The Texas Medical Center Library
DigitalCommons@TMC

Dissertations & Theses (Open Access) School of Public Health

Fall 12-2018

Relationship Between Nursing Safety Culture And Patient Perception Of Safety In Inpatient Units Of An Academic Specialty Hospital

Miguel Angel Lozano Garcia
UTHealth School of Public Health

Follow this and additional works at: https://digitalcommons.library.tmc.edu/uthsph_dissertsopen

Part of the Community Psychology Commons, Health Psychology Commons, and the Public Health Commons

Recommended Citation

Lozano Garcia, Miguel Angel, "Relationship Between Nursing Safety Culture And Patient Perception Of Safety In Inpatient Units Of An Academic Specialty Hospital" (2018). *Dissertations & Theses (Open Access)*. 23.
https://digitalcommons.library.tmc.edu/uthsph_dissertsopen/23

This is brought to you for free and open access by the School of Public Health at DigitalCommons@TMC. It has been accepted for inclusion in Dissertations & Theses (Open Access) by an authorized administrator of DigitalCommons@TMC. For more information, please contact digcommons@library.tmc.edu.

RELATIONSHIP BETWEEN NURSING SAFETY CULTURE AND PATIENT PERCEPTION OF SAFETY IN INPATIENT UNITS OF AN ACADEMIC SPECIALTY HOSPITAL

By:

MIGUEL ANGEL LOZANO GARCIA, MBA

APPROVED:

COMMITTEE CHAIR/ACADEMIC AND BREADTH ADVISOR
REBECCA WELLS, PHD

MINOR ADVISOR/COMMITTEE MEMBER
SHERYL MCCURDY, PHD

COMMITTEE MEMBER
LEE REVERE, PHD

COMMITTEE MEMBER
JACQUELINE ANDERSON, PHD

DEAN, THE UNIVERSITY OF TEXAS
SCHOOL OF PUBLIC HEALTH

Copyright
by
Miguel Angel Lozano Garcia, MBA
2018

DEDICATION

To Graciela, Mauricio and Ivana Lozano

RELATIONSHIP BETWEEN NURSING SAFETY CULTURE AND PATIENT PERCEPTION OF SAFETY IN INPATIENT UNITS OF AN ACADEMIC SPECIALTY HOSPITAL

By:

MIGUEL ANGEL LOZANO GARCIA
BS, Instituto Tecnologico y de Estudios Superiores de Monterrey (ITESM), 1991
MBA, University of Texas at El Paso, 2004

Presented to the Faculty of The University of Texas

School of Public Health

in Partial Fulfillment

of the Requirements

for the Degree of

DOCTOR OF PHILOSOPHY

THE UNIVERSITY OF TEXAS
SCHOOL OF PUBLIC HEALTH
Houston, Texas
November, 2018

ACKNOWLEDGEMENTS

I would like to acknowledge my dissertation committee chair, Dr. Rebecca Wells for her guidance through this long journey and for introducing me to the world of organizational behavior which I find fascinating. Dr. Lee Revere for being my advisor and mentor from the beginning of the program and for sharing her management and quantitative methods expertise. Dr. Sheryl McCurdy for opening my eyes to the world of qualitative research through her courses, which came very naturally to me. Dr. Jackie Anderson and Dr. Kelly Brassil who "adopted me" as one of their own and facilitated my access to the nursing team in the institution where this research took place and helped me navigate through the protocol submission and IRB approval. I would like to acknowledge my leadership team in my department for being supportive through this journey: Tatiana Hmar-Lagroun, Jeremy Meade and John Bingham. Finally, my wife Graciela, who has always been supportive to my most stubborn ideas; my children Mauricio and Ivana, who I have always taught that you never stop challenging yourself and hope this inspires them; and my father, Wenceslao Lozano, M.D. who lives in my memory and inspired me to grant him his wish of having a "doctor" in the family.

RELATIONSHIP BETWEEN NURSING SAFETY CULTURE AND PATIENT PERCEPTION OF SAFETY IN INPATIENT UNITS OF AN ACADEMIC SPECIALTY HOSPITAL

Miguel Angel Lozano Garcia, MBA
The University of Texas
School of Public Health, 2018

Dissertation Chair: Rebecca Wells, PHD

ABSTRACT

The objective of this research was to analyze the relationship between nursing safety work culture in inpatient nursing units of a specialty academic hospital and their patients' perception of safety using quantitative and qualitative methods. The aim of the quantitative study was to quantitatively evaluate whether nursing safety culture, as measured on the Hospital Survey on Patient Safety Culture (HSOPS) safety questions of the institutional employee opinion survey, was associated with patients' perception of safety during their inpatient care, as measured by responses on the inpatient Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey. The aim of the qualitative study was to explore patients' and nurses' perceptions of the experiences about safety through individual interviews. The setting of the study was 14 inpatient nursing units. The sample for the quantitative study was these 14 units. The selected HSOPS and HCAHPS question scores were used for selected domains for a regression analysis. For the qualitative study, 4 units were selected from these 14 units based on their HCAHPS score (top, lowest, and two average performers). A total of 14 nurses and 12 patients were interviewed from these selected units. The quantitative results indicated that there was no significant association between any of the domains of the nurses' safety culture and the domains of patients' perception of safety. A possible explanation was the limited

statistical power, given the fixed sample size of 14 units. In the qualitative study, the nursing themes were the following: High workload and insufficient staff, nurses identified safety risks, and safety climate is favorable. The patient themes were the following: Patients identified safety risks, Communication and caring from nurses is appreciated, Patients noticed nurses work as a team, Insufficient staffing not an issue for patients. The conclusions from the study was that nurses are working in a favorable safety climate and teamwork is important because both nurses and patients recognized it as part of safety, patients perceived safe care and felt that nurses genuinely cared for them, and working and staffing are the highest safety priority for nurses.

TABLE OF CONTENTS

List of Tables i

List of Figures ii

List of Appendices iii

Background 1

Research Question 4

Literature Review 9

Methods 22

A. Qualitative Study 24

B. Quantitative Study 38

Results 54

A. Qualitative Study 54

B. Quantitative Study 82

Discussion 86

Conclusion 92

Appendices 94

References 101

LIST OF TABLES

Table 1. Unit type and HCAHPS aggregate score from December 2016 – May 2017……..28

Table 2. Nurse and patient participant enrollment totals ……30

Table 3. Nurse participant demographics ……31

Table 4. Patient participant demographics ……..32

Table 5. Comparison of employee survey questions with HSOPS survey question ……38

Table 6. Summary of selected questions/statements ……41

Table 7: Summary of the selected HCAHPS and the domain where they belong ……45

Table 8: Summary of covariates with their type and source …… 47

Table 9. Descriptive statistics …… 82

Table 10. Correlation matrix for all independent and dependent variables …… 84

Table 11. Regression models results …… 86

LIST OF FIGURES

Figure 1. Conceptual model of nursing safety culture and patient safety perception …… 6

Figure 2. Sequential exploratory design …….. 22

Figure 3: Mixed methods approach steps followed …….. 23

Figure 4. Description of the qualitative study process …….. 26

Figure 5. Quantitative study measurement model …… 38

Figure 6. Monthly pooled HCAHPS weighted mean score for each unit in FY2017…..…… 50

Figure 7. Nurse themes summary …….. 71

Figure 8. Patient themes summary …… 78

Figure 9 – Diagram with cross-case themes …… 79

LIST OF APPENDICES

Appendix A - Consenting and interview script for staff 95

Appendix B - Qualitative interview guide for patients 97

Appendix C - First cycle codes 98

Appendix D. Nurse interview code frequency by unit 99

Appendix E. Patient interview code frequency by unit 100

Appendix F. Links to survey instruments 100

I. BACKGROUND

Introduction

The objective of this research is to analyze the relationship between nursing safety work culture in inpatient nursing units of a specialty academic hospital and their patients' perception of safety using quantitative and qualitative methods.

Since the report "To Err is Human: Building a Safer Health System" by the Institute of Medicine (IOM) in 1999, which brought to the public's attention the harm that was occurring in hospitals, there has been an emphasis on safety and the need for a safety culture in healthcare organizations and specifically within teams of care givers that provide direct care to patients such as registered nurses, physician assistants and physicians. The follow up report published in 2001 by the IOM, "Crossing the Quality Chasm" presented a vision for designing the healthcare system of the future around six aims: safe, effective, patient-centered, timely, efficient and equitable. The IOM defines the aim of safe as "avoiding harm to patients from the care that is intended to help them". Since the IOM reports and their recommendation of the six aims to redesign the healthcare system of the future, organizations are learning how to measure quality and identify the factors that impact it. The U.S. still has the most expensive healthcare system in the world per capita and is not a leader in key quality and safety outcomes. Hospitals still remain unsafe places.

There are additional pressures for health organizations to improve safety. There is a shift from the fee for service model to bundle payments and a pay for performance model which takes into consideration hospital quality metrics to get reimbursed for services, which include safety

metrics. Hospital and provider ratings are becoming public and more visible through government platforms such as the Center for Medicare and Medicaid Services (CMS) – Hospital Compare website or private initiatives such as The Leapfrog Group. Patients now have the ability to assess the safety performance of hospitals when making decisions about where to seek care. The question then is how can health organizations reduce harm to patients?

Safety Culture

The concept of "safety culture" has been adopted in healthcare from other industries that have been successful in lowering their safety incidents such as the aviation and nuclear industries. Safety culture can defined the following way: "Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures"(*Health and Safety Commission of Great Britain*, 1993). In healthcare, the concept of safety culture has been developed and studied extensively but its effect on patient safety still remains a relevant question to research given the wide variety of methods used to study this relationship and results obtained according to the literature.

Focus on Safety Culture and Nursing

Healthcare organizations have undertaken many strategic initiatives to improve safety such as "high reliability" but when considering safety culture one must look beyond slogans, mission statements, executive retreats and presentations. Safety culture is shaped by the hospital care providers who are in direct contact with the patient day in and day out. All ideas and initiatives

for transformation ultimately come down to execution by the people who are in direct contact with patients such as registered nurses. In the inpatient hospital setting, nurses play a key role in patient perception of care because they spend most time caring for the patient. Further understanding the dynamic of the nursing function and their interaction with patients, and how this is related to hospital safety performance is relevant as organizations are making efforts to reduce patient harm and are trying to adapt to a changing healthcare industry. As a result, this research focuses on nursing because this is where "the rubber meets the road" when it comes to patient safety. Nurses face a challenge in academic specialty hospitals because decisions about care are not as clear and straight forward compared to a community hospital due to the involvement of medical students, residents, chief residents, attending faculty, etc. (Knapp, 2006).

