. J. (2006). Missed nursing care: A qualitative study. *Journal of Nursing Care Quarterly, 21*(4), 306-313.

Kane, R. L., Shamliyan, T., 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.

Kennedy, R. (2008). How do we get the managers we need and the leaders we want? A personal view. *Journal of Nursing Management, 16*, 942-945.

Kovner, C. T., & Schore, J. (1998). Differentiated levels of nursing work force demand. *Journal of Professional Nursing, 14*(4), 242-253.

Krugman, A., & Smith, V. (2003). Charge nurse leadership development and evaluation. *The Journal of Nursing Administration*, *33*(5), 284-292.

Laschinger, H. K. S., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout/engagement. *The Journal of Nursing Administration, 36*(5), 259-267.

Mahlmeister, L. (2006). Best practices in perinatal nursing - professional role development charge nurses. *The Journal of Perinatal Neonatal Nursing, 20*(2), 122-124.

Mahoney, J. E. (1998). Immobility and falls. *Clinics in Geriatric Medicine*, *14*(4), 699.

Malcolm, H., & Stewart, L. (2008). The changing role of charge nurses. *Kai Tiaki Nursing New Zealand, 14*(4), 20.

Mark, B. A. (2002). What explains nurses' perceptions of staffing adequacy? *The Journal of Nursing Administration, 32*(5), 234-242.

Mark, B. A., Slayer, J., & Smith, C. S. (1996). A theoretical model for nursing systems outcomes research. *Nursing Administration Quarterly, 20* (4), 12-27.

McKnight, P. E., McKnight, K. M., Sidan, S., & Figueredo, J. A. (2007). *Missing data: A gentle introduction (Methodology in the social sciences)*. New York: Guilford Publications.

Merriam Webster (2003). *Merriam Webster's Collegiate Dictionary* (11th ed.). Massachusetts: Merriam-Webster, Incorporated.

Miner-Williams, D., Connelly, L.M., & Yoder, L. H. (2000). Taking charge. *Nursing, 30*(3). Retrieved from http://www.Springnet.com.

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

Pronovost, P. J., Berenholtz, S. M., Goeschel, C. A., Needham, D. M., Sexton, J. B., Thompson, D. A., et al. (2006). Creating high reliability in health care organizations. *Health Services Research, 41*(4) (Part II), 1599-1617.

Rogers, A. E., Hwang, W., Scott, L. D., Aiken, L. H., & Dinges, D. F. (2004). The working hours of hospital staff nurses and patient safety. *Health Affairs, 23*(4), 202. Retrieved from http://proquest.umi.com/pqweb.

Schulman, P. R., (2004). General attributes of safe organizations. *Quality and Safety in Health Care, 13*(Suppl. 2), 39-44.

Sexton, J., Holzmueller, C., Pronovost, P., Thomas, E., McFerran, S., & Nunes, J. (2006). Variation in caregiver perceptions of teamwork climate in labor and delivery units. *Journal of Perinatology, 26*(8), 463-470.

Sherman, R. O. (2005). Don't forget our charge nurses. *Nursing Economics, 23*(3), 125-143.

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 and Safety in Health Care, 12*(2), 112-118.

Singer, S. J., Gaba, D., Falwell, A., Lin, S., Hayes, J., & Baker, L. (2009). Patient safety climate in 92 US hospitals: Differences by work area and discipline. *Medical Care, 47*(1), 23-31.

Singer, S., Meterko, M., Baker, L., Gaba, D., Falwell, A., & Rosen, A. (2007). Workforce perceptions of hospital safety culture: Development and validation of the patient safety climate in healthcare organization survey. *Health Services Research, 42*(5), 1999-2021.

Sorra, J. S., Famolaro, T., Dyer, N., Nelson, D., & Khanna, K. (2008). *Hospital Survey on Patient Safety Culture 2008 comparative database report* (Agency for Healthcare Research and Quality Publication No. 08-0039). Rockville, MD: Agency for Healthcare Research and Quality.

Tang, F., Sheu, S., Yu, S., Wei, I., & Chen, C. (2007). Nurses relate the contributing factors involved in medication errors. *Journal of Clinical Nursing, 16*(3), 447-457.

Tzeng, H., Ketefian, S., & Redman, R. W. (2002). Relationship of nurses' assessment of organizational culture, job satisfaction, and patient satisfaction with nursing care. *International Journal of Nursing Studies, 39*, 79-84.

Valdez, A. M. (2008). Transitioning from novice to competent: What can we learn from the literature about graduate nurses in the emergency setting? *Journal of Emergency Nursing, 34*(5), 435-440.

Vessey, J. A., Demarco, R. F., Gaffney, D. A., & Budin, W. C. (2009). Bullying of staff registered nurses in the workforce: A preliminary study for developing personal

and organizational strategies for the transformation of hostile to healthy workplace environments. *Journal of Professional Nursing, 25*(5), 299-306.

Vogus, T. J., & Sutcliffe, K. M. (2007a). The safety organizing scale: Development and validation of a behavioral measure of safety culture in hospital nursing units. *Medical Care, 45*(1), 46-54.

Vogus, T. J., & Sutcliffe, K. M. (2007b). The impact of safety organizing, trusted leadership, and care pathways on reported medication errors in hospital nursing units. *Medical Care, 45*(10), 997-1002.

Wagnild, G. (2009). *The resilience scale: User's guide.* (Version. 1.0) Resilience Center: Montana.

Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the resilience scale. *Journal of Nursing Measurement, 1*(2), 165-178.

Weick, K., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity* (1st ed.). San Francisco: Jossey-Bass.

Wilson, D. S. (2011). Mindfulness: A qualitative description of the behaviors charge nurses enact to safely staff patient care units. *Western Journal of Nursing Research.* Advance online publication. doi:10.1177/0193945910396519

Zander, M., Hutton, A., & King, L. (2010). Coping and resilience factors in pediatric oncology nurses. *Journal of Pediatric Oncology Nursing, 27*(2), 94-108.

Chapter III

The Association of Collective Safety Organizing Behaviors with Perceptions of Patient Safety Cultures

The cultivation of patient safety cultures is critical for the sustainability of positive patient outcomes (Page, 2004; Mark et al., 2007; Moody, Pesut, & Harrington, 2006). At the core of the development of a safety culture in high reliability organizations are the safety behaviors of its workers (Schulman, 2004). Safety cultures are cultivated and maintained when workers act together to prevent, anticipate and contain threats to safety (Weick & Sutcliffe, 2003). Vogus and Sutcliffe (2007) found that safety behaviors of nurses in conjunction with trust in their managers and the use of care pathways played a key role in the reduction of the number of reported medication errors. Although research on patient safety culture has indicated that safety cultures impact patient outcomes (Reason, 1995; Sleutel, 2000; Hughes, Chang & Mark, 2009), little research has been conducted on the association safety behaviors of healthcare workers and their perceptions of patient safety culture. This is especially pronounced when considering the safety behaviors of nurses in general and charge nurses in particular.

Nurses make up the largest segment of healthcare workers, and charge nurses are often the frontline leaders in hospital settings. Therefore, an examination of the extent to which the safety behaviors of nurses may be implicated in perceptions of patient safety cultures is important for ongoing assessment of patient outcomes. Additionally, the unique contribution of charge nurses to patient safety culture is particularly salient and

timely. Studies about patient safety culture among nurses have focused largely on the influence of characteristics such as age and gender of the nurse, work area and length of time on current units (Kim et al., 2007; Liu, Kalisch, Zhang, & Xu, 2009). Little attention has been given to other factors that may have an impact on perceptions of patient safety culture among nurses. One such area that has not been examined in the literature within the framework of patient safety culture is the collective safety behaviors of nurses. Collective safety behaviors have been associated with the reduction of medication error reports among nurses (Vogus & Sutcliffe, 2007) but the potential connections with perceptions of patient safety culture outcomes have not been examined. This study therefore seeks to examine the association between nurses' collective safety behaviors and perceptions of patient culture safety within their work units because perceptions may influence behavior towards safety (Edmondson, 1999).

Background

Organizational Culture

Organizational culture is defined as the dynamic interaction whereby meaning is established within a context of shared beliefs, assumptions, and values (Dennison, 1996; Sleutel, 2000). Culture describes the substratum of organizations that shapes those attitudes and values of the organization. Organizational climate is defined as the shared perspectives of an organization's formal and informal policies, practices, and procedures (Schein, 2004). The terms culture and climate are used interchangeably in discussions about organizations in the healthcare literature (Clarke, 2006). Scott-Findlay et al. (2006) found that reliance on theory from organizational science is necessary for the development and understanding of culture within the healthcare setting. However,

organizational science perspectives do not capture the uniqueness of the healthcare setting, let alone the sub-culture of nursing, and when used in healthcare the constructs are loosely defined and applied broadly. The general use of the term safety climate or safety culture refers to active involvement of management and workers in organizations in the reduction of problems instead of the passive acceptance that things cannot be improved (Clarke, 2006).

Since the mid-1990s, the organizational culture of the healthcare industry has been identified as a source of threats to patient safety (American Nurses Association, 2000; Blegen, 2006; Gallagher & Rowell, 2003; Reason, 1995). The restructuring of healthcare organizations during the early to late 1990s included the decentralization of hospital personnel that led to the reduction of registered staff nurses and an increase in non-licensed personnel performing nursing duties (Aiken, Clarke, & Sloane, 2000). This instability created negative consequences on the role of nurses, the healthcare work environment, and the quality of patient care (Hoover, 1998; Mark, Salyer, & Wan; 2003; Norrish & Rundall, 2001; Tachibana et al., 2007; Wilmot, 1998). Similar restructuring in Canada resulted in the widespread displacement of nurses with similar consequences to patient care (Estabrooks, Midodzi, Cummings & Giovannetti, 2005). The healthcare industry was evolving from a public service to a private sector. Non-healthcare organizations' expansions were deregulated, a trend which influenced an increase in the number of profit-making, private competing healthcare organizations (Dienemann, 1989). The healthcare relationship was altered to a consumer-provider agreement, and patients became more involved in their care (Dienemann, 1989). Subsequently, hospitals were scrutinized as patient satisfaction became a measurement of quality of care (Kane, 2006).

Healthcare organizations had become increasingly complex with shortened patient days, increased use of technology, heightened patient awareness, and increased regulatory protocols (Blegen, 2006). Hospital practice environments present organizational factors that affect patient outcomes (Laschinger et al., 2006; Sleutel, 2000). Patient outcomes are influenced by a number of factors including the education level of nurses (Aiken, Clarke, & Sloane, 2008), high turnover rates among new graduates (Kovner, 2009), staffing levels and registered nurse mix (Hall & Kiesners, 2005; Kane et al., 2007; Talsma, Bahl & Campbell, 2008), excessive use of nursing overtime (Berney & Needleman, 2006), job satisfaction among nurses (Hall & Doran, 2007), interruption of tasks (Kalisch & Aebersold, 2010; Ulrich, 2010), availability of supportive services (Bacon & Mark, 2009), and implementation of magnet principles (McClure, Poulin, Sovie & Wandelt, 1983; Walker, Middleton, Rolley & Duff, 2010).

Hall, Doran and Pink (2008) studied the impact of improved resources (improving linen supply, increased patient medications stocks, identification of basic equipment, needs and enhanced documentation of licensed practical nurses) in the nursing work environment on patient outcomes. This study provided evidence that there was a significant increase in nurses' perception of quality of work over a six month period. There was also a significant increase in patient perception of quality of care and benefit in nursing care. Aiken and Patrician (2000) proposed that better patient outcomes resulted when organizations invested in positive nurse-physician relationships, greater nurse autonomy, control over nursing practice, and organizational support. Therefore, organizational cultures can have both positive and negative impact on the work of nurses

and patient outcomes. The goal of healthcare organizations is to create safety cultures that will enhance the performance of workers and improve quality of patient care.

Safety Cultures

Safety culture is defined by the AHRQ as "group values, attitudes, perceptions, competencies, and behaviors influencing performance of organizations with respect to safety" (Sorra & Nieva, 2004, p.1). Attention to individual effects of medical mistakes might have been suppressed in healthcare because the results of personal catastrophic errors do not tend to involve large communities (Schulman, 2004). However, recent awareness of the deaths of patients in healthcare institutions has raised the sensitivity of the public to medical errors (Needleman et al., 2003; Reason, 1995; Seago, 2001).

The dynamic nature of complex systems gives rise to uncertainty, and unintentional loss of buffer zones may occur. Cook and Rasmussen (2005) noted that safety cultures are created when organizations keep wide margins that separate the operations and workload failure, are vigilant for marginal creep (attending to the operational boundaries at all times and not just in response to accidents), locate marginal boundaries of acceptable performance, understand the individual and organizational response to going solid, and a consensus of what should be the response to crossing the boundaries. "Going solid" is a term used to describe tight coupling of operations in organizations that give rise to the loss of buffer margins that absorb inefficiencies across work areas (Cook et al., 2005). For example, the delay of a family member to arrive for a discharge patient can result in no recovery room beds being available for a post-operative patient. An examination of the frequent bed crunch difficulties in healthcare organizations revealed that scheduling for full bed occupancy created dependence on a

perfect working system. The forecasting models for scheduling nurses exercise similar tight coupling when units are staffed for only 75%-80% bed occupancy.

Schulman (2004) identified two models of creating high reliability safety cultures: precluded events and resilience focused. Precluded events refer to identification of core events that should not occur. The resilience model of high reliability focuses on the inevitability of adverse events occurring and strategies to contain failure by: 1) the un-standardization of input materials (for example, work of the healthcare team members is influenced by professionals' competency levels; individualized medication doses); 2) important role for experiential and tacit knowledge, (as in the work of nurses, which includes the application of intuition); 3) high input variance, such as unpredictability in electrical demand from consumers; 4) improvisation of actions, (variety in inputs, knowledge and un-standardization of the process exhausts the ability to recognize all potential mistakes or errors); and 5) major role for real time action, (the difficulty of anticipating and planning for all mistakes forces just in time decisions and actions by frontline workers) (Schulman, 2004).

High reliability organizations are described as those having a culture of safety, where the focus of operation is not only on outcomes but also on detection of errors (Weick et al., 2001). Weick and Roberts (1993) and Weick et al. (2001) reviewed performance of aircraft carrier flight decks and nuclear plants and found that these are maintained almost error free under highly hazardous conditions. Reliability in organizations is determined not only by the adherence to policies and procedures, but also by responsiveness to the unexpected (Schulman, 1993). The goal of high reliability

organizing is to prevent errors, but in the event of failure, the system that is committed to resilience can contain effects of the error (Weick et al., 2001; Schulman, 2004).

High reliability organizations, like fighter aircraft carriers and nuclear power plants, were cited as examples of safety culture for healthcare organizations (Page, 2004). Many experts in organizational studies found similarities between healthcare organizations (HCO) and high reliability organizations (HRO) (Weick et al., 2001; Yourstone & Smith, 2002; Vogus et al., 2007). Hines, Luna, & Lofthus (2008) identified seven similarities healthcare organizations share with high reliability organizations. Like HROs, hospitals are hyper-complex working environments, require frequent immediate feedback under constant compressed time constraints, and have tight-coupling teams, extreme hierarchical differentiation, multiple decision-makers in a complex communication network, and high degrees of accountability.

Safety Behaviors

The workers in hospitals are compared to workers in nuclear power plants (Weick et al., 2001) and the aviation industry (Gaba, Singer, Sinaiko, Bowen, & Ciavarelli, 2003). Hines et al. (2008) also identified important distinctions between most HROs and HCOs. First, in the healthcare organization, there is higher workforce mobility. Second, humans are the point of care rather than machines. Patients and their families have opinions and the right to accept or refuse treatment provided. Wilson et al. (2011) found that charge nurses could be compared to other professionals in high reliability organizations such as nuclear and electrical power plants in terms of making "real time" decisions. High reliability professionals are usually found at the middle level of organizational management. They tend to be shift supervisors, technical group leaders, or

control operators and are of critical importance for the resilience model of high reliability (Schulman, 2004). In decision making, they are the mediators between unique single cases and organizational level generalizations. Reliability professionals focus on real time issues without losing track of the bigger picture (Schulman, 2004).

Similarities between the electrical power plant operators and charge nurses include hours of coverage, tight coupling, and complex interactivity of the work environment, including rapid changes in demands, real time decision making, preset productivity ratios, and the potential for hazards. Both groups of workers experienced industry restructuring. In California, the electrical companies unbundled to form market and technology nodes. In the 1990s, the introduction of health maintenance organizations resulted in reshuffling of healthcare human resources. Examples of the similarities between charge nurses and nuclear power plant operators are detailed in Table 3.1.

Table 3.1. Similarities between Electrical Power Plant Operators and Charge Nurses

Duties	Electrical Power Plant Operators[a]	Charge Nurses[b]
24-hour coverage	Mainly 8 to 12 hour shifts	More flexibility with 4, 8, 12, and 16 hour shifts
Tight coupling and complex interactivity	One operator in the control room responding to computers, pagers, and speed dial monitors	The charge nurse is the go-to person for patients, family, staff nurses, nurse managers, physicians, and other members of the multidisciplinary team
Can experience rapid, uncontrollable changes or unpredictable conditions	Unpredictable surges and congestion occur for more power depending on weather changes	Increase in patient acuity or census can be unplanned which usually requires adjustment in available staff or skill mix
Real time decision making	The dispatch generators are the decision makers about balance between the outputs of the power plants (frequency in Hertz) with the market demand	Charge nurses make shift-by-shift decisions about the intra and inter-unit movement of patients and staff nurses' workloads
Anchored to preset productivity ratio	The frequency standard within the US is 60,000 Hertz	Each nursing unit is given a forecasted hours per patient day nurse-patient ratio
Potential for hazards	Imbalance in the power output and market demands can introduce instability into the whole electrical system	Operating short staffed or with inappropriate skill mix can result in negative patient outcomes

[a] Schulman, 2004
[b] Wilson et al., 2011

The high-reliability theory assumes an organization relies on collective mindfulness to meet challenges of the complex system (Weick et al., 2001). Organizing for safety demands that all workers be mindful of the process established by the system with the deliberate intent to be prepared for the unexpected (Weick & Roberts, 1993). High reliable professionals possess a toolkit of notable characteristics identified as collective mindfulness. Collective mindfulness is defined as enhanced attention to and awareness of current experience or present reality (Weick & Sutcliffe, 2001). Collective

mindfulness is characterized by an organizational commitment to an infrastructure that promotes enhanced attention and awareness to current experiences or present realities (Weick et al., 2001; Schulman, 2004). In these HRO's, the input about the operating process from leaders as well as frontline workers was valuable for the early detection of errors that, if left unchecked, could mushroom into larger harmful events.

There are five central components of mindful behaviors: preoccupation with failure, sensitivity to operations, deference to expertise, reluctance to simplify operations, and commitment to resilience. Preoccupation with failure refers to the constant attention to the possibility that at any time simple problems, if left alone, can grow into bigger harmful events. Commitment to resilience means the development of capacity to detect and bounce back from errors. Deference to expertise is the downward migration of authority to those who are most knowledge even if it defies hierarchical rank. Sensitivity of operation captures the familiarity and constant sharing of information for updates on the status of the work place. Reluctance to simplify operations helps high reliable professionals to probe beyond common and regular explanations about unexpected events to elicit the nuances that may be specific for the event, work area, or worker (Weick & Sutcliffe, 2001).

Wilson et al. (2011) also found that charge nurses who were effective in staffing a unit usually demonstrated similar mindful behaviors like high reliability professionals. The effective charge nurses were resourceful, aware of the big picture, tactful in their communication, flexible, and decisive. The effective charge nurse behaviors that can be associated with the mindfulness behaviors are: (1) resourcefulness and sensitivity to operations; (2) decisiveness and deference to expertise; (3) awareness of the big picture

and preoccupation with failure; (4) flexibility and commitment to resilience; (5) tactful communication and reluctance to simplify operations. Charge nurses demonstrated mindful staffing behaviors when making intra-shift decisions to safely staff nursing units.

Charge nurses who demonstrated mindful staffing were better able to plan for unexpected admissions and discharges. They also readily make changes to staff assignments to adjust to intra-shift changes in the patient's acuity and census. They were constantly looking at the factors that could have negatively affected the nurse-patient ratio and skill mix. Charge nurses who made mindful staffing decisions were more effective in reducing chaos on the patient units (Wilson et al., 2011). It was evident from the qualitative findings the charge nurses had to demonstrate more than one of these ideal behaviors to be effective. These behaviors are in complex work environments that require close monitoring to prevent disasters.

Perception of Patient Safety Culture

Similarities of the healthcare workers and high reliability professionals have fostered the utilization of high reliability concepts in the development and testing of tools that assess the perceptions of patient safety culture within hospitals. For example, the Patient Safety Climate in Healthcare Organizations (PSCHO) survey (Singer et al., 2007) was administered in 105 hospitals that included three size categories and four regional categories. Results of the study showed that among hospitals the positive responses ranged from 17% to 100%. Hospital staff responses were 28% of physicians, 74% of senior managers, and 66% of other personnel for a total of 21,496 completed surveys, which yielded a response rate of 51%. The Cronbach alphas for the nine dimensions (senior managers' engagement, organizational resources for safety, overall emphasis on

safety, unit safety norms, unit recognition and support for safety efforts, fear of shame, provision of safe care, learning and fear of blame) ranged from 0.58 to 0.89 and the inter-scale correlations ranged from 0.00 to 0.77. The study results supported a theoretical model that included high reliability concepts. Organizational level factors included senior manager's engagement, organizational resources, and overall emphasis on safety. Work unit level dimensions consisted of unit safety norms and unit recognition and support for safety. The individual domain items addressed the issues of fear of shame, fear of blame, and learning. These concepts are all considered to be consistent with high reliability concepts (Singer, 2007).

Perceptions of patient safety culture within the healthcare setting have been studied in conjunction with several outcomes measures such as event reporting, nursing work load, staffing adequacy (Sorra et al., 2004), senior management engagement (Singer, Gaba, Falwell, Lin, Hayes, & Baker, 2009) and uncertainty (Slayer, 1996). The majority of studies included all members of the hospital staff, such as nurses, physicians, technicians, ancillary workers, and managers (Singer et al., 2009; Sorra et al., 2004). However, an examination of the perception of patient safety within the context of the charge nurse role has not been explored.

Theoretical Framework

The *Role of the Charge Nurse* (*RCN*) model is an application of a modified version of the structural contingency theory. The modified version of the structural contingency theory posits that the best way to organize depends on the nature of the environment in which the organization functions. Within this framework, the efficiency of an organization is influenced by its contextual and structural factors. In this research,

the RCN model tests the relationships between the collective context of the charge nurse role and perception of the safety cultures. The collective context of the RCN model represents the shared safety organizing behaviors of nurses. The behaviors that reduce errors in hazardous work environments are preoccupation with failure, sensitivity to operations, and commitment to resilience and deference to expertise. Preoccupation with failure assumes a proactive stance to the possibility of mistakes waiting to happen and alerting team members on how to spot them. Three items are used to capture the sub-concept of preoccupation with failure: when giving a report to an oncoming nurse we, usually discuss what to look for; spend time identifying activities we do not want to go wrong; and discuss alternatives as to how to go about our normal work activities.

