Leader-Member Relationships and Patient Safety Culture

By Albert D. Anderson Jr.

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Director of Dissertation: Dr. Elaine Scott

Major Department: Nursing

Patient safety culture has been a national objective for years. Many different interventions have been explored in hopes of improvement, but reported statistics suggest that this issue has yet to be solved. The purpose of this study is to examine relationships between nurse leaders and their nursing staff, and how these relationships influence patient safety culture.

Several existing data sources were combined into a single dataset to explore the relationships between structural variables, leader-member relationships, and patient safety culture. Structural variables explored included unit size, span of control, leader experience, shift worked, and unit tenure. Leader-member relationships are explored through the lens of Leader-Member Exchange theory, and operationalized using the LMX-7. Patient safety culture is operationalized using AHRQ's Hospital Survey on Patient Safety Culture.

This study has implications for nurse leaders, educators, and researchers. The study demonstrates the importance of contact frequency in the formation of leader-member relationships. Additionally, this study confirms the value of leader-member relationship when building a patient safety culture, both at the individual and unit level.

LEADER-MEMBER RELATIONSHIPS AND PATIENT SAFETY CULTURE

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Albert D. Anderson Jr.

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Albert D. Anderson Jr.

APPROVED BY:

DIRECTOR OF
DISSERTATION: _____
Elaine Scott, PhD

COMMITTEE MEMBER: _____
Melvin Swanson PhD

COMMITTEE MEMBER: _____
Theresa Floegel, PhD

COMMITTEE MEMBER: _____
Linda Hofler, PhD

CHAIR OF THE DEPARTMENT
OF NURSING SCIENCE_____
Elaine Scott, PhD

DEAN OF THE
GRADUATE SCHOOL: _____
Paul J. Gemperline, PhD

DEDICATION

I dedicate my dissertation to my family. You are my reason for living. The reason why I will always work to be a better man.

To the woman who made this possible. Through the last five years, we have lived through more than any husband and wife should reasonably endure. Today as I write these words, I know that there are brighter days ahead. When I think of those bright days, I think of you Melissa. Thank you for loving me.

To my first son, Jackson. You have no idea how much we love you. We did this so that one day you would realize it was possible. I want you to work this hard for something, achieve it, and feel what I feel today. You deserve this.

Finley, my angel in heaven. I miss you so much. I would relive the last five years over-and-over if I could just see your face.

To my big boy, William. In just seven months I know that you are the most loving child I've ever met. I have no doubt that you will continue to dominate life. Your mother would not have it any other way.

Finally, I would like to dedicate this dissertation to the nursing staff who responded to these surveys. I hope that this document adequately portrays your feelings about your leaders and the patient safety culture that you experience. This work is about making your work environments better, so that you can better care for the patients you love.

ACKNOWLEDGEMENTS

Thank you to all of my committee members. Dr. Elaine Scott, you hand fed me through the PhD journey. I know that I can count on you to give me the hard truth, and look out for my best interests at the same time. Dr. Melvin Swanson, you could always make me laugh in spite of all the work I had in front of me. You are brilliant, and it has been an honor to go through this process with you. Dr. Theresa Floegel, I appreciate your willingness to help me on this journey, and I hope in the coming years we can continue to work together. Dr. Linda Hofler, you set me on this journey years ago, and it is only fitting that you are here at the conclusion. Thank you for seeing the potential in me.

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CHAPTER I: INTRODUCTION

In 2000 the number of annual deaths attributed to medical error in the US was estimated to be as high as 98,000 (Kohn, Corrigan, & Donaldson, 2000). A push for patient safety from the highest branches of government followed (Leape, Berwick, & Bates, 2002), but results have been less than desirable. Currently up to 55% of patients do not receive the recommended standard of care, and patient safety issues rank as high as the third leading cause of death in US hospitals with current estimates between 210,000 – 440,000 per year (Thomas & Classen, 2014; Classen et al., 2011; James, 2013).

The Institute of Medicine (IOM) recommends that healthcare leaders create a culture of safety to combat these statistics (Kohn et al., 2000). Culture transformation is a complex undertaking, involving leadership, teamwork, evidence-based practice, communication, ongoing learning, just culture, and patient-centered care (Sammer, Lykens, Singh, Mains, & Lackan, 2010). Weaknesses in any one of these areas could predispose an organization to safety failures.

Efforts in creating patient safety culture have centered on developing improved processes and adopting technology rather than exploring team relationships and leader influences (DeJoy, Gershon, & Schaffer, 2004; Henricksen, Battles, Marks, & Lewin, 2005). The adoption of evidence-based practice, strengthening communication, encouraging continuous learning, and focusing on patient centered care have also been targeted interventions; yet issues that require positive leader-member relationships like culture and teamwork, remain understudied (Wong et al., 2013; Thompson et al., 2011). This study focuses on the role of the leader-member relationship in creating patient safety culture.

Statement of the Problem

Despite increasing emphasis on patient safety, up to 55% of patients do not receive the recommended standard of care, and between 98,000 and 440,000 patients lose their lives unnecessarily every year due to medical errors (McGlynn et al., 2003; Thomas & Classen, 2014; Kohn et al., 2000). One understudied area is how nurse leaders and their teams influence patient safety culture. While previous research confirmed relationships contribute to patient safety culture (Thompson, 2010), the evidence remains scant, and studies on how nursing team relationships affect patient safety culture do not exist.

Background: Patient Safety Culture, Nursing Leadership and Staff Relationships

To improve patient outcomes the IOM has called for focus on building a culture of safety (Kohn et al., 2000). In 2000, there was no consistent measurement of patient safety culture and the Agency for Healthcare Research and Quality (AHRQ) took this to task, creating the Hospital Survey on Patient Safety Culture (HSOPSC) to measure this phenomenon. Researchers have since worked at linking patient safety culture to patient outcomes with mixed findings (Brewer, 2006; Sammer et al., 2010; Groves, 2014).

Patient safety culture is complex, and establishing a connection between patient safety culture and outcomes can be difficult. Culture is the shared values about what is important, how things operate, and the interaction of these beliefs and values within the confines of organizational structures (Singer et al., 2009; Halligan & Zecevic, 2011; Sammer et al., 2010). Behavioral norms are the outward display of these values, and the presence of certain norms like frontline leader commitment, the balance between productivity and safety, communication, and constructive responses to unsafe events have been associated with a positive patient safety culture (Mark et al., 2008). Halligan and Zecevic (2011) emphasized more norms in a systematic

review, citing the importance of leadership, teamwork, shared beliefs, open communication, organizational learning, and non-punitive reporting of error to positive safety culture creation.

Safety culture starts with nursing leaders who must set the tone for the organization's patient safety culture (Sammer et al., 2010). To achieve a positive safety culture, organizations must declare patient safety a primary goal. Taking this step means encouraging safety reporting, and the commitment of resources at all levels (Nance, 2008). Leaders must inspire their teams, influence their values, change their attitudes, and alter their perception of safety (DeJoy, Gershon, & Schaffer, 2004; Sammer et al., 2010). To accomplish this, leaders must develop relationships with their teams, learning their strengths and weaknesses. Strong relationships give leaders the opportunity to place each team member in a position for success.

Hospitals traditionally exhibit a culture of blame (Waterson, 2014). Blame culture has a propensity to hold individuals responsible for errors rather than looking at problems with process or structure (Waterson, 2014). This tendency distances frontline nurses from their leadership, disrupting the communication that must occur to create a safe environment. Without open, non-punitive communication, the root cause of error is often missed, and mistakes risk being repeated.

To change the blame culture of hospitals, leaders have attempted to address patient safety issues as "systemic factors" of error and not individually at the "sharp end" (Waterson, 2014, p. 120). Doing so creates an open, non-punitive communication environment. By empowering frontline caregivers to report problems, nurse leaders create an opportunity to analyze, learn from, and improve the systems that cause deviations (Thomas & Classen, 2014, p. 642).

Nursing organizations recognize the importance of relationships for effective leadership. When developing the healthy work environment tool-kit, the American Association of Critical Care Nurses (AACN) noted that deficient interpersonal relationships lead to mistrust, chronic stress, and dissatisfaction among nurses (AACN, 2005). The American Nurse's Credentialing Center echoes the need for positive leader-member relationships in their forces of magnetism guidelines, describing the ideal nurse leader as one who is committed to a relationship with their nurses by encouraging feedback and effective communication (ANCC, 2008). It is important for the nurse leader to set the tone on the nursing unit, developing relationships with their teams, and creating the expectation for positive patient safety culture (Thomas-Hawkins, Flynn, Lindgren, & Weaver, 2015; Stapleton et al., 2007; Squires, Tourangeau, Laschinger, & Doran, 2010; Thompson et al., 2011; Wong, Cummings, & Ducharme, 2013).

Literature suggests that structural variables that could serve as influences for patient safety culture include unit size (Hung, Hsu, Lee, & Huang, 2013; Milland, Christoffersen, & Hedegaard, 2013), span of control (Pabst, 1993; Mancini, 2011), leader experience (Shirey et al., 2010), shift worked (Drake & Scott, 2015; Smith & Eastman, 2012), unit tenure (Morello et al., 2013), and contact frequency (Morello et al., 2013).

Unit Size

Smaller teams have been thought to possess a better, tighter "knit", safety culture (Hamdan, 2013). Research is needed to identify the effects of unit size on leadership effectiveness and patient safety.

Span of Control

There is no known optimal ratio for effective nurse leader span of control (New, 2009). The size of a nurse leader's span of control affects the amount of contact they have with each staff member, and possibly the resulting quality of relationship between the leader and member.

Leader Experience

The value of experience in a job is difficult to quantify. It is known that experienced leaders become more efficient, and use more effective coping strategies than their less experienced counterparts (Shirey et al., 2010). In attempt to capture leader experience, this study averages the experience of the management team.

Shift Worked

The shift that nurses work has safety implications for both patients and staff (Hughes, 2016). Health maintenance of nurses is important for leaders who hope to improve the patient safety of their units. Even more, employees who work different shifts could experience different frequencies in leader-member contact, thus explaining the different relationship qualities they have with their leader.

Unit Tenure

Time is an important variable in relationship development (Graen & Uhl-Bien, 1995), yet leadership theorists have done little to test this phenomenon (Gerstner & Day, 1997; Nahrgang, Morgeson, & Ilies, 2009; Shamir, 2011). This study considers unit tenure as an indicator of time, and determine if there is a relationship between respondent tenure on a unit and leader-member relationship.

Contact Frequency

Contact frequency provides a measure of personal, face-to-face communication between leaders and members. Research indicates that communication is critical to error prevention (Sammer & James, 2011; Wagner, 2014). The reason for communication as a critical precursor to error prevention may be the ability of the leader to form meaningful relationships with their teams, and ultimately the affect their perceptions of patient safety culture.

Purpose of the Study

The purpose of this study was to examine relationships between nurse leaders and their nursing staff, and how these relationships influence patient safety culture.

Significance of the Study

Nurse leaders need a clearer understanding of the role relationships play in the safe delivery of patient care. There is growing recognition that the relationships leaders have with staff can influence staff safety behaviors and patient outcomes (DiCuccio, 2015; Hoffman & Morgeson, 1999; Institute of Medicine [IOM], 2004; Nembhard & Edmondson, 2006; Pronovost et al., 2008). This proposed study examines patient safety from the relational leadership perspective, concentrating on the relationships between hospital nursing unit management teams and their nurses. To analyze these relationships this study uses Leader-Member Exchange (LMX) Theory. This study proposes that patient safety culture improves when staff members perceive a higher quality relationship with their leader. If true, units with more nurses that share perceptions of a high quality relationship with their leader may have better patient safety perceptions. Additionally, this study explores if member-member agreement about relationship with their leader is associated with the patient safety culture on a unit. If relationship quality is related to patient safety culture this study could be the foundation for a program of research

focusing on how nurse leader and nursing staff relationships can be optimized to improve patient safety culture.

Theoretical Model

LMX theory, a derivative of Social Exchange Theory (Kessler, 2013), proposes that mutual trust and respect between a leader and their followers can generate a positive sense of obligation and relationship (Graen & Uhl-Bien, 1995). LMX presupposes that over the lifespan of a relationship, multiple exchanges occur (Graen & Uhl-Bien, 1995) and each individual team member has a variable relationship experience with their leader (Graen & Uhl-Bien, 1995). The LMX-7 operationalizes this variability.

Scores on the LMX-7 range from low quality, transactional relationships to high quality, socio-emotional relationships (Dansereau, Graen, & Haga, 1975). Scores are calculated at both the individual and unit-level. Based on the LMX-7 score conclusions can be made regarding expected outcomes (Gerstner & Day, 1997). Individually this study uses each subject's sum total LMX score and labels it "TLMX". Two methods analyze LMX on a unit level: Average LMX (ALMX) and Differential LMX (DLMX).

TLMX

LMX theory has been commonly used to evaluate relationships between individuals and their leaders or leaders. More research examines individual LMX measurement than any other method.

ALMX

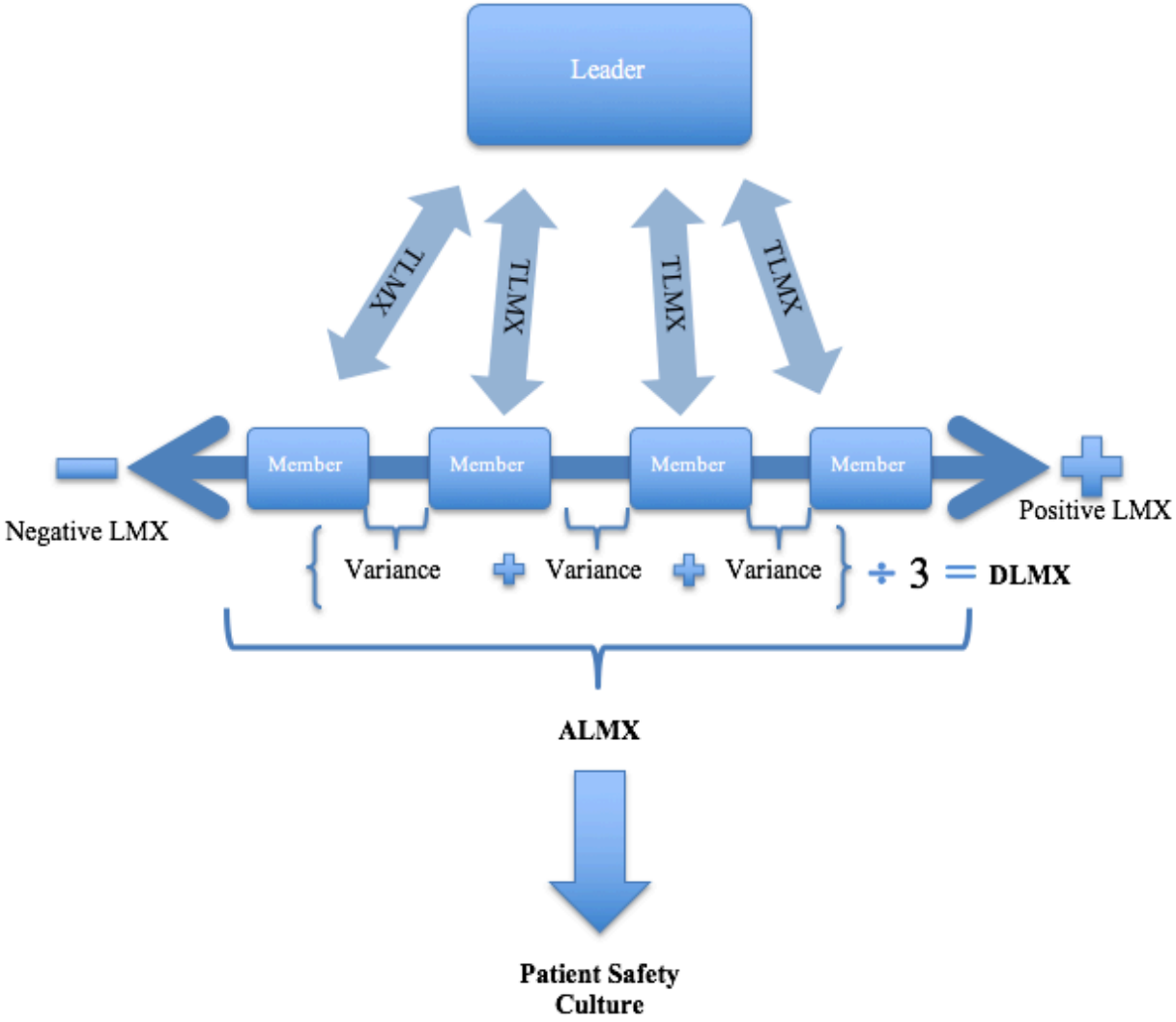
ALMX refers to the average of the TLMX scores for a unit. ALMX is the most popular method of unit analysis. High ALMX scores indicate a positive relationship between leaders and their teams, while a low ALMX scores indicate a negative relationship between leaders and their teams. Varied outcomes are linked to ALMX scores. A meta-analysis of 127 studies concluded that ALMX is consistently associated with member job performance, satisfaction (overall and supervisory), commitment, role perceptions, and turnover intentions (Gerstner & Day, 1997). ALMX also discriminates levels of perceived safety culture on hospital units (Thompson et al., 2011).