Focus on Academic Specialty Hospitals

Academic specialty hospitals are different and they face their own challenges in safety performance. The literature is mixed in determining if academic hospitals perform better or worse. While many studies have concluded that teaching hospitals underperform in a variety of safety performance metrics in multiple studies compared to non-teaching hospitals (Rajaram et al., 2015; Tsai, Joynt, Orav, Gawande, & Jha, 2013; Unruh & Hofler, 2016), other studies have indicated that in certain conditions teaching hospitals provide better care (Ayanian & Weissman, 2002; Knapp, 2006). Some explanations in the literature are that patients in academic specialty hospitals are sicker and that care is more complex and costly. The academic

specialty hospital in which this research will be conducted had its first patient satisfaction data publicly reported in December 2016.

Research Question

Given the background on the importance of safety, the key role of nurses and the environment of a specialty academic hospital, the research question for this study is the following:

"Is there a relationship between inpatient nursing work safety culture and patient perception of safety during their care in an academic specialty hospital?"

This research is distinctive because specialty hospitals, which are late adopters of required public reporting by CMS should have special interest in this research to learn and plan adapting for upcoming changes that will impact their profitability. This research will also contribute to the understanding of the reasons for different safety performance between teaching and non-teaching hospitals by exploring a different avenue: the safety culture and its relationship with patient perception of safety in an academic specialty hospital.

Most studies in the literature compare culture of safety and safety outcomes (Hoffmann et al., 2014; Huang et al., 2010; Singer, Lin, Falwell, Gaba, & Baker, 2009) or patient satisfaction scores (Abrahamson, Hass, Morgan, Fulton, & Ramanujam, 2016; Gerhart, 2008; J. Sorra, Khanna, Dyer, Mardon, & Famolaro, 2014) at the hospital level using public national databases and few studies have taken place in a single hospital (Neal & Griffin, 2006) or have analyzed specific hospital units such as intensive care units (Weaver, Weeks, Pham, & Pronovost, 2014) or surgical units (Mark, 2008). The quantitative results of these studies fall short of understanding in depth these relationships. There was no study found in which nursing units were compared

in an academic specialty hospital. Having access to an academic specialty hospital allows for a deeper understanding by interviewing nursing staff and patients to complement the findings from the quantitative analysis. As a result, this research is also distinctive in that a mixed methods approach was used in an inpatient nursing setting in an academic specialty hospital. Through a mixed methods approach, the nurses' perception of what makes the work environment safe was captured to identify relationships between nursing safety culture and patients safety perception. The same approach was taken with the patients' perception of safety by capturing their thoughts and feelings about what are the interactions with nurses that make them feel safe and comparing those with the established instrument to measure patient satisfaction. In addition, the qualitative study helped understand the results of the quantitative study.

This research is important to leaders in healthcare organizations to have a better understanding of safety culture and its relationship with patient perception of safety through patient satisfaction assessment so they can improve their safety and patient satisfaction performance. It is also important to researchers as it will advance the understanding of culture of safety and its relationship with patient satisfaction.

Aims

Primary Objective 1: To quantitatively evaluate whether nursing safety culture, as measured on the HSOPS safety questions of the institutional employee opinion survey, is associated with patients' perception of safety during their inpatient care, as measured by responses on the inpatient HCAHPS survey.

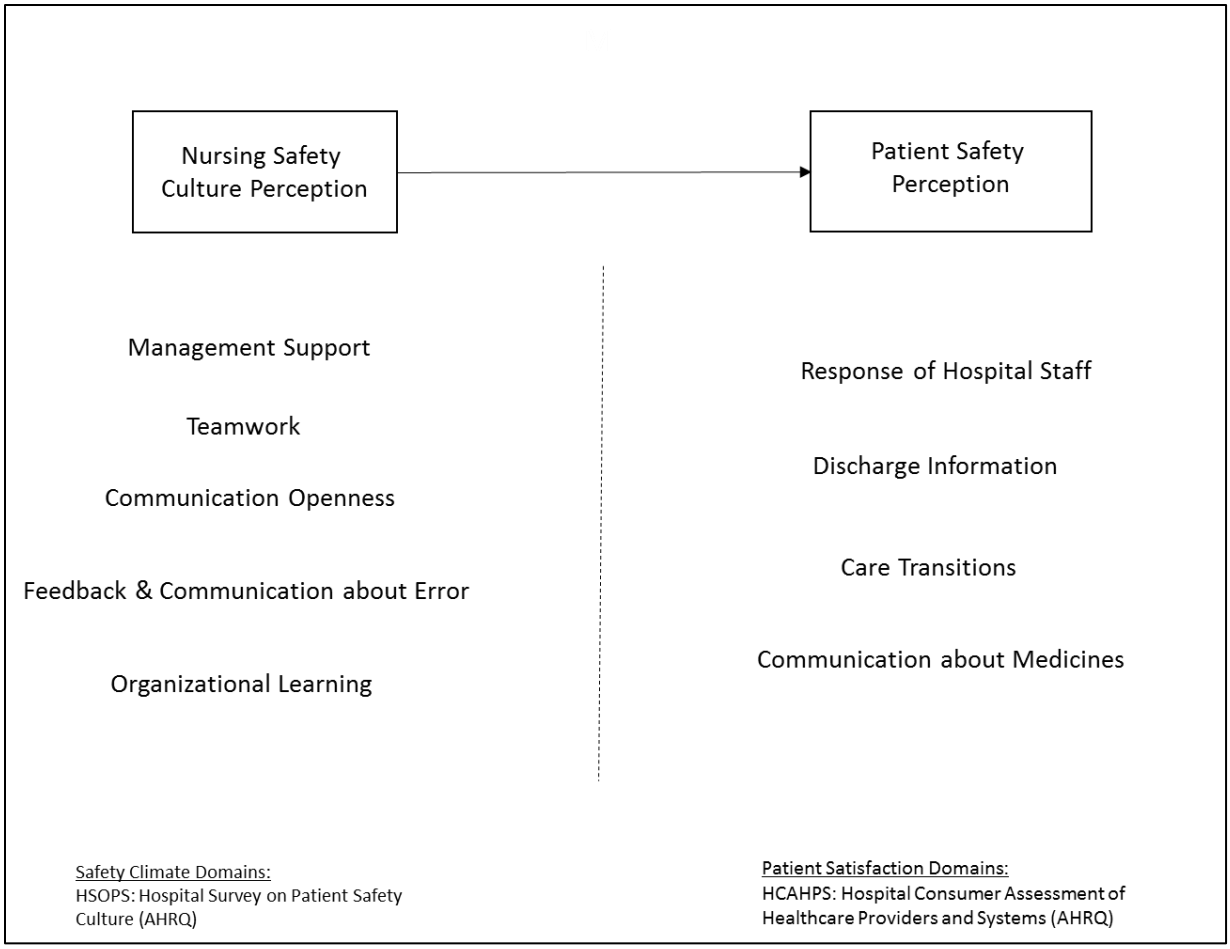
Primary Objective 2. To explore patients' and nurses' perceptions of the experiences influencing safety culture through individual interviews.

This study is significant in exploring how nurses' perception of safety culture is related to patients' perceptions of safety. It is unique in taking a mixed methods approach to explore and validate these relationships, which may further inform hospitals' efforts to enhance safety culture and patient satisfaction, as well as healthcare professionals' perceptions of workplace safety, to further promote a culture of high reliability.

Conceptual Model

The proposed model links the different factors of safety culture (leadership, communication, teamwork, etc.) to the perception of safety experienced by the patient during their care. The items on each side of the conceptual model are domains that were developed in two national surveys from the Agency for Healthcare Research and Quality (AHRQ) that attempt to measure safety culture and patient satisfaction: HSOPS ("Hospital Survey on Patient Safety Culture," 2018) and HCAHPS ("Hospital Consumer Assessment of Healthcare Providers and Systems," 2017).

Figure 1. Conceptual model of nursing safety culture and patient safety perception ("Hospital Consumer Assessment of Healthcare Providers and Systems," 2017; "Hospital Survey on Patient Safety Culture," 2018)



In this research, the relationship between nursing safety culture and patient safety perception, which refers to patient experience with nurses during their stay in the hospital in specific areas related to safety, was analyzed. The conceptual model used has the following components of nursing safety culture: Management Support, Teamwork, Communication Openness, Feedback and Communication about Error, and Organizational Learning. These components were derived from the culture of safety conceptual literature which has identified the multiple factors that contribute to it (Naveh & Katz-Navon, 2014; Reiman, Pietikainen, & Oedewald, 2010; Sammer, 2010; Singla, 2006). The rationale for this model in the context of this study is that front line nurses that are supported by their managers, work in a collaborative manner within their units

and with external units, feel free to communicate openly about errors and problems to leadership in their unit, receive feedback and data about errors in their units and perceive that the organization acts on safety incidents by making positive changes to their work environment will have stronger culture of safety; therefore patients will perceive a higher level of safety in their care compared to units which have a weaker culture of safety.

Patient Safety Perception

The areas of "Patient Safety Perception" to be studied are: responsiveness, discharge information, care transitions and communication about medicines. These are critical interactions between nurses and patients that can affect the safety of the patient. Responsiveness refers to how attentively nursing staff respond when patients use the call button or when they need help to use the bathroom; discharge information refers to discussing help needed and symptoms they may experience when they go home; care transitions refer to taking into account patient preferences and understanding how to manage their health at home and purpose of medication; information about medicines refer to explaining what new medicines are for and their side effects.

Patient safety perception can be measured through patient satisfaction surveys, which can be an indicator of patient safety. This link can be seen in the literature, as there are many studies that have analyzed the relationship between patient experience, in the form of clear, empathic, two-way communication and trust between providers and patients or using patient satisfaction surveys, and patient safety measures finding many positive associations but overall mixed

results (Doyle, Lennox, & Bell, 2013; Tevis, Schmocker, & Kennedy, 2014). Several studies have analyzed the relationship between patient satisfaction using the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey and different safety indicators finding many positive relationships (Boulding, Glickman, Manary, Schulman, & Staelin, 2011; Glickman et al., 2010; Gurland et al., 2013; Isaac, Zaslavsky, Cleary, & Landon, 2010).

The following section will explain in more detail the relationship presented in this conceptual model and its components through a review of the literature.

Literature Review

The relationship of safety culture and patient perception of safety has not been tested exactly as presented in the conceptual model in the literature searched. The literature related to the conceptual model contains some of the studies that have tested similar relationships at the construct level (safety culture vs patient outcomes and safety culture vs patient satisfaction) and also studies that have tested relationships of its components of Management Support, Teamwork, Communication Openness, Feedback and Communication about Error, and Organizational Learning with several aspects of patient satisfaction. This section is divided in three main areas: safety culture and outcomes, safety culture and patient satisfaction and the five components of safety culture mentioned.