Sensitivity to operations refers to the acknowledgment that within the group there are various levels of expertise and skills. Deliberate actions are then taken in an effort to identify who among the group has which skill. This concept is made up of two items: we have a good "map of each other's talents and skills; we discuss our unique skills with each other so that we know who on the unit has relevant specialized skills and knowledge.

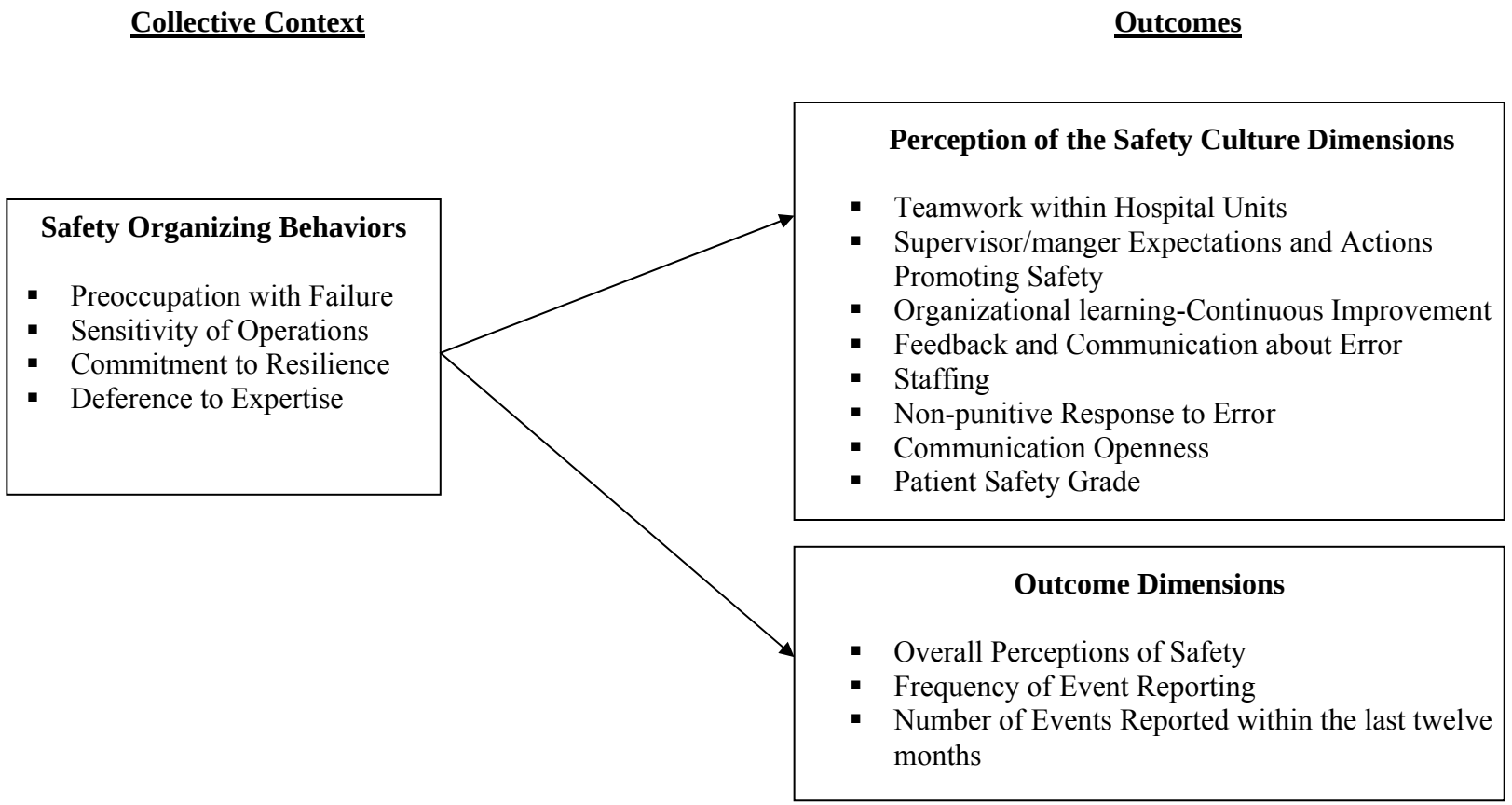
Commitment to resilience refers to the elasticity to recover from mistakes by examining and learning from them. There are two items which capture commitment to resilience: we talk about our mistakes and ways to learn from them; when errors happen, we discuss how we could prevent them. In a safety culture deference to expertise means that team members who are aware of the differences in abilities and talents go the next step and rely on each to make the judgment calls within one's sphere of expertise. Deference of expertise has two items: when attempting to resolve a problem, we take

advantage of the unique skills of our colleagues; when a patient crisis occurs, we rapidly pool our collective expertise to attempt to resolve it.

Perception of Patient Safety Culture

The safety outcomes assess the perceptions of patient safety culture using the AHRQ *Hospital Survey on Patient Safety Culture.* Four outcome dimensions and seven unit-level safety culture dimensions were examined: overall perception of safety; frequency of events reported; safety grade for work area; number of events reported; teamwork; supervisor/manager expectations and actions promoting patient safety; organizational learning-continuous improvement; feedback and communication about error; communication openness; staffing; non-punitive response to error. The partial RCN model for collective context is presented in Figure 3.1.

Figure 3.1. Partial RCN model: Collective Context in Relation to Perceptions of Patient Safety



Adapted from the Modified Version of the Structural Contingency Theory (Mark, Salyer & Smith, 1996)

Research Question and Hypotheses

This study addresses the following research question: Is safety organizing behavior associated with perception of patient safety culture?

The following hypotheses were tested:

H1: Collective safety organizing behaviors will be correlated with perception of patient safety culture outcomes.

H2: Collective safety organizing behaviors will influence perceptions of patient safety culture after controlling for nurse characteristics, individual context of the charge nurse role and unit type

Method

Design

A cross sectional exploratory design was used to examine the relationships between the safety organizing behaviors of nurses and their perceptions of safety culture. This was a cross-sectional study that employed a convenience sampling strategy to recruit nurses in preselected nursing units. Self-administered surveys were placed in the mailboxes of all the nurses in 11 nursing units who worked within a single, tertiary healthcare system.

Sample and Setting

Staff nurses, charge nurses, and nursing units met the inclusion criteria for this study. Nurses self-selected into this study as a result of the invitation found in their mailboxes. The target population was nurses currently working in the acute care and step-down inpatient units. Prior to data collection, power calculations were conducted to determine an adequate sample size. Three hundred and forty-five subjects were needed to

detect small to moderate effect size (R^2 =.04), level of statistical significance of 0.05, and power of 0.80 in an analysis with seven predictors. The research was conducted at a large medical center in southeastern Michigan. This medical center has 30 in-patient units with an average bed capacity of 20-30 patients per unit. Nursing units included in the study were adult medical-surgical and step-down inpatient units. The nursing units in the study are similar to the type of nursing units found in several public and large teaching medical centers in the U.S. Therefore the findings may be representative of the broader population. The final sample included eleven units: 8 adult medical-surgical units (n = 241 nurses), 2 step-down units (n = 99 nurses), and 1 rehabilitation unit (n = 35 nurses) which represents the 375 participating nurses.

Measures

Independent Variable

The main predictor variable used in these analyses was safety organizing behavior. This latent construct was measured at the unit level by the Safety Organizing Scale (SOS). The SOS is a self-reported scale based on a conceptual model developed from studies of high-reliability organizations (Vogus & Sutcliffe, 2007). The SOS consists of 9 items that measure unit level shared and observable behaviors consistent with a safety culture (see Appendix B). The SOS measures four of the five-sub-concepts of mindfulness; preoccupation with failure, commitment to resilience, sensitivity to operations, and deference to expertise.

Psychometrics. There are 4 subscales that cover the four principles of mindfulness given above. The tool was pre-tested for content validity by 45 RNs on a coronary care unit in a large Midwestern hospital and 7 HRO experts, which yielded one minor word

change. Participants involved in the study were randomly selected from 13 hospitals: 5 urban, 5 mid-sized metropolitan, and 3 rural. The sample size was 1,685 participants with a 51% response rate (Vogus & Sutcliffe, 2007). The internal consistency of items on the questionnaire yield reliable and valid scores. This tool was measured for convergent validity using confirmatory factor analysis (CFA). The factor loadings were significant ($p < .001$) with a Cronbach alpha of 0.88 (Vogus et al., 2007a).

The safety organizing scale is a unit-level construct which seeks to establish the collective and shared behaviors of the nurses that support a safety culture within their units. To determine if there are variations in the SOS scores across units, an ANOVA test was conducted with unit membership as the independent variable. The resultant F-statistic ($F = 2.04$, $p = .029$) was statistically significant indicating that the SOS behaviors across the units were different. The F-statistic differences across the units for the eleven dimensions of patient safety culture were positive except for safety grade for work area and number of events reported within the last 12 months. Second, it was also important to determine whether the responses of the nurses within the units were interchangeable. The intra-class correlation coefficient (ICC) was used to test for similarity of responses within units. ICC scores can range from 0 to 1 and is calculated by dividing the variance between units by the total variance (which is a combination of the variance between units and the variance within units).

The ICC score for the safety organizing behaviors of the nurses is 0.03 indicating that the nurses' safety organizing behaviors within the units could not be sufficiently differentiated from the safety organizing behaviors across units. This can be attributed to a shared set of behaviors within the adult-medical surgical units. Nurses also rotate across

these units which may also lend to the commonalties of the safety behaviors. During data collection there was reorganization of three of the eleven units, which may have led to further blurring of the differences across the units. Finally, the sample size may have only supported very small effects of the differences across the units. However, across the eleven dimensions of perceptions of patient safety culture the ICC scores ranged from 0.01 to 0.15. The nurses within the units were more alike for teamwork, manager support, organizational learning, communication openness, frequency of error reported, and staffing. Given these findings, multiple regression analysis was conducted to test for the role of safety organizing behaviors in the perceptions of patient safety culture. The summary of the aggregation tests are presented in Table 3.2.

Table 3.2. Aggregation Tests for Unit-Level Survey Variables (*n*=375)

Variables	*F*-Statistic	*p*-value	ICC
SOS	2.04	.029	0.03
Teamwork	6.03	.000	0.14
Manager support	4.96	.000	0.14
Organizational learning	4.41	.000	0.11
Overall	1.92	.042	0.03
Feedback	2.21	.017	0.04
Communication	2.84	.002	0.10
Frequency	2.87	.002	0.10
Staffing	5.41	.000	0.15
Non-punitive	2.44	.008	0.04
Grade	1.17	.313	0.01
Events	1.52	.130	0.01

Scoring. The values for the Likert responses for the SOS are: 1=Not at all, 2=To a very limited extent, 3=To a limited extent, 4=To a moderate extent, 5=To a considerable extent, 6=To a great extent, and 7=To a very great extent. Participants were asked to assess the degree to which they and the other RNs with which they currently and primarily work engage in certain behaviors and practices. The score range from a low of

7 to a high of 63. All of the items are positively scored. The higher the score, the more safely organized is the unit. The values obtained from each survey completed were added to give the respondents' score of the unit's safety organizing score. All scores from total number of respondents from each unit were added to give an overall score for the unit.

Dependent Variables

Subjective data about the perception of patient safety culture was captured using the Agency for Healthcare Research and Quality scale (AHRQ) (see Appendix B) (Sorra & Nieva, 2004). This tool places an emphasis on patient safety and error and event reporting. This self-reported tool is best suited for direct clinical care providers such as nurses, non-direct care providers such as lab technicians, physicians, managers, and administrators. The areas of safety culture assessments include background variables, outcome measures, unit level safety grade and hospital wide safety dimensions.

Psychometrics. The AHRQ Hospital Survey on Patient Safety Culture survey has a total of 42 items with 12 dimensions. The goodness of fit indices (comparative, goodness-of-fit, adjusted goodness-of-fit, normalized, and non-normalized) were greater than 0.90 and met the criterion for conformance. The correlations among dimensions ranged from 0.23 between non-punitive responses to error and staffing or frequency of error reporting to 0.66 between hospital management support of patient safety and overall perceptions of safety. Correlations were conducted between the 12 culture and two outcomes dimensions. The highest inter-correlation was $r = .66$ ($p < .001$) between overall perceptions of safety and patient safety grade. The second highest inter-correlation of $r = .60$ ($p < .001$) was between overall perceptions of safety and management support for patient safety. The highest inter-correlation for frequency of

event reporting was $r = .48$ ($p < .001$) with feedback and communication about error. The lowest correlation with frequency of event reporting was $r = .23$ ($p < .001$) with non-punitive response to error (Sorra & Nieva, 2004).

In this study, the perception of safety variables included 11 dimensions from the AHRQ scale. The hospital-level subscale was omitted, which reduced the number of items to thirty-three. The AHRQ tool normally takes 10-15 minutes to complete. The reduction of the number of items for this study made the time for completion even shorter. All of these items are measured using a 5-point Likert scale ranging from 1=strongly disagree to 5=strongly agree, expect for two categorical items: patient safety grade and number of events reported within the last 12 months. The background items were modified to reflect the uniqueness of the sample for this study. The tool was administered in paper and pen format.

Scoring. The instrument is scored on 5-point Likert scale with scores ranging from 1 to 5 (1 = a low score and 5 = a high score). The items of the survey are positively and negatively scored. The seventeen negatively scored items are reverse coded so that across all of the items a higher score means a more positive response.

Covariates

The covariates for the study were as follows: length of time in current unit; highest level of education completed; resilience; shift worked which consisted of three dummy variables (night shift, rotators, and day shift as the reference group); charge nurse experience (1 to 5 years, more than five years, and less than one year as the reference group); and 11 nursing units with Unit 1 identified as the reference group.

Procedures for Data Collection

Approval was obtained from the institutional review board (IRB). Study participants were recruited using personal contact and flyers. Upon agreement, nurse managers provided the names of nurses currently working in their units. A modified tailored design method was used to increase response rate from the paper administrations (Dillman, 2000). The design involved engaging the study participants in the following manner: 1) questionnaires in large manila envelopes were placed in the staff nurses' unit mailboxes including a cover letter with an incentive of a candy bar; 2) 1-2 weeks after the study begins, a thank you postcard was placed in the mailboxes to express appreciation for completion or as a reminder if the questionnaire has not been returned; 3) 3-4 weeks after, a thank you postcard was placed in mailboxes to express appreciation for completion or as a gentle reminder if the questionnaire had not been returned. Incentives, were given to units that returning 60% or more of surveys. Locked collection boxes were placed on each unit for placement of completed questionnaires.

Data Analysis

Statistical Package for the Social Science (SPSS) software, version 18.0.3 was used to analyze these data in this study. Correlation was used to test the relationships between the predictors and the perceptions of patient safety culture and multiple regression analysis was employed to test the aforementioned relationships after adjusting for the covariates identified in this study.

Results

Sample

Registered nurses from eleven nursing units participated in this study. They represented eight medical-surgical (n = 241), one rehabilitation (n = 35), and two step-down (n = 99) nursing units in an acute care medical center in Southeast Michigan. Three medical-surgical units were combined to form one of the eleven units. This was primarily done to accommodate the change in unit structure during the last month of the study. The three units, which were originally two, were split to form a third. The third unit consisted of nurses from both of the original units who had participated in the study. The combination of the units may unit one much bigger compared to other units and was therefore used as the reference group for multiple regression analyses. Seven hundred and ten surveys were distributed and 381 were returned, which yielded a response rate of 54%.

The nurses on the units had mostly a bachelor's degree (42% to 66%), followed by an associate or diploma degree (26% to 48%), and then a master's degree (0 to 21%). There were no unique patterns to the shifts worked across the units. There was an even spread for the day, night, and rotating shifts. The units were populated with nurses who had mainly one to five years of service. Only three units had more than 40% of the nurses having greater six years of experience. One unit had 32% of the nurses with less than one year of experience. There were also variations in the nurses' charge experience among the units: two units reported that more than 75% of the nurses had charge experience; for six units over 50% but less than 75% of the nurses had charge experience; and three units indicated that less than 50% of the nurses had charge experience.

Measurement Reliability

The SOS item means were greater than 4.2 with the minimum score of 3.67 and maximum score of 6.0 from the range of one to seven. However, the 'alpha if item deleted' reliability scores ranged from 0.89 to 0.92 with an overall scale reliability of 0.91. The full results of the scale performance are presented in Table 3.3. Perception of patient safety culture was measured using the AHRQ Hospital Survey on Patient Survey Culture. The overall Cronbach's alpha was .88. The reliability scores for the subscales of this scale ranged from .63 to .84, however the alpha coefficients for two sub-scales were less than 0.70, [*i.e.,* organizational learning-continuous improvement (.64), staffing (.62)].

Hypothesis Testing

H1: Collective safety organizing behaviors will influence perceptions of patient safety culture.

Table 3.3 presents descriptive information about the SOS subscales. The mean SOS scores ranged from 4.14 to 5.65 with a range of 1 to 7. This finding indicates a narrow range from the lowest to the highest SOS mean, which reflects the similar finding of low ICC scores. As reflected in Table 3.4, none of the correlations among the SOS variables was above 0.70. In fact, the highest correlation (.675) among the subscale items in the SOS was between the following items: "we talk about mistakes and ways to learn from them" and "we errors happened we discuss how we could have prevented them." All of the other correlations ranged from a low of .357 to a high of .625.

Table 3.3. SOS Item Mean, Standard Deviation and Reliability Scores (*n*=372)

Items (9)	Mean	SD	Alpha if item Deleted	Total *N*
Q1. We have a good "map" of each other's talents and skills	4.78	1.18	0.90	372
Q2. We talk about mistakes and ways to learn from them	4.23	1.26	0.88	372
Q3. We discuss our unique skills with each other so we know who on the unit has relevant specialized skills	4.22	1.34	0.88	372
Q4. We discuss alternatives as to how to go About our normal work activities	4.14	1.30	0.89	372
Q5. When giving report to an oncoming nurse, we usually discuss what to look out for	5.54	1.04	0.89	372
Q6. When attempting to resolve a problem, we take advantage of the unique skills	5.08	1.26	0.88	372
Q7. We spend time identifying activities we do not want to go wrong	4.33	1.30	0.89	372
Q8. When errors happen, we discuss how we could have prevented them	4.34	1.38	0.88	372
Q9. When a patient crisis occurs, we rapidly pool our collective expertise to attempt to resolve it	5.65	1.25	0.90	372
Total Scale	**4.71**	**0.9**	**0.90**	**372**

SOS = Safety Organizing Scale, SD= standard deviation, *N*=number of registered nurses

Table 3.4. Inter-item Correlations between SOS items (*n*=375)

Items	1	2	3	4	5	6	7	8	9
1. We have a good "map"	1								
2. We talk about mistakes	.**538****	1							
3. We discuss our unique skills	.**563****	**.625****	1						
4. We discuss alternatives as to how to go about our normal work activities	.**442****	**.570****	.**612**	1					
5. When giving report, we usually discuss what to look for	**.456****	**.401****	**.413****	**.420****	1				
6. We take advantage of the unique skills	.485**	.513**	.594**	.463**	.567**	1			
7. We spend time identifying activities we do not want to go wrong	.**357****	**.461****	**.446****	**.525****	**.462****	**.587****	1		
8. We discuss how we could prevented them .	.**374****	**.675****	**.529****	**.522****	**.494****	**.550****	**.595****	1	
9. When a patient crisis occurs, we rapidly pool our collective expertise	.**401****	**.377****	**.402****	**.357****	**.483****	**.553****	**.408****	**.486****	1

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

Table 3.5. Correlations between SOS and Perceptions of Patient Safety Culture (*n*=375)

Variable	**SOS**	Perception of Patient Safety Culture Dimensions									
	1	2	3	4	5	6	7	8	9	10	11
SOS	1										
Dimensions											
1	**.52****	1									
2	**.29****	.33**	1								
3	**.48****	.46**	.49**	1							
4	**.34****	.34**	.47**	.45**	1						
5	**.53****	.29**	.38**	.41**	.39**	1					
6	**.45****	.43**	.45**	.41**	.48**	.52**	1				
7	**.30****	.16**	.26**	.29**	.30**	.36**	.38**	1			
8	**.20****	.25**	.34**	.33**	.49**	.19**	.32**	.15**	1		
9	**.18****	.22**	.47**	.26**	.33**	.20**	.36**	.19**	.27**	1	
10	**.36****	.39**	.37**	.41**	.57**	.35**	.39**	.26**	-.32**	.18*	1
11	**-.04**	-.10	-.08	-.05	-.19**	-.12*	-.21**	-.11*	.00	-.05	-.09	1

Perception of safety scales: 1=teamwork, 2=manager actions promoting safety,3= organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6=communication openness, 7=frequency of events reported, 8=staffing, 9=non-punitive response to error, 10= safety grade for unit, 11=number of events reported within the last 12 months.

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

As presented in Table 3.5, SOS is correlated with the eleven dimensions of patient safety culture except for number of events reported within the last 12 months where only three significant correlations were observed. That is, SOS was positively correlated with overall perceptions of safety, feedback about errors, and communication openness. However, there were variations in the correlation of SOS with perceptions of the safety culture dimensions with the strongest being 0.53 ($p < .01$) for feedback and communication about error. Given that the SOS was not highly correlated with the perceptions of patient safety dimensions, there was support for the use of multi-level regression analyses. The results for the unit-level means and correlations with perception of patient safety dimensions are presented in Table 3.6.

Using the t-tests, the difference of SOS mean between nurses with no charge and some charge experience was not significant [t (369) = 1.71, p = .89]. However, comparison among the nurses with less than one year, one to five years, and more than five years charge experience was significant [F (2, 364) = 3.03, p = 0.049]. The post-hoc test indicated there was marginal difference between the nurses with more than five years charge experience who reported more safety organizing behaviors.

Table 3.6 presents the results for standardized regression analyses that examined the extent to which safety organizing behavior is a significant predictor across the 11 dimensions of perception of patient safety after adjusting for key covariates identified in this study. Specifically, the covariates were: nurse characteristics (i.e., length of time as RN, and level of education), individual context (i.e., resilience and shift worked), charge nurse experience (i.e., never, less than one year, 1-5 years, more than 5 years), and the 11 nursing units included in this study. Table 3.6 presents the full model that includes all the variables described above. Both measures of nursing characteristics are not significantly associated with perceptions of patient safety outcomes. The exception to this pattern is observed in a positive significant coefficient for length of time as a RN and frequency of events reported ($B = .22$, $p < .01$). Similarly, the individual contextual factors of resilience and shift worked are not significantly related to perceptions of patient safety.