DLMX

DLMX refers to the degree of LMX variability within an organization (Erdogan & Liden, 2002). Units with a large variance in DLMX quality scores are believed to have low levels of agreement about the leader, while those with little variance are believed to have high levels of agreement about the leader. With DLMX, a sense of harmony can be measured. DLMX has been used to analyze both small group and organizational contexts (Erdogan & Bauer, 2010; Henderson, Liden, Glibkowski, & Chaudhry, 2009; Liden, Erdogan, Wayne, & Sparrowe, 2006).

The theoretical model for this study is reported in Figure 1. This model demonstrates the relationship between the leader and individual team members. Each team member has a different relationship with the leader, and the quality of this relationship can be viewed on the negative to positive line. In this model, DLMX is the average distance between members on the positive to negative LMX scale. The model postulates that TLMX, DLMX and ALMX all influence the unit's perception of patient safety culture.

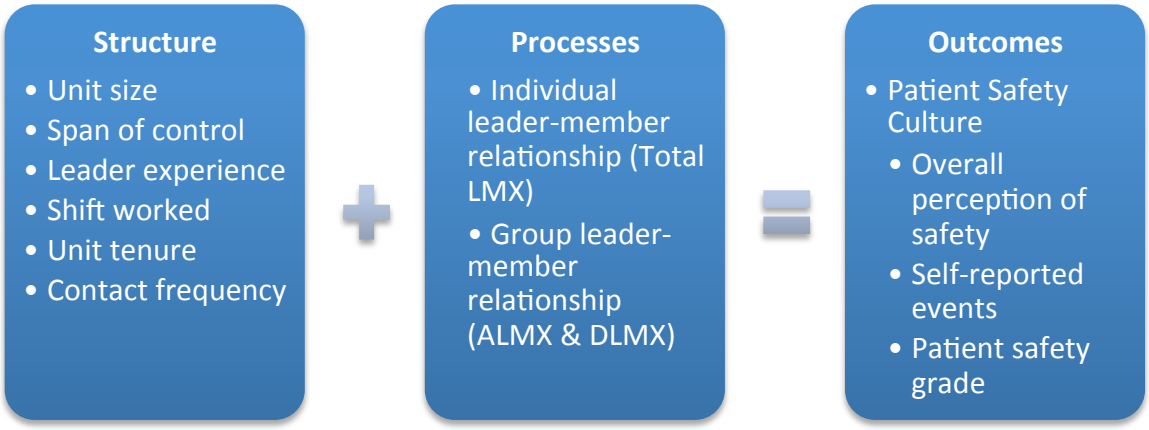
Figure 1: Theoretical model: LMX/HSOPSC Model



Research Model

Donabedian's Quality Framework (Figure 2) is a common model for patient safety culture research (Dellefield, Castle, McGilton, & Spilsbury, 2015). Donabedian theorized that structure, process, and outcome of care delivery are linked, and changes in structure or process affect patient outcomes (Donabedian, 1966; Donabedian, 1988).

Figure 2. Research Model: Donabedian's Quality Framework



Structural elements explored in this study are attributes of the unit, the nurse leader and the nursing staff members. The structural elements specific to units include the unit size, span of control, and leader experience. Structural elements specific to the nurse leader's behavior include contact frequency. Nursing staff member structural elements include their shift worked, and tenure on unit.

Processes of interest are the quality of the nurse leader-member relationship measured as TLMX, ALMX, and DLMX. The LMX-7 scale measures relationship quality on a scale ranging from 7 to 35. This score provides an individual, average, and variance score for leader-member relationship.

The outcome variables for this study are provided by the Hospital Survey of Patient Safety Culture (HSOPSC). The variables of interest include the overall perception of safety (12 HSOPSC dimensions), self-reported events, and patient safety grade.

Research Questions

This study uses LMX theory to examine the association of structural (unit size, span of control, leader experience, shift worked, tenure on unit, contact frequency), process (leader-member relationships), and outcome (patient safety culture) variables. Specifically, the following research questions are investigated:

Question 1

What are the characteristics of the nursing units, nurse leaders, survey respondents, the HSOPSC, and the LMX-7 scale?

Question 2

What is the relationship of TLMX with HSOPSC dimensions, self-reported events, and patient safety grade and is the relationship of TLMX with patient safety grade moderated by contact frequency, shift worked, or unit tenure?

Question 3

What are the relationships among the unit based structural variables (unit bed size, nurse leader span of control, and leader experience), contact frequency, DLMX, ALMX, and patient safety grade?

Question 4

What are the relationships among unit-based ALMX, DLMX, and contact frequency with unit mean HOSPSC dimension scores and patient safety grade?

Theoretical and Operational Definitions

ALMX is the average LMX score for a nursing unit.

Contact frequency is the number of times that a member reports having seen their leader. Measured in this study by asking "On a typical workday, how often do you see your supervisor/leader?".

DLMX is the differential or variance LMX score for a nursing unit.

Full time equivalents (FTE) are the number of hours one employee works on a full time basis. On an annual basis a FTE is considered to be 2080 hours, which is calculated as: 8 hours per day x 5 work days per week x 52 weeks = 2080 hours per year.

Leader-member relationship is the perception that members have of their leaders as measured by the LMX-7.

Leadership team is a group of registered nurses responsible for the daily operations and the strategic planning of a hospital unit.

Nurse leader includes the nurse leader and their respective assistant nurse leaders.

Patient safety culture is the shared beliefs and practices of the organization's members regarding the organizations willingness to detect and learn from errors.

Span of control is the ratio of members to leaders on a unit, operationalized dividing the number of management (leader and assistant leaders) full time equivalents and nurse full time equivalents (bedside nurses, nurse aides and unit secretaries).

Shift worked is the shift that each subject works most commonly.

Tenure on unit is how long the employee has worked in their current hospital area or unit.

TLMX is the sum LMX-7 score for an individual subject.

Unit size is the number of inpatient beds in a hospital unit.

CHAPTER II: REVIEW OF THE LITERATURE

The following chapter provides a review of the literature on patient safety culture guided by the structure, process and outcome variables of this study's research model (see figure 1). This review examines the unit size, nurse leader span of control, leader experience, shift worked, tenure on unit, and contact frequency, along with how these variables affect leader-member relationships, and patient safety culture.

Patient Safety Culture

Patient safety culture is the values shared among organizations members, their beliefs about how things operate, and the interaction of these values and beliefs within organizational structures and processes (Sammer et al., 2010; Halligan & Zecevic, 2011). According to Hellings, Schrooten, Klazinga, & Vleugels (2010) four key issues affect patient safety in the hospital:

1. Healthcare workers and leaders are often more interested in individual accountability than developing a systems approach to patient safety that addresses latent factors that allow an error to occur (or fail to prevent it).
2. Clinicians often encounter numerous errors during clinical practice, leading to the impression that such problems are inevitable.
3. Medical care is organized hierarchically, so reporting "problems" is often viewed as a personal attack rather than an effort to improve.
4. There has been little emphasis on developing a learning environment for front-line workers in healthcare.

Current Literature

Morello et al., (2013) reviewed 2000 publications about patient safety culture, spanning from January 1996 through April 2011. Twenty-one articles met inclusion criteria for the review. Morello et al., (2013) identified limited evidence to support strategies for patient safety culture improvement, but recommended further investigation of executive walking rounds and multi-faceted unit-based programs. To address the gap in literature from 2011 to 2016, nursing research articles written in English were searched for in Medline, Medline (OVID), Proquest, Proquest Health and Medical Complete, and PubMed databases using the keywords "Patient Safety Culture", "Leadership", and "Interventions". After eliminating duplicate articles, 23 were reviewed (See Appendix A).

Demographics

The review returned articles in Australia, Brazil, Canada, Germany, Israel, Jordan, the Netherlands, Sweden, and the United States. The global nature of patient safety culture publications indicates the level of worldwide urgency. A total of twenty-three articles were reviewed consisting of sixteen quantitative, four qualitative, and three mixed methods publications.

Instruments

No tool has been dominant in patient safety culture research until recently. Tools and their frequency of use in this review were the HSOPSC (6), the Safety Attitudes Questionnaire (2), Inter-professional Collaborative Competencies Attainment Survey (1), Quality of Life (1), and other generic surveys (9). Four qualitative/mixed methods studies used interviews. The frequency of HSOPSC use indicates its emergence as the premiere measure for patient safety culture.

Settings & Samples

Most of the studies in this review were performed in an acute care setting (AbuAlRub & AbuAlhijaa, 2014; Carney, West, Neily, Mills, & Bagian, 2010; Dychess, 2014; Hendricks, Cope, & Baum, 2015; Kaplan, Mestel, & Feldman, 2010; Kleiner, Carpenter, Maynard, & Link, 2014; Kullberg, Bergenmar, & Sharp, 2016; Oliveira et al., 2014; Prabhakar et al., 2012; Rosengren, HOGlund, & Hedberg, 2012; Sakowski, Hooper, Holton, & Brody, 2012; Scherb, Specht, Loes, & Reed, 2011; Spaulding & Ohsfeldt, 2014; Squires et al., 2010; Tschannen et al., 2011). Other settings included schools (Baker & Durham, 2013; Kagan & Barnoy, 2013), outpatient centers (Hoffmann et al., 2014; Kear & Ulrich, 2015; Simmons et al., 2015; Thomas-Hawkins & Flynn, 2015; Thomas-Hawkins et al., 2015), and long-term care facilities (Leone & Adams, 2016). Nurses were most often utilized as subjects (AbuAlRub & AbuAlhijaa, 2014; Baker & Durham, 2013; Carney, West, Neily, Mills, & Bagian, 2010; Dychess, 2014; Hendricks, Cope, & Baum, 2015; Kagan & Barnoy, 2013; Kaplan, Mestel, & Feldman, 2010; Kear & Ulrich, 2015; Kullberg, Bergenmar, & Sharp, 2016; Oliveira et al., 2014; Prabhakar et al., 2012; Rosengren, HOGlund, & Hedberg, 2012; Scherb et al., 2011; Simmons et al., 2015; Squires et al., 2010; Thomas-Hawkins & Flynn, 2015; Thomas-Hawkins et al., 2015; Tschannen et al., 2011). Other subjects studied included physicians (Hoffmann et al., 2014; Kaplan et al., 2010; Kleiner, Carpenter, Maynard, & Link, 2014; Kullberg et al., 2016; Prabhakar et al., 2012; Simmons et al., 2015; Tschannen et al., 2011) and students (Baker & Durham, 2013; Kagan & Barnoy, 2013).

Interventions

Patient safety culture interventions included education (AbuAlRub & AbuAlhijaa, 2014; Baker & Durham, 2013; Carney et al., 2010; Hoffmann et al., 2014; Kagan & Barnoy, 2013; Simmons et al., 2015; Thomas-Hawkins et al., 2015), hand-off (Dychess, 2014; Prabhakar et al., 2012), leadership (Hendricks et al., 2015; Kagan & Barnoy, 2013; Kagan & Barnoy, 2013; Kear & Ulrich, 2015; Kleiner et al., 2014; Oliveira et al., 2014; Simmons et al., 2015; Squires et al., 2010; Thomas-Hawkins et al., 2015), operational/procedural changes (i.e. scheduling, huddles, rounding practices, quality registers, staggering procedural start times, and interdisciplinary meetings) (Kullberg et al., 2016; Leone & Adams, 2016; Rosengren et al., 2012; Thomas-Hawkins & Flynn, 2015; Tschannen et al., 2011), shared governance (Sakowski et al., 2012; Scherb et al., 2011), and the addition of operational resources (Spaulding & Ohsfeldt, 2014; Thomas-Hawkins & Flynn, 2015). To date, no one intervention has emerged as a frontrunner to improve patient safety culture.

Summary

This literature search added twenty-three articles to the literature review by Morello et al., (2013). These articles include patient safety culture literature from all over the world, utilizing multiple research methods. The HSOPSC was the most popular instrument utilized, and acute care nurses were the most common subjects found during this review. Efforts to improve patient safety culture have been broad, but leadership is being recognized more commonly as an option for a patient safety culture intervention.

Research Model Elements

The proper combination of sound policy (structure) and organizational climate (process) must be present to achieve desirable outcomes (DeJoy, Schaffer, Wilson, Vandenberg, & Butts,

2004). The following section describes the structure, process, and outcome variables of this study.

Structure

Donabedian defined structure as the conditions under which care is provided including: material (equipment), human (number, variety, and qualifications of personnel), and organizational resources (organization of staff, teaching and research functions, performance review, methods of payment) (Donabedian & Bashshur, 2002). The recognition that staffing systems and patient populations influence patient safety has been suggested by a number of authors. Radwin, Cabral, Chen, & Jennings proposed the creation of a database to track patient variability and nursing staff skill, seeking to justify staffing decisions "based on data, rather than exclusively on clinical judgment and past experience" (2010, p. 103). Rapala (2011) echoed the importance of structure, suggesting analysis of multiple variables from shift-to-shift that included novice-to-expert ratio, educational level, staffing fluctuations, patient turnover, vacancy rate, and the availability of other disciplines.

Balance between activity and resources is a patient safety culture intervention. Thomas-Hawkins & Flynn (2015) studied HDU units, determining that patient safety culture scores were associated with the rate of medication errors, patient hospitalization, infection, and patient satisfaction. They suggested increasing staffing elasticity, defined as "slack staffing models that accommodate variations in patient volume and workload" (Thomas-Hawkins & Flynn, 2015, p. 62), claiming this should improve a unit's patient safety culture. In these circumstances, staff would perceive extra resources as aiding patient safety. Other suggestions by Thomas-Hawkins & Flynn (2015) include staggering start times for patients. This idea could translate into all inpatient areas where the smoothing of activity (admissions, discharges, procedures) on a unit

could reduce stress on staff and impact perceptions of patient safety. Smoothing can also occur in resource management. Kullberg et al. (2016) reported that implementing a fixed schedule for nursing staff was associated with improved patient safety culture perceptions and the minimization of overtime. This intervention assumes that staff are rested and capable of performing at their best.

This study focuses on variables that could signal a potential imbalance in activity or resources. These variables include unit based (unit size, span of control, and leader experience), individual based (shift worked, tenure on unit) and leader based (contact frequency) variables.

Unit size. Unit size is a controllable intervention, which makes it a prime structural variable for patient safety culture research. There is evidence that both small and large units enjoy certain safety advantages.

Studies have reported that larger units may experience more patient safety events than smaller units (Mark, Salyer, & Wan, 2003). Hung, Hsu, Lee & Huang (2013) utilized a cross-sectional design of self-administered questionnaires to study unit size. Trends in unit size were cited, including increased organizational complexity, and span of control predisposing them to patient safety culture struggles. (Hung, Hsu, Lee, & Huang, 2013). Hamdan (2013) echoed this idea, reporting that smaller teams possess a better safety culture and a tighter "knit" culture.