Safety Culture and Patient Outcomes Studies

Since the purpose of measuring the culture of safety is to reduce harmful events, this explains why there are many studies that have compared safety culture and patient safety outcomes using a multitude of surveys and dependent variables such as infection rates, falls and patient safety indicators. Most of these studies have found association between safety culture and outcomes, meaning that a higher assessment score in culture of safety is associated with fewer adverse events (Mardon, Khanna, Sorra, Dyer, & Famolaro, 2010; Singer et al., 2009; Weaver et al., 2014). A systematic review of these types of studies DiCuccio (2015) summarizes 16 different studies using multiple tools, patient outcomes and level of measure. The study concluded that 14 of the 16 studies had significant correlation in the expected direction, meaning that a higher assessment score in culture of safety is associated with fewer adverse events. Many studies have used the AHRQ HSOPS which will be the same instrument that was used for this research and most have found associations in the expected direction to diverse safety outcomes such as Central Line-associated bloodstream infection rate (CLABSI) (Weaver et al., 2014), Patient Safety Indicators (Mardon et al., 2010), hospital safety outcomes (Saleh, Darawad, & Al-Hussami, 2015), patient falls (Brown & Wolosin, 2013) while one study did not find association with CLABSI (Meddings et al., 2016).

The findings in these studies about safety culture and patient outcomes are relevant for this research because it validates the concept of culture of safety and its association with safety in the form of reduced harmful events. The HSOPS is an instrument that is widely used to measure culture of safety. Despite the number of studies that have found an association, there is still a lot of room for research because not only are there studies that have not found an

association, but there is variation in the components of safety culture that are significantly related to the outcomes in question. The degree of association may also vary. For example a study may find that Management Support is significant while Teamwork is not; or the association of Communication Openness and the outcome may be stronger than any other component. Research in some of these individual components is not abundant, as will be discussed later in this section.

Safety Culture and Patient Satisfaction Studies

There are fewer studies in the literature about the relationship between safety culture and patient satisfaction as compared with patient outcomes. These studies are closer to patient perception of safety, which is what this research analyzed, but there are very few and results vary. Two studies that used the same instruments that will be used in this research, the AHRQ HSOPS to assess safety culture and AHRQ HCAHPS to assess patient satisfaction concluded that Teamwork, Organizational Learning, and Continuous Improvement were positively associated to patient satisfaction items but had varied results for the rest of the components of culture of safety including some with no associations (Gerhart, 2008; J. Sorra et al., 2014). Another study that used the AHRQ HSOPS and family satisfaction indicators concluded that only Teamwork and Feedback and Communication about Errors were positively associated to patient satisfaction (Dodek et al., 2012). These studies were done at a hospital level surveying staff across hospitals and not at a unit level within a hospital. They also surveyed all clinical staff and not just nursing.

This research focused on one academic specialty hospital to study safety culture associations with patient perception of safety across nursing units specifically. A qualitative component, in which nurses and patients were interviewed, was added to add knowledge to the relationship being studied between nursing safety culture and patient perception of safety. This research will contribute to the limited and varied findings of what components of safety culture are the ones that are more closely associated with patient perception of safety as measured using the HCAHPS survey. The results of this research will be compared to others that have studied this relationship.

Study Hypothesis

Five hypothesis were evaluated in this study based on the five safety culture domains that are part of the study. In the following section, the basis for each one is discussed. Here is the list of the five hypothesis:

Hypothesis 1: Patients in units with higher nurse reported management support will report higher perception of safety.

Hypothesis 2: Patients in units with higher nurse reported teamwork will report higher perception of safety.

Hypothesis 3: Patients in units with higher nurse reported communication openness will report higher perception of safety.

Hypothesis 4: Patients in units with higher nurse reported feedback and communication about errors will report higher perception of safety.

Hypothesis 5: Patients in units with higher nurse reported organizational learning will report higher perception of safety.

Safety Culture Domains

Management Support

Prior research has found management support to affect safety culture and could be related to patient perception of safety (Havig, Skogstad, Kjekshus, & Romoren, 2011; Kroposki & Alexander, 2006; McCutcheon, Doran, Evans, Hall, & Pringle, 2009; Wong, Cummings, & Ducharme, 2013). Management Support is one of the components of safety culture. In the context of this research, this refers to nurses feeling that they are supported by their managers to act on different scenarios that may affect the safety of the patient. These scenarios could be to call out another clinical staff or physician if they are about to harm the patient in some way, to report on a safety incident they witnessed, to discuss safety issues openly, to make recommendations on changes in the work area to prevent safety issues, etc. If nurses feel that their management "has their back", they should be motivated to act accordingly and the culture of safety would be at a high level under that environment. In theory this should result in improved performance in patient safety and patient satisfaction.

There are a number of studies that have analyzed the relationship between nursing leadership and patient satisfaction. Wong et al. (2013) did a systematic review of such studies which included a number of quantitative studies analyzing nursing leadership and its relationship with patient satisfaction found mixed results. Some studies had a positive relationship between nursing leadership characteristics and patient satisfaction. Examples of these leadership characteristics were having a transactional leadership style (leader-follower relationships that are based on a series of exchanges or interactions) (McCutcheon et al., 2009) or both task-oriented and relationship-oriented leadership styles having a positive effect on quality of care (Havig et al., 2011). Sites where nurses and supervisors had good working relationships were more likely to have better client satisfaction scores. (Kroposki & Alexander, 2006). However, similar studies analyzing leadership styles and their relationship with patient satisfaction concluded there was no relationship (Gardner, Thomas-Hawkins, Fogg, & Latham, 2007; Larrabee et al., 2004; Raup, 2008)

Given the mixed results in the literature, there is some evidence that there is a relationship between management support and patient perception of safety, but there is opportunity to continue to research this relationship using different data instruments and study settings to contribute with new findings that will build on the existing literature. Therefore the following hypothesis is proposed:

Hypothesis 1: Patients in units with higher nurse reported management support will report higher perception of safety.

Teamwork

Prior research has found teamwork to be a part of safety culture and could be related to patient perception of safety (Debehnke & Decker, 2002; Deitrick, Bokovoy, & Panik, 2010; Manser, 2009; Meade, Bursell, & Ketelsen, 2006; Meterko, Mohr, & Young, 2004). Teamwork is a component of safety culture which has two aspects: teamwork within a working unit and across units, the latter sometimes also referred to as collaboration. Teamwork can be a broad concept but in the context of this research, it refers to nurses supporting each other, communicating effectively with other providers, trusting each other with a positive attitude, and having good relationships with other providers and departments to achieve the goal of keeping the patient safe.

This collaborative teamwork environment should create a stronger culture of safety and be perceived by patients each time they interact with nurses during their stay in the hospital. Studies have shown that positive collaboration between nurses and physicians is associated with higher patient satisfaction. (Debehnke & Decker, 2002; Litaker et al., 2003). There are many healthcare studies about the effect of different aspects of teamwork on outcomes performance. Individual studies have demonstrated a positive relationship between aspects of teamwork and patient satisfaction (Deitrick et al., 2010; Meade et al., 2006; Meterko et al., 2004). However, two systematic review articles studying the literature of the relationship between different elements of teamwork and patient safety or satisfaction found mixed results. A review of the literature studying teamwork and patient safety found that teamwork plays an important role in the causation and prevention of adverse events, however only a few studies were found that established a direct link between specific teamwork behaviors and

performance or outcomes (Manser, 2009). The other systematic review on patient satisfaction, found that in the 27 articles studied, almost half found no statistical difference between patient satisfaction of those who received team-based care compared to those which did not (Wen & Schulman, 2014).

There are studies in this area studying the link between teamwork and perception of patient safety through measureable outcomes such as patient satisfaction and patient safety incidents. There is an opportunity to add to this knowledge through this research because although there are some studies that have concluded there is a positive relationship between some facets of teamwork and patient satisfaction (Manser, 2009), there are many studies that have not found a relationship (Wen & Schulman, 2014). There are many different ways to assess "teamwork" depending on the study settings and methods used which are still to be studied as they relate to patient perception of safety. The specific settings and methods of this research, nursing unit level, academic specialty hospital, and using mixed methods will add to the knowledge in this area. As a result of the mixed literature review, the following hypothesis is proposed because there is some evidence of this relationship:

Hypothesis 2: Patients in units with higher nurse reported teamwork will report higher perception of safety.

Communication Openness

Prior research has found communication openness to be a part of safety culture and could be related to patient perception of safety (Greenberg et al., 2007; Okuyama, Wagner, & Bijnen,

2014; Rabol et al., 2011; Sutcliffe, Lewton, & Rosenthal, 2004). Communication openness is a component of safety culture. In this context, it refers to the ability of staff to speak freely to do the right thing for the patients. In this environment, nurses should not feel intimidated by their supervisors, other clinical staff or physicians to call out safety concerns they witness. The expectation is that patients should notice this when they see that the culture of the unit is one where all nurses communicate openly with their colleagues while treating them and the perception of safety will be higher and will be more satisfied with their care. Nurses can have the role of patient advocates and there are non-organizational factors that may affect that and they also face some barriers. A literature review studying the factors and issues in nurses advocating for patients when patients are in jeopardy resulted in a theory that identifies organizational factors as determinants, among other things (Rainer, 2015). Another factor that affects communication openness is hierarchy. Given the disparate hierarchy of healthcare providers working together, sometimes nurses end up being on the bottom of the chain. A study about nurses' workplace communication, showed that nurses can find their voice when empowered, but often they feel silenced by the system (Garon, 2012). A study found that feeling hurried by the physician was the most frequent barrier to open communication (Tjia et al., 2009).

The literature studying the relationship between communication openness and patient safety or satisfaction is scarce compared to the previous components of safety culture. A systematic review on the topic of speaking up for patient safety by healthcare professionals found that few studies directly address the relationship between speaking-up behavior and patient safety outcomes (Okuyama et al., 2014). Of the three studies identified, one study concluded that of

84 root-cause analysis reports of safety incidents only 2 were identified as “hesitancy to speak up” but 44 reports had descriptions of verbal communication errors between staff (Rabol et al., 2011), a second study concluded that 60 of 444 surgical malpractice claims were identified with communication breakdowns, of which nurses were a part of in many cases (Greenberg et al., 2007), and a third study which was qualitative and involved interviewing residents, concluded that communication is likely to be distorted or withheld when there are hierarchical differences between two communicators, like between residents and nurses (Sutcliffe et al., 2004).

The limited results in the literature analyzing this relationship warrants more empirical investigation. There are many factors that affect the ability for nurses to communicate openly about safety with each other and with other providers, therefore the relationship with patient perception of safety should continue to be explored. The qualitative portion of this research will help to understand this relationship. There is some evidence that there is a relationship between communication openness as a component of safety culture and its relationship with patient perception of safety and consequently patient satisfaction. The following hypothesis is proposed:

Hypothesis 3: Patients in units with higher nurse reported communication openness will report higher perception of safety.