There are, however, two departures from this pattern of finding: resilience is positively related to feedback about errors ($B = .11$, $p < .05$), and nurses who worked at nights report less positive perception about communication openness ($B = -.13$, $p < .05$) and safety grade ($B = -.15$, $p < .05$) as compared to the nurses who worked during the day. Charge nurse experience was a significant predictor of organizational learning, continuous improvement, communication openness, frequency of errors reported, and safety grade. Compared to the nurses with more than 5 years of experience, the nurses with no charge experience had positive perceptions of frequency of events reported ($B = .26$, $p < .05$) and safety grade ($B = .27$, $p < .05$). While compared to the nurses with more than five years of charge experience, the nurses with one to five years charge experience had more positive perceptions of organizational learning and continuous improvement (*B*

= .17, $p < .05$), communication openness ($B = 0.16$, $p < .05$), frequency of events reported ($B = 0.24$, $p < .05$), and safety grade ($B = 0.18$, $p < .05$).

There were significant associations between the nursing units and the eleven dimensions of perceptions of patient safety culture. Compared to Unit 1, Unit 6 had modest positive association with organizational learning. Unit 6 has strong positive associations for teamwork, manager actions promoting safety, feedback about error, communication openness, frequency of events reported, and especially staffing. Unit 2 was more positive about manager actions promoting safety, organizational learning, communication openness, and number of events reported within the last twelve months. Unit 3 had more positive perceptions of manager actions promoting safety, organizational learning, feedback about error, communication openness, frequency of event reporting and staffing. Unit 5 was more positive about perceptions of staffing. There were mixed findings for Unit 8 when compared to Unit 1. Unit 8 had more positive perceptions about teamwork, communication openness, staffing and less positive perceptions about non-punitive response to error. Unit 9 was more positive than Unit 1 about feedback about error, frequency of events reporting and staffing. Compared to Unit 1, Unit 10 was also more positive about teamwork, manager actions promoting safety, communication openness, but less positive about staffing. Unit 11 had more positive perceptions about teamwork than Unit 1. These results are summarized in Table 3.6.

Table 3.6. Standardized Regression Coefficients for Nurse Characteristics, Individual Context, Units, Safety Organizing Behavior and Perceptions of Patient Safety Culture

Variables	Perception of Patient Safety Culture Dimensions						
	1	2	3	4	5	6	7
Nurse Characteristics							
Length of time as RN	0.03	0.02	0.12	0.04	-0.04	0.04	**0.22***
Level of education	0.01	0.00	-0.07	0.02	-0.05	0.04	-0.04
Individual Context							
Resilience	-0.08	0.00	-0.04	0.07	**0.11***	-0.01	0.06
Shift worked [a]							
Night	-0.01	-0.11	-0.07	-0.12	-0.03	**-0.13***	-0.01
Rotators	-0.02	-0.01	0.04	0.02	-0.00	-0.03	0.01
Charge Nurse (CN) Experience [b]							
No CN experience	0.14	0.15	0.15	0.21	0.02	0.19	**0.26***
Less than one year	0.03	0.04	0.02	0.05	-0.06	0.08	0.05
1 to 5 years	0.09	0.13	**0.17***	0.07	0.06	0.16*	0.24*
Units [c]							
Unit 2	-0.04	**0.19****	-0.12*	-0.11	-0.00	-0.12*	0.01
Unit 3	-0.02	0.12*	0.16**	0.04	0.11*	0.14**	0.21**
Unit 4	-0.07	0.03	-0.10	-0.05	0.04	0.07	-0.04
Unit 5	-0.08	0.07	0.03	-0.02	0.02	0.01	0.12
Unit 6	**0.15****	**0.17****	**0.12***	0.05	**0.20****	**0.19****	**0.20****
Unit 7	0.04	-0.10	0.03	-0.05	0.02	0.08	0.05
Unit 8	**0.14***	-0.04	0.04	0.08	0.01	0.14*	0.04
Unit 9	0.02	0.06	0.09	-0.01	0.14*	0.05	0.13*
Unit 10	0.13*	0.13*	0.06	-0.05	0.10	0.12*	0.06
Unit 11	0.14**	-0.01	0.02	-0.09	-0.00	0.08	0.05
Collective Context							
Safety organizing behavior	**0.41*****	**0.24*****	**0.42****	**0.26*****	**0.48*****	**0.37*****	**0.24*****
N	301	301	301	301	301	301	295
F statistic	**7.13*****	**3.74*****	**6.27*****	**3.12*****	**7.91****	**5.72*****	**3.59*****
R^2	0.33	0.20	0.30	0.17	0.35	0.28	0.20

(continued)

Table 3.6 (*Continued*). Standardized Regression Coefficients for Nurse Characteristics, Individual Context, Units, Safety Organizing Behavior and Perceptions of Patient Safety Culture

Variables	Perception of Patient Safety Culture Dimensions			
	8	9	10	11
Nurse Characteristics				
Length of time as RN	0.04	-0.04	0.05	0.12
Level of education	-0.04	0.03	-0.02	0.06
Individual Context				
Resilience	0.10	0.06	-0.04	0.09
Shift worked [a]				
Night	-0.11	-0.03	-0.15*	0.06
Rotators	0.00	0.14	-0.07	-0.04
Charge Nurse Experience [b]				
No charge nurse experience	0.11	-0.01	0.27*	0.00
Less than one year	0.04	0.00	0.03	0.04
1 to 5 years	0.07	0.07	0.18*	0.12
UNITS [c]				
Unit 2	-0.06	-0.03	-0.07	0.14*
Unit 3	0.12*	0.01	0.05	-0.07
Unit 4	0.02	-0.06	-0.07	0.00
Unit 5	0.13*	0.00	-0.00	0.04
Unit 6	0.23***	0.10	0.07	-0.02
Unit 7	0.07	-0.03	-0.04	-0.04
Unit 8	0.16*	-0.16*	0.12	0.02
Unit9	0.14*	-0.08	0.04	0.06
Unit 10	-0.18**	0.08	0.04	-0.01
Unit 11	0.11	0.05	-0.08	0.01
Collective Context				
Safety organizing behavior	**0.14***	**0.19****	**0.27*****	-0.04
N	301	301	293	297
F statistic	**3.49*****	**2.31****	**2.84*****	1.18
R^2	0.19	0.13	0.17	0.08

Perceptions of safety scales: 1=teamwork, 2=manager actions promoting safety,3= organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6= communication openness, 7=frequency of events reported; 8=staffing, 9=non-punitive response to error, 10= safety grade for unit,11=number of events reported within the last 12 months.
[a] reference group "dayshift" [b] reference group is more than five years of charge experience, [c] unit 1 is reference unit.
*p< .05 **p< .01 ***p< .001

After adjusting for nurse characteristics, individual context, and nursing units, safety organizing behavior is positively associated with the aforementioned 11 dimensions of perceptions of patient safety culture. That is, high levels of safety organizing behaviors are associated with increased perceptions of patient safety culture as identified by teamwork ($B = .41$, $p < .001$), manager actions promoting safety ($B = .24$, $p < .001$), organizational learning ($B = .42$, $p < .01$), overall perception of safety ($B = .26$, $p < .001$), feedback about errors ($B = .48$, $p < .001$), communication openness ($B = .37$, $p < .001$), frequency of events reported ($B = .24$, $p < .001$), staffing or being satisfied with the number of staff nurses on the unit ($B = .14$, $p < .05$), non-punitive response to error ($B = .19$, $p < .01$) and safety grade for work area ($B = .27$, $p < .001$). However, safety organizing behavior was not a significant predictor for number of events reported within the last 12 month. The variance explained for these analyses ranged from a high of 28% for teamwork to a low of 6% for staffing.

Discussion

Unlike previous studies that examined the impact of hospital features and respondents characteristics on perception of patient safety culture (Lee, 2010; Haugen, Softeland, Eide, Nortvedt, Aase, & Harthug, 2010; Sorra et al., 2008), this study went further by examining the relationship between the safety behavior of nurses and their perceptions of patient safety culture. The association of hospital and staff characteristics with perceptions of patient safety culture provides assessments of patient safety culture as reported by sub-categories of study participants (Huang et al., 2007; Kim et al., 2007; Liu et al., 2009). Although these studies provide an understanding of how patient safety

culture is perceived by healthcare workers, this information does not indicate whether the workers are influencing the very culture they are assessing.

This study added empirical information about the influence of nurses' collective safety behavior on their perceptions of patient safety culture. Among nurses, safety behaviors in conjunction with trust in manager and care pathways have been associated with fewer reports of medication errors (Vogus & Sutcliffe, 2007). By exploring the influence of nurses' collective safety behaviors in relation to perceptions of patient safety culture, additional insights into the black box of organizational dynamics that may be implicated in perceptions of patient safety culture among staff nurses and charge nurses are provided. This study is an important first step in understanding the potential connections between organizational safety behaviors and perceptions of patient safety culture and the unique contributions of nurses in their role as healthcare providers.

The findings in this study support the hypothesis that collective safety organizing behaviors are predictive of perceptions of patient safety culture after controlling for key confounding variables. The results of the regression analyses demonstrate that while controlling for the individual context and unit characteristics, safety organizing behavior had a strong positive significant relationships with the perceptions of patient safety culture. That is, with increased safety organizing behaviors, the more positive were the nurses' perceptions of patient safety culture. There were significant positive perceptions for teamwork, manager actions promoting safety, organizational learning, overall perceptions of patient safety, staffing, and safety grade for work area. These findings suggest that the collective safety organizing behaviors may have enhanced the nurses' situational awareness of the patient safety culture. Situational awareness is necessary for

the management of outcomes in highly complex work environments (Autrey & Moss, 2006; Benner, Sheets, Uris, Malloch, Schwed & Jamison, 2002; Epstein, 2008). However, collective safety organizing behaviors may be suggestive of the merits of situational awareness within the framework of the perceptions of patient safety culture. Two of the core features of collective safety behaviors are sensitivity to operations and deference to expertise, which means that the nurses knew and trusted the experts in their group (Weick & Sutclifffe, 2003). The interdependence promotes tight-coupling of collective attention instead of individual strengths that helped to improve the safety of the unit as a whole (Weick & Roberts, 1993). Safety organizing behaviors may have facilitated the nurse interdependence and teamwork for increased perceptions of safety on the unit. Hence, the importance of frontline workers such as staff nurses in early detection of challenges to the creation of positive safety culture.

There were also positive relationships with feedback and communication about error, communication openness, frequency of event reports and non-punitive response to error. These findings are consistent with the reporting and discussion about errors within safety cultures. The items for frequency of event reported included mistakes that were caught and corrected before affecting the patient; had no potential to harm the patient; and harmed the patient. The reporting of near misses and errors suggests that the nurses had the freedom to discuss the prevention of mistakes. In organizational climates where the discussion about errors are encouraged there is more willingness and less fear to report mistakes (Clancy, Farquhar, & Sharp, 2005; Yourstone & Smith, 2002). Sorra et al. (2008) reported that among transfusion workers who had positive attitudes about event reporting, there was more recording of events that result in or had the potential to harm

patients. In addition, in nine of the eleven units within this sample, more than 50% of the nurses had charge experience. The charge nurse is usually the first management member made aware of any potential for errors. Typically within the charge nurse role not only is there more awareness of mistakes occurring within the unit, but there is also more accountability for the errors (Connelly et al., 2003; Wilson et al., 2011). Within safety cultures, willingness to report events is essential for the early detection of errors (Edmondson, 1999; Weick & Sutcliffe, 2003). This study however, departs from the extant literature on patient safety outcomes by examining the role of safety organizing behaviors in predicting perceptions of patient safety culture. By focusing on perceptions of patient safety culture, this study points to the importance of these perceptions which are often the precursors of patient safety outcomes.

In this study, safety organizing was not predictive for the number of events reported within the last 12 months. This finding is unlike other empirical work that shows associations between safety culture and reports of errors (Singer et al., 2009; Sorra et al., 2008; Vogus & Sutcliffe, 2007b). Within this study 33% of the written responses that were provided by the respondents in response to an open-ended question about safety culture were related to the reporting of errors. For example, the respondents expressed that there were barriers to reporting errors such as: "Sometimes the process takes too long and too many interruptions happen," "The incident report form is time consuming and cumbersome," "We are often too busy, too understaffed to have time to fill out reports," and "If the reporting process wasn't so time consuming more events would be reported." There were specific concerns about the newly installed electronic reporting system. The respondents wrote in: "[patient] safety report form on our computer is tedious and

lengthy. It should be more basic and nursing/pt oriented," and "These are difficult types of "events" and the answer to this varies accordingly, med event? sentinel event?" Therefore, these situational factors may have contributed to non-significant finding with number of events reported. Specifically, these barriers to self-reporting may have suppressed the actual number of events reported. In summary, there were mixed findings from this study. Safety organizing behavior was associated with positive perceptions of the patient safety culture and not associated with number of events reported in the last 12 months.

The ever-increasing emphasis on the positive impact of safety culture on provider and patient outcomes requires effective measurement of the safety culture constructs. In this study the nursing characteristics and individual context were not predictive of perceptions of patient safety culture. The sample size of this study may have led to the inconclusive findings about the nurse characteristics and individual context. In other studies, perceptions of patient safety culture were associated with gender, age work areas and professional disciplines (e.g., Hartman et al., 2008). However, in this study the perceptions of safety was assessed using a collective construct that measures the workers sense of their own safety behavior as compared to the organizational safety culture. By applying this tool two objectives are achieved: the findings provided an indication of the workers' assessment of their own safety behaviors; and an assessment of the organization's safety grade. The safety behaviors may be more accurate in the assessment of the patient safety culture since the summary effect of the safety behaviors encourages preoccupation with failure, which is a constant wariness and assumption that something may be missing in the analysis of problems (Weick & Sutcliffe, 2007).

Limitations

In this study, safety organizing behavior was examined in relation to the outcomes, perceptions of patient safety culture. There were eleven units represented, however no significant differences in the nurses' safety behaviors were found across the units. This finding may have been subsequent to the small sample size and use of a single study site that restricted multi-level analyses across the eleven units. Future studies may want to consider a longitudinal study that will allow for a more precise evaluation of the causal flow of the variables included in this study. While efforts were made to have a representative sample, this was nonetheless a convenience sample of nurses in a single hospital system. Convenience samples are often susceptible to selection bias, thus the extent to which nurses were motivated to participate (or not to participate) may have influenced their self-selection into the study. A future study may want to consider probability sampling to reduce the biases associated a convenience sample, especially within the context of using a single hospital design. Also, the inclusion of various and multiple healthcare organizations can increase variations within the samples. Finally, the response options for the variable, "number of events reported" were in categories which did not allow the participants give specific number of events. Therefore, the preciseness of the number of events reported was not captured.

Conclusion

The work of nurses and their practice environments impact the quality of care provided to patients. The need for constant improvement in patient outcomes calls for comprehensive strategies to cultivate and maintain patient safety cultures. In this study, the collective behaviors of nurses have been shown to influence the perceptions of nurses about the patient safety culture. The collective safety behaviors supported a more positive perception of the patient safety culture. These findings suggest that collective safety behaviors may increase the registered nurses' recognition that mistakes can happen to anyone, heighten the awareness of the strengths of team members, provide psychological safety for the reporting of errors, and increase the ability to recover from mistakes.

These behaviors may be necessary tools to augment organizational strategies aimed at improving patient safety outcomes. In addition, these behaviors operate at the unit level, which facilitates the more manageable implementation and assessment as compared to organizational level strategies. This provides the opportunity to provide intervention strategies that can address any lapses in either the workers collective behaviors or organizational safety practices. In creating organizational change, strategies aimed at unit-level behaviors may be more successful (Blegen, Sehgal, Alldredge, Gearhart, Auerbach & Wachter, 2010; Kooker & Kamikawa, 2010; Smits, Wagner, Spreeuwenberg, van derr Wal & Groenewgen, 2007).

The need for constant improvement in patient outcomes calls for comprehensive strategies to cultivate and maintain patient safety cultures (Havens & Aiken, 1999; Hughes, 2008). Safety cultures have supported research utilization (Cummings, Hutchinson, Scott, Norton & Estabrooks, 2010) and improved provider outcomes

(Brewer, 2006). Nurses can lead the charge for transformation of patient safety culture. Nurses function in complex tight-coupling work environments and demonstrate safety behaviors similar to reliable professionals in non-health high reliable organizations. Future studies that test changes in perceptions of patient safety culture following the implementation of safety organizing behaviors are encouraged.

References

Aiken, L. H., & Patrician, P. A. (2000). Measuring organizational traits of hospitals: The revised nursing work index. *Nursing Research, 49*(3), 146-153.

Aiken, L.H. Clarke, S.P., & Sloane, D.M. (2000). Hospital restructuring: Does it adversely affect care and outcomes? *The Journal of Nursing Administration*, *30*(10), 457-465.

Aiken, L. H., Clarke, S. P., Sloane, D. M., Douglas, M.S., Sochalski, J. A., Busse, R., …Shamian, J. (2001). Nurses' report on hospital care in five countries. *Health Affairs, 20*(3), 43-53.

American Nurses Association, (2000). *Nurse staffing and patient outcomes in the inpatient hospital setting*. Washington, DC: American Nurses Association.

Arzoomanian, D., & Keys, A., (2008). ED charge nurse workshop: Queen for a day: One hospital's answer to orienting nurses to the charge role. *Journal of Emergency Nursing, 34*(4), 373-374.

Asphen, P., Corridan, J., Walcott, J., & Erickson, S. M. (2004). *Patient safety: Achieving a new standard for care*. Washington, DC: National Academy Press.

Autrey, P., & Moss, J. (2006). High-reliability teams and situation awareness - implementing a hospital emergency incident command system. *The Journal of Nursing Administration, 36*(2), 67-72.

Benner, P., Sheets, V., Uris, P., Malloch, K., Schwed, K., & Jamison, D. (2002). Individual, practice, and system causes of errors in nursing - A taxonomy. *The Journal of Nursing Administration, 32*(10), 509-523.

Berney, B., & Needleman, J. (2006). Impact of nursing overtime on nurse-sensitive patient outcomes in New York hospitals, 1995-2000. *Policy, Politics Nursing Practice, 7*(2), 87-100.

Blegen, M., Sehgal, N., Alldredge, B., Gearhart, S., Auerbach, A., & Wachter, R. (2010). Improving safety culture on adult medical units through multidisciplinary teamwork and communication interventions: The TOPS project. *Quality Safety in Health Care, 19*(4), 346-350.

Brink, P.J., & Wood, M.J. (1998). *Advanced design in nursing research* (2nd ed.). Thousand Oaks, California: Sage.

Brewer, B. B. (2006). Relationships among teams, culture, safety, and cost outcomes. *Western Journal of Nursing Research, 28*(6), 641-653.

Clancy, C.M., Farquhar, M.B., & Sharp, B. A. (2005). Patient safety in nursing. *Journal of Nursing Care Quarterly, 20*(3), 193-197.

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

Connelly, L.M., & Yoder, L. H. (2003).). A qualitative study of barriers and facilitators of the charge nurse role. *Nursing Leadership Forum, 7*(4), 157-164.

Cook, R., & Rasmussen, J. (2005). "Going solid": A model of system dynamics and consequences for patient safety. *Quality and Safety in Health Care, 14,* 130-134.

Cummings, G., Hutchinson, A., Scott, S., Norton, P., & Estabrooks, C. (2010). The relationship between characteristics of context and research utilization in a pediatric setting. *BMC Health Services Research, 10*(1), 168.

Denison, D. R. (1996). What is the difference between organizational culture and

organizational climate? A native's point of view on a decade of paradigm wars. *The Academy of Management Review 21*(3), 619-654.

Dienemann, J. (1989). Theoretical perspectives in organizing science administration. In B. Henry, C. Arndt, M. Di Vincenti, A. Marriner-Tomey (Eds.). *Dimensions of nursing administration: Theory, research, education, practice* (pp. 159-174). California: Blackwell Scientific Publications, Inc.

Edmondson, A. C. (1999). Psychology safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.

Epstein, R. (2008). Mindful practice. *The Journal of the American Medical Association*, *282*(9), 833-839.

Estabrooks, C.A., Williams, K.M., Cummings, G. G., Ricker, K. L., & Giovannetti, P. (2005). The impact of hospital nursing characteristics on 30-day mortality. *Nursing Research, 54*(2), 78-84.

Gaba, D. M., Singer, S. J., Sinaiko, A. D., Bowen, J. D., & Ciavarelli, A. P. (2003). Differences in safety climate between hospital personnel and naval aviators. *Human Factors, 45*(2), Summer 2003, 173-185.

Gallagher, R.M., Rowell, P.A. (2003).Claiming the future of nursing through nursing-sensitive quality indicators. *Nursing Administration Quarterly. 27*(4), 273-284.

Hall, L. M. (2003). Nursing intellectual capital: A theoretical approach for analyzing nursing productivity. *Nursing Economics, 21*(1), 14-19.

Hall, L., Doran, D., & Pink, L. (2008). Outcomes of interventions to improve hospital nursing work environments. *The Journal of Nursing Administration, 38*(1), 40-46.

Hall, L., & Kiesners, D. (2005). A narrative approach to understanding the nursing work environment in Canada. *Social Science and Medicine, 61,* 2482-2491.

Hall, L., Pink, L., Lalonde, M., Murphy, G. T., O'Brien-Pallas, L., Laschinger, H. K. S., …Akeroyd, J. (2006). Decision making for nurse staffing: Canadian perspectives. *Policy, Politics, and Nursing Practice, 7*(4), 261-269.

Havens, D. S., & Aiken, L. H. (1999). Shaping systems to promote desired outcomes. The magnet hospital model. *Journal of Nursing Administration, 29*(2), 14-20.

Hines, S., Luna, K., & Lofthus, J. (2008). *Becoming a high reliability organization: Operational advice for hospital leaders* (Agency for Healthcare Research and Quality Publication No. 08-0022). Rockville, MD: Agency for Healthcare Research and Quality.

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

Hughes, L., Chang, Y., & Mark, B. (2009). Quality and strength of patient safety climate on medical-surgical units. *Health Care Management Review, 34*(1), 19-28.

Hughes, R. G. (Ed.). (2008). *Patient safety and quality: An evidence-based handbook for nurses.* (Agency for Healthcare Research and Quality Publication No. 08-0043). Rockville, MD: Agency for Healthcare Research and Quality.

Kalisch, B., & Aebersold, M. (2010). Interruptions and multitasking in nursing care. *The Joint Commission Journal on Quality and Patient Safety, 36*(3), 126-32.

Kane, R. L. (Ed.). (2006). *Understanding health care outcomes research* (2nd ed.). Sudbury, Massachusetts: Jones and Bartlett Publishers.

Kane, R.L., Shamliyan, T., 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.

Kim, J., An, K., Kim, M., & Yoon, S. (2007). Nurses' perception of error reporting and patient safety culture in Korea. *Western Journal of Nursing Research, 29*(7), 827-844.