Counter arguments for large units exist in the literature. Milland, Christoffersen, & Hedegaard (2013) made an argument for increased patient safety on large units. This conclusion was drawn from the evaluation of the number of obstetric unit claims across Denmark between 1995 and 2009. This study hypothesized that larger units have the ability to support better resources and thus deliver better care.

It is understandable that smaller units could provide opportunities for more intense oversight by unit leadership, while larger units could possess the economies of scale necessary for better resources. Unit size clearly affects the patient care delivered, and researchers could learn a lot by investigating this phenomenon.

Span of control. The number of workers that a supervisor can effectively manage is known as their span of control (Pabst, 1993). Span of control is important for teams because it effects the efficiency, satisfaction, retention, and quality of care of a nursing unit (Pabst, 1993; Cathcart et al., 2004; McCutcheon et al., 2009). Further, span of control can influence quality outcomes including med errors, infections, and complaints (Wong et al., 2015). Span of control ranges from low (leader performing patient care responsibilities in addition to the management role), to high (leader responsible for multiple patient care areas). Currently there is no consensus as to what is an optimal leader to staff nurse ratio.

To perform optimally, teams must possess the appropriate skill mix, experience level, and organizational culture (Pabst, 1993). Meyer (2008) identified five underlying elements to a successful span of control, which included supervisor capability, reporting structure, contact frequency, leader scope, and work group size. In saying this, Meyer (2008) indicates that leaders with less ability, a shorter reporting structure, less contact with members, greater leadership scope, and larger unit sizes are predisposed to failure. Similarly, Meyer (2008) is stating that leaders with more ability, a longer reporting structure, greater contact with members, smaller leadership scope, and smaller unit sizes may become frustrated. Thus, the success of a team likely hinges on the fit between the leader's ability and these elements (Meyer, 2008; New, 2009).

Meyer (2008) acknowledges that span of control has been traditionally measured as a simple ratio, but this method carries the assumption that "all employees have similar needs for leadership support, and that all leaders provide equal amounts, frequency, and quality of support within comparably resourced and spatially designed environments" (2008, p. 109). Complicating measurement consistency is the argument of what ratio to use, whether a "head count" or full time equivalents (FTE). To best reflect Meyers (2008) opinion, this study utilizes the FTE method of ratio measurement and account for the time commitment by both the leaders and employees.

Leader experience. Leader experience is the first measure of time used in this study. Nurse leaders with experience have been reported to have stronger leadership skills (Irurita, 1988; Jenkins & Ladewig, 1996), indicating that they may learn more about what it takes to be a good leader as they gain more leadership experience (Nichols, 2016). Yet, length of time in a position has been negatively associated with leadership effectiveness (Irurita, 1998).

Shift worked. Shift worked describes the difference in nurse leader-member relationship and safety perception between day, night and weekend staff. Shift work is an understudied safety performance phenomenon (Smith & Eastman, 2012).

Safety interventions have focused on shift times (Kullberg, Bergenmar, & Sharp, 2016; Geiger-Brown et al., 2012; Scott et al., 2007), and working at night has been identified as risk to patient safety (Hughes, 2016). Smith & Eastman (2012) reported that night employees have challenges including (1) circadian misalignment between the internal circadian clock and activities such as work, sleep, and eating, (2) chronic, partial sleep deprivation, and (3) melatonin suppression by light at night.

Hughes (2016) performed a literature search revealing nurses who work at night are at an increased risk for developing chronic health conditions which include obesity, type 2 diabetes, lung cancer, menstrual disturbances, stroke, fractures, hypertension or lack of BP recovery, thyroid disease, breast cancer, irritable bowel syndrome, cardiovascular disease, depression, anxiety, and attention deficit. This trend in decreased physical health of nurses could explain their increase in patient care errors for night shift workers (Hughes, 2016).

Shift worked is thought the affect contact frequency. Hughes recommends facilitating leadership interaction to improve the satisfaction of night-shift nurses (2016). Not only could increasing leadership contact frequency augment nurse satisfaction, it could also improve their ability to monitor staff habits and consistent process execution. An inability to spend quality face-to-face time with staff could complicate the execution of complex directives (Gordon & Melrose, 2013).

Unit tenure. Unit tenure is a second measure of time used for this study, but the best attempt at capturing the length of leader-member relationship. Despite the seemingly simple concept of time, theorists have done little to test the influence of this phenomenon on patient safety (Gerstner & Day, 1997; Nahrgang, Morgeson, & Ilies, 2009; Shamir, 2011).

Time is a central tenant to LMX theory. LMX theory presupposes that there is a connection between time and relationship development. LMX theory describes three stages of a relationship's life cycle progression over time (Graen & Uhl-Bien, 1995). Each stage signifies a strengthening of the leader-member relationship. The first stage is the stranger stage. During the stranger stage, leaders and members are forming their roles. Relationships tend to be immediate and transactional, resulting in lower LMX because both the leader and member are largely looking out for their own personal self-interest. The second stage is the acquaintance stage.

During the acquaintance stage the leader-member relationship begins to solidify, with some tolerance for delayed reciprocity. LMX values for this stage usually improve, and leaders develop some incremental influence (trust) with their member. The third and final stage of the life cycle is maturity. During maturity, all parties understand their role. Reciprocity for tasks becomes in-kind, and LMX values improve to high levels. Incremental influence at this stage is almost unlimited and both the leader and the member's interests are aligned with the success of the team (Graen & Uhl-Bien, 1995).

Nahrgang, Morgeson & Ilies (2009) studied the development of leader-member relationships from the initial interaction through the first 8 weeks of relationship development. In this study, the initial relationship quality depended on the agreeableness of the leader, while long-term relationship quality depended predominantly on member performance. According to Shamir (2011) time is "positively related to growing trust and respect between the leader and the member, and the length of time leaders and members are together increases the chances for friendship to develop" (Shamir, 2011, p. 311). Park, Sturman, Vanderpool & Chan (2015) evaluated the relationship between LMX, job performance, and justice, and found that early in a relationship changes to justice perception were critical to the long-term development of LMX. This idea highlights the importance of consistent decision-making by leadership during the early stages of relationships.

Contact frequency. Contact frequency is defined as the number of times that an employee reports seeing their leader. How contact frequency affects patient safety is not yet clear, but research indicates that communication between leaders and members is one of the driving factors of patient safety (Sammer & James, 2011; Wagner, 2014). Research on communication indicates that increased frequency of communication has the potential to both

improve (Gajendran & Joshi, 2012), and hinder (Patrashkova-Volzdoska, McComb, & Green, 2003) the relationship between leaders and members.

Several studies demonstrate that communicating more frequently can improve leader-member relationships. Gajendran and Joshi (2012) measured relationships using LMX theory, and found that better relationships were formed on teams where the leader and team members communicated more frequently. Kacmar, Witt, Zivnuska & Gully (2003) also utilized LMX theory, demonstrating that increased communication moderates leader-member relationships and member performance ratings. Finally, Orner (2010) found that communication frequency positively correlates with member satisfaction.

High communication frequency can contribute to poor relationships. According to Patrashkova-Volzdoska, McComb & Green (2003), communication frequency and member performance share a curvilinear relationship. Members can oversaturate with communication from their leader (Patrashkova-Volzdoska, McComb, & Green, 2003). If employees reach a point where they "tune out" the leader's instruction, patient safety may suffer.

Processes

Donabedian defined process as "the activities that constitute the delivery of health care – including diagnosis, treatment, rehabilitation, prevention, and patient education – usually carried out by professional personnel, but also including other contributions to care, particularly by patients and their families" (Donabedian & Bashshur, 2002, p. 46). Much of the research on safety culture focuses on processes (Gluck, 2012; Laugaland, Aase, & Barach, 2012). Leadership is a central topic in the patient safety culture research literature, but the consideration of leader-member relationship quality as a process is less explored (Thompson et al., 2011). Thomas Hawkins et al. (2015) used a qualitative approach to seek out those processes essential

to nurse leaders in positive patient safety culture creation and found that the enforcement of policy, education of staff, facilitation of patient involvement, auditing compliance, disciplining staff, environmental design, adequate staffing, and the management of patient flow were among the most important nurse leader processes (Thomas-Hawkins et al., 2015). Despite the influence of leaders in patient safety, one study supported that staff deny their leader's responsibility for patient safety culture maintenance, indicating that a disconnection exists somewhere (Hendricks, Cope, & Baum, 2015). This study examines the exchange process between the nurse leaders and their staff nurses (leader-member), as well as the agreement amongst the nursing team (member-member) to look deeper at the dynamics occurring between leaders and members.

Leader-Member Relationship. Relational leadership is a branch of leadership that defines itself as "a process whereby an individual influences a group to achieve a common goal… by focusing on people and relationships" (Cummings et al., 2010 p. 364). Viewing leadership from this perspective means believing that leadership is a two-way relationship between a leader and a member, aimed at the achievement of mutual goals (Uhl-Bien, 2006). The focus of relational leadership research is to gain a better understanding of the interpersonal relationships between leaders and members. The strength of the leader-member relationship has been called the most significant contributing factor to a team's success (Graen & Uhl-Bien, 1991), directly affecting the member's work environment, and in the context of nursing, the resulting patient safety climate (Squires et al., 2010).

Dansereau, Cashman & Graen (1973) introduced LMX theory as an alternative to the average leadership style theory. LMX theorists define leadership as mutual trust, respect, and obligation that generates influence (Graen & Uhl-Bien, 1995). The relationship between each leader and member is different, creating "dyads" between each leader-member pair (Graen &

Uhl-Bien, 1995). LMX is the "nature of exchange" between each leader-member dyad (Wayne, Shore, & Liden, 1997), and explains the quality of the relationship that emerges in these dyads within an organizational context (Scandura & Lankau, 1996).

Quality of exchange relationships is a continuum from low-quality (transactional) relationships, to high-quality (socio-emotional) relationships (Dansereau, Graen, & Haga, 1975). Employees who engage in socio-emotional relationships with their supervisors give extra effort in the hopes that the long-term benefits will "even out" (Kessler, 2013). If a series of positive exchanges occurs, a "mutual obligation" between the leader and the member will develop, where both parties care about the other's success. LMX theory states that leaders have limited resources to invest in employees, and they tend to allocate resources to those employees with whom they have a history of the best exchanges (Graen & Uhl-Bien, 1995). These individuals are called members of the "In" group, and they are characterized by a high degree of mutual trust, respect and obligation (Graen & Uhl-Bien, 1995). "In" group members enjoy benefits such as the most challenging tasks, the best training opportunities, the most information, the most support and the most leniency in job performance rating (Liden et al., 2006). Conversely, "Out" group members are characterized by a sense of low trust, respect, and obligation (Graen & Uhl-Bien, 1995).

TLMX. Individual measurement of LMX is called TLMX. LMX has been measured this way most commonly in research studies. In recent studies, LMX has been linked to outcomes such as change management (Portoghese et al. 2012), turnover intention (Brunetto, Xerri, et al., 2013; Galletta, Portoghese, Battistelli, & Leiter, 2013; Shacklock, 2014; Squires, 2010; Trybou, De Pourcq, Paeshuyse & Gemmel, 2014), work family conflict (Brunetto, Farr-Wharton, Ramsay & Shacklock, 2010), extra role behavior (Trybou, Gemmel et al., 2014; Shacklock, 2014;

Brunetto, Farr-Wharton, Shacklock, 2010), employee satisfaction (Farr-Whatron, Brunetto & Shacklock, 2012; Katrinli, Atabay, Gunay & Guneri, 2008; Shackclock et al., 2014) and justice (Han & Bai, 2014). The wealth of support for the effect of TLMX on positive outcomes gives merit to studying the link between leader-member relationships and patient safety culture (Henderson, Liden, Glibkowski, & Chaudhry, 2009).

ALMX. ALMX is the most common method of applying LMX theory to individuals. ALMX has been used to explore concepts such as structural empowerment (Laschinger, Finegan, & Wilk, 2011), intention to leave (Galletta, Portoghese, Battistelli, & Leiter, 2013), member intuition (Farr-Wharton, Brunetto, & Shacklock, 2012), and safety climate (Thompson et al., 2011). Positive ALMX scores reflect environments where employees stay longer and perform better. Thompson et al. (2011) is the only study found that focused on patient safety culture with a group-level ALMX analysis.

DLMX. One of the most important roles of leaders is to build trust and teamwork among their employees. According to Brasite, Kaunonen & Suominen (2014), teamwork climate is the most important determinant for patient safety attitude among RNs. Teamwork builds trust among members and provides opportunities for ongoing learning (Quigley & White, 2013).

Team members interact with one another in a shared environment, which includes the relationships they have with their peers and their leader. During interactions, team members process social cues that make them aware of each other's opinions and their own social standing in the team (Kahn, 1990). This allows team members to assess where they stand in relation to other team members, eliciting feelings by the employee. Team members who perceive a great deal of variation between the way the leader treats them and their peers are subject to feelings of unfairness, straining the member-member relationship (Hooper & Martin, 2008). Conversely,

team members that perceive little variation in their relationship with the leader and their peers' relationship may work better together fostering teamwork.

Teamwork plays a crucial role in shaping unit processes and outcomes (Boies & Howell, 2006; Henderson et al., 2009; Tse, 2014). More importantly, the presence of positive teamwork is essential to the creation of a safe patient care environment (Kalisch, Weaver, & Salas, 2009). Since Differential LMX (DLMX) represents the degree of disagreement among team members about the leader, this measurement could serve as a proxy to teamwork by measuring the level of agreement within nursing units. In a number of studies DLMX is used to measure the team's agreement, and is thought to influence their ability to work together as a team (Banks et al., 2014; Tse, 2014).

DLMX research is just beginning (Henderson et al., 2009). What research has been done indicates that LMX variability is negatively related to employee job satisfaction (Hooper & Martin, 2008), well-being (Hooper & Martin, 2008), member-member friendship (Tse, Dasborough, & Ashkanasy, 2008), financial performance (Li & Liao, 2014), organizational commitment (Yuan & Jian, 2012), turnover intention (Yuan & Jian, 2012), justice (Fein, 2013), team potency, conflict (Le Blanc & Gonzalez-Roma, 2012), work attitudes, withdrawal behaviors (Erdogan & Bauer, 2010), self-efficacy (Liao, Liu, & Loi, 2010), creativity (Liao, Liu, & Loi, 2010), and innovation (Zhichao & Cui, 2012). Exploring the nature of variation, "in" and "out" group sizes, and how they relate to patient safety culture is the novelty of this study.

Outcomes

Donabedian defined outcomes as "changes (desirable or undesirable) in individuals and populations that can be attributed to health care" (Donabedian & Bashshur, 2002, p. 46). The HSOPSC provides the outcomes for this study. Outcomes include the individual dimensions of

the HSOPSC, individual and team perceptions of safety, the frequency of self-reported events, and the overall patient safety grade.

Perceptions of safety. AHRQ developed the HSOPSC as an instrument to capture and compare patient safety conduct and culture (Kohn et al., 2000; "HSOPSC", 2015). This tool provides a widely used, valid and reliable source of patient safety culture measurement (Sorra & Nieva, 2004; Blegen et al., 2009; Pfeiffer & Manser, 2010; Waterson et al., 2010), which has been proven to positively correlate with patient outcomes (Yen & Lo, 2004). Hospitals may voluntarily participate in submission of patient safety data to benchmark the organization's performance against that of other peer health systems (AHRQ, n.d.). In 2016, AHRQ published its comparative database report (Famolaro et al., 2016). This database has collated reports from 680 hospitals and 447,584 staff responses to the HSOPSC, demonstrating the widespread adoption of the HSOPSC. Three hundred twenty six of the reported hospitals submitted data more than once, providing a longitudinal perspective on their patient safety culture. The average response rate per hospital was 55%, with nurses as the largest represented group (36%). Larger teaching hospitals typically had lower scores while smaller, nonteaching hospitals boasted higher scores on average.