Feedback and Communication about Errors

Feedback and communication about errors is another component of safety culture (J. S. Sorra & Dyer, 2010). This concept is that when nurses receive feedback about errors in their unit, they

will be more conscious about safety and could develop tips about how to improve processes to perform better. This in turn should impact the perception of safety from patients. There are many studies about error reporting and its barriers and effects, however the relationship between feedback about errors and patient satisfaction is such a narrow proposition that there are few studies that have analyzed that relationship without including other factors such as teamwork, communication, etc. For example, a 73 hospital studying the relationship between the HSOPS safety culture survey scores of all components of safety culture and a composite average of the patient satisfaction survey score (CAHPS) found that the correlation between "feedback and communication about error" component and the CAHPS composite average was positive and significant ($p<0.05$) (J. Sorra et al., 2014).

Nursing studies have found that lack of feedback, negative feedback or no positive feedback are deterrents toward reporting errors (Alqubaisi, Tonna, Strath, & Stewart, 2016; Vrbnjak, Denieffe, O'Gorman, & Pajnkihar, 2016). A literature review on feedback mechanisms in healthcare studied the feedback capabilities of reporting systems used in healthcare and used semi-structured interviews with subject matter experts from a range of industries to develop a common framework for "safety action" in which effective feedback is necessary and it depends on timely corrective actions, awareness by disseminating information and involvement of front-line staff (Benn et al., 2009). Other studies about feedback highlight the importance of continuity and persistence for the feedback, having a systematic method, and prioritizing and accountability for the feedback to be effective and turn into improvements (Bradley et al., 2004; Gandhi, Graydon-Baker, Huber, Whittemore, & Gustafson, 2005).

There is a large body of research on reporting and feedback but given the limited number of studies which include the effect on taking corrective actions and impact to patient perception of safety, this study will add to the body of literature as the relationship between the variable of feedback about errors and patient satisfaction items will be analyzed. The qualitative portion of this research will help to understand this relationship. Nevertheless, there is some evidence to establish the following hypothesis about feedback and communication about errors (J. Sorra et al., 2014):

Hypothesis 4: Patients in units with higher nurse reported feedback and communication about errors will report higher perception of safety.

Organizational Learning

Organizational learning is a component of safety culture (J. S. Sorra & Dyer, 2010). This concept of organizational learning refers to organizational change. In this case, it's about the nurses seeing that there are positive changes in their areas when errors occur. This should motivate nurses and perhaps give them permission to take safety seriously because their leadership does too. This is something that the patients don't get to experience directly in their interactions with nurses therefore it is difficult to establish a direct relationship but nonetheless it is part of that nursing environment which should be conducive to reducing harm to patients. A qualitative study which defined patient-perceived quality of nursing care by interviewing 199 hospitalized patients identified the following themes: providing for my needs, treating me

pleasantly, caring about me, being competent, and providing prompt care (Larrabee & Bolden, 2001).

Similar to Hypothesis 4, this is a very narrow proposition and there is limited research on this relationship between organizational learning and patient perception of safety. Some studies have identified that the lack of action by the organization when nurses report safety incidents is a deterrent for nurses to continue to report issues (Garon, 2012; Vrbnjak et al., 2016). Similar to the feedback loop, these articles treat organizational learning as an additional barrier for reporting if it is missing. How this is related to patient satisfaction will be one of the contributions of this study, since there is limited research on this specific relationship. The qualitative portion of this research will help to understand this relationship.

Given the results in the literature, there is some evidence that there is a relationship between organizational learning and safety culture, and in turn this may affect patient perception of safety as nurses are motivated to see organizational change. In the 73 hospital study mentioned in the previous section in which the relationship between the HSOPS safety culture survey scores of all components of safety culture and a composite average of the patient satisfaction survey score (CAHPS) were compared, the "organizational learning" component and the CAHPS composite average had a positive and significant ($p<0.01$) correlation (J. Sorra et al., 2014). The following hypothesis is proposed, given the evidence that there is some relationship between organizational learning and safety culture:

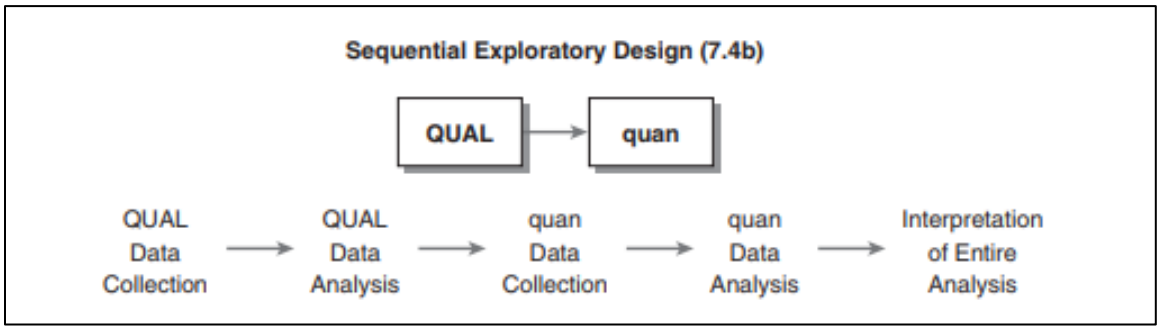
Hypothesis 5: Patients in units with higher nurse reported organizational learning will report higher perception of safety.

II. METHODS

Study Design

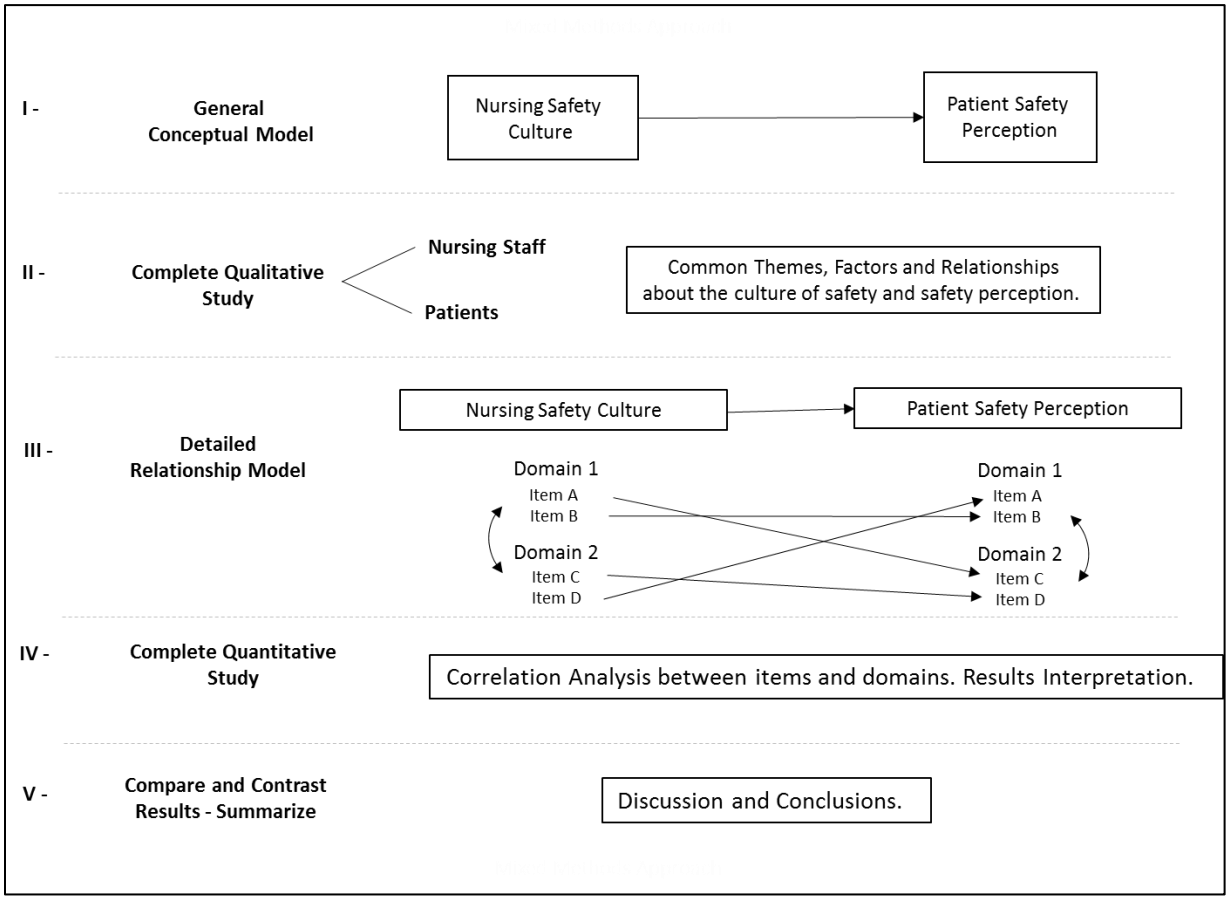
The study design is a "Sequential Exploratory Design", in which a qualitative study was done first to identify or narrow the focus of the possible variables and then a quantitative study followed (Creswell, 2003). Figure 2 shows the sequence of steps followed in this design.

Figure 2. Sequential exploratory design – Source (Creswell, 2003)



In this study, a qualitative study was done first by interviewing nurses and patients and developing a thematic analysis; and a quantitative study followed by doing a cross sectional statistical correlational and regression models. Figure 3 shows the detailed steps taken in this study following this methodology.

Figure 3: Mixed methods approach steps followed



The conceptual model is broad because the relationship between nursing perception of culture and the patient's perception of safety during their care is not well developed in the literature for some of the components. The qualitative study provided a more detailed framework. It was conducted prior to the data analysis of the quantitative study in order to explore the selected components of nursing safety culture and patient perception of safety as well as the relationships between them. The objective of the quantitative study was to find associations between the domains of the nurses' perception of safety culture and the patients' perception of safety domains.

Study Setting

The study took place in a specialty academic hospital. Inpatient nursing units were selected due to having sufficient patient satisfaction survey data (HCAHPS) and also the availability of employee satisfaction data from the consistent application of a hospital wide employee satisfaction survey through several years. Due to the hospital's interest in the culture of safety, the leadership of the hospital decided to include specific questions from the AHRQ survey (HSOPS). The availability of this data and access to nurses and patients from these inpatient units for a qualitative study made this location a convenient setting for this type of study. Details of the selection of nursing units and subject interviews are discussed in the next section.

A. QUALITATIVE STUDY

A qualitative study involving interviews with nursing staff and patients provided more in depth information about the exploration of the domains of safety culture and patient perception of safety and their relationships. This was compared with the findings of the quantitative study to help with interpretation of results. Figure 4 shows the structure and flow of the qualitative study starting with the selection of the four nursing units and going from general discussion to detail discussion about the themes with separate sets of nurses and patients. Finally a cross-case analysis was done to identify common themes, factors and relationships between the factors identified.