Kooker, B., & Kamikawa, C. (2010). Successful strategies to improve RN retention and patient outcomes in a large medical centre in Hawaii. *Journal of Clinical Nursing, 20*(1-2), 34-39.

Kovner, C. T., & Harrington, C. (2000). Counting nurses. *American Journal of Nursing, 100*(9), 53-53.

Laschinger, H. K. S., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout/engagement. *The Journal of Nursing Administration, 36*(5), 259-267.

Liu, Y., Kalisch, B., Zhang, L., & Xu, J. (2009). Perception of safety culture by nurses in hospitals in China. *Journal of Nursing Care Quality, 24*(1), 63-68.

Mark, B. A., Hughes, L. C., Belaya, M., Bacon, C.T., Chang, Y., & Jones, C. A. (2008). Exploring organizational context and structure as predictors of medication errors and patient falls. *Journal of Patient Safety, 4*(2), 66-77.

Mark, B. A., Slayer, J., & Smith, C. S. (1996). A theoretical model for nursing systems outcomes research. *Nursing Administration Quarterly, 20*(4), 12-27.

Moody, R. F., Pesut, D. J., & Harrington, C. F. (2006). Creating safety culture on nursing units: Human performance and organizational system factors. *Journal of Patient Safety, 2*(4), 197-206.

Needleman, J., Buerhaus, P., Mattke, S., Stewart, M., & Zelevinsky, K. (2002). Nurse-staffing levels and the quality of care in hospitals. *The New England Journal of Medicine, 346*(22), 1715-1722.

Norrish, B. R., & Rundall, T. G. (2001). Hospital restructuring and the work of registered nurses. *The Milbank Quarterly, 79*(1), 55-79.

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

Reason, J. (1995). Understanding adverse events: Human factors. *Quality in Health Care, 4*, 80-89.

Schien, E. (2004). *Organizational culture and leadership*. (3rd. ed.). San Francisco: Jossey-Bass.

Schulman, P. R. (1993). Negotiated order of organizational reliability. *Administration and Society, 25*(3), 353-372.

Schulman, P. R. (2004). General attributes of safe organizations. *Quality and Safety in Health Care, 13*(Suppl. 2), 39-44.

Schulman, P. R., Roe, E., Van Eeten, M., & de Bruijne, M. (2004). High reliability and the management of critical structures. *Journal of Contingencies and Crisis Management, 12*(1), 14-28.

Scott-Findlay, S., & Estabrooks, C. A. (2006). Mapping the organizational culture research in nursing: A literature review. *Journal of Advanced Nursing, 56*(5), 498-513.

Sherman, R. O. (2005). Don't forget our charge nurses. *Nursing Economics, 23*(3), 125-143.

Singer, S. J., Gaba, D., Falwell, A., Lin, S., Hayes, J., & Baker, L. (2009). Patient safety climate in 92 US hospitals: Differences by work area and discipline. *Medical Care, 47*(1), 23-31.

Sleutel, M. R. (2000). Climate, culture, context, or work environment? Organizational factors that influence nursing practice. *Journal of Nursing Administration, 30*(2), 53-58.

Smits, M., Wagner, C., Spreeuwenberg, P., van der Wal, G., & Groenewegen, P. (2009). Measuring patient safety culture: An assessment of the clustering of responses at unit level and hospital level. *Quality Safety in Health Care, 18*(4), 292-296.

Sorra J. S., Famolaro, T., Dyer, N., Nelson, D., & Khanna, K. (2008). *Hospital Survey on Patient Safety Culture 2008 comparative database report* (Agency for Healthcare Research and Quality Publication No. 08-0039). Rockville, MD: Agency for Healthcare Research and Quality.

Sorra, J. S., & Nieva, V. F. (2004). *Hospital Survey on Patient Safety Culture* (Agency for Healthcare Research and Quality Publication No. 04-0041). Rockville, MD: Agency for Healthcare Research and Quality.

Sorra, J., Nieva, V., Fastman, B. R., Kaplan, H., Schreiber, G., & King, M. (2008). Staff attitudes about event reporting and patient safety culture in hospital transfusion services. *Transfusion, 46*, 1934-1942.

Tachibana, A., & Nelson-Peterson, D. L. (2007). Implementing the clinical nurse leader role using the Virginia Mason Production system. *Journal of Nursing Association, 37*(11), 477-479.

Talsma, A., Bahl, V., & Campbell, D. (2008). Exploratory analyses of the "failure to rescue" measure - evaluation through medical record review. *Journal of Nursing Care Quality, 23*(3), 202-210.

Ulrich, B. (2010). The future of nursing. *Nephrology Nursing Journal, 37*(6), 591-592.

Vogus, T. J., & Sutcliffe, K. M. (2007a). The safety organizing scale: Development and validation of a behavioral measure of safety culture in hospital nursing units. *Medical Care, 45*(1), 46-54.

Vogus, T. J., & Sutcliffe, K. M. (2007b). The impact of safety organizing, trusted leadership, and care pathways on reported medication errors in hospital nursing units. *Medical Care, 45*(10), 997-1002.

Walker, K., Middleton, S., Rolley, J., & Duff, J. (2010). Nurses report a healthy culture: Results of the practice environment scale (Australia) in an Australian hospital seeking magnet recognition. *International Journal of Nursing Practice, 16*(6), 616-623.

Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly, 38*(3), 357-381.

Weick, K., & Sutcliffe, K. M. (2001). *Managing the unexpected: Assuring high performance in an age of complexity* (1st ed.). San Francisco: Jossey-Bass.

Weick, K., & Sutcliffe, K. M. (2003). Hospitals as cultures of entrapment: A reanalysis of the Bristol Royal Infirmary. *California Management Review, 45*(2), 73-84.

Weick, K., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty* (2nd ed.). San Francisco: Jossey-Bass.

Willmot, M. (1998). The new ward manager: An evaluation of the changing role of the charge nurse. *Journal of Advanced Nursing, 28*(2), 419-427.

Yourstone, S., & Smith, H. (2002). Managing system errors and failures in health care organizations: Suggestions for practice and research. *Health Care Management Review, 27*(1), 50-61.

Chapter IV

The Association of Unit Leadership with Perceptions of Patient Safety Culture: The Impact of Charge Nurse Mix

The shift-by-shift leadership of nursing units is one of the main responsibilities that falls within the purview of charge nurses. As frontline managers, charge nurses are usually the first to become aware of potential risks that threaten the safety of patients (Mahlmeister, 2006). They receive ongoing updates about patients from staff nurses, filter and monitor the flow of information to and from staff nurses, collaborate with physicians for the care of patients, and are the general assistants to nurse managers (Ambrose, 1995; Connelly, Yoder, & Miner-Williams, 2003; Krugman & Smith, 2003). Therefore, charge nurses tend to have the pulse of the units and are often in a position to provide an accurate assessment of the patient safety culture

It remains unclear what type of charge nurse leadership is most effective for the maintenance and cultivation of positive patient safety cultures. This study examined the extent to which the unit structure of the charge nurse leadership is associated with perceptions of the patient safety culture and the association between organizational structure of the charge nurse role and perceptions of patient safety culture. The literature about safety cultures suggests that attitudes about safety culture impact the reporting of events (Edmondson,1999).

Background

Organizational Structure of Unit Leadership

Historically, the shift-by-shift leadership of nursing units has been the primary role of charge nurses and ward sisters (Halliday, 2006). Traditionally, the scope of the charge role is broad. These unit leaders made staffing assignments (Bostrum & Suter, 1992; Connelly et al., 2003), mentored staff nurses, assisted unit managers, collaborated with physicians (Admi & Moshe-Eilon, 2010; McEwen, Cooper, & Clayworth, 2005), and were patient advocates (Mathias, 2001). The emphasis on clinical competence outweighed the need to develop competence in managing personnel of events. Typically, within healthcare organizations, nurses who had developed clinical expertise with a specific patient population filled the charge nurse role (Ambrose 1995; Connelly, Nabarrete, & Smith, 2003; Zimmerman, 2000). However, with the constant shortage of nurses and restructuring of healthcare organizations, orientation to the charge nurse role was common once a nurse had worked for two consecutive years on a unit (Mathias, 2001; Rani, Brennan & Timmons, 2010). Within any given unit, there can be several nurses functioning in the charge role with a wide variation in clinical skills. This pattern of choosing charge nurses has remained unchanged although there have been some modifications of the job title and descriptions in some organizations (Malcolm & Stewart, 2008). With the increased demand for improved patient outcomes, the charge nurse role has been broadened to include more accountability for the quality of care provided within their assigned units (Rani et al., 2010; Smyth, 2010).

The impact of practice environments on patient outcomes and therefore the management of the associated organizational factors was not highlighted until late in the

1990s (Aiken & Patrician, 2000; Reason, 1995). As the level of care within the units became more complex, the increase in negative patient outcomes became the subject of national commissions on quality of patient care (Norrish & Rundall, 2001; Page 2004). More attention was placed on the level of nurse staffing (hours per patient day and RN mix) to ensure patient or provider satisfaction (Kane et al., 2007; Spetz, 2004) and nurse practice environments (Estabrooks et al., 2005; Lake & Friese, 2006; Laschinger & Leiter, 2006). However, there has not been extensive examination of the structure of leadership of these complex healthcare organizational sub-units. With the increased demand for improved patient outcomes, the leadership role of charge nurses has been broadened to include more accountability for the quality of care provided within their assigned units (Smyth, 2010).

In a recent study, Wilson et al. (2011) found that the organizational structure for unit leadership was loosely defined. The charge nurse role was classified, by union contract language, as direct care (bedside care) providers instead of non-direct caregivers like managers. Many of the units could not have charge nurses function only as non-direct care providers. The position of the charge nurse role was not assigned full time equivalents (FTE). To facilitate the charge nurse role, nurse managers had to pull nurses who were scheduled for direct patient care for the non-direct management of each shift. No two units had the same structure for the role of the charge nurse. To ensure trained charge nurses were in the role for every shift including weekends and holidays, some nurse managers developed a one-month rotating schedule for experienced charge nurses. However, in the majority of the units, on a shift-by-shift basis, either a trained charge

nurse or the most senior staff nurse on duty assumed the charge nurse role (Wilson et al., 2011).

The structure of the charge nurse role has also been influenced by the debate about the legal scope of practice of nurses who supervise others. The designation of a permanent charge nurse role in several healthcare organizations across the country has been the subject of legal debate (Straight, 1999; Szczepanski, 2010). Collective bargaining stipulations exclude membership to anyone in supervisory roles. In an attempt to deny several nurses from joining the local union, a hospital in Alaska claimed that the charge nurses were supervisors and therefore members of the management team (DiCesare, 1996). Effectively, by asserting charge nurses are supervisors, approximately 25% of the nurses would have been denied membership in the union. The National Labor Relations Board (NLRB) ruled that the nurses in permanent or rotating charge roles were not supervisors because they did not exercise independent judgment in the execution of their duties (Tammelleo, 1997). The rulings by the NLRB have been reinterpreted, challenged, and reversed in many states given that there are many variations in the scope of practice for charge nurses. In Ohio, a charge nurse for a long term facility was ruled to be a supervisor by the NLRB (Szczepanski, 2007), while in Michigan, the NLRB ruled that permanent but not rotating charge nurses are considered supervisors (American Nurses Association, 2006). These labor law rulings have impacted and probably suppressed the formation of permanent charge nurse positions in healthcare organizations. Consistency in the charge nurse role is essential for the development of competency in leadership skills at the unit-level.

The transformation of nurse leadership has been underscored as a pivotal component in the triad approach nurses need to adopt to lead change in healthcare outcomes and advance health (Institute of Medicine, 2011). The call for transformation of the nurse leadership at the bedside is therefore timely and critical. This is especially salient for charge nurses who as frontline managers are usually the first to be aware of potential risks that threaten the safety of patients. Charge nurses are usually the most knowledgeable about patient and staff status as they work in full partnership with physicians and other members of the multi-disciplinary (Kennedy, 2008). Having competent nurses serve in the leadership role provides other benefits for nursing units. Unit leadership is also very critical for the utilization, translation and implementation of research (Bolton et al., 2005; Grimshaw et al., 2006). Unit leaders are often described as opinion leaders whose support of improvement strategies can motivate staff nurses (Grossman, 2007; Wallin, 2008). Finally, Hughes and Kring (2005) found that charge nurses who function consistently in the role improved teamwork among nurses in a medical-surgical unit.

The call for nurses to develop leadership skills from the bedside to boardroom requires the redesign of nursing education (IOM, 2011). Unlike the emphasis for demonstration of expertise in clinical practice with specialty certifications, there is no known certification to demonstrate expertise in charge nurse leadership. Except for organizationally sponsored educational programs, most charge nurses receive limited unit-specific leadership training prior to being in charge (Arzoomanian & Keys, 2008; Connelly et al., 2003; Sherman, 2005). However, the charge nurse role requires the development of broader leadership skills (Burns, Eagleton, Golden, & Thompson, 2009;

McCallin & Frankson, 2010). Most formal leadership training for nurses occurs at the graduate level, however most staff nurses are expected to be shift leaders for the unit within 12 to 18 months post-graduation (Wilson et al., 2011). There is a current eight-year gap between undergraduate to graduate education (IOM, 2011), which often does not provide opportunities for charge nurses to be formally trained. Nonetheless, upon completion of graduate leadership degrees, most nurses function mainly as nurse managers and not as charge nurses. With more than 60% of nurses working in the acute healthcare settings, there are many nurses functioning in the leadership role without adequate training. This large number of nurses in the acute care setting provides opportunities for the transformation, development and comparison of leadership models at the unit-level.

Unit-level Culture and Patient Outcomes

Healthcare organizations are comprised of sub-structures like nursing units. Although most of the errors in hospitals occur during routine care in patient care units, the majority of studies about nurse staffing and patient outcomes are conducted at the hospital level and not at the patient care unit level (Blegen, 2006). Studies of unit-level outcomes are inconsistent and at times run counter to the findings from hospital-level research (Blegen, 2006; Talsma et al., 2008). Many of the research measures about healthcare providers' performance and outcomes can only capture the effects the organizational culture or structure at either the macro or the micro level while the phenomenon observed may be occurring at the meso level (Kane, 2006).

Zimmerman's et al. (1993) study of the hospital culture and intensive care unit performance included 3,672 admissions in nine ICUs, 316 nurses, and 202 physicians.

The findings suggested that superior organizational practices among ICUs were related to patient-centered culture, strong medical and nursing leadership, effective communication, and collaborative approaches to conflict. Scott et al. (2003) reviewed 10 empirical studies to determine whether there was evidence that organizational culture influenced health care performance. The culture of nine ICUs was assessed to determine the impact on actual/predicted death rates and actual/predicted length of ICU stay. Four of the ten studies provided evidence of linkage between culture and performance.

Event Reporting

Accident and incident reporting procedures are necessary for safety cultures (Khon et al., 1999; Reason, 1995). Systems factors related to the errors can be corrected with the early detection and reporting of adverse events (Edmondson, 1996; Webster et al., 2001; Weick et al., 2001). The provision of an environment where errors are reported and discussed openly facilitates learning from mistakes (Lipshitz et al., 2002; Yourstone et al., 2002). The emphasis of a systems approach to improvement of a healthcare environment was strongly influenced by studies emerging from the organizational studies research. The performance of workers on fighter aircraft carriers was almost error free (Weick & Roberts, 1993) and the posture of learning from mistakes was encouraged so that early detection of errors prevented occurrences of more disastrous problems (Lipshitz et al., 2002). The reduction of a punitive environment led to the sustenance of safety culture (Edmondson, 1996). Subsequently, this can lead to the reduction of the number of patient errors that occur.

Medication errors and patient falls are two quality care indicators sensitive to nursing (American Nurses Association, 2000; Gallagher et al., 2003; National Quality

Forum, 2006). Medication errors occur in three stages: prescribing, dispensation, and nurse administration. Thirty-eight percent of medication errors occur during nursing administration (Leape et al., 2000). Medication errors are associated with nursing stress, shortages, work overload, and distractions during administration (American Nurses Association, 1995; Fuqua & Stevens, 1988). Communication failure was cited most often (>60%) as the cause of medication errors (Patterson, Cook, Woods, & Render, 2004). At least one medication error occurs every day for one patient (IOM, 2006). The Center for Medicare and Medicaid Services (CMS) inpatient prospective payment system does not allow reimbursement for care generated from treatment of patient falls (Center for Medicare and Medicaid Services, 2009). This stance by the federal government has increased the vigilance by healthcare organizations to improve reporting of events.

The format for reporting errors varies. Errors may be recorded on internal incident reports and may not be included in the patient's charts (Iezzoni et al., 1994). Reporting of adverse events in most hospital systems is via voluntary incident report forms (Yourstone et al., 2002). The inclusion of web-based reporting systems has been established to facilitate ease of reporting (Flynn, Barker, & Pepper, 2002). Mandatory reporting of errors is usually required by state laws for events that result in serious injury like the loss of a limb, or death. Voluntary reporting of errors has been associated with more reporting of near misses. This reporting provides insights to system structures that represent latent failures (Page, 2004). Mayo and Duncan's (2004) cross-sectional study of 983 registered nurses examined the error reporting behaviors of nurses. Nurses did not consider it necessary to complete incident reports for missed or omitted medication doses but verbally reported to physicians. The fear of co-workers' reactions was also a barrier to

error reporting found by Mayo and Duncan (2004). Reporting of medication errors and completion of incident report forms are more frequently documented by nurses than physicians and pharmacists (Tuckett, 2005).

Mark et al. (2008) examined the role of organizational context and safety climate on event reporting of medication errors and falls. This study included 278 medical-surgical units in 143 hospitals. The nursing unit environment variables included size work complexity, patient acuity, and availability of support services. The safety climate was measured using the error orientation scale and Zohar safety climate scale. Medication errors and patient falls were measured using incident reports for 6 consecutive months. In their study, Mark et al. (2008) found that the interaction between safety climate and unit capacity was significantly related to medication errors. At low levels of safety, higher unit capacity was associated with fewer reported medication errors. However at high and average levels of safety climate, there was no relationship with unit capacity and reported medication errors. This suggests that either fewer errors occurred even in high complexity or nurses' reporting behaviors were affected by increased unit capacity. The possible contributing factors were: 1) better safety climates had fewer support staff available to assist patients; 2) high work demand forced the RNs to focus less on surveillance of patients who were at risk for falls; and 3) reporting of falls were higher in the low safety climate (Mark et al., 2008).

Vogus et al. (2007) conducted a cross-sectional analysis of the joint effect of a safety organizing behavior, and trust in manager and use of care pathways on report of medication errors. A total of 1,033 nurses participated, and medication errors reports were collected for a period of 6 months. The findings provided evidence that high levels

of safety organizing and high levels of trust in a unit manager, and the use of care pathways were associated with fewer reports of medication errors. In a study in two Iowa hospitals Wakefield et al. (1999), nurses reported that approximately 60% of medication errors are reported. Barriers to reporting events include fear, shame, guilt, administrative response, disciplinary actions against individuals, and reporting effort (Wakefield et al., 1999; Meurier, 2000; Hughes & Ortiz, 2005). Nurses in another study (Rathert & May, 2007) were surveyed to determine the relationship between patient-centered work environments and medication errors. Findings indicated that nurses who felt their units were patient-centered were more comfortable reporting medication errors and near misses. Patient falls have been one of the nursing sensitive quality indicators included in Centers for Medicare and Medicaid Services. Blegen and Vaughn (1998) found that units with a higher proportion of RNs were found to have lower fall rates. However, some studies found no relationship with nurse staffing and falls (Morse et al., 1987).

In summary, the reporting of events has been found to be influenced by the use of technology, reporting behaviors of providers, managers' responses to errors and the safety climate. Charge nurses are usually the first line of management to be aware of errors within a nursing unit. Yet, it is unknown whether the structure of the charge nurse role influences the frequency of event reporting by staff nurses.

Theoretical Framework

The structural contingency theory asserts an organization's successes depend on their ability to match the structural features with the specific environment with which it relates. The provision of nursing care in the acute care setting is challenging given the complexity of patient care and uncertainty of outcomes. Recent research on the

effectiveness of the delivery of healthcare has been extensive and has provided mixed reviews on the factors that contribute to negative nursing sensitive outcomes and the strategies for quality nursing care (Kane et al., 2007). In part, this may be due to the fact that nursing research has been focused mainly on either the nursing context (e.g., RN mix, HPPD, age education); the nursing process (e.g., use of technology, event reporting, handoffs, teamwork and infection control practices); or the organizational structure (e.g., type of facility, magnet status, geographic location, and practice environment) (Mark et al., 1996). The inclusion of both context and structure in the examination of the charge nurse role can provide nuanced information about the uniqueness of healthcare organizations and strategies that can be implemented for the improvement of the role of the charge nurse.