Self-reported events. The "frequency of events reported" outcome is Section D, dimension 8, of the HSOPSC. This dimension asks 1) how often events are reported; 2) when they are corrected before affecting the patient; 3) if they had no potential to harm the patient; and 4) could they but did they do no harm the patient. These four questions are Likert-style ranging from never to always. Reporting is important, because the more comfortable staff feel reporting adverse events, the less likely it is that adverse events will occur. Staff feelings regarding error reporting are influenced by management practices surrounding the error, so this dimension may

indicate if a culture is perceived as just by employees (Arde, 2015). Hellings et al. (2010) identified the willingness to communicate error as a key variable for patient safety culture. According to Wang et al. (2014) there is an inverse relationship between the reporting and occurrence of adverse events, suggesting that when staff are comfortable reporting adverse events they are less prone to commit error.

Patient safety grade. Patient safety grade is a single item outcome variable located in Section E of the HSOPSC. The performance of a unit on the patient safety grade item has been strongly associated with unit characteristics including staffing levels (Waterson, 2014; Panozzo, 2007) years of experience for staff (El-Jardali et al., 2011) and mortality (Olds, 2010). Analysis of the relationship between patient safety grade and leader-member relationship provides a deeper understanding of how leaders affect unit safety.

Summary

This chapter has reviewed the literature in an effort to provide an understanding of the relevant structures, processes, and outcomes surrounding patient safety culture. An updated review of patient safety culture provides an understanding of current trends. Structural variables explored include the unit size, span of control, leader experience, shift worked, tenure on unit, and contact frequency. These variables may affect the leader's ability to form meaningful relationships with their employees, which subsequently influences the quality of a unit's patient safety culture.

CHAPTER III: METHODOLOGY

The purpose of this chapter is to provide information on the methods used to implement the study. This chapter describes the sample, measures, and methods used to address each research question. This study uses secondary data analysis to test a model (presented in chapter 1) that explains the influence of leader-member relationships on patient safety culture. This study evaluates how patient safety culture and leader-member exchange relate to each other and how they are affected by structural variables (unit size, nurse leader span of control, leader experience, shift worked, tenure on unit, contact frequency). Patient safety culture as an outcome variable is determined by evaluating perceptions of safety, frequency of events reported, patient safety grade, and self-reported events.

Setting and Sample

This study uses a secondary data set of seven hospitals in a health system in Eastern NC. De-identified structural data about units, staff members and leaders is included in the data set. The health system where data includes one large Academic Medical Center and six rural community hospitals. The system maintains 1,415 licensed acute care beds. In 2014, this health system reported admitting 63,891 patients.

Inpatient hospitals are the ideal location for this study, because the relationships between hospital nursing staff and their nurse leaders (especially as they relate to patient safety) in this area remain understudied (Thompson et al., 2011; Wong et al., 2013). The subjects of interest (nurse leaders, bedside nursing staff) and the safety outcomes measured in this study are organized into nursing units within these hospitals.

Inclusion Criteria

To be a participant in this study the subject must be a registered nurse, who works in one of the 36 surveyed acute care inpatient hospital units that works on a full- or part-time basis.

Sample

The participants of this study are a convenience sample of nursing personnel that consist of staff nurses and their nurse leaders (nurse leaders and assistant nurse leaders) who completed the HSOPSC in March of 2015. A hospital employee de-identified responses from 801 staff members across 36 units, and placed them into a database for use by the researcher.

Human Subjects

Approval was gained through the University and Medical Center Institutional Review Board for an exempt, nonhuman subject, research study prior to data collection. Permission for use of the database was obtained from senior nursing leadership at the health system where the data was gathered. The HSOPSC, the LMX-7, unit size, the number of Registered Nurse FTEs per unit, number of leader FTEs per unit, and years of experience on the unit for each leader was requested. All identifiable information was removed, including unit, leader, and staff identifiers by a third party hospital employee.

Instruments

Two instruments were combined into one survey: the HSOPSC and the LMX-7. Additionally, three Likert-style questions were added to this survey, which include (1) "On a typical workday, how often do you see your supervisor/leader?" (2) "Typically, what shift do you work?" and (3) "My supervisor/leader makes daily safety rounds that include spending time with patients and staff discussing safety."

HSOPSC

The HSOPSC (see Appendix B) was developed by reviewing the existing research in nuclear manufacturing, employee health and safety, organizational climate and culture, safety climate and culture, and medical error and event reporting (Sorra & Nieva, 2004). Developers utilized existing safety climate and culture instruments, including the Medical Event Reporting System for Transfusion Medicine (MERS-TM), and a tool developed by the Veterans Health Administration (VHA) to formulate the key dimensions for survey inclusion. An exhaustive research reference list for the HSOPSC is available online ("HSOPSC", 2015).

The HSOPSC is organized into 12 dimensions: Teamwork within units, supervisor/leader expectations and actions promoting patient safety, organizational learning – continuous improvement, management support for patient safety, overall perceptions of patient safety, feedback and communication about error, communication openness, frequency of events reported, teamwork across units, staffing, handoffs and transitions and, and non-punitive response to errors. These 12 dimensions have been analyzed via factor analysis, and their individual questions are provided in Appendix C ("HSOPSC", 2015). The HSOPSC has been studied internationally, and these dimensions may differ upon factor loading, but the most commonly agreed upon dimensions and their Cronbach's alpha are: Teamwork within units (.83), supervisor/leader expectations and actions promoting patient safety (.75), organizational learning – continuous improvement (.76), management support for patient safety (.83), overall perceptions of patient safety (.74), feedback and communication about error (.78), communication openness (.72), frequency of events reported (.84), teamwork across units (.80), staffing (.63), handoffs and transitions and (.80), and non-punitive response to errors (.79) (Blegen et al., 2009; Pfeiffer & Manser, 2010; Waterson et al., 2010). The HSOPSC version for

this health system is a 52-item survey tool with 42 Likert-style items (See Appendix B). On these 42 items, there are five possible responses, ranging from strongly disagree to strongly agree. The remaining items are multiple choice (9) and short answer (1). Questions wordings are positive, negative, and neutral. It took the subjects approximately 15 minutes to complete the HSOPSC.

HSOPSC dimensions are divided into relevance according to unit/department and hospital level measurements (Jones et al., 2008). Seven dimensions measure patient safety culture at the unit/department level: supervisor/leader expectations and actions promoting patient safety, organizational learning, teamwork within departments, communication openness, feedback and communication about error, non-punitive response to error, and staffing. Three dimensions measure patient safety culture at the hospital level: Three dimensions measure safety culture at the hospital level: hospital management support for patient safety, teamwork across hospital departments, and hospital handoffs and transitions. Along with analyzing the dimensions, the HSOPSC also provides several outcome variables which include: overall perception of safety, the frequency of self-reported events, and a patient safety grade.

Overall perception of safety. The overall perception of patient safety is dimension 5 of the HSOPSC. This dimension asks four questions which include (1) Patient safety is never sacrificed to get more done (2) Our procedures and systems are good at preventing errors from happening (3) It is just by chance that more serious mistakes don't happen around here and (4) We have patient safety problems in this unit. These are all five-point Likert-style questions that focus on the systems that prevent error on units. Answer choices range from strongly disagree to strongly agree.

Frequency of events reported. The frequency of events reported is dimension 8 of the HSOPSC, and it consists of 3 questions. The questions asked are (1) When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported? (2) When a mistake is made, but has no potential to harm the patient, how often is this reported? and (3) When a mistake is made that could harm the patient, but does not, how often is this reported? Questions are Likert-style questions ranging from never to always. These questions seek to find out how employees feel about error reporting in hopes of understanding why some employees share, and others do not. There is value in studying the relationship between self-reported events and leader-member relationships.

Patient safety grade. Using a single 5-point Likert-style (excellent, very good, acceptable, poor, failing) question, the HSOPSC asks: "Please give your work area/unit in this hospital an overall grade on patient safety."

LMX-7

The LMX-7 (See Appendix D) is a seven-question survey formulated by Graen & Uhl-Bien (1995) to measure the quality of leader-member relationships. The LMX- 7 is a 5-point, Likert-type scale ranging from strongly disagree to strongly agree. Scores for the LMX-7 range from 7 to 35. It takes approximately 7 minutes to complete the LMX-7. The LMX-7 was chosen because it consistently demonstrates high reliability (Gerstner & Day, 1997) and it validly measures the construct of relationship between a leader and a member.

Nursing studies utilizing the LMX-7 have demonstrated an average Cronbach's alpha of .91 (Portoghese et al. 2012; Brunetto, Xerri, et al., 2013; Shacklock et al., 2014; Squires, 2010; Trybou, De Pourcq, Paeshuyse & Gemmel, 2014; Brunetto, Farr-Wharton, Ramsay & Shacklock, 2010; Trybou, Gemmel, Pauwels, Henninck & Clays, 2014; Shacklock, 2014;

Brunetto, Farr-Wharton, Shacklock, 2010; Farr-Whatron, Brunetto & Shacklock, 2012; Katrinli, Atabay, Gunay & Guneri, 2008; Shackclock, Brunetto, Teo & Farr-Wharton, 2014; Galletta, Portoghese, Battistelli, Leiter, 2013; Han & Bai, 2014; Thompson et al. 2011), signifying strong internal reliability (Nunnally, 1978). The LMX-7 has been the most frequently utilized measure of LMX, with 24 uses in the nursing literature between 2010 and 2015 (Brunetto, Farr-Wharton, Ramsay, & Shacklock, 2010; Brunetto, Shriberg et al., 2013; Brunetto, Shacklock et al., 2013; Brunetto, Farr-Wharton, & Shacklock, 2010; Brunetto et al., 2010; Davies, Wong, & Laschinger, 2011; Farr-Wharton, Brunetto, & Shacklock, 2012; Han & Bai, 2014; Han & Jekel, 2011; Katrinli, Atabay, Gunay, & Guneri, 2008; Laschinger, Finegan, & Wilk, 2009; Laschinger, Purdy, & Almost, 2007; Nelson et al., 2013; Portoghese et al., 2012; Portoghese, Galletta, Sardu, Mereu, & Contu, 2014; Robson & Robson, 2015; Shacklock, Brunetto, Teo, & Farr-Wharton, 2014; Shacklock & Brunetto, 2012; Squires et al., 2010; Thompson et al., 2011; Trybou, Gemmel, Pauwels, Henninck, & Clays, 2014; Trybou, De Pourcq, Paeshuyse, & Gemmel, 2014; Vasset, Marnburg, & Furunes, 2012; Vasset, Marnburg, & Furunes, 2010). Over the last 5 years, studies have attempted to link the LMX phenomenon to outcomes such as change management (Portoghese et al. 2012), turnover intention (Brunetto, Xerri, Shriberg, Farr-Wharton, Shacklock, Newman, & Dienger, 2013; Galletta, Portoghese, Battistelli, & Leiter, 2013; Shacklock, 2014; Squires, 2010; Trybou, De Pourcq, Paeshuyse & Gemmel, 2014) work family conflict (Brunetto, Farr-Wharton, Ramsay & Shacklock, 2010), extra role behavior (Trybou, Gemmel, Pauwels, Henninck & Clays, 2014; Shacklock, 2014; Brunetto, Farr-Wharton, Shacklock, 2010), employee satisfaction (Farr-Whatron, Brunetto & Shacklock, 2012; Katrinli, Atabay, Gunay & Guneri, 2008; Shackclock, Brunetto, Teo & Farr-Wharton, 2014) and justice (Han & Bai, 2014). This study analyzes leader-member exchange's effect on patient safety culture using two

different unit-level measures: Average LMX and Differential LMX. ALMX is the average of each nursing unit's LMX scores, while DLMX is the average of each nursing unit's LMX variance (Liden et al., 2006).

Procedure/Data Collection

A third-party research company administered these surveys electronically. Invitations were emailed by the research company to subjects in March of 2015, and they were initially given 14 days to complete. This date was extended 7 days by hospital leadership to maximize participants. Invitations were delivered with a code to activate the survey, eliminating the possibility of duplicate submissions. Nurse leaders and staff were asked to complete surveys independently. Nurse leaders were provided participation data daily to encourage participation during the 21-day open period. Once completed, the third party company de-identified the data and presented it to hospital leadership. Once approved by Institutional Review Board, the database was obtained from the facility. This database included the HSOPSC, LMX-7 responses, and previously de-identified structural data.

Data Analysis

Response frequencies were run on the secondary database to look for out-of-range values, missing values, or other data anomalies. The HSOPSC data and structural variables were entered into SPSS version 24 in a way that allowed individual response data and unit specific data to be analyzed together. In addition, individual nurse responses were aggregated into their respective units, and unit level means and percentages were computed for the study variables.

Twelve patient safety dimensions in the HOSPSC are computed from 42 survey items. Each dimension is a mean of either three or four items. Most of the survey items ask respondents to answer using 5-point response categories in terms of agreement (strongly

disagree, disagree, neither, agree, strongly agree) or frequency (never, rarely, sometimes, most of the time, always). Three of the 12 patient safety culture composites use the frequency response option (feedback and communication about error, communication openness, and frequency of events reported), while the other nine composites use the agreement option. In addition, one researcher added item (contact frequency) used the frequency option.

The LMX-7 consists of seven items and uses a 5-point Likert-style response category. TLMX scores are calculated for each respondent by adding the total on the seven items. Based on this total score, respondents can be categorized into 5-categories (very low to very high) (Northhouse, 2012).

In addition to the mean dimension scores for the 12 patient safety areas, a composite-level percent positive response was calculated by averaging the percent positive responses on the items within a composite. For positively worded items, percent positive response is the combined percentage of respondents in the study sample who answered "Strongly agree" or "Agree," or "Always,", or "Most of the time," depending on the response categories used for the item. For negatively worded items, percent positive response is the combined percentage of respondents in the study sample who answered "Strongly disagree" or "Disagree," or "Never," "Rarely", or "Sometimes," because a negative answer on a negatively worded item indicates a positive response. For example, for a three-item composite, if the item-level percent positive responses were 40 percent, 50 percent, and 60 percent, the composite-level percent positive response would be the average of these three percentages, or 50 percent positive.

In addition, the 42 survey items, the percent of positive responses was computed for contact frequency. Two groups were determined, one included the combined percentage of respondents who answered "Always" or "Most of the time" (denoted as frequent contact), and

the other was determined as the combined percentage of respondents who answered "Never", "Rarely", or "Sometimes," denoted as "infrequent contact."

Percent positive responses were also determined for LMX-7 total score. The combined percentage of respondents with LMX-7 total scores categorized as "High" or "Very High" formed one group in contrast to those that score "Very Low", "Low", and "Moderate".

"Patient safety grade" was converted from a string variable to a numerical variable by converting letter grades to a five-point measure (A = 5, B = 4, C = 3, D = 2, and F = 1). Percent positive letter grade was computed as the combined percentage of respondents who awarded grades "A" or "B" to the units where they worked.

To determine how units performed in contrast to individuals, composite percent positive responses, LMX-7 total scores, LMX-7 percent positive responses, patient safety grades, percent positive safety grades, and contact frequency and percent positive contact frequency were computed by averaging the measures over the nurses in their respective units. DLMX was computed as the standard deviation of the LMX-7 total scores among each unit's nurses. ALMX was computed as the mean LMX-7 score among the nurses in each unit.

Question 1

What are the characteristics of the nursing units, nurse leaders, survey respondents, the HSOPSC, and the LMX-7 scale?

Descriptive statistics including frequencies, means, and standard deviations were used to describe characteristics of the nursing units and participants included in the study. Coefficient alpha was computed for the 12 HOSPSC dimensions and the LMX-7 scale. Means and standard deviations were used to describe the 12 HOSPSC dimensions, patient safety grade, contact frequency, TLMX, and the percent positive responses for each of those variables. Pearson

correlations were used to inter-correlate the seven LMX-7 scale items, the 12 dimension scores and patient safety grade.

Question 2

What is the relationship of TLMX with HSOPSC dimensions, self-reported events, and patient safety grade and is the relationship of TLMX with patient safety grade moderated by contact frequency, shift worked, or unit tenure?