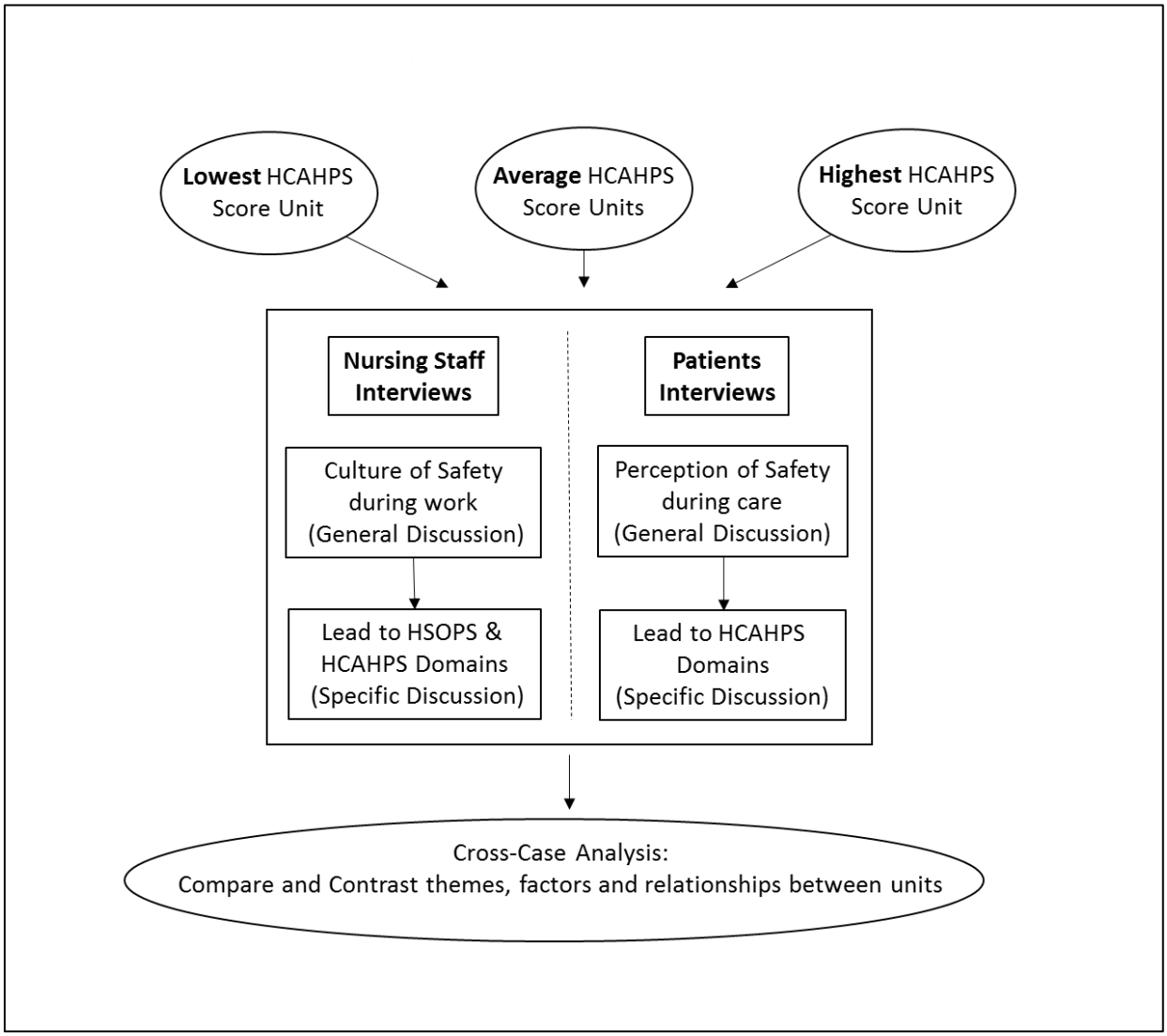
Study Aims for Qualitative Study

1. Analyze the perception of culture of safety from the nurse's perspective in their work environment by Identifying the different factors that they think are part of a culture of safety and compare them to the domains identified for this study: Management Support, Teamwork, Feedback and Communication about Errors, Organizational Learning, Communication Openness and Non Punitive Response to Error.

2. Analyze safety from the patient's perspective by identifying the different factors that contribute to a safe patient experience during their stay and interaction with nurses and compare them to the variables identified for the quantitative study: Response of Hospital Staff, Discharge Information, Care Transitions and Communication about Medicines

3. Analyze which factors nurses and patients see as most important to safety to have a better understanding that helps in the analysis of the quantitative study.

Figure 4. Description of the qualitative study process



1. Selection of Units for Qualitative Study

Nurses and patients were selected from 14 inpatient units. Of the 19 inpatient units in the institution, 14 administer the HCAHPS survey to their patients. Those that do not, specifically the intensive care units, pediatrics, and palliative care, were excluded from participation.

Participants were chosen from units with the lowest, highest and intermediate aggregate scores. The algorithm for determining the units with the lowest, highest and intermediate aggregate scores is as follows. The mean score for each of the nine HCAHPS questions pertaining to safety (these will be discussed in detail in the Dependent Variable selection section of the Quantitative Study section) were obtained for each unit and each month in Quarters 2 and 3 of FY17 (December 2016-May 2017). The aggregate score was calculated by pooling the monthly weighted mean scores for that unit so that each of the 14 units now has one aggregate score for FY17 Q2 and Q3. The aggregate scores were ordered to select units with the lowest, highest and intermediary scores. The intermediary scores are those scores immediately on either side of the median score (those units with the 7th and 8th highest aggregate scores).

The rationale for choosing participants from these units is that by selecting these highest, lowest and intermediate scoring units, the differences in how nurses and patients perceived safety culture were analyzed, given the different performance environments they were in. The list of units in ranking order is shown in Table 1.

Table 1. Unit type and HCAHPS aggregate score from December 2016 – May 2017

Rank	Unit Type	HCAHPS Score - Dec'16-May'17	Respondents (n)
1	Surgical	78.19	168
2	Surgical	77.89	137
3	Hematology	77.01	66
4	Hematology	76.37	76
5	Medical	75.00	103
6	Hematology	74.29	55
7	Hematology	73.46	158
8	Surgical	72.36	134
9	Medical	72.08	102
10	Surgical	71.67	95
11	Surgical	70.79	151
12	Hematology	69.63	50
13	Medical	68.45	60
14	Hematology	67.37	79

The high performing unit was a surgical unit with a 78.19 average HCAHPS score; the low performing unit was a hematology unit with a 67.37 average HCAHPS score; and the average performing units in the 7th and 8th place ranking were a hematology unit with a 73.46 HCAHPS average score and a surgical unit with a 72.36 average HCAHPS score.

2. Selection of Participants for Qualitative Study

The inclusion and exclusion criteria for the participants of the study was as follows:

Inclusion Criteria for Qualitative Study

1. Nurse participants who have worked on their respective unit for greater than 1 year
2. Patient and nurse participants aged 18 and older
3. Patient and nurse participants who can speak, read and write in English.

4. Patients with the capacity to provide informed consent and participate in an interview, as identified in the electronic health record
5. Nurses who are willing to provide informed consent and participate in an interview
6. Patients must be inpatients at the time of the interview
7. Patient and nurse participants from the selected units (lowest, highest and 7th and 8th aggregate score as explained in "Selection of Units" section).

Exclusion Criteria for Qualitative Study

1. Nurses who are in management positions (e.g. nurse managers, associate directors, clinical nurse leaders)
2. Patients on palliative care or intensive care units, or those seen in the emergency center

Data Sample for Qualitative Study

As this was a qualitative study, sampling occurred until no new information was reached. This occurred when there was no new substantively significant information relative to the research question was being provided by participants. For nurses, a total of 14 nurses were enrolled and for patients, a total of 12 were enrolled. Table 2 below shows the number of enrollments per unit.

Table 2. Nurse and patient participant enrollment totals

Unit	Nurses	Patients
High Performer	5	3
Low Performer	5	3
Average Perf. (7th rank)	2	3
Average Perf. (8th rank)	2	3
Total	**14**	**12**

The order of interviews consisted in starting with the high performing unit, then the low performing unit and finally the average performing units. The qualitative data was analyzed for each unit before proceeding to the next unit interviews. Nurse leadership was engaged in order to have access to the nurses and patients in those units to perform the recruitment of interviewees and to conduct the interviews, however to protect the anonymity of participating nurses, managers were not given access to the subject enrollment list identifying which nurses participated in the interviews. Interviews were conducted on the identified units in a private room (for patients this was their hospital room). Nurses were interviewed in a private consult or conference room during their scheduled work shift or when they were not working, based on the nurse's preference and the needs of the unit. If the patient workload and staffing of the unit allowed for coverage of patient care by another nurse, the nurse could interview during his/her shift based of his/her preference.

In the case of nurse interviews, recruiting was done by reaching out to the unit nursing associate director, who then would talk to the nurse manager or directly to the charge nurse on the floor to ask who was available for the interview. The nurses that declined to be interviewed were unable to break off from their duties to sit in a conference room for the interview. No new

information was reached after 12 interviews. After the first 10 interviews were completed for the high and low performing units, the first interview for each of the average performing unit revealed no new information. At that point an additional interview was added to each average performing unit to ensure one day shift nurse and one night shift nurse was interviewed for each. No new information was reached. The nurse interviews were conducted between 3/12/2018 and 5/7/2018 and the average duration for the interview was 39 minutes.

Table 3 summarizes the demographic data collected and the working shift of the nurses interviewed.

Table 3. Nurse Participant demographics (n=14)

Gender	**Total**	**%**	
Male	4	28.6%	
Female	10	71.4%	
Shift			
Day	8	57.1%	
Night	6	42.9%	
Race/Ethnicity			
White	2	14.3%	
Black	0	0.0%	
Asian	10	71.4%	
Hispanic	2	14.3%	
	Avg.	**Std. Dev.**	**Range**
Years of Experience	13.7	13.1	2-36
Years in Institution	8.5	5.5	2-17

In the case of patient interviews, the nursing units selected for the study were visited and the charge nurse was asked for a recommendation on patient candidates that were accessible for an interview and that are close to discharge. It was more difficult to find patients that were able to be interviewed due to their poor health condition, mainly in the hematology units. One

patient declined to be interviewed due to family being present in his room and another patient fell asleep as the interview was starting. No new information was reached in each unit after 3 patients. The patient interviews were conducted between 5/9/2018 and 6/14/2018. The average duration of interviews was 14 minutes. Table 4 summarizes the demographic data collected for the patients interviewed.

Table 4. Patient participant demographics (n= 12)

Gender	**Total**	**%**	
Male	5	41.7%	
Female	7	58.3%	
Race/Ethnicity			
White	8	66.7%	
Black	2	16.7%	
Asian	1	8.3%	
Hispanic	1	8.3%	
	Avg.	**Std. Dev.**	**Range**
Avg. Inpatient Days	7.8	5.6	2-19
Avg. Age	56.5	20.3	42-79

3. Data Collection - Interview Structure for Qualitative Study

In this section, the interview questions are presented and discussed. Qualitative methods and qualitative studies about safety culture and perception of care on nurses and patients were consulted to develop the questions in the interview guide (Kingston, 2011; Larrabee & Bolden, 2001; Sandelowski, 2000) with advice from the dissertation committee. The full interview scripts can be found in Appendix A – Nurses Interview Guide and Appendix B – Patients Interview Guide.