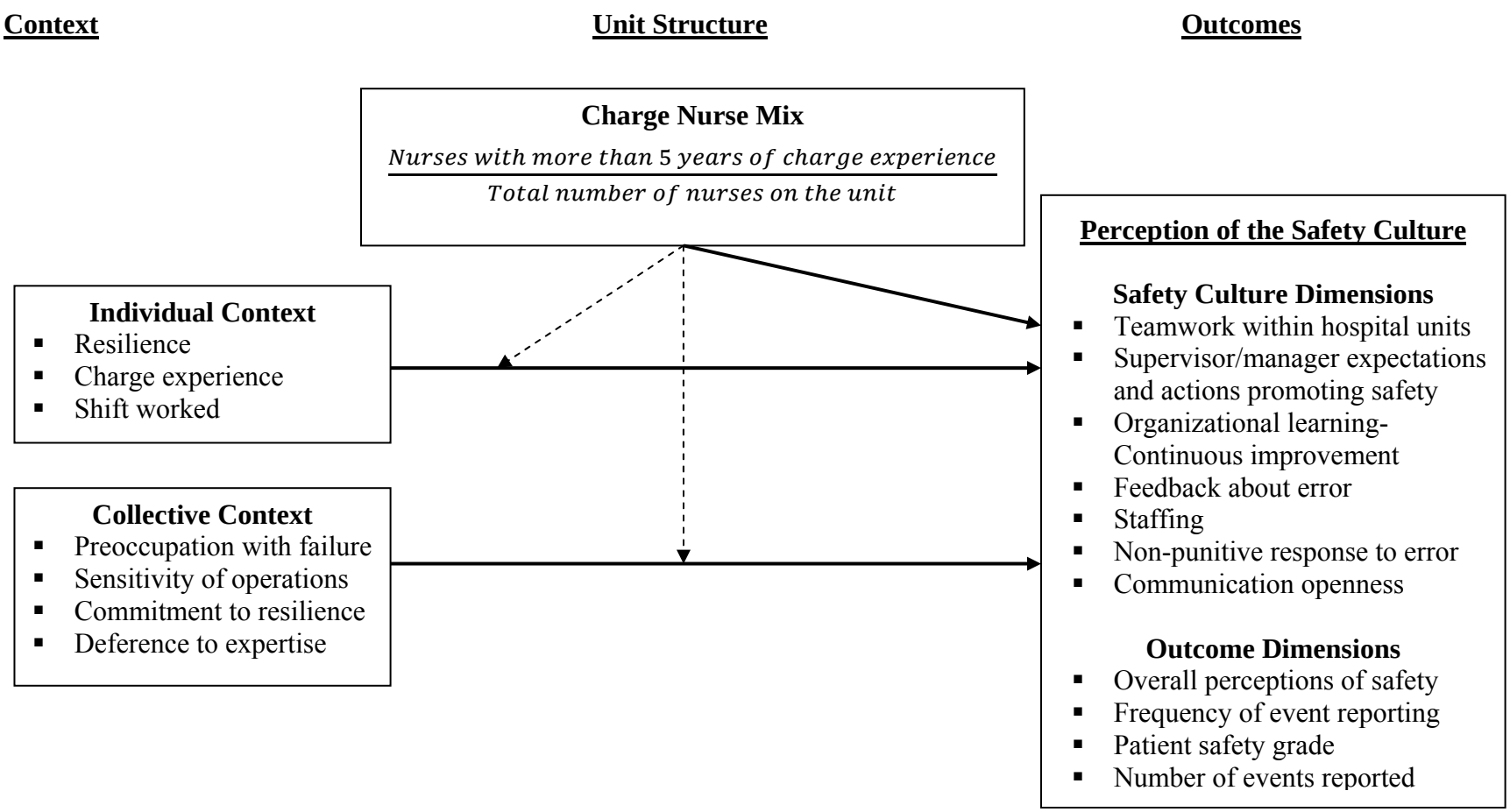
In this paper, the nursing *unit structure* is added to the RCN model (see Figure 4.1). In the complete model the unit-level charge nurse structure was tested to determine there is a direct relationship with perceptions of patient safety culture and whether it had a moderating effect on the perception of patient safety culture in relation to the individual and collective contexts of the charge nurse role. In the study setting, the charge nurse role was not fixed. Therefore, the charge nurse mix (CN mix) index was created to capture unit structure of the charge nurse role in this study. The CN mix is the ratio of the number of nurses with more than five years charge experience to the total number of nurses working within the unit. The variable number of years as charge nurse on current unit was used to calculate the charge nurse mix because it captured significant differences in four of the perception of safety culture dimensions. There were noted differences for teamwork [$F(3, 365) = 3.52$, $p < .01$], overall perception of patient safety [$F(3, 365) =$

4.20, $p < .05$], safety grade for work area [$F(3, 360) = 2.61$, $p < .05$], and number of events reported within the last month [$F(3, 362) = 3.49$, $p < .05$]. The other charge experiences were less differentiating in perception of patient safety culture. The variables "some charge, no charge" and "percentage of shifts in charge within the last month" only captured differences in overall of perceptions of safety and number of events reported within the last twelve months. Kim et al. (2007) also found that among staff nurses there were significant differences in perception of safety culture according to the number of years worked in current healthcare organization. In this model the charge nurse mix index is the proxy for unit structure.

Within the context of structural contingency theory, the organizational subunits should be organized to fit the nursing practice environment to promote optimal patient safety and provider outcomes. In healthcare organizations, nursing units are the subunits for nursing leadership and, as such, the manner in which leadership roles are constructed at the unit level may have an impact on patient and provider outcome at the unit level.

.

Figure 4.1. Role of the Charge Nurse (RCN) Model



Theoretical Framework. Adapted from the Modified Version of the Structural Contingency Theory (Mark, Salyer & Smith, 1996)

Research Questions and Hypotheses

The following research questions (Q) and hypotheses (H) were examined:

Q1. Does the structure of the charge nurse role influence perceptions of patient safety culture?

H1: There is an association between charge nurse mix and perceptions of patient safety culture.

Q2. Are the effects of selected contextual factors of the charge nurses' role moderated by the structure of the charge nurse role in relationship with perception of patient safety culture?

H2a: Charge nurse mix moderates charge nurses' individual context in relationship to perception of patient safety.

H2b: Charge nurse mix moderates charge nurses' collective context in relationship to perception of patient safety

Method

Design

This research utilized a cross-sectional exploratory design. This project was conducted to determine to what extent unit-level collective safety organizing behaviors were associated with perceptions of patient safety culture. Collective safety behaviors were measured by the Safety Organizing Scale (SOS), a one-dimensional tool (Vogus & Sutcliffe, 2007). The tool consists of 9 items and is a self-report measure that describes the extent to which the five behaviors listed above are practiced at the unit-level. The items are positively worded in Likert responses ranging from 1 (not at all) to 7 (to a very great extent). The item means ranged from 4.19 to 5.62 with overall mean of 42.6. The

Cronbach reliability score is 0.91. Perceptions of patient safety culture were measured by the AHRQ *Hospital Survey on Patient Safety Culture* (Sorra & Nieva, 2004). The 42-item tool measured 11 facets of patient safety culture, and the reliability scores were greater than 0.70 except for staffing dimension at 0.62 and organizational learning-continuous improvement at 0.64.

Procedures for Data Collection

Administrative and institutional review board approvals were obtained prior to the recruitment of nursing units and study participants. Questionnaires were placed in mailboxes for only registered nurses in the units. LVNs were not employed consistently within the study setting and thus were excluded. A modified tailored approach was used to increase response rates (Dillman, 2000). Strict IRB recommendations for the collection and storage of survey data were implemented during the data collection phase.

Sample

To capture unit-level safety behaviors, a total of 11 adult units in an acute-care hospital in Michigan were enrolled following approval from the Internal Review Board. The number of nurses in the units ranged from 19 to 51 with the exception of one unit, which was a combination of three units. The units were combined following restructuring and reassignment of the nurses from the two units to form three units. The ICC for charge nurse mix and AHRQ dimensions ranged from 0.00 to 0.04. The results indicated that multi-level analyses were not appropriate; however unit-level regression models were justified.

Measures

Independent Variables

The nursing unit structure represents the organizational structure in the RCN model. In this model the unit-level charge nurse structure was tested to determine whether there is an association with perception of patient safety culture and if it had a moderating effect on the perception of patient safety culture in relation to the charge nurse context. The nursing unit structure of the charge nurse role is operationalized as the *charge nurse mix (CN mix) index.* The unit CN mix is a ratio of the number of nurses with more than five years charge experience to the total number of nurses in the unit.

$$\text{CN mix} = \frac{\text{Number of charge nurses with more than 5 years charge experience}}{\text{Total number of nurses in the unit}}$$

Four categories for the CN mix were created to reflect the percentage of nurses in the units with more than five years of charge experience: high to represent greater than 75%; moderate to high, which is between 51% and 75%; moderate, which is between 26% and 50%; and low, which is less than 25%. In this study, the nursing units only had moderate or low charge nurse mixes. The units with moderate charge mix provided medical (units 3 and 6), surgical (unit 4), and rehab (unit 5) services. The types of units with low charge mix were medical-surgical (units 1 and 9), medical (units 3 and 11), surgical (units 2 and 10), or step-down (units 7 and 8). This study setting has an overall low charge nurse mix index. The CN mix percentage and categories for each unit are presented in Tables 4.1 and 4.2.

Table 4.1. Calculation of Unit Charge Nurse (CN) Mix

Unit	Unit Type	Nurses in unit with More than 5 years Charge experience	Total nurses in unit	CN mix (%)
1	Medical Surgical	13	70	Low (20%)
2	Surgical	2	20	Low (10%
3	Medical	5	18	Moderate (28%)
4	Surgical	10	32	Moderate (31%)
5	Rehabilitation	15	32	Moderate (47%)
6	Medical	12	28	Moderate (43%)
7	Step-down	9	51	Low (18%)
8	Step-down	10	47	Low (21%)
9	Medical-surgical	2	27	Low (7%)
10	Surgical	2	19	Low (11%)
11	Medical	4	25	Low (16%)
Total		**84**	**369**	**Low (23%)**

Table 4.2. Categorization of Units Using Charge Nurse (CN) Mix Index

CN mix	Percentage of nurses with more than five years of charge experience	Eligible Units
High	>75 %	None
Moderate to High	51% to 75%	None
Moderate	25% to 50%	3, 4, 5, and 6
Low	<25%	1, 2, 7, 8, 9, 10, and 11

Dependent Variables

The dependent variables in the study are the dimensions of perception of the safety culture by staff and charge nurses as operationalized by the AHRQ survey *Hospital Survey on Patient Safety Culture* (Sorra & Nieva, 2004). This scale has eleven safety culture dimensions and is defined below.

Hospital Survey on Patient Safety Culture. This is a self-reported tool that assesses background variables, outcome measures, unit level safety assessment, and hospital-wide safety dimensions. The reliability scores for the twelve dimensions ranged from .63 to .84. The Cronbach's alpha for each dimension from a national study is as follows: overall perceptions of safety, 0.74; frequency of event reporting, 0.84; supervisor expectations, 0.75; organizational learning, 0.76; teamwork, 0.83; communication, 0.72; feedback, 0.78; non-punitive response, 0.79; staffing, 0.63; hospital management support, 0.83; teamwork across hospital units, 0.80; hospital handoffs, 0.80. The instrument is scored on 5-point Likert scale with scores ranging from 1 to 5 (1 = a low score and 5 = a high score). The items of the survey are positively and negatively scored. The 17 negatively scored items are reverse coded so that across all of the items a higher score means a more positive response.

Covariates

The covariates for the study were nurse characteristics (length of time in current unit and educational level), individual context (resilience and shift worked), and collective context (safety organizing behavior). Length of time as registered nurse on current unit was a continuous variable measured in years. Resilience was measured using the Wagnild-Young RS-14 tool (Wagnild et al., 2009). The tool consists of 14 items with

Likert scale options ranging from 1 (strongly disagree) to 7 (strongly agree). The Cronbach's alpha was 0.94 and the inter item correlations ranged from 0.60 to 0.80. The total possible scores range from 14 to 98. Scores 90 and above indicate high resilience. Scores from 61 to 89 represent moderately-low to moderate levels of resilience. Scores 60 and less indicate low resilience (Wagnild et al., 2009). The categorical variables were: shift worked (day, night, rotators); and highest level of education attained (associate degree and diploma, bachelor's, master's).

Safety organizing behavior was measured using the Safety Organizing Scale (SOS). There are 4 subscales that cover four principles of mindfulness, preoccupation with failure, reluctance to simplify interpretations, sensitivity to operations, and deference to expertise (Vogus et al., 2007). The options in to the tool are presented in a Likert type scale that ranges from 1=not at all, 2=to a very limited extent, 3=to a limited extent, 4=to a moderate extent, 5=to a considerable extent, 6=to a great extent, and 7=to a very great extent. All items are positively scored. The higher the score, the better organized the unit is on safety components.

Data Analysis

Statistical Package for the Social Science (SPSS) software, version 18.0.3 was used to run analyses of the data in this study. Multiple regression analysis was used to examine charge nurse individual and unit contextual factors (charge nurse resilience, charge nurse experience, shift worked, and unit's safety organizing score) was moderated by the nursing unit structure (charge nurse mix) in relationship with the perception of safety culture.

Results

In this study setting, the CN mix at the organizational level was low; meaning that less than one fourth of the nurses in the hospital had more than five years of charge experience. The units with moderate charge nurse mix were a mixture of two medical, one surgical, and a rehabilitation unit. The units with low charge nurse mix were two step-down, two medical-surgical, one medical, and two surgical units. Across the units, the charge nurse mix ranged from a low of 7% to a high of 47%. Within the category of moderate CN mix the range was 28% to 47%, while the range for the low CN mix was 7% to 21%.

Three hundred and eighty-one nurses completed surveys, which yielded a response rate of 54%. The majority of the nurses (91%) worked in their current unit for greater than one year. There were significant differences [$X^2(2) = 21.44$, $p = .000$] between the units with low and moderate charge nurse mix. Almost twice as many nurses who worked in the units with moderate charge nurse mix were on the unit for more than five years compared to 75% of the nurses in the units with low charge nurse mix having less than five years of experience in their current unit. There were no differences in the education level and shift worked across the two groups of nurses. These findings are presented in Tables 4.3, 4.4, and 4.5.

Table 4.3. Chi-Square for Charge Nurse Mix and Length of Time as RN (*n*=373)

CN Mix	N	Number of years as RN on current unit (%) <1 year	1 to 5 years	6 or more years
Mod	112	9(8)	48(43)	55(49)
Low	261	24(9)	172(66)	65(25)
Total	**373**	**33**	**220**	**120**

$X^2(2) = 21.44$, $p = .000$

Table 4.4. Chi-Square for Charge Nurse Mix and Education (*n*=375)

CN Mix	N	Highest Degree Obtained (%) AD	B	M
Mod	114	42(37)	65(57)	7(6)
Low	261	102(39)	140(54)	19(7)
Total	**375**	**144**	**205**	**26**

$X^2(2) = .42$, $p = .812$; (AD) Associate and Diploma (B) bachelors (M) Masters

Table 4.5. Chi-Square for Charge Nurse Mix and Shift Worked (*n*=333)

CN Mix	N	Shifts worked (%) Day	Night	Rotaters
Mod	94	40(43)	28(30)	26(28)
Low	239	74(31)	85(36)	80(34)
Total	**333**	**114**	**113**	**106**

$X^2(2) = 4.03$, $p = .130$

As expected, the moderate (between 26% and 50%) charge nurse mix units were significantly different in their charge experience than the nurses in the units with low charge nurse mix. Thirty-eight percent of the nurses in the units with moderate charge nurse mix had more than five years of charge nurse experience as compared to sixteen percent in the low charge nurse mix units [$X^2(3) = 27.96$, $p = .000$]. Also, 45% of the nurses in the low charge nurse mix units were never in charge as compared to 23% of the nurses in the moderate charge nurse mix units. In the category of one to five years charge experience, there were nearly equal number of nurses in the moderate (34%) and low (30%) charge nurse mix units. These findings are presented in Table 4.6.

Table 4.6. Chi-Square for Charge Nurse Mix and Length of Time as Charge Nurse (*n*=369)

CN Mix	*N*	Number of years as charge nurse on current unit (%) Never	<1 year	1 to 5 years	more than 5 years
Mod	110	25(23)	6(6)	37(34)	42(38)
Low	259	116(45)	24(9)	77(30)	42(16)
Total	**369**	**141**	**30**	**114**	**84**

$X^2(3) = 27.96$, $p = .000$

Almost half of the nurses in the low charge nurse mix units were not in charge within the last month as compared to 32% of those in the moderate charge nurse mix units [$X^2(2) = 14.53$, $p = .001$]. However, an unexpected finding was that more (37%) of the nurses in the moderate charge nurse units reported being in charge for less than 25% of the shift as compared to low charge nurse mix (20%) units. In addition, in both the moderate and low charge nurse units, only 31% of the nurses were in charge for more than 25% of the shifts. These findings can be found in Table 4.7. This unexpected finding may indicate that the lack of a permanent charge nurse positions in this setting may have led to the nurses constantly moving in and out of the charge role charge nurse role. There were significantly more (95%) of the charge nurses in the low charge nurse mix units with shadow-charge experience as compared to 88% of the nurses in the moderate charge nurse mix units [X^2 (2) = 7.43, $p = .024$]. Within this study setting, the majority of the nurses participated in the shadow-charge experience.

Table 4.7. Chi-Square for Charge Nurse Mix and Percentage of Shifts in Charge Within the Last Month (*n*=372)

CN Mix	*N*	Number of shifts in charge within the last month (%) None	< 25% of shifts	>25% of shifts
Mod	112	36(32)	41(37)	35(31)
Low	260	129(50)	51(20)	80(31)
Total	**372**	**165**	**92**	**115**

$X^2(2) = 14.53$, $p = .001$

A summary of these results are presented in Table 4.8. These findings are similar to the individual-level results that indicated that among nurses with charge experience, 92% reported having the shadow-charge experience but only 56% of them had worked greater than 25% of shifts worked within the last month. In this organizational structure of no permanent unit leaders, there was overcompensation of exposing everyone to the

charge experience so that there can always be someone who was oriented to charge on duty.

Table 4.8. Chi-Square for Charge Nurse Mix and Unit Level Shadow-Charge Orientation (row%)

CN Mix	N	None	1 to 2 shifts	More than 3 shifts
Mod	82	10(12)	55(67)	17(21)
Low	145	7(5)	89(61)	50(34)
Total	**228**	**17**	**144**	**67**

$X^2(2) = 7.43$, $p = .024$

Hypothesis Testing

Hypothesis 1

H1: There is an association between charge nurse mix and perceptions of patient safety culture

Table 4.9 presents the correlations between charge nurse mix and the other predictors and the outcomes used in this study. Charge nurse mix was significantly correlated with four patient safety culture dimensions: teamwork; manager actions promoting safety; feedback about errors; and staffing. There was positive correlation with teamwork, which means that there were more positive perceptions of teamwork in the units with higher charge nurse mix. The units with higher charge nurse mix had lower positive perceptions of manager actions promoting safety, feedback about errors, and staffing. However, the magnitude of the correlations was small; ranging from a high of 0.16 for teamwork to a low of 0.12 for frequency of events reported. There were no significant correlations with the other predictor variables.

Table 4.9. Correlations for Predictor and Perceptions of Patient Safety Culture Variables (*n*=375)

Variables	CN	Resi-	Shift	Safety	Perceptions of Patient Safety Culture Dimensions										
mix	mix	lience	worked	behavior	1	2	3	4	5	6	7	8	9	10	11
CN mix	**1.70(.46)**[a]														
Resilience	.03	**81.72(9.5)**													
Shift worked	.10	-.00	**1.2(.81)**												
Safety Behavior	.10	.21**	.48	**42.32(8.4)**											
Safety Dimensions															
1Teamwork	**.16****	.03	.38	.52**	**3.90(.61)**										
2 Manager	**-.13***	.05	.02	.29**	.33**	**3.60(.70)**									
3 Org. Lrn	.00	.07	.02	.48**	.46**	.46**	**3.80(.50)**								
4 Overall	.05	.15**	.07	.34**	.34**	.47**	.45**	**3.35(.63)**							
5 Feedback	-.04	.19**	-.02	.53**	.29**	.38**	.41**	.40**	**3.34(.69)**						
6 Comm.	-.06	.09	.02	.45**	.43**	.45**	.41**	.48**	.52**	**3.5(.61)**					
7 Freq	**-.12***	.10	-.01	.30**	.16**	.26**	.30**	.30**	.36**	.38**	**3.47(.74)**				
8 Staffing	**-.14****	.10	.02	.20**	.25**	.34**	.33**	.50**	.19**	.32**	.15	**3.44(.63)**			
9 Non-punitive	-.05	.09	.12	.18**	.22**	.47**	.26**	.33**	.20**	.36**	.19**	.27**	**3.11(.84)**		
10 Grade	-.03	.04	.02	.36**	.39**	.37**	.41**	.57**	.35**	.40**	.26**	.32**	.18**	**1.38(.57)**	
11 Events	-.05	.03	-.07	-.04	-.10	-.08	-.05	-.19**	-.12	-.21**	-.11*	.00	-.05	-.09	**2.20(.71)**

**Correlation is significant at the 0.01 level (2-tailed). \
*Correlation is significant at the 0.05 level (2-tailed)
[a]Mean and standard deviation on diagonals.
CN mix= charge nurse mix

Prior to analyzing the influence of charge nurse mix on perceptions of patient safety, the units were compared to determine if there were differences in perceptions of patient safety. Regression analyses were conducted while controlling for length of time as RN, education, resilience, shift worked, and safety behaviors. The largest unit, Unit 1 (medical-surgical), was the reference group. The analysis yielded mixed findings. Units 3 (medical), 9 (medical-surgical), 6 (medical), and Unit 11 (medical) reported significantly higher scores than Unit 1 on some of the dimensions of patient safety culture. Unit 2 (surgical) as compared to Unit 1 reported lower levels of perceptions of manager's support, organizational learning, communication openness, and higher levels of number of reported events in the last 12 months. Unit 8 (step-down) reported lower levels of perceptions of non-punitive response to error and higher levels of teamwork, communication openness, and perceptions of staffing compared to the reference group. Finally, Unit 10 (surgical) as compared to Unit 1 reported lower levels of perceptions of staffing, and higher perceptions of teamwork, manager's support, communication openness, and frequency of events reported. There were no significant associations with Units 4 (surgical), 5 (rehabilitation) and 7 (step-down). The results are summarized in Table 4.10.

Table 4.10. Standardized Regression Coefficients, *F* Statistic and R^2 for Safety Behavior and Perception of Safety Dimensions

Variables	Perception of patient safety culture dimensions						
	1	2	3	4	5	6	7
Nurse Characteristics							
Length of time as RN	.03	.02	.12	.04	-.04	.04	.22**
Level of education	.01	.00	-.07	.02	-.05	.04	-.04
Individual Context							
Resilience	-.08	.00	-.04	.07	.11*	-.01	.06
Shift worked [a]							
Night -0.00	-.11	-.07	-.12	-.03	-.13*	-.01	
Rotators	**-.02**	**-.01**	**.04**	**.02**	**-.00**	**-.03**	**.01**
Charge Nurse Experience [b]							
No charge nurse experience	.14	.15	.15	.21	.02	.19	.26*
1 to 5 years	.03	.04	.02	.05	-.06	.08	.05
More than 5 years	.09	.13	.17*	.07	.06	.16*	.24**
Collective Context							
Safety organizing behavior	.41***	.24***	.42***	.26***	.48***	.37***	.24***
Units [c]							
Unit 2	-0.04	-.19**	-.12*	-.11	-.00	-.12*	.01
Unit 3	-0.02	.12*	.16**	.04	.11*	.14**	.21**
Unit 4	-0.07	.03	-.11	-.05	.04	.07	-.04
Unit 5	-0.08	.07	.03	-.02	.02	.01	.12
Unit 6	0.15**	.17**	.12*	.05	.20***	.19**	.20**
Unit 7	0.04	-.10	.03	-.05	.02	.08	.05
Unit 8	0.14*	-.04	.04	.08	.01	.14*	.04
Unit9	0.02	.06	.09	-.01	.14**	.05	.13*
Unit 10	0.13*	.13*	.06	-.05	.10	.12*	.06
Unit 11	0.14**	-.01	.02	-.09	-.00	.08	.05
N	301	301	301	301	301	301	295
F statistic	7.13***	3.74***	6.27***	3.12***	7.91***	5.72***	3.59***
R^2 0.33	.20	.30	.17	.35	.28	.20	

(continued)

Table 4.10 (*continued*). Standardized Regression Coefficients, *F* statistic and R^2 for Safety Behavior and Perception of Safety Dimensions

Variables	Perception of patient safety culture dimensions			
	8	9	10	11
Nurse Characteristics				
Length of time as RN	.04	-.04	.05	.12
Level of education	-.04	.03	-.02	.06
Individual Context				
Resilience	.10	.06	-.04	.09
Shift worked [a]				
Night	-.11	-.03	-.15*	.06
Rotators	**.00**	**.14**	**-.07**	**-.04**
Charge Nurse Experience				
No charge nurse experience	**.11**	**-.01**	**.26***	**.00**
1 to 5 years	.04	.00	.03	.04
More than 5 years	.07	.07	.18*	.12
Collective Context				
Safety organizing behavior	.14*	.19**	.27***	-.04
UNITS				
Unit 2	-.06	-.03	-.07	.14*
Unit 3	.12*	.01	.05	-.07
Unit 4	.02	-.06	-.07	.00
Unit 5	.13	.00	.00	.04
Unit 6	.23***	.10	.07	-.02
Unit 7	.07	-.03	-.04	-.04
Unit 8	.16*	-.16**	.12	.02
Unit 9	.14*	-.08	.04	.06
Unit 10	-.18**	.08	.04	-.01
Unit 11	.11	.05	-.08	.01
N	301	301	293	297
F statistic	3.49***	2.31**	2.84***	1.18
R^2	.19	.14	.17	.08

Perception of safety scales: 1=teamwork, 2=manager actions promoting safety,3=organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6=communication openness, 7=frequency of events reported, 8=staffing, 9=non-punitive response to error, 10= safety grade for unit,11=number of events reported within the last 12 months.