The relationship of LMX-7 positive responses with HSOPSC percent positive responses, self-reported events, and percent positive patient safety grade was evaluated using the independent-samples T test and eta squared effect size to compare HSOPSC percent positive response means and percent positive patient safety grade means between respondents with low to moderate TLMX scores and respondents with positive response scores (high or very high TLMX scores). The chi-square test for independence was used to evaluate the relationship between respondents with low to moderate TLMX scores and respondents with positive response scores and positive contact frequency, shift worked, unit tenure, and positive patient safety grade. Analysis that positive contact frequency, shift worked, or unit tenure were functioning as moderators was conducted by examining the mean positive patient safety grade responses between respondents with positive LMX-7 scores and non-positive LMX-7 scores at each level of the moderator variables using the independent-samples T test and eta squared effect size. Evidence for a moderation effect is differences in the t-test comparisons for each level of each moderator variable.

Question 3

What are the relationships among the unit based structural variables (unit bed size, nurse leader span of control, leader experience), contact frequency, DLMX, ALMX, and patient safety grade?

Descriptive statistics, including the means, standard deviation, median, and skewness were calculated for the structural variables, contact frequency, DLMX, ALMX, and patient safety grade. Pearson correlations were used to investigate the relationships among these variables.

Question 4

What are the relationships among unit-based ALMX, DLMX, and contact frequency with unit mean HOSPSC dimension scores and patient safety grade?

Descriptive statistics, including mean, standard deviation, and range are computed for the unit level percent positive responses for the HSOPSC dimensions, patient safety grade, contact frequency, ALMX and DLMX. Pearson correlations were used to correlate DLMX, ALMX and contact frequency with the HOSPSC dimension means and patient safety grade. The level of analysis for the correlations is the unit.

The chi-square test for independence was used to evaluate the relationship between unit total LMX category scores among "In" and "Out" groups. The ALMX score can be categorized into a five – point Likert type scale where LMX-7 scores of 7 – 14 are categorized as 1 = very low; LMX scores 15-19 categorized as 2 = low, scores of 20-24 categorized as 3 = moderate, scores 25-29 categorized as 4 = high, and scores 30-35 categorized as 5 = very high (Northouse, 2012). LMX-7 categories were used to categorize nurses within units into in groups and out groups. Nurses with high and very high scores (categories 4 and 5) were identified as the "In"

group, and nurses with very low, low, or moderate scores (categories 1, 2, and 3) were identified in the "Out" group. Evidence for significance is differences in the t-test comparisons for each level of each variable.

Summary

This chapter provided information to replicate this study. The proposed study analyzes the relationship between unit structural variables, leader-member relationship, member-member agreement and patient safety culture.

CHAPTER IV: FINDINGS

This chapter contains descriptions of the study sample and the results of statistical analyses for each of the four research questions in this study. Analyses that involve survey respondent characteristics are conducted using individual respondent level data (N = 801), and analyses related to unit level characteristics are conducted using unit level data from 36 units.

Question 1

What are the characteristics of the nursing units, nurse leaders, survey respondents, the HSOPSC, and the LMX-7 scale?

Table 1 reports the characteristics for the 23 Academic Medical Center and 13 Community units. The Medical Center's units had more survey respondents, more unit staff, more beds, greater spans of control, and less unit leader experience than the community hospital units. General medicine units, intensive care units, and surgical units comprised the majority of the sampled nursing units.

Table 1

Characteristics of Nursing Units (N = 36 units)

Characteristic	n	%	M	SD	Range
Medical Center Units	23	64			
Nurse participants	628	78			
Unit FTEs			35.4	13.6	8.7-71.9
Unit size			33.0	12.6	9.0-60.0
Experience of management team			14.3	6.56	3.1-30.0
Span of Control			14.7	8.8	6.5-44.9
Community Hospital Units	13	36			
Nurse participants	173	22			
Unit FTEs			11.2	3.4	3.0-16.3
Unit size			18.7	7.9	4.0-28.0
Experience of management team			17.1	10.7	1.3-37.5
Span of control			9.8	3.8	1.5-14.5
Type of unit					
Medical	13	36			
Intensive care	8	22			
Surgical	7	19			
Obstetric	4	11			
Behavioral health	2	6			
Non-specified (other)	2	6			

Table 2 reports the frequency and percent of the 801 survey respondents on their tenure in the nursing profession, tenure in their current hospital employment, tenure in their current unit employment, direct patient contact, and work hours per week. The 1 to 5-year category was the most prevalent category for tenure in the nursing profession, hospital, and current unit. Almost all of the respondents participated directly in patient care (99%). Sixty-five percent of the respondents worked less than 40 hours per week.

Table 2

Participant Characteristics (N = 801)

Characteristic	n	%
Staff years of service within current profession		
Less than one year	114	14
1 to 5	295	37
6 to 10	168	21
11 to 15	73	9
16 to 20	58	7
21 years or more	83	10
Missing	10	1
Staff years of service at hospital		
Less than one year	151	19
1 to 5	318	40
6 to 10	160	20
11 to 15	77	10
16 to 20	41	5
21 years or more	47	6
Missing	7	1
Years tenure in unit		
Less than one year	179	22
1 to 5	337	42
6 to 10	150	19
11 to 15	66	8
16 to 20	31	4
21 years or more	33	4
Missing	5	1
Work hours per week		
Less than twenty hours	18	2
20 to 39	499	62
40 to 59	261	33
60 to 79	11	1
80 to 99	7	1
100 hours or more	1	< 1
Missing	4	< 1
Direct patient contact	790	99

Table 3 reports the results of Cronbach's alpha for each of the HSOPSC dimensions for

the study responses, and compares the study results to previously published results. The desired goal for internal consistency is .70 (Nunnally & Bernstein, 1994). All of the dimensions demonstrated adequate internal consistency reliability with the exception of the staffing dimensions. However, it is an important aspect of patient safety, and thus remains in the HSOPSC survey.

Table 3

HSOPSC Internal Consistency Reliability

		Cronbach's alpha	
Dimension	No. of items	Current Sample (N=801)	Published Results* (N=1437)
Hospital HSOPSC dimension			
Management support for patient safety	3	.78	.83
Teamwork across units	4	.81	.80
Handoffs and transitions	4	.83	.80
Unit HSOPSC dimensions			
Teamwork within Units	4	.84	.74
Supervisor/leader expectations	4	.82	.75
Organizational learning	3	.74	.76
Overall perceptions of safety	4	.73	.74
Feedback and communication about error	3	.82	.78
Communication openness	3	.74	.72
Frequency of events reported	3	.89	.84
Staffing	4	.65	.63
Non-punitive response to errors	3	.84	.79

* *Note*: Published results from Sorra & Dyer (2010).

Table 4 reports the inter-item correlations of the thirteen variables, twelve dimensions scores and patient safety grade, resulting in 78 individual Pearson correlation coefficients. Less than .80 is desirable to assure that different constructs are being measured (O'Brien, 2007). All

of the correlations are statistically significant, with one (1%) small correlation (< .30), 40 (51%) moderate correlations (.30 to .49) and 37 (47%) large correlations (.50 or larger). The largest correlations were between feedback and communication about error and communication openness (.70), overall perceptions of safety and patient safety grade (.68), teamwork across units and handoffs and transitions (.67), and organizational learning and feedback and communication about error (.65). The smallest correlations were between frequency of event reporting and staffing (.27), and frequency of event reporting and non-punitive response to error (.30).

Table 4

HSOPSC Inter-item Correlations (N=801)

HSOPSC Items	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Teamwork within units	_												
2. Supervisor/Manager expectations	.54	_											
3. Organizational learning	.58	.61	_										
4. Management support	.40	.52	.54	_									
5. Overall perceptions of safety	.55	.53	.60	.61	_								
6. Feedback and communication	.49	.61	.65	.51	.57	_							
7. Communication openness	.57	.64	.61	.52	.60	.70	_						
8. Frequency of event reporting	.32	.35	.41	.40	.44	.50	.44	_					
9. Teamwork across units	.44	.38	.41	.55	.52	.43	.43	.36	_				
10. Staffing	.44	.40	.41	.46	.63	.38	.47	.27	.48	_			
11. Handoffs and transitions	.43	.36	.37	.45	.52	.38	.43	.35	.67	.50	_		
12. Non-punitive response	.48	.50	.47	.40	.53	.43	.54	.30	.42	.48	.35	_	
13. Patient safety grade	.56	.51	.58	.52	.68	.53	.58	.39	.45	.52	.45	.46	_

Note. All correlations are significant at the $p \leq .001$ level

Table 5 reports the percentage of respondents reporting positive responses to the items comprising the HSOPSC dimensions and assigning grades of A or B to the patient safety grade items. In addition, the means and standard deviations of each dimension's score, along with the overall patient safety grade is included in table 5. The lowest positive responses for dimension items included: items related to non-punitive response to error (47%), items related to staffing (50%), items related to transitions in care (52%), and items related to teamwork across units

(55%). The highest average positive responses were for items in the teamwork within units dimension (85%) and items in the supervisor/leaders expectations dimension (80%).

Table 5

HSOPSC Dimension Mean, Standard Deviation, and Percent Positive Responses (N = 801)

Dimension	M	SD	% Positive Responses	Published % Positive Responses*
Hospital dimensions				
Management Support for Patient Safety	3.59	.83	66	72
Teamwork across Units	3.35	.77	55	61
Handoffs and Transitions	3.31	.79	52	48
Unit dimensions				
Teamwork Within Units	4.08	.70	85	82
Supervisor/Leader Expectations	4.03	.76	80	78
Organizational Learning	3.90	.63	78	73
Overall Perceptions of Patient Safety	3.57	.74	64	66
Feedback and Communication about Error	3.90	.80	71	68
Communication Openness	3.72	.78	64	64
Frequency of Events Reported	3.94	.83	70	67
Staffing	3.24	.78	50	54
Non-punitive Response to Errors	3.25	.93	47	45
Outcome dimension				
Patient safety grade A/B	3.92	.84	71	76

*Note: Published % positive responses from Famolaro et al., (2016)

Table 6 reports the mean and standard deviations for the seven items of the LMX-7 scale. The two items with the highest percent of positive responses were staff perceptions of where they stand with their unit leader (66%) and staff level of confidence in their leader's decisions

(65%). The one item with the lowest positive response was Item 5, “What are the chances that he/she would "bail you out," at his/her expense?” (26%). Item 1 and Item 5 had the largest variability in their scores, while Item 7 had the smallest variability in the item scores. Internal consistency reliability (Cronbach’s alpha) for the study sample was .92.

Table 6

Means and Standard Deviations of LMX-7 Item Scores and Percent Positive Responses to the LMX Items

LMX Items		M	SD	% Positive Response
1	Do you know where you stand with your leader…do you usually know how satisfied your leader is with what you do?	3.75	1.24	66
2	How well does your leader understand your job problems and needs?	3.74	1.17	64
3	How well does your leader recognize your potential?	3.54	1.07	54
4	Regardless of how much formal authority he/she has built into his/her position, what are the chances that your leader would use his/her power to help you solve problems in your work?	3.74	1.05	61
5	Again, regardless of the amount of formal authority your leader has, what are the chances that he/she would "bail you out," at his/her expense?	2.75	1.22	26
6	I have enough confidence in my leader that I would defend and justify his/her decision if he/she were not present to do so? (Your member would)	3.79	.96	65
7	How would you characterize your working relationship with your leader?	3.68	.93	55

Table 7 reports the inter-item correlations among the seven LMX-7 items. The average of the 21 correlations was .66, with correlations ranging from a low of .48 to a high of .79. The lowest correlations was with item 5.

Table 7

LMX-7 Inter-Item Correlations

LMX Items		1	2	3	4	5	6	7
1	Do you know where you stand with your leader…do you usually know how satisfied your leader is with what you do?	_						
2	How well does your leader understand your job problems and needs?	.72	_					
3	How well does your leader recognize your potential?	.79	.76	_				
4	Regardless of how much formal authority he/she has built into his/her position, what are the chances that your leader would use his/her power to help you solve problems in your work?	.67	.71	.74	_			
5	Again, regardless of the amount of formal authority your leader has, what are the chances that he/she would "bail you out," at his/her expense?	.48	.53	.56	.60	_		
6	I have enough confidence in my leader that I would defend and justify his/her decision if he/she were not present to do so? (Your member would)	.62	.66	.67	.70	.58	_	
7	How would you characterize your working relationship with your leader?	.69	.72	.74	.68	.54	.72	_

Table 8 reports the participant responses to the researcher added questions related to contact frequency, typical work shift, and LMX-7. Most of the nurses worked either days or nights, with only 5% of the sample working weekends. Twenty-six percent of the respondents

reported they never or rarely saw their unit leader, and 20% of the sample had low or very low LMX-7 scores. Thirteen percent reported having daily contact with their unit leader and 27% of the sample had very high LMX-7 scores.

Table 8

Responses to Researcher Added Variables of Contact Frequency, Shift Worked and TLMX (N=801)

Researcher added variables	n	%
Contact frequency		
Never	48	6
Rarely	157	20
Sometimes	261	33
Most of the time	230	29
Always	101	13
Missing	4	<1
Typical work shift		
Day	366	46
Night	268	33
Both day/night	123	15
Weekend	39	5
Missing	5	<1
TLMX		
Very low	56	7
Low	105	13
Moderate	188	23
High	239	30
Very high	213	27

Question 2

What is the relationship of TLMX with HSOPSC dimensions, self-reported events, and patient safety grade, and is the relationship of TLMX with patient safety grade moderated by contact frequency, shift worked, or unit tenure?

Table 9 reports the mean percent of positive responses on the HSOPSC dimensions and patient safety grade (A/B grades) between nurses categorized with very low to moderate TLMX scores and nurses categorized with high to very high TLMX scores. On all the dimensions and patient safety grade, mean positive responses are significantly higher for nurses with higher TLMX scores compared to those with lower TLMX scores. The dimension with the largest effect size was supervisor/leader expectations (eta squared = .30), where 95.7 percent of the responses to the four items comprising that dimension were either agree or strongly agree among the nurses with higher TLMX scores, compared to 63.2 percent of the responses to the four items by nurses with low to moderate TLMX scores. Other dimensions with larger effect sizes included communication openness, non-punitive response to error, error feedback, and overall safety perceptions. Patient safety grade also had a large effect size, with 88.7 percent of nurses with higher TLMX scores giving A/B safety grades to their unit, compared to 52.3 percent with lower TLMX scores giving A/B grades to their unit.

Table 9

Positive Response Differences Between Nurses With Very Low to Moderate TLMX Scores and Very High to High TLMX Scores on HSOPSC Dimensions and Patient Safety Grade (N = 801)

HSOPSC Dimensions & PSG	Very Low to Moderate TLMX			High to Very High TLMX				
	n	M	SD	n	M	SD	*t*	η^2
Hospital HSOPSC dimensions								
Management support	272	53.6	38.89	349	78.8	31.50	8.94	.114
Teamwork across units	268	40.4	36.12	350	64.9	35.66	8.43	.103
Handoffs and transitions	274	41.7	37.88	346	61.1	37.34	6.40	.062
Unit HSOPSC dimensions								
Teamwork within units	275	76.9	30.63	349	93.8	17.02	8.72	.109
Supervisor/leader expectations	273	63.2	34.37	350	95.7	12.82	16.32	.300
Organizational learning	269	67.9	33.93	347	89.1	19.51	9.72	.133
Overall safety perceptions	270	51.4	34.23	346	77.4	27.25	10.50	.152
Error feedback	272	55.4	39.41	344	85.2	26.39	11.20	.170
Communication openness	272	44.4	37.13	348	80.8	27.90	13.97	.240
Event reporting frequency	270	57.5	43.00	346	82.8	32.12	8.33	.102
Staffing	272	40.1	32.12	347	58.1	33.42	6.83	.070
Non-punitive response	268	28.0	33.77	346	63.0	38.65	10.59	.184
Outcome dimensions								
Patient safety grade A/B	264	52.3	50.04	346	87.9	32.70	10.59	.156

There was a statistically significant relationship between TLMX and events reported, $\chi^2 = 12.72$, p = .002, Phi = .126 (small effect). Of the 488 nurses with higher TLMX scores, 171 (38.2%) reported three or more safety related events compared to 25.6 percent of nurses with low to moderate TLMX scores. Twenty-nine percent of nurses with lower TLMX scores did not report any events, while 22 percent of nurses with higher TLMX scores did not report any events.