Nurse Interview Questions

The following are the questions determined for the nurses:

1. Describe the culture of safety
    a. Tell me about an experience where the culture of safety protected a patient, a staff member or you.
    b. What do you do to help keep patients and colleagues safe at this institution?
2. Tell me the last time you used “stop the line” when you identified a risk?
    a. How supported do you feel in stopping a process if a safety concern is present?
3. What types of situations do you perceive as making patients feel unsafe at this institution?
    a. Tell me about a recent safety event that occurred on your unit.
4. Do you think patients receive safe care at our institution?
5. Do you feel safe as an employee of this institution?

The questions were designed to have an open discussion about safety culture in the unit and obtain information about how they perceive the safety culture domains of Teamwork, Management Support, Communication Openness, Feedback and Communication about Error, Non-punitive Response to Errors and Organizational Learning and the domains of the HCHAPS survey of Response of Hospital Staff, Discharge Information, Care Transitions and Communication about Medicines. Probing questions were added during the interview in order

to expand on information about certain domains or obtain information on domains if they were not mentioned during the responses to the scripted questions.

Patient Interview Questions

The following are the questions determined for the patients:

1. Tell me about your care experience during your hospitalization.
    a. What did staff members do that made you feel safe?
    b. What experiences have you had that made you feel safe?
2. Tell me about any concerns you have or had during this experience.
    a. What about your hospitalization made you feel unsafe at any time?

Similar to the nurse interviews, probing questions were added to these open questions during the interview in order to expand on certain points, expand on information about certain domains or obtain information on domains if they were not mentioned during the responses to the scripted questions.

4. Data Analysis for Qualitative Study

The following is the methodology that was followed to do the qualitative data analysis: 1) First cycle coding: a list of codes from the conceptual model domains was determined and interview transcripts were coded; 2) Second cycle coding: emerging codes were added, the code list was updated based on frequency of use and relevance, and used memoing to note observations

about codes and themes (Appendix D and E show the top 1st and 2nd cycle codes used by frequency for Nurses and Patients respectively); 3) Cross-case analysis: identified themes and construct models that cut across units for nurses and for patient perceptions, and refine conceptual model Safety Culture vs Perception of Safety with conclusions from qualitative study (Miles, 2014; Yin, 2014).

Themes emerged from the open discussion codes (2nd cycle codes), other themes emerged from the 1st cycle codes, and other themes were a combination of first cycle codes and second cycle codes (or emerging codes). A detailed description of all codes used in the study is presented in the Appendix section. Transcriptions were coded using the ATLAS.ti v.8 software. The software was also used to categorize groups of codes and quotations to facilitate the identification of themes and relationships.

Consistent with qualitative methodology, data analysis was iterative, beginning with the data from the first interview with coding occurring as each subsequent interview is completed. After each set of interviews and coding was completed for a unit, a memo was written in ATLAS.ti v.8 to identify emerging themes, validate themes of predetermined domains and write observations about similarities and differences between units, day or night shift, nurses or patients, etc. Subsequently interview questions evolved based on the codes and themes occurring at each stage of analysis. For example, as nurses frequently mentioned insufficient staff as one of the main safety risks, nurses were asked how they felt about their workload because some nurses associated the two things.

5. Data Management for Qualitative Study

All data was collected and stored in accordance with the hospital's IRB requirements. Audio recordings will be kept for five years or until the qualitative data analysis is published, whichever is sooner. The interviews were transcribed by the Primary Investigator (PI). Audio files and transcriptions were transferred via the institutionally approved cloud based storage system, Box, which is a HIPPA compliant and institutionally approved cloud storage system. Upon completion of data analysis and publications, data may be destroyed or archived, in accordance with institutional requirements. The transcription files are maintained in the password protected computer of the PI. No patient names were recorded or documented. A patient identification number will be used. Only the PI and study personnel have access to this information. Any names used during the interview were removed from the interview transcription. The results of this study are presented in aggregate data form without unique participant identifiers.

6. Ethical Considerations for Qualitative Study

There is a potential for patient coercion to participate due to their condition of being in an inpatient setting and for the registered nurses since they are employed by the academic hospital. The consenting was done in as private conditions as possible and emphasis was made for patients that no health care services were contingent on participating in a study. Likewise for nurses it was emphasized that their employee status or records would not be affected by their participation in the study. No study data was released to unit leaders nor individual participant's responses disclosed, to reduce risk of retribution if the nurse were to disclose

something unfavorable about safety culture or their work experience on the unit. The study was approved by the institutional review boards for the academic hospital and the University of Texas - School of Public Health. Subjects are protected according to their respective guidelines.

7. Limitations for Qualitative Study

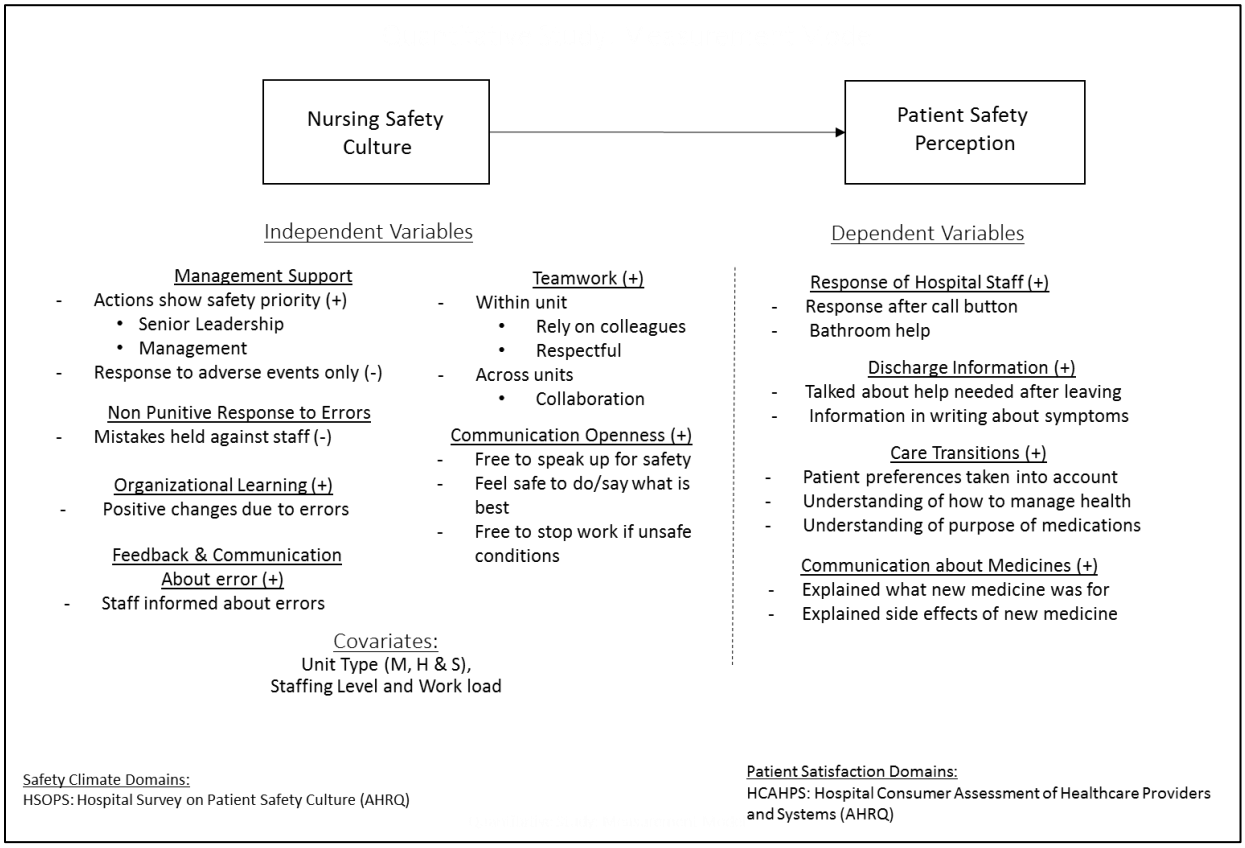
Given that sample selection of nurses and patients for interviews were from one academic specialty hospital, the generalizability of findings will be subject to future replication. The themes that emerged from the interviews were compared to prior research findings and there was some common ground found. The Discussion section expands on this by comparing the findings of this study with previous studies cited in the Literature Review. Another limitation is having purely perceptual data for this part of the study.

Finally another limitation was participant selection bias. The unit nursing managers usually made recommendations of what nurses were available to be interviewed on a given shift so it was not a completely random selection. Bias could have occurred by selecting nurses that would have good things to say, but given the communication openness that was observed in the study, nurses were candid in their interviews. The same occurred with patients. They were selected based on recommendations of nurses determining who was available and able to do an interview given their health condition. Although the principal investigator is not a nurse, he is an employee of the institution. This could also bring bias in both nurses and patient responses even if the consent clearly stated that their answers would not affect them in any way.

B. QUANTITATIVE STUDY

The diagram below is the measurement model which details the independent variables, dependent variables and covariates for the quantitative study. Figure 5 depicts the quantitative study measurement model.

Figure 5. Quantitative study measurement model ("Hospital Consumer Assessment of Healthcare Providers and Systems," 2017; "Hospital Survey on Patient Safety Culture," 2018)



Study Aim for Quantitative Study

The aim of the quantitative study was to quantitatively evaluate whether nursing safety

culture, as measured on the HSOPS safety questions of the institutional employee opinion survey, is associated with patients' perception of safety during their inpatient care, as measured by responses on the inpatient HCAHPS survey. To examine this, regression models with total patients' perception of safety score as the dependent variable and total nurses' perception of safety as the independent variable were calculated for each unit.

1. Selection of Independent Variables – Employee Survey Instrument

The independent variables selected are 6 constructs that are made up of 12 questions that are related to culture of safety. Six questions were taken directly from the AHRQ Hospital Survey on Patient Safety (HSOPS) survey and six questions are included in the predefined 3rd party employee survey. These six questions are very similar to questions in the HSOPS survey therefore they were considered safety culture questions. Table 5 compares the Hospital four survey questions to the HSOPS questions.