[a]**Betas shown are for the last step** *p< .05 **p< .01 ***p< .001

Following the analyses for the individual units, multiple regression analyses were conducted to test whether the unit structure of the charge nurse model was associated with the dependent variables, the eleven dimensions of perception of patient safety culture. Table 4.11 presents the results of the regression analyses for charge nurse mix with perceptions of patient safety culture. While controlling for length of time as RN, education level, resilience, shift worked, and safety organizing behavior, compared to the units with moderate charge nurse mix the low charge nurse mix units reported significantly more positive perceptions about teamwork ($B = .10$, $p < .05$). There were significant negative associations or less positive perceptions of manager actions promoting safety ($B = -.21$, $p < .001$), feedback about errors ($B = -.13$, $p < .01$), communication openness ($B = -.10$, $p < .05$), frequency of events reported ($B = -.13$, $p < .05$), and staffing ($B = -.14$, $p < .05$). When compared to the low CN mix units, there were no significant associations with organizational learning, overall perceptions of safety, non-punitive response to error, safety grade for work area and number of events reported within the last twelve months. Therefore, Hypothesis 1 was supported for teamwork, manager actions promoting safety, feedback about error, communication openness, frequency of events reported, and staffing.

Table 4.11. Standardized Regression Coefficients, *F* Statistic and R^2 for Low Charge Nurse Mix and Perception of Safety Dimensions

Variables	Perception of patient safety culture dimensions					
	1	2	3	4	5	6
Nurse Characteristics						
Length of time as RN	-.03	-.06	.03	-.05	-.07	-.05
Level of education	.01	.01	-.06	.04	-.04	.05
Individual Context						
Resilience	-.08	-.01	-.04	.08	-.10*	-.01
Shift worked [a]						
Night	.04	-.09	-.06	-.09	-.05	-.09
Rotators	**.05**	**.04**	**.08**	**.06**	**-.01**	**.03**
Collective Context						
Safety organizing behavior	.49***	0.28***	.47***	.30***	.51***	.42***
Unit Structure						
Low CN mix	.10*	-0.21***	-.05	-.03	-.13**	-.10*
N	305	305	305	305	305	305
F statistic	14.48***	5.69***	11.79***	6.25***	18.39***	10.23***
R^2	0.25	0.12	0.22	0.13	0.30	0.19

Perception of safety scales: 1=teamwork, 2=manager actions promoting safety,3=organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6=communication openness, 7=frequency of events reported, 8=staffing, 9=non-punitive response to error, 10= safety grade for unit,11=number of events reported within the last 12 months.

[a]Betas shown are for the last step

*p< .05 **p< .01 ***p< .001

Table 4.11 (*Continued*). Standardized Regression Coefficients, *F* Statistic and R^2 for Low Charge Nurse Mix and Perception of Safety Dimensions

Variables	Perception of patient safety culture dimensions				
	7	8	9	10	11
Nurse Characteristics					
Length of time as RN	.10	.05	-.05	-.08	.09
Level of education	-.04	-.04	.01	-.00	.06
Individual Context					
Resilience	.04	.07	.05	-.03	.07
Shift worked [a]					
Night	.02	-.07	-.03	-.13	.04
Rotators	**.08**	**.06**	**.14**	**-.02**	**-.06**
Collective Context					
Safety organizing behavior	.30***	.19***	.19**	.31***	-.04
Unit Structure					
Low CN mix	-.13*	-.14*	-.08	.01	.08
N	299	305	305	297	301
F statistic	5.29***	3.41**	3.32**	5.29***	1.08
R^2	.11	.07	.07	.11	.03

Perception of safety scales: 1=teamwork, 2=manager actions promoting safety,3= organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6=communication openness, 7=frequency of events reported, 8=staffing, 9=non-punitive response to error, 10= safety grade for unit,11=number of events reported within the last 12 months.

[a]Betas shown are for the last step

*p< .05 **p< .01 ***p< .001

Hypothesis 2

H2a: Charge nurse mix moderates the relationship between charge nurses' individual contexts with perception of patient safety.

H2b: Charge nurse mix moderates the relationship between charge nurses' collective contexts with perception of patient safety.

Regression analyses were conducted to test for the moderation effects of CN mix on the relationship between the charge nurse individual and collective context with perceptions of patient safety culture after adjusting for the covariates identified in the previous models. Interaction terms were composed for CN mix with resilience, shift worked, and safety organizing behavior. There were no significant moderating effects of charge nurse mix on the relationships between the charge nurse individual and collective context with perceptions of patient safety culture. *Hypotheses 2a* and *2b* were not supported for moderation effects of charge nurse mix on the relationship between charge nurse individual and collective context on perceptions of patient safety. Table 4.12 presents the findings for the interaction between charge nurse mix and the collective context. Safety organizing behavior was associated with perceptions of patient safety culture. However, there were no significant associations when the interaction term (charge nurse mix *x* safety behavior) was entered into the model. The results for the individual context were also similar in that there were no associations with the interaction terms for resilience (charge nurse mix *x* resilience) and shift worked (charge nurse mix *x* shift worked) and perceptions of patient safety culture.

Table 4.13 summarizes the results of the hypothesis tests in this paper.

Table 4.12. Standardized Regression Coefficients, *F* Statistic and R^2 for Charge Nurse Mix and Safety Behavior Interaction with Perceptions of Patient Safety Outcomes

Variables	Perception of patient safety culture dimensions						
	1	2	3	4	5	6	7
Nurse Characteristics							
Length of time as RN	-.03	-.06	.04	-.04	-.07	-.05	.11
Level of education	.01	.01	-.06	.04	-.04	.05	-.03
Individual Context							
Resilience	-.08	-.01	-.04	.08	.10*	-.01	.04
Shift worked [a]							
Night	.04	-.08	-.06	-.09	-.05	-.09	.02
Rotators	.05	.05	-.09	.07	-.01	.03	.09
Collective Context							
Safety Behavior	**.57****	.38	**.71*****	**.43***	**.44***	**.46***	**.61****
Unit Structure							
CN mix	-.21	.07	-.27	-.14	.23	.06	-.27
CN mix *x* Safety behavior	-.15	-.18	-.42	-.23	.13	-.06	-.54
N	305.0	305.0	305.0	305.0	305.0	305.0	299.0
F statistic	**12.66*****	**4.10*****	**10.53*****	**5.51*****	**16.07*****	**8.92*****	**4.93*****
R^2	.26	.12	.22	.12	.30	.19	.12

Perception of safety scales: 1=teamwork, 2=manager actions promoting safety,3= organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6=communication openness, 7=frequency of events reported, 8=staffing, 9=non-punitive response to error, 10= safety grade for unit,11=number of events reported within the last 12 months.

[a]Betas shown are for the last step

*p< .05 **p< .01 ***p< .001

Table 4.12 (*Continued*). Standardized Regression Coefficients, *F* Statistic and R^2 for Charge Nurse Mix and Safety Behavior Interaction with Perceptions of Patient Safety Outcomes

Variables	Perception of patient safety culture dimensions			
	8	9	10	11
Nurse Characteristics				
Length of time as RN	.05	-.05	-.08	.09
Level of education	-.04	.01	.00	.06
Individual Context				
Resilience	.07	.05	-.03	.07
Shift worked [a]				
Night	-.07	-.24	-.13	.04
Rotators	**.06**	**.14**	**-.21**	**-.07**
Collective Context				
Safety Behavior	.18	.33	.37	-.19
Unit Structure				
CN mix	.15	-.10	-.08	-.14
CN mix *x* Safety behavior	.01	-.23	-.10	.25
N	305.0	305.0	297.0	301.0
F statistic	**2.97****	**3.00****	**4.62*****	**1.00**
R	.07	.07	0.11	0.03

Perception of safety scales: 1=teamwork, 2=manager actions promoting safety,3= organizational learning, 4=overall perceptions of safety, 5=feedback about errors, 6=communication openness, 7=frequency of events reported, 8=staffing, 9=non-punitive response to error, 10= safety grade for unit,11=number of events reported within the last 12 months.

[a]**Betas shown are for the last step**

*p< .05 **p< .01 ***p< .001

Table 4.13. Summary of Tests Results for Hypotheses 1 and 2

Hypothesis	Variable		Statistical test
	Independent	Dependent	Multi-stage Regression (*p*)
H1:	Charge nurse mix	**Teamwork**	**Yes (< .05)**
		Manager Support	**Yes (< .001)**
		Organizational learning	No
		Overall perceptions	No
		Feedback about error	**Yes (< .01)**
		Communication Openness	**Yes (< .05)**
		Frequency of events reported	**Yes (< .05)**
		Staffing	**Yes (< .05)**
		Non-punitive response	No
		Safety Grade	No
		Number of events reported within the last 12 months	No
H2:	*Interactions*:	Teamwork	
	CN Mix *x* Resilience	Manager Support	
		Organizational learning	
	CN Mix *x* Shift Worked	Overall perceptions	
		Feedback about error	
	CN Mix *x* Safety Behavior	Communication Openness	No
		Frequency of events reported	
		Staffing	
		Non-punitive response	
		Safety Grade	
		Number of events reported within the last 12 months	

Discussion

In this study the charge nurse model was tested to examine the association between the unit structure of the charge nurse role with perceptions of patient safety outcomes. This is the first known study that used the organizational structure of the charge nurse role, as operationalized by the charge nurse mix, to determine the influence of nursing unit leadership on perceptions of patient safety culture. Most of the literature about charge nurses opinions about educational preparation (Sherman, 2005) and complexity of role responsibilities (Halliday, 2006; Mathias, 2001; Smyth, 2010). Previous studies that examined the role of charge nurses were mainly descriptive about competencies (Connelly et al., 2003, Grossman, 2007; McEwen et al., 2005), satisfaction within the role (Lufkin, Herrick, Newman, Hass, & Berninger, 1992), and patient assignments (Bostrum & Suter, 1992; Mullinax & Lawley, 2002). This research provides empirical evidence about the influence of both the context and structure of the charge nurse role and the perception of patient safety culture.

There were no significant differences in level of education and shift worked between the moderate and low CN mix units. However, there were significant differences in length of time as RN on current unit, percentage of shifts in charge within the last month, and number of shifts for shadow charge experience driven in part by the need for charge coverage for the 24-hour work cycle, weekends, and holidays. An interesting finding from this study is the high percentage of nurses in the low charge nurse mix who were oriented to the charge role. In this organizational structure of no permanent unit leaders, there was overexposure of the staff nurses to the charge experience so that there can always be someone who was oriented to charge on duty. These findings are similar to

the individual-level results in chapter two that indicated 92% of the nurses with charge experience reported having the shadow-charge experience but only 56% were in charge greater than 25% of shifts worked within the last month. The units with low charge nurse mix had a higher percentage of nurses who were registered nurses for less than five years; were more likely to have no charge experience; and spent less than 25% of the shifts worked within the last month in charge. Having differences in charge nurse experience and length of time as a nurse on the current unit between the two groups were important for the utilization of the CN mix variable, which examined the influence of the structure of the CN role in the perception of patient safety culture.

Hypothesis 1 was partially supported with significant associations between charge nurse mix (percentage of nurses within the unit with more than five years charge experience) and perceptions of patient safety culture dimensions. Within both groups of CN mix there were medical and surgical units. However, the step-down and medical-surgical units were found in the low CN mix group and the rehabilitation unit was in the moderate charge nurse group. While controlling for the largest medical-surgical unit in the study setting, comparisons between the moderate and low CN mix units did not indicate differences in perceptions of patient safety culture according to type of patient service provided. This finding may indicate that the differences in perceptions to patient safety culture across the CN mix units could not be attributed to type of nursing clinical unit.

While adjusting for nurse characteristics, and individual and collective contexts, compared to the units with moderate CN mix, the units with low CN mix were more positive about teamwork. This was an expected finding given that in the individual

responses to this survey, the nurses with less than one year of experience were more positive about teamwork. In this group of nurses, there were more nurses who had less than five years' experience as a registered nurse and as a charge nurse. This finding is supported in a study by Kalisch and Lee (2009) where teamwork was higher in nurses with less than six months experience. The nurses in the low CN mix group may have been more dependent on each other to complete patient care and support for stressful situations. The nurses in the moderate CN mix group may have practiced more independently and did not rely as much on team work for task completion or support. Similar findings that indicate perceptions of teamwork may be lower among experienced nurses were found in a national study of 519 hospitals with 36% of sample self-identified as nurses. In the study compared to other healthcare professionals, nurses had lower percent positive perceptions than physicians, respiratory therapists, and managers. Nurses were only better than patient care assistants, unit clerks, and technicians in their perceptions about teamwork (Sorra et al., 2008). In this research, charge nurse mix influenced perceptions of teamwork, which indicates that in the absence of higher percentages of experienced charge nurses, the nurses within the units with low CN mix were more cohesive.

In contrast, while controlling for length on time of unit, level of education, and the individual and collective contexts, compared to moderate CN mix units, the low CN units were less positive about manager actions supporting safety, feedback and communication about errors, frequency of events reported, staffing and non-punitive response to error. The higher percentage of nurses with less than five years of experience either as an RN or charge nurse in the low CN mix units may have contributed to higher

percent of nurses who were less familiar with the error reporting system or interacted with the manager. These findings about the impact of the CN mix structure provide deeper understanding about the influence of the structure of the charge nurse role on perceptions about patient safety culture. In the individual context, the nurses with less charge experience were more positive about overall perceptions of safety and safety grade for work area. However, in the units that had nurses with lesser experiences in nursing practice and charge experience, there were less positive perceptions of patient safety culture. This significant finding indicates there may be a critical tipping point at which the lack of experienced charge nurses in the unit may indicate less positive perceptions of patient safety culture.

Charge nurse mix was not predictive of the number of events reported in this study. That is, the number of events reported by the nurses was not influenced by the percentage of charge nurses within the unit. This pattern is inverse to the results found for the association between the individual context with number of events reported within the last twelve months. In the individual context, the charge experience (no charge, some charge), percentage of shift in charge during the past month, and number of years as charge nurse were significantly associated with the number of events reported with the last twelve months. However, the pattern is similar to the finding for the collective context in that safety organizing behavior was not associated with number of events reported in the last month. Although there are no known studies about the structure of charge nurse role in the literature, there is evidence that organizational leadership support for a simplified error reporting system (Mills, Neily, Kinney, Bagian, & Weeks, 2008) and psychologically safe environments (Edmondson, 1999) reduce adverse drug events.

The inconclusive findings about the influence of the CN mix on the number of events reported may indicate that there is a need for further development of the CN mix construct.

Hypothesis 2a and 2b were not supported. There was no support for the interaction effects of charge nurse mix with the individual and collective contexts. This was an unexpected finding. However, in this study there were also no significant differences in resilience, shift worked and safety organizing behaviors among the nurses. The ability to detect interactions could have been limited by the use of a single study site and the sample size. Future studies with larger sample sizes and multiple sites may provide more conclusive results about moderation effects of CN mix with the contexts of the charge nurse role.

Implications and Recommendations

With over 60% of nurses working in the acute care inpatient setting (Shalala, 2011), the continuation of an acute nursing shortage in the foreseeable future (Health Resources and Services Administration Bureau of Health Professions, 2006), and the variations of the charge nurse role across organizations (Malcolm & Stewart, 2008), it is likely that within six months to a year new graduate nurses may find themselves in the leadership role for a patient care unit. This scenario presents an impending crisis in nursing leadership that has several implications for the education and scope of practice for charge nurses.

The role of the charge nurse involves mainly non-direct care in the shift-by-shift management of the patient care unit, and, therefore, charge nurses are generally very knowledgeable about the delivery of care within their current units. Notwithstanding,

charge nurses are not being used to their fullest potential without formal leadership training in addition to acting in the charge nurse role more consistently. To promote safe patient care at the unit level, charge nurses should be provided with the opportunities to develop competency in leadership. The level of leadership expertise of charge nurses who manage acute care in-patient units is very critical to the quality of care provided. Connelly and Yoder's (2003) qualitative analysis of the charge nurse role revealed that organizational barriers and facilitators were related to the need for standardization of protocols, inadequate staffing, or the lack of support from ancillary staff. The findings in the present paper suggest that lack of opportunity to be consistent in the role can be added to this list.

Limitations

This is a cross sectional study in which data were collected at a single time point. The correlation design used in this study provides the possibility of using collected data to discover information about relationships that are postulated to exist among the variables (Weiss, 2005). However, the cross-sectional method limits the ability of the researcher to be confident that the observed variables behave the same way over time in the study setting. Further research in this area may be enriched by the use of longitudinal designs that evaluate changes over time.

This study was conducted in a tertiary teaching medical center which is one of many different types of healthcare organizations. The findings of the study may have been influenced by the type of structural factors peculiar to this type of healthcare setting. Additionally, in this setting, the fluidity of the charge positions was established based on

union contract negotiations. Future studies about the role of charge nurses should include settings where the nurses do not self-select, but function constantly in the role.

The sample size of this study necessitated the aggregation of some variables to meet the assumptions for some of the statistical tests. Future studies with larger sample sizes may facilitate the examination of all categories of the variables, which may reveal more nuances of the sample characteristics. While the educational level of the nurses in the sample of this study was similar to that of the population of nurses who met the inclusion criteria, the findings should be interpreted within the context of the study design. In particular, the use of a convenience sample is often associated with selection bias that may limit the generalizability of the results. Future studies may benefit from the use of a probability sample design to increase the likelihood that the sample is representative of the population of charge nurses from which the sample was drawn.

Conclusion

This study focused on the effects of the role and structure of charge nurses on the perception of patient safety. The provision of nursing care in the acute care setting is challenging given the complexity of patient care and uncertainty of outcomes. Historically, charge nurses tend to be the most senior and or clinically staff nurse on the unit. This pattern of choosing charge nurses has remained unchanged. The use of this structure of the charge nurse role may lead to unprepared or deficient leadership at the unit level and lax mentorship of new charge nurses. The context of the charge nurse role has been broadened with the restructuring of healthcare organizations and the increased acuity of patients. Therefore, the structure of the charge nurse role will need to be developed so that charge nurses can be adequately prepared to be nursing unit leaders.

Charge nurses are frontline leaders who make shift-by-shift decisions that are directly related to patient outcomes. Yet, the relationship between the role of the charge nurse and patient safety is notably missing from recent studies on nurse staffing and patient outcomes. There is evidence in the literature of associations between staffing and patient outcomes. Charge nurses are the unit leaders who make daily staffing decisions, and this puts them in a substantive position to decide unit staffing conditions that may impact patient safety. There is also empirical support for the effect of the psychological safety and the reporting of events on nursing units. Wilson et al. (2011) found that staff nurses reported that communication with charge nurses about patient care is strongly influenced by the charge nurses' professional behaviors that promote positive "tones." The extensive use of charge nurses as unit leaders places them in opportune position to be part of the transformation of leadership in nursing. These collective findings present empirical evidence about the structure of nurse leadership at the unit-level and provide insightful results that can inform the debate about the role of leadership at the nursing unit level and the need for transformation of nurse leadership at the bedside. Moreover, the recent IOM emphases on creation and maintenance of safety cultures (2004) and the transformation of nursing leadership (2011) make this research topic and study population particularly salient and timely.

References

Admi, H., & Moshe-Eilon, Y. (2010). Stress among charge nurses: Tool development and stress management. *Nursing Economics, 28*(3), 151-154.

Aiken, L. H., & Patrician, P. A. (2000). Measuring organizational traits of hospitals: The revised nursing work index. *Nursing Research, 49*(3), 146-153.

Ambrose, J. M. (1995). Orientation to the charge nurse role. *Nursing Management, 26*(11), 63-64.

American Nurses Association, (2000). *Nurse staffing and patient outcomes in the inpatient hospital setting*. Washington, DC: American Nurses Association.

Barker, K., Flynn, E., & Pepper, G. (2002). Observation method of detecting medication errors, *59*(23), 2314-2316.

Benner, P. (1984). From novice to expert: Excellence and power in clinical nursing practice. California: Addision-Wesley.

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

Blegen, M., & Vaughn, T. (1998). A multisite study of nurse staffing and patient occurrences. *Nursing Economics, 16*(4), 196-203.

Bolton, L., Shihady, I., Bennett, C., Broussard, P., Fridman, M., & Fink, A. (2005). Engaging nurse leaders in health services research. *The Journal of Nursing Administration, 35*(5), 238-243.

Bostrum, J., & Suter, W. N. (1992). Charge nurse decision making about patient assignment. *Nursing Administration Quarterly, 16.*

Brink, P.J., & Wood, M.J. (1998). *Advanced design in nursing research* (2nd ed.). Thousand Oaks, California: Sage.

Burns, P., Eagleton, B., Golden, T., Thompson, J. (2009). Improving financial outcomes with high-performing charge nurses. *Healthcare Leadership White Paper*. Retrieved from http://www.besmith.com/Repository/6/Document/ 09_High-Performing%20Charge%20NursesWEB.pdf

Center for Medicare and Medicaid Services. (2009). *Medicare takes new steps to help make your hospital stay safer.* Retrieved from http://www.cms.hhs.gov/apps/ media/ press/ factsheet

Connelly, L.M., & Yoder, L. H. (2003). A qualitative study of barriers and facilitators of the charge nurse role. *Nursing Leadership Forum, 7*(4), 157-164.

Connelly, L.M., Nabarette, S. R., & Smith, K. K. (2003). A charge nurse workshop based on research. *Journal for Nurses in Staff Development*, *19*(4), 203-208.

Connelly, L.M., Yoder, L. H., & Miner-Williams, D. (2003). A qualitative study of charge nurse competencies. *Medical Surgical Nursing*, *12*(5), 298-306.

DiCesare, C. (1996). Update: Nurses not supervisors. *Monthly Labor Review, 119*(7), 52-52.