Table 10 reports the association of TLMX categorized into low/moderate and high/very high scores with contact frequency, shift worked, unit tenure, and patient safety grade. There was a strong relationship between TLMX and contact frequency where 62% of nurses with high or very high TLMX report frequent contact with their leader compared to 16% of nurses with lower TLMX scores reporting frequent contact. There was also a strong association of LMX with patient safety grade where 87% of nurses with high TLMX scores awarding A/B grades to their unit compared to 51% with lower TLMX scores. There was a statistically significant (although with small effect size) relationship between TLMX and shift worked, where 69% of nurses who work days or days and nights had high TLMX scores to 52% of nurses with lower TLMX scores. Unit tenure was not associated with TLMX.

Table 10

Relationship of TLMX Score With Contact Frequency, Shift Worked, Unit Tenure and Patient Safety Grade

Variable	TLMX Low-Moderate n	%	TLMX High-Very High n	%	$\chi 2$	*p*	Phi
Contact frequency							
Infrequent	293	84.4	173	38.4			
Frequent	54	15.6	277	61.6	170.68	< .001	.463
Shift worked							
Night-weekend	166	48.0	141	31.3			
Day – day/night	180	52.0	309	68.7	22.87	< .001	.169
Unit tenure years							
Less than 1	71	20.5	108	24.0			
1 to 5	164	47.4	173	38.4			
6 to 10	57	16.5	93	20.7			
10 or more	54	15.6	76	16.9	6.78	.079	.092
Patient safety grade							
C, D and F	164	49.4	57	12.9			
A and B	168	50.6	384	87.1	123.41	< .001	.400

Table 11 reports the results of examining each potential moderator to identify whether the relationship of LMX-7 positive responses on patient safety grade differs at the levels of each of the potential moderators. For each of the potential moderators, the percent of nurses with higher TLMX scores reported statistically significant higher percentage of A/B grades compared to nurses with lower TLMX scores at each level of each moderator. For example, of the 279 nurses with very low to moderate TLMX scores and who reported infrequent contact (never, rarely, sometimes) with their unit leader, 48.6% of them awarded A/B safety grades to their unit compared to 82% of the 167 nurses with higher TLMX scores and infrequent contact with their

leader. If contact frequency were moderating the effect of high and low LMX-7 scores on positive percentage of patient safety grades, we would observe that one of the comparisons, at either infrequent or frequent contact frequency, would be statistically significant while the other comparison would not be significant. However, we see that all the comparisons between levels of TLMX are statistically significant. Respondents who worked days or both days and nights had a significant difference between the lower TLMX score group on percent positive patient safety grades (M = 52.9%) compared to the group with higher TLMX scores (M = 88.5%). Similarly, respondents who worked nights or weekends reported a lower mean positive percent safety grade (M = 47.5%) and had lower TLMX scores than respondents with higher TLMX scores (M = 84.4%, $p < .001$). We observe the same patterns for the different categories of unit tenure. There were significant differences between mean percent positive safety grades in those with lower TLMX scores compared to those with higher TLMX scores, at each category of unit tenure. Since shift worked and unit tenure are not moderating the relationship of TLMX positive responses with positive patient safety grades, and since there were only weak associations of shift worked and unit tenure with TLMX, these variables were eliminated from further analysis. Although contact frequency did not function as a moderator, there is a strong relationship between contact frequency and LMX.

Table 11

Percent of A/B Patient Safety Grades Between Nurses With Very Low to Moderate TLMX Scores and High to Very High TLMX Scores by Level of Contact Frequency, Type of Shift Worked, and Unit Tenure (N = 801)

	TLMX Low-Moderate			TLMX High-Very High					
Patient Safety Grade	n	M	SD	n	M	SD	*t*	*p*	η^2
Contact frequency									
Infrequent	279	48.6	50.7	167	82.0	38.50	7.42	<.001	.111
Frequent	52	61.5	49.13	272	90.1	29.26	5.59	<.001	.088
Shift worked									
Day – day/night	172	52.9	50.06	304	88.5	31.97	9.45	<.001	.159
Night – weekend	158	47.5	50.09	135	84.4	36.38	7.12	<.001	.148
Unit tenure years									
Less than 1	69	68.1	46.94	107	87.9	32.82	3.28	.001	.058
1 to 5	160	44.4	49.84	171	83.6	37.11	8.16	<.001	.168
6 to 10	52	46.2	50.34	91	89.0	31.45	6.27	<.001	.218
10 or more	48	50.0	50.53	71	91.5	28.01	5.75	<.001	.220

Question 3

What are the relationships among the unit based structural variables (unit bed size, nurse leader span of control, and leader experience), contact frequency, DLMX, ALMX, and patient safety grade?

Table 12 reports the means, medians, standard deviations, and skewness for the structural variables (unit bed size, span of control, leader experience), DLMX, ALMX, and patient safety grade. All of the variables presented display a moderate amount of skew, with ALMX being the most normally distributed among the variables (.185)

Table 12

Description of Unit Structural Variables, Contact Frequency, DLMX, ALMX, and Patient Safety Grade (N = 36)

Variable	M	Median	SD	Skew
Unit size	28.2	25.0	12.70	.458
Span of control	12.9	12.0	7.72	.393
Leader experience	15.3	16.0	8.27	.490
Contact frequency	3.2	3.2	.40	-.570
DLMX	5.4	5.3	1.31	.421
ALMX	25.1	24.5	3.11	.185
Patient safety grade	3.9	3.9	0.37	.393

Table 13 reports the inter-correlations among the variables described in Table 12. Of the 28 correlations, six were moderate size (.30 to .49) and three were large (.5 or larger). The structural variable unit size had moderate correlations with span of control (.33), ALMX (-.38), and DLMX (.43). The DLMX correlations suggest that increasing unit bed size is associated with increasing variability in TLMX scores. TLMX has a moderate correlation with patient safety grade (.43) and a large positive correlation with contact frequency (.63).

Table 13

Inter-item Correlations Among Unit Based Structural Variables, DLMX and ALMX (N=801)

	1	2	3	4	5	6	7
1. Unit size	_						
2. Span of control	.33**	_					
3. Leader experience	-.14	.20**	_				
5. Contact frequency	-.21	-.13**	-.01	_			
6. DLMX	.43**	-.23**	-.00	-.15**	_		
7. ALMX	-.38**	-.17**	-.01	.63**	-.26**	_	
8. Patient safety grade	-.36*	.08	.07	.43**	-.06	.54**	_

Note. **p < .01; *p < .05

Question 4

What are the relationships among unit mean ALMX, DLMX, and contact frequency with unit mean HOSPSC dimension scores and patient safety grade?

Table 14 reports the mean percent positive responses for the HSOPSC dimensions, patient safety grade, ALMX, contact frequency, and DLMX averaged over the nursing staff in each unit. The average percent of A/B grades awarded by the unit staff averaged over the 36 units was 71%, where one unit had 29% of the staff awarding A/B's and one unit had all the staff awarding A or B's. The highest averages of positive responses across units were for teamwork within units (84%), supervisor/leader expectations (80%), and organizational learning (72%). The lowest mean positive responses across units was for non-punitive response to error (46%) and staffing (50%). Interestingly, one unit had 74% of their staff reporting positive responses to non-punitive response to errors, and one unit had 71% of their staff reporting positive response to staffing. The average of the 36 unit averages of contact frequency was 41 %, with one unit having only 6% of their nurses reporting frequent contact with their leader while the largest unit

average of 75% indicated that 75% of the nurses in that unit reported frequent contact with their leader. The average percent of staff reporting high levels of ALMX was 57%, with percentages ranging from low of 15% to a high of 100%. The mean unit average DLMX was 5.4 with variability ranging from 3.0 to 8.8.

Table 14

Descriptive Statistics for Percent Positive Response for HSOPSC Variables, Percent Positive Responses for ALMX, Contact Frequency, and DLMX (N = 36)

Variables	M	SD	Range	
			Low	High
Hospital HSOPSC Dimensions				
Management support	64	12.7	41	89
Teamwork across units	54	15.6	17	81
Handoff and transitions	51	15.1	30	82
Unit HSOPSC Dimensions				
Teamwork within units	84	11.3	44	98
Supervisor/leader expectations	80	12.5	53	100
Organizational learning	72	16.1	36	100
Overall perception of safety	63	13.3	21	90
Feedback and communication	70	13.8	35	94
Communication openness	64	14.5	28	92
Frequency of events reported	69	12.9	36	93
Staffing	50	13.6	22	71
Non-Punitive response	46	15.4	15	74
Other Variables				
PSG	71	19.6	29	100
ALMX	57	22.2	15	100
Contact frequency	41	16.3	6	75
DLMX	5.4	1.31	3.0	8.8

Table 15 reports the correlations of ALMX, DLMX, and contact frequency with the HSOPSC dimensions and patient safety grade computed for each of the 36 units. Unit ALMX scores correlated most strongly with the unit-specific dimensions of supervisor/leader expectations (.93), communication openness (.83), organizational learning (.65), and teamwork within units (.63). The smallest correlations with ALMX included teamwork across units (.18), management support (.26), and staffing (.37). Contact frequency correlated most strongly with supervisor/leader expectations (.73), communication openness (.65), and non-punitive response to error (.64). DLMX had moderate negative correlations with supervisor/leader expectations (-.43), communication openness (-.36), and error feedback (-.34). Patient safety grade has a moderate correlation with contact frequency (.47) and a large correlation with ALMX (.54).

Table 15

Pearson Correlations for ALMX, DLMX, and Contact Frequency With HSOPSC Dimensions and Patient Safety Grade (N=36)

Dimension	DLMX	ALMX	Contact Frequency
Hospital dimensions			
Management support	.04	.26	.27
Teamwork across units	.06	.18	.21
Handoffs and transitions	-.02	.40*	.29
Unit dimensions			
Teamwork within units	-.16	.63**	.42*
Supervisor/leader expectations	-.43**	.93**	.73**
Organizational learning	-.23	.65**	.46**
Overall safety perceptions	-.05	.47**	.46**
Error feedback	-.34*	.58**	.51**
Communication openness	-.36*	.83**	.65**
Event reporting frequency	-.09	.43**	.34*
Staffing	.02	.37*	.43**
Non-punitive response to error	.00	.59**	.64**
Outcome Dimensions			
Patient safety grade	-.07	.54**	.47*

Note: * $p < .05$. **$p < .01$

Table 16 reports comparisons of patient safety grade and frequency of contact between in and out groups in units grouped by the percent of unit nursing staff with high member-leader relationship scores. Of the 36 units, 14 (39%) of the units had 15 to 44% (low group) of their nursing staff reported high LMX scores, 66% of the nurses in those units were in the in group (nurses who rated their leader with moderate, high or very LMX scores), and 34% were in the out group (nurses who rated their leaders with very low or LMX scores). In those 14 units, 73.4% of the nurses in the in-group awarded patient safety grades of A or B, compared to 34.8%

in the out-group, and 40% of the in-group had frequent contact with their leader compared to 5% in the out-group. There were 11 (30.5%) units in the moderate group where 50 to 68% of the unit staff reported high LMX scores. In the in group (83% of the staff), 76.9% of the nurses reported high patient safety grades compared to 34.1% in the out group (17% of the staff), and 53% of the in group reported frequent contact with their leader compared to 16% in the out group. In the high group, 70 to 100% of the unit staff reported high LMX score, 95% of the staff in those groups were in the in-group compared to only 5% in the out-group. The nurses in the in-group had significantly higher patient safety grades ($p = .027$) and more frequent contact ($p = .034$) than nurses in the out-group.

Table 16

Comparison of "In" and "Out" Groups in Units With Low, Moderate, and High Percentage of Unit Staff With High ALMX Scores

	"In" group			"Out" group					
Unit ALMX Categories	n	M	SD	n	M	SD	t	p	η2
Low									
PSG (A/B)	192	73.4	44.3	98	43.9	34.8	5.15	< .001	.084
Contact frequency	192	40.0	49.2	98	5.0	21.7	6.93	< .001	.138
Moderate									
PSG (A/B)	216	76.9	42.3	44	34.1	47.9	5.97	< .001	.122
Contact frequency	216	53.0	50.0	45	16.0	36.7	4.76	< .001	.079
High									
PSG (A/B)	211	85.3	35.5	12	58.3	51.5	2.49	.013	.027
Contact frequency	215	55.0	49.8	13	15.0	37.6	2.84	.005	.034

CHAPTER V: DISCUSSION, CONCLUSION, IMPLICATIONS, RECOMMENDATIONS

The purpose of this study was to examine relationships between nurse leaders and their nursing staff, and how these relationships influence patient safety culture. A secondary data analysis was performed to explore these relationships. Survey data was combined with hospital structural data (unit size, span of control, leader experience) into one SPSS version 22 database. There were four research questions designed around the exploration of leader-member relationships and patient safety culture. Question One examined the descriptive characteristics of the nursing units, leaders, and respondents, along with the psychometric characteristics of the HSOPSC and the LMX-7 scale. Question Two examined the relationship of TLMX scores with HSOPSC dimensions, self-reported events, and patient safety grade and determined if contact frequency, shift worked, or unit tenure moderated the relationship of TLMX and patient safety grade. Question Three examined the relationship between unit based structural variables (unit size, span of control, and leader experience), contact frequency, DLMX, TLMX and patient safety grade. Finally, Question Four examined unit level relationships among ALMX and DLMX scores with HSOPSC dimensions and patient safety grade.

Discussion of Findings

Thirty-six nursing units (23 from an Academic Medical Center, and 13 from six community hospitals) were included in the study. The number of units in the Medical Center was larger than the combined number of community hospital units. Eight hundred and one registered nurses of inpatient units met inclusion criteria for this study (628 from the Medical Center and 173 from the community hospitals). Nurses represented medical, intensive care, surgical, obstetric, behavioral health, and non-specified nursing units.

Question 1

What are the characteristics of the nursing units, nurse leaders, survey respondents, the HSOPSC, and the LMX-7 scale?

Medical and intensive care units from the Academic Medical Center represented the majority of the sample units and work environments of the survey participants. On average Medical Center units were larger, with more employees, with greater spans of control and less leader experience, signaling an increased workload for Medical Center unit leaders. Having more employees and more patients on the unit may handicap the nurse leader's ability to form relationships.

Another concern is the level of experience of the nurse leaders in the Medical Center's units. Studies have shown that experienced leaders learn more about leading from real work and life experiences than they do from leadership development or college programs (Thomas & Cheese, 2005). Time spent in a leadership role also allows leaders to learn balance between the organization and their own personal professional development needs (Mathena, 2002). Building a stable nursing workforce starts with experienced nurse leaders, because their experience is crucial to the recruitment, retention, and satisfaction of nursing staff (Mathena, 2002).

The average registered nurse in this study provided direct patient care with only 1 to 5 years of experience in their area. This finding is important because experience has been shown to effect a nurse's competency level. The five-year mark has traditionally been considered the point at which nurses achieve expert status in their areas (Benner, 1982). Studies that are more recent have indicated that while growth may be rapid during the first few years, it continues for 10 or more years after arrival to a patient population (Takase, 2012). It is clear that when nurses remain in one patient population they become better at their jobs (Jeretoja, Numminen, Isoaho &

Leino-Kilpi, 2015). The limited time nurses spent in their current units in this study is a concern for patient safety culture.

Most of the sample reported working less than 40 hours per week. This statistic is much lower than expected given nursing workforce literature (Buerhaus, 1994). It is also known that the Southeast region, which is where this study takes place, is disproportionately impacted by the current nursing shortage (Auerbach, Buerhaus & Staiger, 2017).

HSOPSC. Cronbach's alpha was calculated to test HSOPSC internal consistency. The current sample averaged .79 against previously published results of .77 (Sorra and Dyer, 2010). Only the staffing dimension reported below the .70 threshold. The inter-item correlations for the HSOPSC were all significant and less than the .80 goal. Dimension 12, Non-punitive response to error (Appendix C), registered the second lowest mean results, with the highest standard deviation, and the lowest percent of positive responses. This item tests the concept of just culture, which is discussed in implications of practice.