Table 5. Comparison of employee survey questions with HSOPS survey question ("Hospital Survey on Patient Safety Culture," 2018)

Domain	Employee Survey Question (used in Study)	HSOPS Question (Similar)
Teamwork within units	3. I can count on my coworkers to help me at work, even if they have to go out of their way to do so.	1. People support one another in this unit
		11. When one area in this unit gets really busy, others help out
Teamwork within units	5. At Hospital people treat one another with trust and mutual respect.	4. In this unit, people treat each other with respect

Teamwork across units	17. I see cooperation across different departments and groups.*	2. Hospital units do not coordinate well with each other
		4. There is good cooperation among hospital units that need to work together
		10. Hospital units work well together to provide the best care for patients
Communication Openness	9. I feel safe at work to do or say what I think is best for the institution.	2. Staff will freely speak up if they see something that may negatively affect patient care
		6. Staff are afraid to ask questions when something does not seem right

These questions were included in the April 2017 employee satisfaction survey that was conducted in the academic hospital. The employee satisfaction survey is administered by a third party consultant and it includes dozens of additional questions. Hospital executives responsible for quality management selected questions from the AHRQ Hospital Survey on Patient Safety (HSOPS) survey to be included in the employee satisfaction survey in order to make an assessment of some of the domains of culture of safety of the different departments, clinics and units of the hospital. Table 6 has the summary of the selected questions/statements and the domain where they belong.

The following is the background of the development of the AHRQ Hospital Survey on Patient Safety (AHRQ HSOPS). It consists of 44 questions and measures 14 dimensions. It was developed by Westat under contract with AHRQ,16 with questions derived from a review of existing safety culture literature and instruments, including the Veterans Health Administration Patient Safety Questionnaire and the Medical Event Reporting System for Transfusion Medicine, a safety culture instrument developed for use in transfusion medicine. The AHRQ

instrument was piloted in 20 hospitals, and the results were used to generate a list of 14 factors, which all displayed high internal consistency by factor analysis (0.63 to 0.84) (Singla, 2006). Subsequent psychometric studies performed on the HSOPS survey have shown moderate-to-strong validity and reliability (Blegen, Gearhart, O'Brien, Sehgal, & Alldredge, 2009).

Table 6. Summary of selected questions/statements

Domain	Variable	Question	Source
Management Support	Manager actions show safety priority	The actions of hospital management show the patient is a top priority.	HSOPS
	Senior Leadership actions show safety priority	Senior Leadership demonstrates through its actions that safety is a top priority	Employee Survey
	Response to adverse events only	Hospital management seems interested in patient safety only after an adverse event happens.	HSOPS
Teamwork	Rely on colleagues (within unit)	I can count on my coworkers to help me at work, even if they have to go out of their way to do so.	Employee Survey
	Respectful (within unit)	At (academic hospital) people treat one another with trust and mutual respect.	Employee Survey
	Collaboration (between units)	I see collaboration across different departments and groups.	Employee Survey
Non Punitive Response to Errors	Mistakes held against staff	Staff feel like their mistakes are held against them.	HSOPS

Communication Openness	Free to speak up for safety	I feel safe at work to do or say what I think is best for the institution.	Employee Survey
	Feel safe to do/say what is best	Staff will freely speak up if they see something that may negatively affect patient care.	HSOPS
	Free to stop work if unsafe conditions	I feel free to stop my work if I believe conditions are unsafe	Employee Survey
Organizational Learning	Positive changes due to errors	Patient safety mistakes have led to positive changes on our unit/work area.	HSOPS
Feedback & Communication of Errors	Staff informed about errors	We are informed about patient care errors that happen on our unit/work area.	HSOPS

These twelve questions are aligned to 6 domains. The questions utilize a 5-point Likert scale with the following responses: Strongly Disagree, Disagree, Neither, Agree, Strongly Agree. The responses were aggregated to the unit level due to a confidentiality agreement with the administrator of the 3rd party survey. An aggregate score was calculated for each unit calculating the percent of respondents who chose one of these responses: Strongly Agree and Disagree or Agree and Strongly Agree depending on the question. As a result, each unit was assigned a score from 0 to 100.

Survey Response Sample

Data were collected from 14,213 hospital employees in May 2017, of which 749 were employed in inpatient units, which is the sample being used for this study. The data was aggregated by the third party survey vendor and reported back to the institution without participant identifiers. The response rate for the Employee Survey for FY17 (September 2016-August 2017) was 62% (n=749) from inpatient units, which was used to inform the statistical analysis content of this study. Employee Survey Data collected in May 2017 reported in aggregate percent score for “Always” responses from the adult inpatient units that administer the HCAHPS survey are included in the analysis of this study.

Safety Culture Measurement (HSOPS – Hospital Survey on Patient Safety Culture)

The following references describe the development of this survey and summarize psychometric property studies that have been done on it.

- Development and multilevel psychometric properties of the (HSOPS) hospital survey on patient safety culture by AHRQ ("Hospital Survey on Patient Safety Culture," 2018)
- Psychometric properties study of the HSOPS concluded that factor analysis partially confirmed the validity of the HSOPSC subscales. Inter-item consistency reliability was above 0.7 for 5 subscales; the staffing subscale had the lowest reliability coefficients. (Blegen et al., 2009)
- An additional psychometric properties study of the HSOPS using survey data from 331 hospitals and 50,513 respondents which concluded that all 12 dimensions and

42 items have acceptable psychometric properties at all levels of analysis with a few exceptions. (J. S. Sorra & Dyer, 2010).

2. Selection of Dependent Variables

The dependent variables are nine questions from the AHRQ Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) patient satisfaction survey which is mailed and emailed to all patients and administered by a third party consultant for the academic hospital. The response rate was 23.7% (n= 3,599) according to the hospital's FY17 data (September 2016-August 2017). This is comparable to the response rate average of all clients of the third party vendor who administered the survey for CY2017: 27.7% for mail survey and 20.4% for eSurvey. All patient responses during this period of time were used. Approximately half of patients mail completed surveys and the other half respond via email based on records at the academic hospital. The questions selected for the study were decided after consultation with various nursing leaders responsible for quality management in the institution. The criteria for selection was evaluating which domains and questions would impact safety perception from the patient's perspective during their hospital stay.

The following is the background of development of the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey ("Hospital Consumer Assessment of Healthcare Providers and Systems," 2017). It was developed through a partnership of AHRQ and the Center for Medicare and Medicaid Services (CMS) and approved for national

implementation in 2005 (Giordano, Elliott, Goldstein, Lehrman, & Spencer, 2010). The objectives of the project were to develop (1) the best tool to measure patient perspectives on care for public reporting and (2) a core set of questions to be used by all hospitals that can be combined with hospital-specific items. It included a public call for measures, multiple Federal Register notices soliciting public input, a review of the relevant literature, meetings with hospitals, consumers and survey vendors, cognitive interviews with consumer, a large-scale pilot test in three states and consumer testing and numerous small-scale field tests. The instrument has 32 items and it measures seven composites, three global ratings, and one recommendation item (Goldstein, Farquhar, Crofton, Darby, & Garfinkel, 2005). In the pilot testing phase, the seven composites had median reliability estimates of 0.69 (internal consistency) and 0.74 (hospital-level reliability) as reported in the HCAHPS Three-State Pilot Study Analysis Results from December 22, 2003. In a different study, the psychometric properties of the HCAHPS survey calculated that the reliabilities of the scales for each domain varied from 0.876 to 0.281 (Westbrook, Babakus, & Grant, 2014).

Table 7: Summary of the selected HCAHPS questions and the domain where they belong ("Hospital Consumer Assessment of Healthcare Providers and Systems," 2017)

Domain	Variable	Question
Response of Hospital Staff	Response after call button	During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?
	Bathroom help	How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?

Discharge Information	Talked about help needed after leaving	During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital? Y/N
	Information in writing about symptoms	During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital? Y/N
Care Transitions	Patient preferences taken into account	During this hospital stay, staff took my preferences and those of my family or caregiver into account in deciding what my health care needs would be when I left.
	Understanding of how to manage health	When I left the hospital, I had a good understanding of the things I was responsible for in managing my health.
	Understanding of purpose of medication	When I left the hospital, I clearly understood the purpose for taking each of my medications.
Communication about Medicines	Explained what new medicine was for	Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?
	Explained side effects of new medicine	Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?

The survey instrument responses are through a Likert scale with the following: Never, Sometimes, Usually and Always with the exception of the "Discharge Information" domain questions, which are yes/no responses. Survey results are reported by a 3rd party consultant, who administers and collects survey data on the hospital's behalf. The only exception is if a patient provides feedback for which they would like a response from the institution, in which case they can provide contact information. The third party consultant provides an aggregate score for each department, clinic or unit calculating the percent of respondents choosing the

"Always" response. As a result, each unit was assigned a score from 0 to 100 using the weighted mean scores.

3. Selection of Covariates

The selection of the covariates for the quantitative study is summarized in Table 8.

Table 8: Summary of covariates with their type and source

Variable	Type	Source
Unit Type	Dummy 1/0	Hospital - Hematology, Surgical, Medical
Total nursing unit staff - FTE	Discrete	Hospital - Human Resources
Workload - Hours per patient day	Continuous	NDNQI - National Database of Nursing Quality Indicators

These variables were selected based on the literature review of studies that were done comparing hospital safety of culture with patient safety outcomes or patient satisfaction. In most cases they used hospital type (academic, profit or non-profit) and bed size. (Meddings et al., 2016; J. Sorra et al., 2014; Weaver et al., 2014). The omission of any of these may create omitted variable bias which will overestimate the unique variance explained by each key independent variable. In this study the equivalent covariates would be unit type, which will be discussed in detail in the next section and nursing staff.

The nursing staff variable was the FTEs for each nursing unit during the time of the employee survey in April 2017 and will be provided by the Human Resources department of the hospital.

The FTEs will be monitored for variation during the data collection the HCAHPS survey and if significant variation is observed a monthly average of FTEs may be calculated instead.

The workload variable is included here because “Staffing” is one of the domains of safety climate in the HSOPS survey but the questions related to this domain were not selected for the employee survey of the hospital. The workload variable will be represented by the nursing hours per patient day (HPPD) metric which is collected by the hospital and reported to NDNQI - National Database of Nursing Quality Indicators. The HPPD used will be from April 2017 when the employee survey is administered. Similar to the FTEs, the HPPD will be monitored for variation during the data collection the HCAHPS survey and if significant variation is observed a monthly average of HPPDs may be calculated instead.

4. Sample for Quantitative Study

The sampling unit for the quantitative portion of this study is the 14 inpatient nursing units. As explained in the qualitative study, of the 19 inpatient units in the institution, 14 administer the HCAHPS survey to their patients. Those that do not, specifically the intensive care units, pediatrics, and palliative care, were excluded from participation. Given that the sample size is fixed at 14, the statistical power of the study was limited. With a desired power of 80%, a large effect size was expected for significance of alpha = 0.05 (Cohen, 1992).

5. Data Collection for Quantitative Study

Study data was collected from the following instruments:

1) Mean domain scores calculated from 12 questions on the institution's employee satisfaction survey conducted in May 2017 from 14 inpatient units. These questions focus on safety culture on the respective units and can be reviewed in Table 6.