Edmondson, A. C. (1996). Learning from mistakes is easier said than done: Group and organizational influences on the detection and correction of error. *The Journal of Applied Behavioral Science, 32*(1), 5-28.

Edmondson, A. C. (1999). Psychology safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.

Flynn, E., Barker, K., Pepper, G., Bates, D., & Mikeal, R. (2002). Comparison of methods for detecting medication errors in 36 hospitals and skilled-nursing facilities, *59*(5), 436-446.

Fuqua, R., & Stevens, K. (1988). What we know about medication errors: A literature review. *Journal of Nursing Quality Assurance, 3*(1), 1-17.

Grossman, S. (2007). Assisting critical care nurses in acquiring leadership skills. *Dimensions of Critical Care*, *26*(2). 57-65.

Grimshaw, J., Eccles, M., Greener, J., Maclennan, G., Ibbotson, T., Kahan, J., & Sullivan, F. (2006). Is the involvement of opinion leaders in the implementation of research findings a feasible strategy? *Implementation Science, 1*(1), 3.

Halliday, R. (2006). Ups and downs. *Nursing Management*, *13*(1), 14-15.

Health Resources and Services Administration. Bureau of Health Professions (2006). *The registered nurse population. Findings from the March 2004 National Sample Survey of Registered Nurses.* Rockville, MD: U.S. Department of Health and Human Services. ftp://ftp.hrsa.gov/bhpr/ workforce/0306rnss.pdf.

Hughes, C. & Kring, D. (2005). Consistent charge nurses improve teamwork. *Nursing Management, 36*(10), 16.

Hughes, R., & Ortiz, E. (2005). Medication errors: Why they happen, and how they can be prevented. *Journal of Infusion Nursing, 28*(2 Suppl.), 14-24.

Iezzoni, L.I. (Ed.). (2003). *Risk adjustment for measuring health care outcomes.* (3rd ed.). Chicago: Health Administration Press.

Institute of Medicine. (2001). *Crossing the quality chasm: A new health system for the 21st Century*. Washington, DC: The National Academies Press.

Institute of Medicine. (2011). *The future of nursing: Leading change, advancing health*. Washington, DC: The National Academies Press.

Kalisch, B., & Lee, H. (2009). Nursing teamwork, staff characteristics, work schedules, and staffing. *Health Care Management Review, 34*(4), 323-333.

Kane, R.L., Shamliyan, T., 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.

Kohn L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.) (2000). *To err is human: Building a safer health system. A report of the Committee on Quality of Health Care in America.* Washington, DC: National Academy Press.

Krugman, A., & Smith, V. (2003). Charge nurse leadership development and evaluation. *The Journal of Nursing Administration*, *33*(5), 284-292.

Lake, E. T., & Friese, C. R. (2006). Variations in nursing practice environments: Relation to staffing and hospital characteristics. *Nursing Research, 55*(1), 1-9.

Laschinger, H. K. S., & Leiter, M. P. (2006). The impact of nursing work environments on patient safety outcomes: The mediating role of burnout/engagement. *The Journal of Nursing Administration, 36*(5), 259-267.

Lipshitz, R., Popper, M., Friedman, V. J. (2002). A multifaceted model of organizational Learning. *The Journal of Applied Behavioral Science, 39*(1), 78-98.

Lufkin, S. R., Herrick, L.M., Newman, D. A., Hass, J. H., & Berninger, D. L. *(*1992). Job satisfaction in the head nurse role. *Nursing Management,* March, 27-29.

McCallin, A., & Frankson, C. (2010). The role of the charge nurse manager: A descriptive exploratory study. *Journal of Nursing Management, 18*(3), 319-325.

Malcolm, H., & Stewart, L. (2008). The changing role of charge nurses. *Kai Tiaki Nursing New Zealand, 14*(4), 20-20.

Mark, B. A., Hughes, L. C., Belaya, M., Bacon, C.T., Chang, Y., & Jones, C. A. (2008). Exploring organizational context and structure as predictors of medication errors and patient falls. *Journal of Patient Safety, 4*(2), 66-77.

Mathias, J. M. (2001). Charge nurses juggle many needs. *Operating Room Management, 17*(7), 18-19.

Mayo, A., & Duncan, D. (2004). Nurse perceptions of medication errors - what we need to know for patient safety. *Journal of Nursing Care Quality, 19*(3), 209-217.

McEwen, A., Cooper, S., & Clayworth, S. (2005). Are ward sisters and charge nurses able to fulfill their role? *Nursing Times, 101*(29), 38-41.

Meurier, C. (2000). Understanding the nature of errors in nursing: Using a model to analyze critical incident reports of errors which had resulted in an adverse or potentially adverse event. *Journal of Advanced Nursing, 32*(1), 202-207.

Mullinax, C., & Lawley, M. (2002). Assigning patients to nurses in neonatal intensive care unit. *Journal of Operational Research Society, 53,* 25-35.

National Quality Forum (2004). National voluntary consensus standards for nursing-sensitive care: An initial performance measure set. *National Quality Forum*, Retrieved from http://www.qualityforum.org.

National Quality Forum (2006). Standardizing a patient safety taxonomy: A consensus report. Washington, DC: National Quality Forum.

NLRB rules certain charge nurses 'supervisors'. (2006). National labor relations board. (2006). *American Nurse, 38*(6), 1; 5.

Norrish, B. R., & Rundall, T. G. (2001). Hospital restructuring and the work of registered nurses. *The Milbank Quarterly, 79*(1), 55-79.

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

Perell, K., Nelson, A., Goldman, R., Luther, S., Prieto-Lewis, N., & Rubenstein, L. (2001). Fall risk assessment measures: An analytic review. *The Journals of Gerontology.Series A, Biological Sciences and Medical Sciences, 56*(12), M761-M766.

Rani, S., Brennan, M., & Timmons, D. (2010). Development of a leadership role in a secure environment. *Journal of Forensic Nursing, 2010,* 96-103.

Rathert, C., & May, D. R. (2007). Health care work environments, employee satisfaction, and patient safety: Care provider perspectives. *Health Care Management Review, 32*(1), 2-11.

Reason, J. (1995). Understanding adverse events: Human factors. *Quality in Health Care,* 4, 80-89.

Rothschild, J., Bates, D., & Leape, L. (2000). Preventable medical injuries in older patients. *Archives of Internal Medicine, 160*(18), 2717-2728.

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.

Sherman, R. O. (2005). Don't forget our charge nurses. *Nursing Economics, 23*(3). 125-143.

Singer, S. J., Gaba, D., Falwell, A., Lin, S., Hayes, J., & Baker, L. (2009). Patient safety climate in 92 US hospitals differences by work area and discipline. *Medical Care, 47*(1), 23-31.

Smyth, J. (2010). Time for nurses to take charge. *Nursing Management, 16*(10), 11.

Spetz, J. (2004). California's minimum nurse-to-patient ratios: The first few months. *Journal of Nursing Administration, 34*(12), 571-578.

Straight, R. J. (1999). Who's the boss? Charge Nurses and "Independent Judgment" after National Labor Relations Board v. Health Care & Retirement Corporation of America. *Minnesota Law Review,* June, 1999.

Szczepanski, A. (2010). Are charge nurses considered supervisors? *Michigan Nurse, 79*(6), 7-7.

Szczepanski, A. (2007). Labor law: Is a charge nurse a rank and file employee or supervisor? *Michigan Nurse, November/December,* 7.

Talsma, A., Bahl, V., & Campbell, D. (2008). Exploratory analyses of the "failure to rescue" measure - evaluation through medical record review. *Journal of Nursing Care Quality, 23*(3), 202-210.

Vogus, T. J., & Sutcliffe, K. M. (2007). The safety organizing scale: Development and validation of a behavioral measure of safety culture in hospital nursing units. *Medical Care, 45*(1), 46-54.

Wakefield, D., Wakefield, B., Borders, T., Uden-Holman, T., Blegen, M., & Vaughn, T. (1999). Understanding and comparing differences in reported medication administration error rates. *American Journal of Medical Quality, 14*(2), 73-80.

Wallin, L. (2009). Knowledge translation and implementation research in nursing. *International Journal of Nursing Studies, 46*(4), 576-587.

Webster, C., & Copenhaver, J. (2001). Structured data entry in a workflow-enabled electronic patient record. *The Journal of Medical Practice Management, 17*(3), 157-61.

Weick, K. E., & Roberts, K. H. (1993). Collective mind in organizations: Heedful interrelating on flight decks. *Administrative Science Quarterly, 38*(3), 357-381.

Wilson, D. S., Redman, R. W., & Potempa, K. (2010). A vision and compass for healthcare leadership: Lessons from the migrant nurse resolution for recurrent nursing shortage. *Journal of Healthcare Leadership, 2010*(2), 91-96.

Wilson, D.S. (2011). Mindfulness: A qualitative description of the behaviors charge nurses enact to safely staff patient care units. *Western Journal of Nursing Research.* Advance online publication. doi:10.1177/0193945910396519

Yourstone, S., & Smith, H. (2002). Managing system errors and failures in health care organizations: Suggestions for practice and research. *Health Care Management Review, 27*(1), 50-61.

Zimmerman, J., Hammerstad, S., Mechanic, J., & Hammerstad, S. M. (1993). Unit-based educators: Decentralizing resources at the unit level. *Medsurg Nursing, 2*(5), 411-413.

Zimmerman, P. G. (2000). Charge nurse. *Journal of Emergency Nursing, 26*(2), 164-165.

Chapter V

Summary, Conclusions and Recommendations

This dissertation examined the perceptions of patient safety culture among nurses with differences in charge experience and the influence of unit structure which was operationalized as 'charge nurse mix' (unit variation in the ratio of nurses with more than five years charge experience divided by the total number of nurses). In addition, it examined the association of the nurses' collective safety behaviors with perceptions of patient safety culture. Finally, the study focused on the influence of charge nurse mix on the perceptions of patient safety culture.

The *Role of the Charge Nurse (RCN)* model, developed to test the relationships among these variables, was guided by the structural contingency theory. The theory posits that one of the best ways to create a successful and efficient organization is to match the structural features with the environmental context in which it functions. In the application of this theory, the environment contexts were the individual (resilience, charge experience, and shift worked) and collective (safety organizing behaviors) contexts. The structural feature was the charge nurse mix. The charge nurse mix (unit ratio of the number of nurses with more than five years charge experience to the total number of nurses) is a new concept that was introduced to measure the density of charge nurse experience within this study setting that did not have permanent charge nurse positions.

The results suggested that both the environmental context and structure of the charge nurse role were associated with perceptions of patient safety culture. The findings provided important insights into the dynamics of organizational factors that are associated with perceptions of patient safety culture. Perceptions of patient safety are important because attitudes affect psychological safety that in turn impact the detection and reporting of errors (Edmondson, 1999; Reason, 1995; Weick & Sutcliffe, 2007). In this chapter the summary of the study findings and their implications to nursing practice are presented. The limitations, revision of the role of the charge nurse model, and recommendations for future studies are also discussed.

Summary

In Chapter 2, the research hypotheses were supported for positive associations between resilience and four safety culture dimensions: overall perceptions of safety; feedback about errors, staffing; and non-punitive response to error. Charge nurse experience was associated with overall perceptions of safety, number of events reported within the last twelve months, teamwork, and safety grade. Shift worked was associated with non-punitive response to error. Within the individual context, important differences were observed between the charge and non-charge nurses in their perceptions of patient safety culture. That is, the nurses who had some charge experience were less positive than the nurses with no charge experience about the perceptions of patient safety culture. Another important finding about the individual context was that although the majority of the charge nurses had some shadow-charge experience, less than half functioned as charge nurses for greater than 25% of the time they worked. Therefore, it seemed that more emphasis was placed on having some preparation for the charge role and less on the

development of competency within the role. Prior research has shown that the collective of staff nurses, including charge nurses, were less positive about perceptions of safety cultures. As a result of this research, there is now a better understanding of the differences between charge nurses' and staff nurses' perceptions of patient safety culture.

Chapter 3 described the association of the collective context (safety organizing behaviors of the nurses) with perceptions of patient safety culture. Researchers of patient safety culture have focused consistently on the impact of differences by professional disciplines and work areas or organizations. In this study, it is argued that perceptions of patient safety culture could also be influenced by safety behaviors of nurses. The collective context was positively associated with the all of the dimensions of patient safety culture except for number of events reported within the last 12 months. The findings indicated that collective safety behaviors influenced perceptions of patient safety culture. Therefore, it seems that in addition to professional and organizational characteristics, studies about perceptions of patient safety culture should include measures that assess the safety behaviors of healthcare workers.

In Chapter 4, research questions two and three were examined. The relationship between the charge nurse mix and perceptions of patient safety culture was examined as well as the moderation effect of charge nurse mix on the individual and collective contexts. The hypotheses for the association of charge nurse mix with perceptions of patient safety culture were supported. The CN index utilized the unit ratio of charge nurses with more than five years charge experience to the total number of nurses in the unit. The CN mix goes beyond just examining whether there is charge nurse coverage and attempts to assess the quality of the coverage provided. In this study, the influence of

education and length of service on perceptions of patient safety were not as significant as in previous studies. The CN mix index provided additional information about the level of charge nurse experience that may account for variations in the perceptions of patient safety culture across different nursing units. This suggests that in studies about workers' attitudes towards patient safety culture, the contextual in addition to the structural factors should be considered.

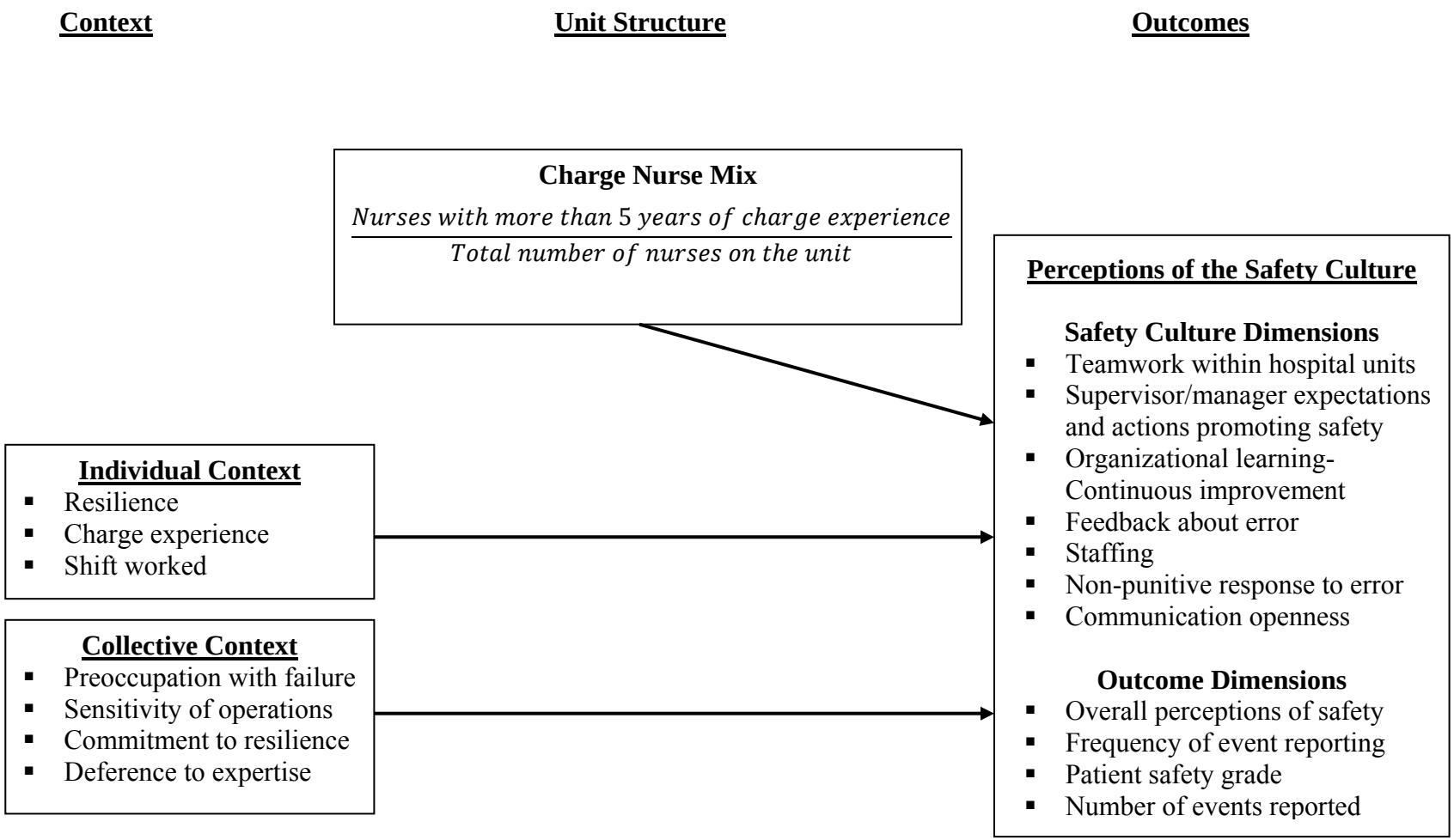
Model Revision

The *Role of the Charge Nurse (RCN)* model was developed to test associations between the individual context, collective context, and unit structure with perceptions of patient safety culture. The model hypothesized that perceptions of patient safety will be influenced by the individual context, collective context, and unit structure of the charge role. It also was developed to test whether there would be a moderation effect of the unit structure of the charge role on the context. The structural contingency theory posits that organizational environmental contexts and structure of its sub-units influence their success. Therefore, in this research, the success of charge nurses as unit leaders would have depended on the structure of the charge nurse role in regards to the organizational configuration of charge nurse duties and positions

There was partial support for the model as theorized. There was evidence of direct associations between the individual context, collective context, and structure with perceptions of patient safety culture, but there was no support for a moderation effect of unit structure on the individual and collective contexts. Therefore, although the structure of the charge nurse role did have a significant association with perceptions of patient safety culture, there was no impact on the environmental context of the charge nurse role.

There were significant differences in the individual or collective contexts between the units with moderate and low charge mix however; there were no correlations with the measures for the contexts of the charge nurse role and charge nurse mix. This suggests that there may be additional mechanisms such as nurse staffing ratio or patient factors influencing the impact of charge nurse mix. In consideration, the charge nurse model was revised to include staffing and patient factors in the unit structure. The revised model should be tested with larger a sample size in a variety of healthcare organizational structures. The revised model is depicted in Figure 5.1.

Figure 5.1. Role of the Charge Nurse (RCN) Model *(Revised)*



Theoretical Framework: Adapted from the Modified Version of the Structural Contingency Theory (Mark, Salyer & Smith, 1996)

Limitations

While this study provided important information about the individual and collective context and the CN mix in perceptions of patient safety culture in nursing units, there were a number of limitations associated with this study. The results of this study should be interpreted within the framework of the limitations identified. First, this was a cross sectional study and the causal direction of the variables used in the study cannot be determined. For example, the perceptions of a patient safety culture and the safety behaviors may be also theorized to be influenced by organizational and unit level factors. While this study provided theoretical and empirical evidence to support the model used, a longitudinal study design will allow for the examination of the causal direction of the concepts and variables described in this project.

Second, the study was conducted in a single, large academic medical center. The levels of resilience were high and no differences in safety behaviors were detected across the nursing units. In spite of the power analysis that was conducted to ensure the study was appropriately powered for multiple regression analyses, a lack of a large sample size and lack of variation in the organizational setting may have magnified the similarity of resilience and shared safety beliefs among the nurses. In addition, three units shared one large physical space and common lunchrooms, which enabled further inter-mingling of the nurses.

Third, the lack of designated charge nurse positions in this study setting made it difficult to truly test for differences in charge experience as nurses moved in and out of that role. Additionally, there may be other variables influencing the charge nurse mix index. The low charge nurse mix units may have been subject to high turnover or burnout

rates which could have accounted for increased transfer across units within or out of the organization. In future studies the charge nurse mix may need to be refined to reflect more charge nurse expertise by capturing how recent and how often within the last year the nurses were in charge.

Finally, the small to moderate effect size used in determining an adequate sample size may have been limited in testing for differences across units. The use of a moderate to large effect size might have allowed for larger number for respondents within the nursing units. In addition, the use of a convenience sample is often associated with selection bias that may limit the generalizability of the results. Future studies that use a probability sample design may increase the likelihood that the sample is representative of the population of charge nurses from which the sample was drawn.

Recommendations

Recommendations suggested are applicable to research, practice, and policy issues regarding the role of the charge nurse. This research has demonstrated the importance of organizational structure of the charge nurse role to the influence of perceptions of patient safety culture. However, the study could have been enhanced with the consideration of other factors. First, inclusion of other study sites within and outside of the organization may have provided better comparisons of the nurse characteristics and behaviors. Future studies should include larger samples with variations in type of nursing units such as pediatric, ambulatory or diagnostics centers. In addition, the study should include organizations with different characteristics such as: leadership structures where there are permanent and non-permanent charge nurse positions; magnet status;

geographic variations such as urban and rural settings; and levels of care provided such as tertiary versus community based.

Second, the findings from this study will serve to inform nursing practice in regards to the importance of the structure of charge nurse role. The practice of having the majority of the charge nurses practicing within the role for fewer than 75% of shifts worked may lead to lax or deficient unit leadership. The development of expertise within a role typically requires some consistency in practice and proficiency may take as much as 18 months to two years (Benner, 1984). This suggests that charge nurses with less experience may not be developing their full leadership potential. Given the importance of the charge nurses' decision-making in staffing a unit (Wilson et al., 2011), rotating charge nurses in and out of the role may only serve to prepare the nurses with a basic knowledge patient assignments. Wilson et al. (2011) found that effective charge nurses demonstrated reliable behaviors that develop as the nurses develop competency within the role. Therefore, the utilization and implementation of the unit leadership may need to be re-examined to provide more opportunities for the nurses to develop expertise within the role. Facilitating changes in the structure of unit-level leadership has a direct impact on the utilization of the nursing workforce and therefore has major implications for organizational policies.

This study is an important contribution to the empirical results about role of leaders in perceptions of patient safety in healthcare organizations, especially as pertaining to nurses. In this research, the nursing unit leaders were less positive than staff nurses about perceptions of patient safety culture. This was contrary to findings from national studies (Singer et al., 2009; Sorra & Nieva, 2004). Future studies should include

charge nurses and other healthcare leaders to further explore differences that may occur across leadership roles. In the literature, frontline workers were less positive than leaders about perceptions of safety cultures. A contrast of healthcare leadership that includes charge nurses may highlight the importance of frontline leadership.