LMX-7. Cronbach's alpha was calculated to test LMX-7 internal consistency. The current sample scored .92 against previously published results of .91 (Thompson, 2010). The inter-item correlations for the LMX-7 were less than the .80 goal. Item 5 "Regardless of the amount of formal authority your leader has, what are the chances that he/she would "bail you out," at his/her expense?" (Appendix D), had the lowest mean, highest standard deviation, and the lowest percentage of positive responses. This question tests the concept of mutual obligation, where both the leader and the member care about the success of the other party (Graen & Uhl-Bien, 1995). Mutual obligation develops late in the stages of relationship development and may reflect the larger number of 1 to 5 year experienced nurses in the study sample (Graen & Uhl-Bien, 1995).

Other variables analyzed included contact frequency, shift worked, and LMX-7 score categories. Contact frequency appears to be normally distributed, with most of the scores falling within the rarely, sometimes, and most of the time categories. The number of respondents were approximately equal between night shift and those who worked day shift or a mixture of day and night shift. Most LMX-7 scores fell into the high or very high category, indicating that most staff felt they had a good relationship with their leader. This finding diminishes the value of DLMX calculations, because with skewing of the leader-member relationship variance will naturally be lower.

Question 2

What is the relationship of TLMX with HSOPSC dimensions, self-reported events, and patient safety grade and is the relationship of TLMX with patient safety grade moderated by contact frequency, shift worked, or tenure on the nurse's work unit?

Individuals with higher TLMX scores, those feeling they had a positive relationship with the leader, provided had a higher response rating for every dimension of the HSOPSC, self-reported events, and patient safety grade when compared to individuals with lower TLMX scores. These relationships suggest that when leader-member relationships are good, nurses feel that the unit is safer and they more willingly report error events.

This question also explored if structural variables (contact frequency, shift worked, and unit tenure) moderate the relationship between TLMX and patient safety grade. Nurses with higher TLMX scores reported higher contact frequency and worked at least some day shifts. TLMX did not change significantly because of unit tenure. Although contact frequency and shift worked variables had strong relationships with TLMX, none of the variables moderated the relationship between TLMX and patient safety grade.

Question 3

What are the relationships among the unit based structural variables (unit bed size, nurse leader span of control, and leader experience), contact frequency, DLMX, ALMX, and patient safety grade?

Unit size (number of physical beds) was associated with span of control, DLMX, ALMX, and patient safety grade. Most large units have more FTEs and leaders on these units had greater spans of control. Nurses on larger units reported weaker relationships with their leaders and believed that their units were not as safe. Further, they demonstrated more variability in opinion of the leader (DLMX), indicating that there may be some discord among the unit team.

Span of control (the number of RN FTEs divided by the number of leaders) is an attempt to quantify the leadership resources that support patient safety culture. On average subjects in units with larger spans of control reported less contact with their leaders, indicating that the management team may struggle to contact the entire staff. Management teams with larger spans of control also suffered from lower relationships and increased relationship variability. Interestingly, the units with larger spans of control were those with the most experienced leaders.

Leader experience (the average experience in years of the management team) was only associated with span of control. It is possible that the workload leaders are being assigned is proportionate to their perceived ability, and more experienced leaders are being challenged to accomplish larger assignments. Leader experience was not significantly correlated to performance variables, indicating that although some units had more experienced leaders, they were still unable to create better leader-member relationships or patient safety cultures.

Contact frequency (the frequency which nurses "see" their leader) was associated negatively with span of control, signaling that lower spans of control may provide opportunities

for increased contact frequency. More contact between the leader and their team built stronger, less variable relationships, and achieved higher patient safety grade. Based on the strength of these findings contact frequency is the strongest contributor among the structural variables to building a positive leader-member relationship and thus a positive patient safety culture.

DLMX (the variance in leader-member relationship) is a potential indicator of teamwork among a unit. Better relationships, more contact between leaders and members, and decreased spans of control result in better teamwork. This sample also indicated that larger units suffer from less teamwork. These findings indicates on larger units, management teams are unable to maintain equal relationship development within their team, and the formation of larger "out" groups may be more prominent (Graen & Uhl-Bien, 1995).

ALMX (the group average of leader-member relationship) scores are associated with smaller units, more limited spans of control, and less relationship variability. Among all the variables, ALMX had the highest correlations with contact frequency and patient safety grade.

Question 4

What are the relationships among unit-based ALMX, DLMX and contact frequency with unit mean HSOPSC dimension scores and patient safety grade?

ALMX scores are strongly associated with all of the unit-specific HSOPSC dimensions, patient safety grade, and the handoffs and transitions dimension, indicating that analysis of leader-member relationship has value in the assessment of patient safety culture at the unit level. This finding supports the findings of Thompson (2010).

This study attempted to measure teamwork among the staff using DLMX (Banks et al., 2014; Tse, 2014). This study found significance with DLMX and three HSOPSC dimensions, but was unable to determine significance with either of the teamwork dimensions of the survey

and found no correlation between DLMX and patient safety grade. When categorized into low and moderate ALMX, the distribution of patient safety grade and contact frequency assignment between "in" and "out" groups was significantly different, meaning that within units there were groups of nurses who viewed the patient safety grade and contact frequency differently based on their relationship with the leader. This dynamic was less significant at the high ALMX category because of an understandably low population of "out" group members and subsequently a lower effect size.

Contact Frequency. Contact frequency captures personal, face-to-face, contact between leaders and members. Contact frequency correlated with all unit level HSOPSC dimensions and the patient safety grade, solidifying contact frequency as a key structural variable for patient safety culture. The correlations of contact frequency with patient safety grade mirrored those of ALMX, adding more evidence to relationship that exists between contact frequency and ALMX. The strength of these correlations does not completely dispel the idea that a curvilinear relationship exists with leader-member communication, but it does demonstrate that this population has not yet reached saturation with their leader's communication efforts (Patrashkova-Volzdoska, McComb & Green, 2003).

Relationship of Findings to Conceptual and Theoretical Models

Donabedian's quality framework (Figure 2) provided the conceptual framework and the theoretical model (Figure 1) for exploring the relationships among the variables in this study. These models helped identify and explore associations between structural variables, leader-member relationships, and patient safety culture. This section will explain the relationship of those variables to the conceptual and theoretical models based on the research findings.

Structural Variables

The structural variables of this study included unit size, span of control, leader experience, shift worked, unit tenure, and contact frequency. Leader experience and unit tenure did not directly affect leader-member relationship quality. The chief finding of this study supports the value of contact frequency in leader-member relationship development. Members who see their leaders face-to-face more often report a higher quality relationship with their leader. Altering span of control could increase the ability of leaders to contact their members.

TLMX

The relationship between patient safety culture and leader-member relationship was confirmed (Thompson, 2010). Significantly, more respondents with high TLMX answered positively on the HSOPSC, suggesting a strong influence of leader-member relationship with patient safety culture. Further, most nurses with better leader-member relationships worked at least some day shifts, reported higher contact frequencies, and assigned their units with an A or B patient safety grade. These study findings suggest that if leaders can improve their relationships with their nurses then they can improve their patient safety scores, and improvement could be achieved by increasing contact with nurses on different shifts.

ALMX.

ALMX was found to have a strong relationship with every unit level HSOPSC dimension and patient safety grade. The strong correlations between ALMX and HSOPSC unit dimensions provide evidence of the value unit leaders have with regard to patient safety culture. Structural variables were strongly associated with ALMX scores, including decreased unit size, decreased span of control, and increased contact frequency. Altering these variables could prove important in the formation of positive leader-member relationships and patient safety culture.

DLMX

DLMX correlated moderately with three of the HSOPSC dimensions (none of which were teamwork related dimensions), and did not find significance with patient safety grade scores. Among structural variables, lower DLMX values were associated with smaller units, smaller spans of control, increased contact frequency, and higher LMX scores.

DLMX was appreciated by separating units based on ALMX performance into low, moderate and high categories. Analyzing in this way allows the removal of high categories where DLMX values are naturally artificially low. The respondents on low to moderate ALMX units provide a more pronounced effect of variance among the "In" and "Out" groups. Percent positive responses for both the low and moderate categories of ALMX for patient safety grade and contact frequency were large, and significant, displaying the influence of LMX for individuals in the prediction of both patient safety grade and contact frequency.

HSOPSC

Patient safety culture's connection with leader-member relationship was evident at both the individual (TLMX) and unit level (ALMX). The strongest correlating dimensions were the supervisor/leader expectations and communication openness dimensions. Analyzing these dimensions further could provide insight into potential changes in practice. The lowest scoring dimensions were non-punitive response and staffing. Staffing is traditionally among the lowest scoring dimensions, but the non-punitive response to error dimension indicates a need for changes in just culture practices.

Strengths and Limitations

Strengths of this study include the sample, the data, and the levels this research was analyzed. This sample came from a large hospital system that included an Academic Medical Center and several community hospitals. This study combined data from multiple sources to examine patient safety culture, offering new ways to conduct safety research. Data was examined from the individual and the unit level, providing new perspectives on leader-member relationship and patient safety culture. Six structural variables were analyzed, three of which significantly contributed to leader-member relationship, and five of which were determined to significantly predict the patient safety culture of a unit.

Survey data is dependent on perception rather than observation. This survey was pre-existing, which limited the ability of researchers to control for confounding variables such as turnover, staffing fluctuations, and unit acuity levels. Additional demographic information such as education level and certification at the individual level could aide in better understanding the respondent perspectives. It would also be helpful to separate leaders and members in the survey, as leaders often more optimistic about unit performance. Specific data regarding the behaviors of the leader such as when they perform rounds or the nature of the leader's contact with employees would be valuable. Further, it is questionable whether this sample is generalizable to the nursing workforce at large. The study was cross-sectional, with all measures collected at one point in time, meaning it may not be representative of the nursing workforce, or even these hospitals over a longer period.

Implications

Education

The establishment of leader-member relationship's importance in patient safety culture should create conversation about how nurse leaders are educated. If contact frequency is a significant contributor to positive leader-member relationship, and leader-member relationship is strongly associated with patient safety culture, then leaders must be educated about the meaning and value of contact frequency. More importantly, contact frequency may be viewed by staff as caring about and valuing staff concerns and as being supportive of their ability to meet patient needs. Leaders must increase their face-to-face interactions with staff by being present on their nursing units. While emails may keep staff informed, they may not count as contact frequency the way face to face engagement does. Leaders should be taught that it is important to be visible on their nursing units and meetings and other administrative duties that occur off the nursing unit are less valuable in the creation of a unit's patient safety culture.

Practice

The supervisor/leader expectations and communication openness dimensional scores were influenced by leader-member relationship more than any other dimensions, and the non-punitive response to error dimension was one of the worst performing. With a strong link between these dimensions and leader-member relationship, it would be wise to dissect the leader behaviors that are contained in these dimensions in hopes of relationship improvement. Below is a more detailed analysis of these dimensions and actionable areas that could affect these dimensions.

The Supervisor/leader expectations dimension asks if leaders (1) Give positive feedback for a job well done (2) Consider staff suggestions, (3) Encourage "shortcuts" and (4)

Purposefully "overlook" patient safety problems that exist on a unit. Leader behaviors addressed in this dimension include providing positive feedback, listening to staff opinions, discouraging "work-arounds", and consistently enforcing rules. This dimension discusses areas of consistency and communication. Communication must occur both ways. Listening to staff concerns is just as important as giving feedback. The candor at which listening and feedback are performed is key to success. Leaders must be fair and consistent when enforcing rules. Taking shortcuts and overlooking problems encourages staff to do the same, which is a recipe for problems in the patient care environment.

The communication openness and non-punitive response to error dimensions capture the quality of just culture on a unit by exploring the staff member's willingness to share issues with the management staff. The communication openness dimension asks respondents if (1) Staff will freely speak up if they see something that may negatively affect patient care (2) Staff feel free to question the decisions or actions of those with more authority (3) Staff are afraid to ask questions when something does not seem right. The non-punitive error dimension asks respondents if (1) feel like their mistakes are held against them (2) feel like the person is being written up, not the problem and (3) worry that mistakes they make are kept in their personnel file. Just culture environments foster trust between leaders and members by addressing the systems that create error and avoid individual blame, freeing members to be transparent about their mistakes. AHRQ suggests four interventions to support a just culture: (1) Education regarding the nature of human error and organizational accidents (2) Education regarding the concept of just culture (3) The same individual who is responsible for employee discipline should not collect and analyze safety information (4) Introduce an algorithm for determining the blameworthiness of unsafe acts (Jones et al., 2008).

Research

Further research areas around leader-member relationship development include exploring details related to leader-member contact, better defining time variables, and investigating span of control. Researchers need to isolate leader behavior details of leader-member contact and determine how leader behaviors change the leader-member relationship. Examples of contact details would be if leaders form better relationships during formal or informal contact. Is it informal leader presence or formal safety rounds that factor into relationship formation? Qualitative studies would be beneficial in exploring these behaviors. Researchers should interview leaders and staff of both high and low ALMX performing units, exploring their opinions of contributing or inhibiting factors of relationship formation.

Research is needed to determine the causality of structural variables. Span of control, unit size, and shift worked could conceivably be moderators of contact frequency and leader-member relationship. Further research is needed to determine causality among these relationships.

Time's effect on leader-member relationship remains in question. This study attempted to capture the variable of time in the development of relationships, but measures utilized in this study were less than desirable. A specific length of time for leader-member relationship would be ideal, with future studies asking how long members have spent as a subordinate of their leader. Other helpful measures of time could include how long leaders had performed in their role during their careers, and how long they had been a leader on their current unit. Finally, the ideal method of study would be a longitudinally structured study, which could demonstrate the change in leader-member relationship and patient safety culture on a unit over time.

The relationship between span of control and leader experience should be investigated further. This study revealed major differences in span of control and leader experience among the sample. This study establishes that larger spans of control are associated with TLMX and ALMX, while leader experience is linked to unit size, contact frequency, and leader-member relationship. Analyzing the relationships between span of control and leader experience further could provide valuable information about allocation of leadership resources and the achievement of patient safety outcomes.

Conclusion

The purpose of this study was to examine the relationship between nurse leaders and their staff, and determine how these relationships influence patient safety culture. Patient safety continues to be an issue in the healthcare industry, and the complexity with which patient safety develops makes studying it challenging. To build a positive patient safety culture, organizations must prioritize patient safety above all other goals. This prioritization starts with the nurse leader.

Structural variables were used to explore the conditions that positively or negatively influence leader-member relationships and patient safety cultures. None of the structural variables of this study were determined to moderate leader-member relationship and patient safety grade, but it could be determined that more contact frequency between leaders and members helps build relationships.

At the individual level, this study confirmed earlier findings by Thompson (2010) that leader-member relationships do have a significant effect on patient safety culture. At the unit level, leader-member relationship is significantly related to patient safety grade, and the presence of "In" and "Out" groups significantly affect the patient safety grade and contact frequency

scores of units and their respondents. These findings fill a void in current literature surrounding the relationship between unit-level leader-member relationships and patient safety culture.

This study demonstrates that leader-member relationships are an important component of patient safety culture, and that contact frequency is a controllable, actionable behavior that leaders can incorporate into their daily routines to effect these relationships. Leader-member relationship should be considered fundamental to the development of a hospital's patient safety culture.

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APPENDIX A: PATIENT SAFETY CULTURE INTERVENTION RESEARCH

Citation	Country	Instrument(s)	Study Design	Setting & Sample	Intervention	Sub-concepts, content
AbuAlRub & AbuAlhijaa (2014)	Jordan	HSOPSC	Quantitative	Acute Care Registered Nurses	Education	IHI lead education improves frequency of event reporting, non-punitive response to error and the rate of adverse events.
Baker & Durham (2013)	US	Inter-professional Collaborative Competencies Attainment Survey (ICCAS)	Quantitative	School 33 Nursing Students	Education	TeamSTEPPS improves perception inter-professional competencies.
Carney, West, Neily, Mills, & Bagian (2010)	US	Safety Attitudes Questionnaire (SAQ)	Quantitative	Acute Care; Registered Nurses (OR) and surgeons	Education; Medical team training program	Surgeons report a more favorable perception of teamwork than nurses.
Dychess (2014)	US	Survey	Quantitative	Acute Care; NICU Registered Nurses	Electronic patient handoff tool.	RN satisfaction increases with patient handoff and handoff-related error did not increase.