Finally, the charge nurse mix index (CN index) was introduced and provided an initial step to quantify charge nurse expertise. Several factors may need to be considered in the construction of a CN index. The charge nurse index may need to be more precise to capture the experience of charge nurses in that specific role and not only years of experience as a nurse. In this study the units with higher charge nurse index had significantly more nurses with longer years of nursing experience. The level of charge nurse expertise needs to be measured as separate from nursing expertise. The effect of nursing characteristics such as educational level, longevity within current unit, satisfaction, and intent to leave unit or charge nurse position may provide insights into the stability of the nursing workforce and the supply of charge nurses in the nursing units. In addition, the desire to be in charge may be impacted if the nursing units have low staffing ratios in relation to patient acuity or census. Nurse staffing overwhelmingly took up most of the charge nurses' time during a shift (Wilson et. al., 2011). Given that unit staffing is a major responsibility of charge nurses, future studies should include nursing staffing factors such as hours per patient day, registered nurse mix, and patient factors such as length of stay, acuity, census, and outcomes.

Conclusion

The need for constant improvement in patient outcomes calls for comprehensive strategies to cultivate and maintain patient safety cultures. The patient care units are

complex and uncertain environments that impact the quality of outcomes for both providers and patients. This dissertation is the first known study that compares charge and non-charge nurses' perceptions of patient safety culture. Charge nurses' perceptions are critical because they are at the interface of practice and management. Charge nurses function as the leaders of complex tight-coupling work environments and demonstrate similar safety behaviors comparable to reliable professionals in non-health high reliable organizations.

In high reliability systems, the workers must be resilient, constantly aware of pending danger, tactful in communication with all levels of co-workers, persistent in getting to the bottom of mishaps, and very knowledgeable of the procedures, policies and skills required to get the work done. These behaviors may be necessary tools for nurses in order to augment organizational strategies aimed at improving patient safety outcomes. Therefore, charge nurses, if they are to be effective, deserve the deliberate support for role development by nursing management.

References

Benner, P. E. (1984). *From novice to expert: Excellence and power in clinical nursing practice*. Menlo Park, CA: Addison-Wesley Pub. Co., Nursing Division.

Edmondson, A. C. (1999). Psychology safety and learning behavior in work teams. *Administrative Science Quarterly, 44*, 350-383.

Reason, J. (1995). Understanding adverse events: Human factors. *Quality in Health Care, 4*, 80-89.

Singer, S. J., Gaba, D., Falwell, A., Lin, S., Hayes, J., & Baker, L. (2009). Patient safety climate in 92 US hospitals: Differences by work area and discipline. *Medical Care, 47*(1), 23-31.

Sorra, J. S., & Nieva, V. F. (2004). Hospital Survey on Patient Safety Culture (Agency for Healthcare Research and Quality Publication No. 04-0041). Rockville, MD: Agency for Healthcare Research and Quality.

Weick, K., & Sutcliffe, K. M. (2007). *Managing the unexpected: Resilient performance in an age of uncertainty* (2nd ed.). San Francisco: Jossey-Bass.

Wilson, D. S. (2011). Mindfulness: A qualitative description of the behaviors charge nurses enact to safely staff patient care units. *Western Journal of Nursing Research*. Advance online publication. doi:10.1177/0193945910396519

Appendix A

To: Mrs. Deleise Wilson

From:

Michael	Geisser
John	Weg

Cc:

Kathleen	Sutcliffe
Akke	Talsma
Richard	Redman
Michelle	Aebersold
Deleise	Wilson

Subject:Initial Study Approval for [HUM00027432]

SUBMISSION INFORMATION:
Study Title: Effects of Charge Nurse Role and Structure on the Patient Safety Cultures of Nursing Units
Full Study Title (if applicable):
Study eResearch ID: HUM00027432
Date of this Notification from IRB:9/18/2009
Initial IRB Approval Date: 9/15/2009
Current IRB Approval Period:**9/15/2009 - 9/14/2010**
Expiration Date: Approval for this expires at **11:59 p.m. on 9/14/2010**
UM Federalwide Assurance (FWA): FWA00004969 expiring on 11/17/2011
OHRP IRB Registration Number(s): IRB00001996

NOTICE OF IRB APPROVAL AND CONDITIONS:
The IRBMED has reviewed and approved the study referenced above. The IRB determined that the proposed research conforms with applicable guidelines, State and federal regulations, and the University of Michigan's Federalwide Assurance (FWA) with the Department of Health and Human Services (HHS). You must conduct this study in accordance with the description and information provided in the approved application and associated documents.

APPROVAL PERIOD AND EXPIRATION:
The approval period for this study is listed above. Please note the expiration date. If the approval lapses, you may not conduct work on this study until appropriate approval has been re-established, except as necessary to eliminate apparent immediate hazards to research subjects. Should the latter occur, you must notify the IRB Office as soon as possible.

IMPORTANT REMINDERS AND ADDITIONAL INFORMATION FOR INVESTIGATORS

APPROVED STUDY DOCUMENTS:
You must use any date-stamped versions of recruitment materials and informed consent documents available in the eResearch workspace (referenced above). Date-stamped materials are available in the “Currently Approved Documents” section on the “Documents” tab.

RENEWAL/TERMINATION:
At least two months prior to the expiration date, you should submit a continuing review application either to renew or terminate the study. Failure to allow sufficient time for IRB review may result in a lapse of approval that may also affect any funding associated with the study.

AMENDMENTS:
All proposed changes to the study (e.g., personnel, procedures, or documents), must be approved in advance by the IRB through the amendment process, except as necessary to eliminate apparent immediate hazards to research subjects. Should the latter occur, you must notify the IRB Office as soon as possible.

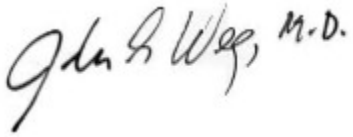
AEs/ORIOs:
You must inform the IRB of all unanticipated events, adverse events (AEs), and other reportable information and occurrences (ORIOs). These include but are not limited to events and/or information that may have physical, psychological, social, legal, or economic impact on the research subjects or other.

Investigators and research staff are responsible for reporting information concerning the approved research to the IRB in a timely fashion, understanding and adhering to the reporting guidance (http://www.med.umich.edu/irbmed/ae_orio/index.htm), and not implementing any changes to the research without IRB approval of the change via an amendment submission. When changes are necessary to eliminate apparent immediate hazards to the subject, implement the change and report via an ORIO and/or amendment submission within 7 days after the action is taken. This includes all information with the potential to impact the risk or benefit assessments of the research.

SUBMITTING VIA eRESEARCH:
You can access the online forms for continuing review, amendments, and AEs/ORIOs in the eResearch workspace for this approved study (referenced above).

MORE INFORMATION:
You can find additional information about UM's Human Research Protection Program (HRPP) in the Operations Manual and other documents available at: www.research.umich.edu/hrpp.

Michael Geisser
Co-chair, IRBMED



John Weg
Co-chair, IRBMED

Appendix B

CHARGE NURSE STUDY

UNIVERSITY OF MICHIGAN SCHOOL OF NURSING

RETURN INSTRUCTIONS

PLEASE PLACE COMPLETED QUESTIONNAIRES AND CONSENT FORMS IN THE CHARGE NURSE STUDY COLLECTION BOXES IN THE NURSES' CONFERENCE ROOM

- *An "event" is defined as any type of error, mistake, incident, accident, or deviation, regardless of whether or not it results in patient harm.*
- *"Patient safety" is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of health care delivery.*

[AHRQ Perceptions of Safety Culture Scale]

INSTRUCTIONS

This survey asks for your : 1) opinions about the charge nurse role, patient safety issues, medical error, and event reporting in your hospital; and 2) about the charge nurse role on your unit.

SECTION A: Your Work Area/Unit

In this survey, think of your "unit" as the work area, department, or clinical area of the hospital where you spend *most* of your work time or provide *most* of your clinical services.

Please indicate your agreement or disagreement with the following statements about your work area/unit. Mark your answer by filling in the circle.

Think about your hospital work area/unit…	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
1. People support one another in this unit	①	②	③	④	⑤
2. We have enough staff to handle the workload	①	②	③	④	⑤
3. When a lot of work needs to be done quickly, we work together as a team to get the work done	①	②	③	④	⑤
4. In this unit, people treat each other with respect	①	②	③	④	⑤
5. Staff in this unit work longer hours than is best for patient care	①	②	③	④	⑤
6. We are actively doing things to improve patient safety	①	②	③	④	⑤
7. We use more agency/temporary staff than is best for patient care	①	②	③	④	⑤
8. Staff feel like their mistakes are held against them	①	②	③	④	⑤
9. Mistakes have led to positive changes here	①	②	③	④	⑤
10. It is just by chance that more serious mistakes don't happen around here	①	②	③	④	⑤
11. When one area in this unit gets really busy, others help out	①	②	③	④	⑤
12. When an event is reported, it feels like the person is being written up, not the problem	①	②	③	④	⑤

SECTION A: Your Work Area/Unit (continued)

Think about your hospital work area/unit…	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
13. After we make changes to improve patient safety, we evaluate their effectiveness	①	②	③	④	⑤
14. We work in "crisis mode" trying to do too much, too quickly	①	②	③	④	⑤
15. Patient safety is never sacrificed to get more work done	①	②	③	④	⑤
16. Staff worry that mistakes they make are kept in their personnel file	①	②	③	④	⑤
17. We have patient safety problems in this unit	①	②	③	④	⑤
18. Our procedures and systems are good at preventing errors from happening	①	②	③	④	⑤

SECTION B: Your Supervisor/Manager

Please indicate your agreement or disagreement with the following statements about your immediate supervisor/manager or person to whom you directly report. Mark your answer by filling in the circle.

	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
1. My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures	①	②	③	④	⑤
2. My supervisor/manager seriously considers staff suggestions for improving patient safety	①	②	③	④	⑤
3. Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts	①	②	③	④	⑤
4. My supervisor/manager overlooks patient safety problems that happen over and over	①	②	③	④	⑤

SECTION C: Frequency of Events Reported

In your hospital work area/unit, when the following mistakes happen, *how often are they reported?*
Mark your answer by filling in the circle.

	Never ▼	Rarely ▼	Some-times ▼	Most of the time ▼	Always ▼
1. When a mistake is made, but is *caught and corrected before affecting the patient*, how often is this reported?	①	②	③	④	⑤
2. When a mistake is made, but has *no potential to harm the patient*, how often is this reported?	①	②	③	④	⑤
3. When a mistake is made that *could harm the patient*, but does not, how often is this reported?	①	②	③	④	⑤

SECTION D: Communications

How often do the following things happen in your work area/unit? Mark your answer by filling in the circle.

Think about your hospital work area/unit…	Never ▼	Rarely ▼	Some-times ▼	Most of the time ▼	Always ▼
1. We are given feedback about changes put into place based on event reports	①	②	③	④	⑤
2. Staff will freely speak up if they see something that may negatively affect patient care	①	②	③	④	⑤
3. We are informed about errors that happen in this unit	①	②	③	④	⑤
4. Staff feel free to question the decisions or actions of those with more authority	①	②	③	④	⑤
5. In this unit, we discuss ways to prevent errors from happening again	①	②	③	④	⑤
6. Staff are afraid to ask questions when something does not seem right	①	②	③	④	⑤

SECTION E: Patient Safety Grade

Please give your work area/unit in this hospital an overall grade on patient safety. Mark ONE answer

○	○	○	○	○
A	B	C	D	E
Excellent	Very Good	Acceptable	Poor	Failing

SECTION F: Number of Events Reported In the past 12 months, how many event reports have you filled out and submitted? Mark ONE answer.

- ○ a. No event reports
- ○ b. 1 to 2 event reports
- ○ c. 3 to 5 event reports
- ○ d. 6 to 10 event reports
- ○ e. 11 to 20 event reports
- ○ f. 21 event reports or more

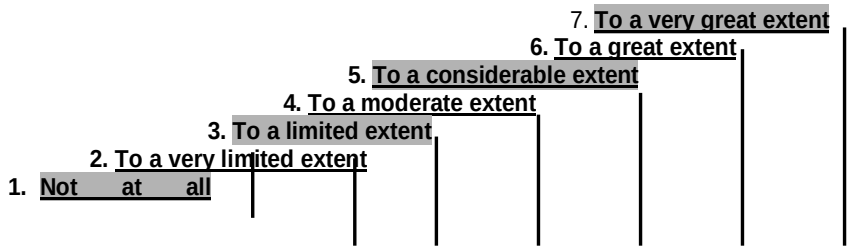
SECTION G: Your Comments

Please feel free to write any comments about patient safety, error, or event reporting in your hospital.

[Safety Organizing Scale]

SECTION H.

The following questions ask you to assess the degree to which you and other RNs with whom you currently and primarily work engage in certain behaviors and practices. Circle the number in the appropriate column.



1. We have a good "map" of each other's talents and skills.	1	2	3	4	5	6	7
2. We talk about mistakes and ways to learn from them.	1	2	3	4	5	6	7
3. We discuss our unique skills with each other so we know who on the unit has relevant specialized skills and knowledge.	1	2	3	4	5	6	7
4. We discuss alternatives as to how to go about our normal work activities.	1	2	3	4	5	6	7
5. When giving report to an oncoming nurse, we usually discuss what to look out for.	1	2	3	4	5	6	7
6. When attempting to resolve a problem, we take advantage of the unique skills of our colleagues.	1	2	3	4	5	6	7
7. We spend time identifying activities we do not want to wrong.	1	2	3	4	5	6	7
8. When errors happen, we discuss how we could have prevented them.	1	2	3	4	5	6	7
9. When a patient crisis occurs, we rapidly pool our collective expertise to attempt to resolve it.	1	2	3	4	5	6	7

[Resilience Scale]

SECTION I.

Please read the following statements. To the right of each you will find seven numbers, ranging from "1" (Strongly Disagree) on the left to "7" (Strongly Agree) on the right. Circle the number which best indicates your feelings about that statement. For example, if you strongly disagree with a statement, circle "1". If you are neutral, circle "4", and if you strongly agree, circle "7", etc.

Circle the number in the appropriate column	Strongly Disagree						Strongly Agree
11. I usually manage one way or another.	1	2	3	4	5	6	7
12. I feel proud that I have accomplished things in life.	1	2	3	4	5	6	7
13. I usually take things in stride.	1	2	3	4	5	6	7
14. I am friends with myself.	1	2	3	4	5	6	7
15. I feel that I can handle many things at a time.	1	2	3	4	5	6	7
16. I am determined.	1	2	3	4	5	6	7
17. I can get through difficult times because I've experienced difficulty before.	1	2	3	4	5	6	7
18. I have self-discipline.	1	2	3	4	5	6	7
19. I keep interested in things.	1	2	3	4	5	6	7
20. I can usually find something to laugh about.	1	2	3	4	5	6	7
21. My belief in myself gets me through hard times.	1	2	3	4	5	6	7
22. In an emergency, I'm someone people can generally rely on.	1	2	3	4	5	6	7
23. My life has meaning.	1	2	3	4	5	6	7
24. When I'm in a difficult situation, I can usually find my way out of it.	1	2	3	4	5	6	7

SECTION J: Demographics

A **"permanent"** charge nurse is defined as someone who is in charge for **more than 75%** of shifts worked.

A **"relief"** charge nurse is defined as someone who is in charge for **less than 75%** of shifts worked.

A **"staff"** nurse is defined as someone who has **never** been in charge

Please check the appropriate answers

1. On your unit, which role (as defined above) best describes you?
   ____permanent charge nurse ____relief charge nurse ____staff nurse

2. On your current unit are there **permanent** charge nurses (as defined above) for the: (Choose all that apply)
   _____Day shift _____ Evening shift
   _____Night shift _____Weekends _____Holidays

3. On your current unit are there **relief** charge nurses (as defined above) for the: (Choose all that apply)
   _____Day shift _____ Evening shift
   _____Night shift _____Weekends _____Holidays

4. On your current unit what kind of preparation do staff nurses normally get for the charge nurse role? (Choose all that apply)
   _____None
   _____Formal continuing education class sponsored by hospital
   _____Unit based class
   _____ Shadow-charge with an experienced charge nurse

5. On your current unit, how many shifts do staff nurses normally shadow-charge with an experienced charge nurse before they are in charge alone?
   _____None _____1-2 shifts
   _____3-4 shifts _____5 or more

6. If you became a charge nurse on your current unit, how many shifts did you shadow-charge with an experienced charge nurse before you were in charge alone?
   _____None _____1-2 shifts _____3-4 shifts
   _____5 or more _____Not applicable

7. In the past month on average, how many shifts have you been in charge?

_____ None
_____ Less than 25% of shifts worked
_____ more than 25% but less than 50% of shifts worked
_____ more than 50%- but less than 75% of shifts worked
_____ more than 75% of shifts worked

8. How long have you worked as a charge nurse on your current unit?

_____ Never _____less than 1 year
_____ 1 to 5 years _____ 6 to 10 years
_____ 11 to 15 years _____ 16 to 20 years
_____ More than 21 years

9. Which shift do you normally work?

_____Day shift _____ Evening shift
_____Night shift _____Weekends

10. Name of the specific unit you work on:

_____

11. What is your highest degree obtained?

_____ Diploma
_____ Associate Degree (ADN)
_____ Baccalaureate Degree (BSN) or higher in nursing
_____ Baccalaureate Degree or higher outside of nursing
_____Masters Degree or higher in nursing
_____Masters Degree of higher outside of nursing
_____Other

12. Current level on the professional framework scale

_____A _____B
_____C _____D
_____E

13. How long have you worked on your unit?

_____ Less than 1 year _____ 1 to 5 years
_____ 6 to 10 years _____ 11 to 15 years
_____ 16 to 20 years _____More than 21 years

THANKS FOR YOUR PARTICIPATION

Appendix C

August 30, 2009

Deleise Wilson MA, RN
Doctoral Candidate
School of Nursing
400 N. Ingalls
University of Michigan
Ann Arbor, MI 48109-5482

Dear Mrs. Wilson:

We are pleased to write this letter in support of the research proposal you are submitting for the fulfillment of the requirements of your doctoral degree. Your proposal to examine the effects charge nurses' role and structure on the patient safety culture of nursing units is both important and timely. The emphasis on the frontline leadership role of charge nurses is much needed. This research project has great potential for contributing to the improvement of preparation and selection of staff nurses for the charge nurse role.

We will provide administrative support to access requested frequency of events reports for the months specified. We understand that all data will be confidential and reported in the aggregate, making it impossible to identify our institution through any of the information we will provide. Institution specific results will be made available to us, upon our request.

As key members of the nursing leadership team here at the University of Michigan Health System, we are supportive of research that furthers the goals of our institution, namely excellence in patient care, education, and the delivery of safe patient care. The results of the project you are proposing are of great interest to us as a patient care provider as well as a major training center for nurses and physicians. We will be very interested in reviewing your findings and the types of educational programs you propose for potential application in our clinical setting. The focus on charge nurses and their role in creating and maintaining the culture of safety is vital to patient safety and we would welcome any contribution your research efforts can make in this arena.

We strongly support your research efforts and look forward to your results. Best wishes for success in your application.

Sincerely,

Margaet M. Calarco, PhD, RN
Senior Associate Director and Chief of Nursing Services
The University of Michigan Health System
Associate Dean for Clinical Affairs
The University of Michigan School of Nursing

Appendix D

UNIVERSITY OF MICHIGAN
CONSENT TO BE PART OF A RESEARCH STUDY

NAME OF STUDY AND RESEARCHERS

Title of Project:

Effects of charge nurses' role and structure on the patient safety cultures of nursing units

Principal Investigator:

Deleise S. Wilson MA RN, Doctoral Candidate, School of Nursing, University of Michigan

Co-Investigators:

Richard Redman, PhD, RN, Professor, School of Nursing, University of Michigan

AkkeNeel, Talsma, PhD RN, Assistant professor, School of Nursing, University of Michigan

Michelle Aebersold, PhD, RN, Clinical Assistant professor, School of Nursing, University of Michigan

Kathleen Sutcliffe, PhD, RN, Professor, Ross School of Business, University of Michigan

GENERAL INFORMATION

Description of the research

The goal of this study is to understand the effects of the charge nurse role and structure on the patient safety culture of nursing units. To accomplish this goal, two sources of information will be collected. First, the attached surveys ask you about the role and structure of charge nurses and your perceptions of safety on your current unit.

Second, the frequency of events reports will be obtained for a 6 month period from risk management. **Only unit-level total of events will be obtained.** The names of all nurses who reported the events and patients involved will be removed before the data is obtained. Therefore, it will be very difficult, if not impossible to link specific people or patients to the data retrieved.

Description of human subject involvement

The study involves the completion of survey questionnaires by nurses.

Length of human subject participation

The surveys will take between 15 and 20 minutes to complete.

Risks & discomforts of participation
There are no more than minimal risks to you. All the data collected will be de-identified and will not be shared with co-workers or managers.

Expected benefits to subjects or to others
Although you may not receive direct benefit from your participation, others may ultimately benefit from the knowledge obtained in this study.

Costs to subject resulting from participation in the study

The participants will not incur any costs for being in the study.

Payments to subject for participation in the study

Participants will receive a candy bar at the beginning of the study. The units with 90% and over return rate will receive pizza pies as soon as the 90% goal is reached.

The candy bars and pizza pies will still be given even if anyone or unit withdraws from participation in the research study.

Confidentiality of records/data

Only members of the research team will have access to surveys from which all identifying information will have been removed. You will not be identified in any reports on this study. Records will be kept confidential to the extent provided by federal, state, and local law. However, the Institutional Review Board, the sponsor of the study (i.e. NIH, FDA, etc.), or university and government officials responsible for monitoring this study may inspect these records.

The surveys will be kept in locked files cabinets, and office with limited access. Any information electronically will only be accessed using an individual ID and password.

Upon completion of this study all surveys will be destroyed.

Contact Information

Deleise S. Wilson MA RN, Doctoral Candidate, School of Nursing, University of Michigan.

Telephone number: (909) 810-7511

Faculty Advisors:

Richard Redman, PhD, RN, Professor, School of Nursing, University of Michigan.

Telephone number: (734) 764-7188

AkkeNeel Talsma, PhD RN, Assistant professor, School of Nursing, University of Michigan.

Telephone number: (734) 563-5199

Michelle Aebersold, PhD, RN, Clinical Assistant professor, School of Nursing, University of Michigan

Telephone number: (734) 936-7590

Kathleen Sutcliffe, PhD, RN, Professor, Ross School of Business, University of Michigan

Telephone number: (734) 764-2312

If you have any questions or concerns about your rights as a research subject, or any grievance, you may also contact the Institutional Review Board for Human Subject Research (IRBMED), University of Michigan, 517 W. William, Argus I, Ann Arbor, MI 48103-4943; telephone 734 763-4768.

Voluntary nature of participation

Your participation in this project is voluntary. Even after you sign the informed consent document, you may decide to leave the study at any time without penalty or loss of benefits to which you may otherwise be entitled.

Documentation of the consent

Please return this consent form signed with your completed survey.

SIGNATURES

Consent of the subject

I have read the information given above. Deleise Wilson has offered to answer any questions I may have concerning the study. I hereby consent to participate in the study.

ADULT SUBJECT OF RESEARCH

_____

Printed Name Consenting signature

DATE: _____