Citation	Country	Instrument(s)	Study Design	Setting & Sample	Intervention	Sub-concepts, content
Hendricks, Cope, & Baum (2015)	Australia	None	Qualitative	Acute Care 146 Registered Nurses	Leadership	Nurses referred to nurse shortages, and ratios, but few tied leadership responsibility to patient safety culture.
Hoffman et al. (2014) *	Germany	Schein patient safety culture model, Incident reporting, Structural variables, Frankfurt Patient Safety Climate Questionnaire	Quantitative	Outpatient; 60 family or internal medicine practices. Physicians and healthcare assistants.	FraTrix: a combination of team sessions and the introduction of a safety matrix to assess culture and organize an action plan	Cultural assessment is the starting point in fixing patient safety culture. FraTrix is one way of organizing this culture assessment.
Kagan & Barnoy (2013)*	Israel	Questionnaire addressing medication mistakes, reporting rate, and perceptions of safety culture	Quantitative	School 247 Registered Nurses/students	Organizational safety culture training, executive leadership support.	The level of patient safety culture is positively correlated with the rate of error reporting.

Citation	Country	Instrument(s)	Study Design	Setting & Sample	Intervention	Sub-concepts, content
Kaplan, Mestel, & Feldman (2010)	US	7 question Likert-style survey	Quantitative	Acute Care 50% MDs, 25% nurses/surgical technologists, 25% ancillary/other.	Behavioral code and a process to reinforce. Leaders mediated conversations, tracked situations, & training.	Staff respect level is congruent with traditional hierarchical tradition. Program produced steadily increasing levels of respect over three years.
Kear & Ulrich (2015)	US	Select items of the HSOPSC combined with two qualitative questions	Mixed Methods	Outpatient; Nephrology unit Leaders, Registered Nurses, APRNs, educators.	Non-punitive event reporting, internet based electronic medical record, huddles	Should focus on communication, and transparency to improve safety.
Kleiner, Carpenter, Maynard, & Link (2014)	US	Checklist/tool created to measure briefings and debriefings.	Quantitative	Acute Care; OR 320 surgical procedures & 43 surgeons	Coaching	Coaching can improve the lack of teamwork, poor communication, and hierarchical structure that contribute to error.
Kullberg et al. (2016)	Sweden	Safety Attitudes Questionnaire (SAQ)	Quantitative	Acute Care Registered Nurses, nurse assistants, & physicians	Fixed schedule implementation for nursing staff.	Fixed scheduling associated with less overtime.

Citation	Country	Instrument(s)	Study Design	Setting & Sample	Intervention	Sub-concepts, content
Leone & Adams (2016)	US	Falls rates for inpatient rehab, HSOPSC	Quantitative	Long term care Number of falls	Safety huddles, signage, hourly rounding	Large decrease noted upon implementation of safety huddles and hourly rounding, but overall the number of falls remains variable.
Oliveira et al. (2014)	Brazil	Interview	Qualitative	Acute Care Registered Nurses	Suggest investment in nursing staff to make the feel valued.	Factors in patient safety include workload, professional training, teamwork, number of contracted employees, turnover, and lack of security, and bad practice.
Prabhakar et al. (2012)	US	12 item questionnaire	Quantitative	Acute Care Physicians, Registered Nurses & Scrub Techs	Read-backs	Nurses and attending MDs agree that there is value in read-back training.
Rosengren, HOGlund, & Hedberg, (2012)	Sweden	Interview	Qualitative	Acute Care Registered Nurses	Quality register	"Senior Alert" provides a preventative approach and reduces costs.
Sakowski, Hooper, Holton, & Brody (2012)	US	HSOPSC	Mixed/Case Study	Acute Care Registered Nurses	Staff-led shared governance councils	Councils increase professional development and enhance work experience for clinical staff.

Citation	Country	Instrument(s)	Study Design	Setting & Sample	Intervention	Sub-concepts, content
Scherb, Specht, Loes, & Reed (2011)	US	Decisional involvement scale	Quantitative	Acute & Outpatient Care Registered Nurses	None	Imbalance in shared decision-making between staff and leaders.
Simmons et al. (2015)	Netherlands	HSOPSC & Factorial Surveys, data from incident reporting system (IRS), Interviews	Mixed Methods	Outpatient Physicians physicists, Registered Nurses	Lean management activities, workshops	Open communication and non-punitive response to error improved, allowing leaders to eliminate "work-arounds" and process deviations, decreasing the number of reported events.
Spaulding & Ohsfeldt (2014)	US	Quality of life	Quantitative	Acute Care Meta-analysis	Emergency Response Team	Emergency response teams provide better care at reduced cost.
Squires et al. (2010) *	Canada	Survey measuring leader-nurse relationship, safety climate and work environment	Quantitative	Acute Care Registered Nurses	Positive leader-member relationships	Outcomes (medication errors, nurse emotional exhaustion and intentions to leave) improve in the presence of trusting and respectful (high quality) relationships.

Citation	Country	Instrument(s)	Study Design	Setting & Sample	Intervention	Sub-concepts, content
Thomas-Hawkins & Flynn (2015)	US	HSOPSC	Quantitative	Outpatient Registered Nurses	Safety culture assessment, Staggering start times, increasing unit staffing elasticity.	Negative patient safety culture ratings associated with increased odds of medication errors, patient hospitalization, infection, and patient complaints.
Thomas-Hawkins et al. (2015)	US	Interview	Qualitative	Outpatient Registered Nurse leaders	Enforce policy, educate, encourage patient involvement, audits, discipline, environmental design, adequate staffing, juggle/balance staff, and managing patient flow.	Suggests practices used by nurse leaders in outpatient hemodialysis units to keep patients safe.
Tschannen et al. (2011)	US	Organization and Management of the ICU survey	Quantitative	Acute Care Registered Nurses & Physicians	RN-MD collaborative meetings to develop a solution to communication issues.	Suggest education system and hospitals embrace the concept of inter-professional education and ensure it becomes a part of every RN and MD's curriculum.

* Hand searched article: articles found by reviewing bibliographies of original articles and searching the internet.

APPENDIX B: HSOPSC

Hospital Survey on Patient Safety

Instructions

This survey asks for your opinions about patient safety issues, medical error, and event reporting in your hospital and will take about 10 to 15 minutes to complete.

If you do not wish to answer a question, or if a question does not apply to you, you may leave your answer blank.

- *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.*

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.

What is your primary work area or unit in this hospital? Select ONE answer.

- ☐ a. Many different hospital units/No specific unit
- ☐ b. Medicine (non-surgical)
- ☐ c. Surgery
- ☐ d. Obstetrics
- ☐ e. Pediatrics
- ☐ f. Emergency department
- ☐ g. Intensive care unit (any type)
- ☐ h. Psychiatry/mental health
- ☐ i. Rehabilitation
- ☐ j. Pharmacy
- ☐ k. Laboratory
- ☐ l. Radiology
- ☐ m. Anesthesiology
- ☐ n. Other, please specify: _____

Please indicate your agreement or disagreement with the following statements about your work area/unit.

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

SECTION A: Your Work Area/Unit (continued)

Think about your hospital work area/unit...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
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
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.

	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: Communications

How often do the following things happen in your work area/unit?

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 D: Frequency of Events Reported

In your hospital work area/unit, when the following mistakes happen, *how often are they reported?*

	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 E: Patient Safety Grade

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

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

SECTION F: Your Hospital

Please indicate your agreement or disagreement with the following statements about your hospital.

Think about your hospital...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. Hospital management provides a work climate that promotes patient safety	☐1	☐2	☐3	☐4	☐5
2. Hospital units do not coordinate well with each other	☐1	☐2	☐3	☐4	☐5
3. Things "fall between the cracks" when transferring patients from one unit to another	☐1	☐2	☐3	☐4	☐5
4. There is good cooperation among hospital units that need to work together	☐1	☐2	☐3	☐4	☐5

SECTION F: Your Hospital (continued)

Think about your hospital...	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
5. Important patient care information is often lost during shift changes	☐1	☐2	☐3	☐4	☐5
6. It is often unpleasant to work with staff from other hospital units	☐1	☐2	☐3	☐4	☐5
7. Problems often occur in the exchange of information across hospital units	☐1	☐2	☐3	☐4	☐5
8. The actions of hospital management show that patient safety is a top priority	☐1	☐2	☐3	☐4	☐5
9. Hospital management seems interested in patient safety only after an adverse event happens	☐1	☐2	☐3	☐4	☐5
10. Hospital units work well together to provide the best care for patients	☐1	☐2	☐3	☐4	☐5
11. Shift changes are problematic for patients in this hospital	☐1	☐2	☐3	☐4	☐5

SECTION G: Number of Events Reported

In the past 12 months, how many event reports have you filled out and submitted?

- ☐ 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 H: Background Information

This information will help in the analysis of the survey results.

1. How long have you worked in this hospital?

- ☐ a. Less than 1 year
- ☐ b. 1 to 5 years
- ☐ c. 6 to 10 years
- ☐ d. 11 to 15 years
- ☐ e. 16 to 20 years
- ☐ f. 21 years or more

2. How long have you worked in your current hospital work area/unit?

- ☐ a. Less than 1 year
- ☐ b. 1 to 5 years
- ☐ c. 6 to 10 years
- ☐ d. 11 to 15 years
- ☐ e. 16 to 20 years
- ☐ f. 21 years or more

3. Typically, how many hours per week do you work in this hospital?

- ☐ a. Less than 20 hours per week
- ☐ b. 20 to 39 hours per week
- ☐ c. 40 to 59 hours per week
- ☐ d. 60 to 79 hours per week
- ☐ e. 80 to 99 hours per week
- ☐ f. 100 hours per week or more

SECTION H: Background Information (continued)

4. What is your staff position in this hospital? Select ONE answer that best describes your staff position.

- ☐ a. Registered Nurse
- ☐ b. Physician Assistant/Nurse Practitioner
- ☐ c. LVN/LPN
- ☐ d. Patient Care Asst/Hospital Aide/Care Partner
- ☐ e. Attending/Staff Physician
- ☐ f. Resident Physician/Physician in Training
- ☐ g. Pharmacist
- ☐ h. Dietician
- ☐ i. Unit Assistant/Clerk/Secretary
- ☐ j. Respiratory Therapist
- ☐ k. Physical, Occupational, or Speech Therapist
- ☐ l. Technician (e.g., EKG, Lab, Radiology)
- ☐ m. Administration/Management
- ☐ n. Other, please specify:

5. In your staff position, do you typically have direct interaction or contact with patients?

- ☐ a. YES, I typically have direct interaction or contact with patients.
- ☐ b. NO, I typically do NOT have direct interaction or contact with patients.

6. How long have you worked in your current specialty or profession?

- ☐ a. Less than 1 year
- ☐ b. 1 to 5 years
- ☐ c. 6 to 10 years
- ☐ d. 11 to 15 years
- ☐ e. 16 to 20 years
- ☐ f. 21 years or more

SECTION I: Your Comments

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

THANK YOU FOR COMPLETING THIS SURVEY.

APPENDIX C: HSOPSC DIMENSIONS, CORRESPONDING ITEMS AND SCALES

	Dimension	Items	Scale
1	Teamwork Within Units	A1. People support one another on this unit. A3. When a lot of work needs to be done quickly, we work together as a team to get the work done. A4. In this unit, people treat each othe with respect. A11. When one area in this unit gets really busy, others help out.	5 Choices, strongly disagree to strongly agree
2	Supervisor/Leader expectations & actions promoting patient safety	B1. My supervisor/leader says a good word when he/she sees a job done according to established patient safety procedures. B2. My supervisor/leader seriously considers staff suggestions for improving patient safety. B3. Whenever pressure builds up, my supervisor/leader wants us to work faster, even if it means taking shortcuts. (negatively worded) B4. My supervisor/leader overlooks patient safety problems that happen over and over. (negatively worded)	5 Choices, strongly disagree to strongly agree
3	Organizational learning – continuous improvement	A6. We are actively doing things to improve patient safety. A9. Mistakes have led to positive changes here. A13. After we make changes to improve patient safety, we evaluate their effectiveness.	5 Choices, strongly disagree to strongly agree
4	Management support for patient safety	F1. Hospital management provides a work climate that promotes patient safety. F8. The actions of hospital management show that patient safety is a top priority. F9. Hospital management seems interested in patient safety only after an adverse event happens. (negatively worded)	5 Choices, strongly disagree to strongly agree
5	Overall perceptions of patient safety	A15. Patient safety is never sacrificed to get more work done. A18. Our procedures and systems are good at preventing errors from happening. A10. It is just by chance that more serious mistakes don't happen around here. (negatively worded) A17. We have patient safety problems in this unit. (negatively worded)	5 Choices, strongly disagree to strongly agree
6	Feedback & communication	C1. We are given feedback about changes put into place based on event reports.	5 Choices, never to always

	about error	C3. We are informed about errors that happen in this unit. C5. In this unit, we discuss ways to prevent errors from happening again.	
7	Communication Openness	C2. Staff will freely speak up if they see something that may negatively affect patient care. C4. Staff feel free to question the decisions or actions of those with more authority. C6. Staff are afraid to ask questions when something does not seem right. (negatively worded)	5 Choices, never to always
8	Frequency of events reported	D1. When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported? D2. When a mistake is made, but has no potential to harm the patient, how often is this reported? D3. When a mistake is made that could harm the patient, but does not, how often is this reported?	5 Choices, never to always
9	Teamwork across units	F4. There is good cooperation among hospital units that need to work together. F10. Hospital units work well together to provide the best care for patients. F2. Hospital units do not coordinate well with each other. (negatively worded) F6. It is often unpleasant to work with staff from other hospital units. (negatively worded)	5 Choices, strongly disagree to strongly agree
10	Staffing	A2. We have enough staff to handle the workload. A5. Staff in this unit work longer hours than is best for patient care. (negatively worded) A7. We use more agency/temporary staff than is best for patient care. (negatively worded) A14. We work in "crisis mode" trying to do too much, too quickly. (negatively worded)	5 Choices, strongly disagree to strongly agree
11	Handoffs & transitions	F3. Things "fall between the cracks" when transferring patients from one unit to another. (negatively worded) F5. Important patient care information is often lost during shift changes. (negatively worded) F7. Problems often occur in the exchange of information across hospital units. (negatively worded) F11. Shift changes are problematic for patients in this hospital. (negatively worded)	5 Choices, strongly disagree to strongly agree
12	Non-punitive response to errors	A8. Staff feel like their mistakes are held against them. (negatively worded) A12. When an event is reported, it feels like the	5 Choices, strongly disagree to

	person is being written up, not the problem. (negatively worded)	strongly agree
	A16. Staff worry that mistakes they make are kept in their personnel file. (negatively worded)	

Adapted from “HSOPSC”, 2015

APPENDIX D: LMX-7 QUESTIONS

1	Do you know where you stand with your leader… do you usually know how satisfied your leader is with what you do? (Does your member usually know) Rarely				
	Rarely	Occasionally	Sometimes	Fairly Often	Very Often
2	How well does your leader understand your job problems and needs? (How well do you understand)				
	Not a Bit	A Little	A fair Amount	Quite a Bit	A Great Deal
3	How well does your leader recognize your potential? (How well do you recognize)				
	None	Small	Moderate	High	Very High
4	Regardless of how much formal authority he/she has built into his/her position, what are the chances that your leader would use his/her power to help you solve problems in your work? (What are the changes that you would)				
	None	Small	Moderate	High	Very High
5	Again, regardless of the amount of formal authority your leader has, what are the chances that he/she would "bail you out," at his/her expense? (What are the chances that you would)				
	None	Small	Moderate	High	Very High
6	I have enough confidence in my leader that I would defend and justify his/her decision if he/she were not present to do so? (Your member would)				
	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
7	How would you characterize your working relationship with your leader? (Your member)				
	Extremely Ineffective	Worse Than Average	Average	Better Than Average	Extremely Effective

(Graen & Uhl-Bien, 1995)