2) Aggregate domain weighted mean scores from 9 questions on the HCAHPS patient satisfaction survey as reported for 14 inpatient nursing units. These questions focus on patient perception of safety in the inpatient environment and can be reviewed in Table 7. Domain scores were aggregated as follows. The weighted mean score for each of the four HCAHPS domains pertaining to safety was obtained for each unit in May, June and July FY17. The aggregate domain score is simply the weighted mean score for each domain in each unit, which was calculated by pooling the monthly weighted mean domain scores for each unit so that each of the 14 units now has one aggregate score for each domain.

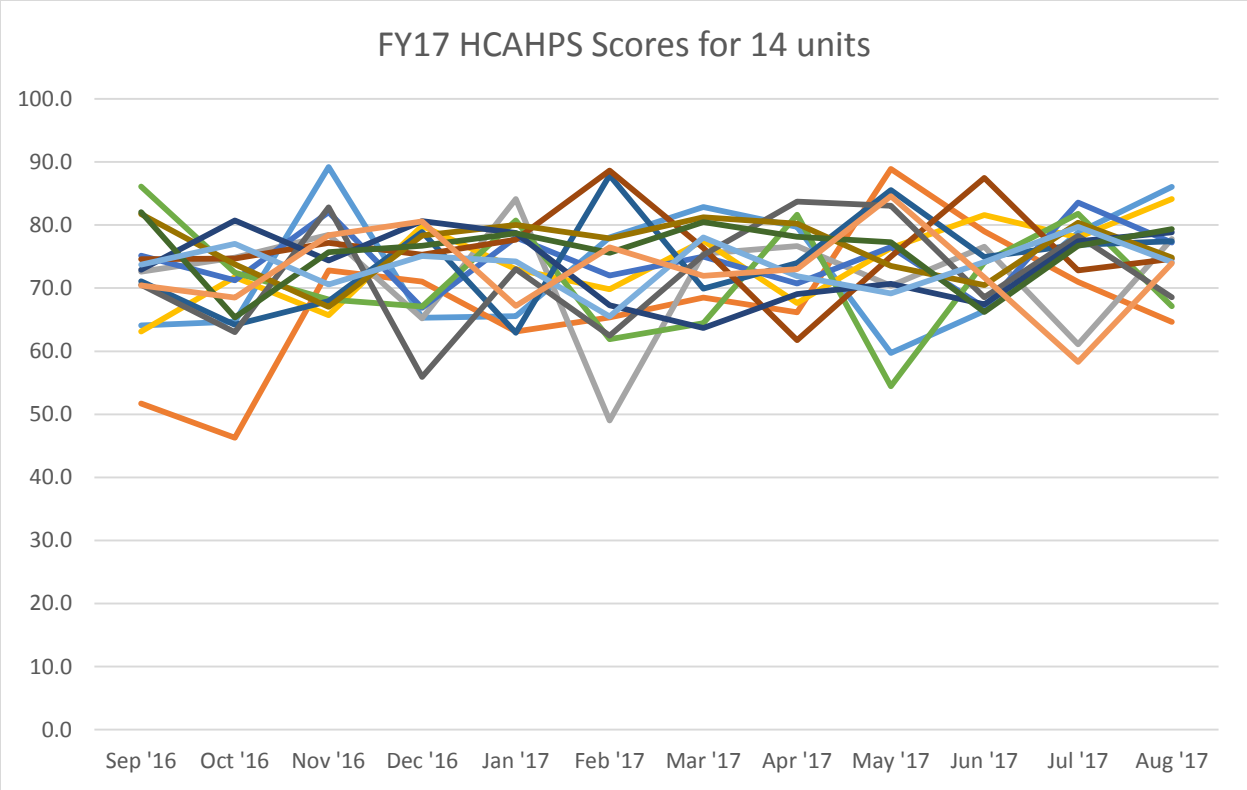
In addition, demographic data was collected for each inpatient unit, including: unit type, total nursing unit staff (reported in full time equivalents - FTE); and workload reported in hours per patient day (HPPD). This data was provided by the Information Services group of the Nursing Administration Department.

6. Data Analysis for Quantitative Study

The analysis of the quantitative data consisted in calculating correlations between all variables, and regression models with total patients' perception of safety score as the dependent variable and total nurses' perception of safety as the independent variable, holding constant unit type, unit nursing staff and HPPDs (hours per patient day). The following are assumptions that were

made as part of the analysis. Because patient perception scores was pooled together over May, June and July of FY17 to create one score, all analyses assume that (1) patient perception scores are relatively stable over a 3-month period and (2) nursing perception as measured in May is an accurate estimate of nursing perception for a three-month period. This implies that cultural changes did not occur during this period that might alter the relationship between nurses' and patients' perception of safety, should one exist. No changes were anticipated that might impact either nurses' or patients' perceptions of safety during this time period. Although the threat of layoffs was particularly strong during the first two quarters of FY17 in the hospital, the threat was less pervasive by May and the impact of the January layoffs should have been normalized by May. However, the stability of monthly patient perception estimates was reviewed by graphing them over time separately for each unit and it was concluded that the data across FY17 was stable. The graph below shows the monthly pooled HCAHPS percent score for "Always" for each unit represented by a different color.

Figure 6. Monthly pooled HCAHPS percent weighted mean score for each unit in FY2017



The graph shows variation across all units and there is no indication of collective negative or positive trends. Regression models were created pairing each of the 4 patient safety perception domains with each of the 6 nurse safety perception domains creating a total of 24 models. In these models, patient safety perception is the dependent variable and nurse safety perception is the independent variable.

An additional analysis, examining the impact of covariates, specifically nursing unit type, total unit nursing staff in terms of FTE, and workload, in terms of hours per patient day (HPPD), upon the model was considered exploratory. Results from these analyses were grouped with results from the secondary analyses when limiting the false discovery rate (FDR) to 5% (Benjamini & Hochberg, 1995). All testing was 2-sided using $\alpha = 0.05$. The relationship between nurses' and patients' perceptions of safety was examined for linearity prior to

calculating correlation and regression coefficients. No data transformations were necessary. All internal construct consistency, correlation, regression and calculations were done using Minitab 18.

7. Data Management for Quantitative Study

All data was collected and stored in accordance with the hospital's IRB requirements. Data is stored in Box, which is a HIPPA (Health Insurance Profitability and Accountability Act of 1996) compliant and institutionally approved cloud storage system. Upon completion of data analysis and publications, data may be destroyed or archived, in accordance with institutional requirements. The results of this study are presented in aggregate data form without unique participant or unit identifiers.

8. Study Limitations for Quantitative Study

The survey instruments are widely used and are of the public domain from AHRQ but they are mainly used to compare at the hospital level in large sample sizes and not the unit or ward level. Therefore, the small sample size of 14 inpatient nursing units is a limitation for the regression analysis due to limited statistical power. No access to the individual responses of the employee survey due to a confidentiality agreement with the third party vendor contracted to administer the survey limits the amount of information that can be obtained from the respondents. As a result, the hospital has aggregate scores for each item that will be assigned to a relatively small sample size of nursing units (14).

The small sample size limits the ability to detect a statistically significant effect when one exists, particularly in models with covariates, any effects seen with these small sample sizes must be of a sufficiently large size that the results might not be generalizable to other study populations. In addition, the assumption that nursing and patient safety perception scores are stable over short periods of time might not be valid.

An additional limitation of the study is that the employee survey data does not include job title identifier therefore the nursing unit responses include personnel other than nurses such as patient care technicians and patient safety coordinators. An analysis of the staff mix of the units concluded that nurses make up approximately 75% of each unit staff therefore the study considers that the aggregate response scores by unit represent the nursing culture.

The safety culture domains were constructed of a mix of survey questions from an institution employee survey and questions inserted from the ARHQ HSOPS survey which created the limitation of properly validating the reliability of items under each domain. It is recommended to use the complete ARHQ HSOPS instrument when conducting research on safety culture using the ARHQ HSOPS domains. The institution where this research was conducted decided to apply the full ARHQ HSOPS survey to its employees one year later after the employee survey that was used in this study was completed. A recommendation is to redesign the quantitative analysis using the results of the full survey and using individual responses instead of units to have a much larger sample size in the hundreds. Another benefit is that the results can be better matched with the timing of the interviews so that both studies can represent conditions in the same year. The time difference between the employee survey in this study and the interviews is approximately 15 months. (March 2017 to the summer of 2018).

III. RESULTS

A. Study Results for Qualitative Study

As a starting point for the qualitative study analysis, the memos that were generated for each unit's set of interviews were evaluated to determine what nurses and patients had in mind during the interviews and to put some structure to the analysis process to determine themes and identify differences between units. The cross-case analysis consisted in identifying themes that cut across units for nurses, patients and themes that reflected common perceptions of safety from nurses and patients. This section is divided into three sub-sections: Nurse themes, Patient themes and cross-case themes. All quotations include the assigned identification number to the nurse or patient for the interviews (nurses #1-14 and patients #15-26), they include if they came from a high, medium or low performing unit based on the patient HCAHPS scores, in the case of nurses, their years of experience in the hospital where the study was done, and finally the unit type.

Themes resulting from nurse interviews

Three themes will be discussed in this section. The first two are themes that were inductive/emergent from the responses to the open interview questions and the third was deductive/related to domains from prior research of safety culture. The following are the three nursing themes: Nurse burden: workload and staffing; safety risks; and safety climate domains.

Nurse burden: Workload and Insufficient staff is highest safety priority

Nurses on all units were concerned with insufficient staffing for nurses and nurse assistants and many were concerned that this was the highest safety risk. The perception of insufficient nursing staff stems from different factors mentioned in the interviews: unpredictable sick nurse call-ins, insufficient assistants and turnover. For example, this quotation reflects the issue with last minute call-ins: "This floor, we are pretty good with staffing. The only issue is when we have call-ins. When 2-3 nurses call in sick and they don't have staff. That is a problem" (Nurse #2 in high performing unit, 5 years, Surgery). Some nurses were also concerned with turnover of nurses in their units given the perception that they don't have enough staff and are experiencing increased workload. This quotation is an example of turnover concerns:

> "This is a tough specialty all across the board we haven't hired that many new nurses. I started here as a new grad and so it is kinda hard to resist that balance and stuff like that, the revolving door but, they try their best at staffing but merely can't create new nurses if there's not a base. I know they're working on ratios as far as nurse patient ratios and something that and so that's something they're looking into. In the meantime every day the charges and the managers and everyone is like you know working hard to making sure that we have adequate or safe numbers to support the unit needs so that's just is again ongoing" (Nurse #13 in average performing unit, 3 years, Hematology unit).

The feeling of being understaffed triggered two reactions from nurses. One has been to put pressure on their management to hire more nurses and assistants and the other is a reaction of genuine concern for their patients and their colleagues. The following quotation reflect the

nurses' frustration with their management's sluggish response to the staffing situation: "Truth to tell, if they truly care about safety they would address the staffing issue. That's how I feel. Because I know they have heard that. I know they are aware of the stress of the nurses because of the staffing issue" (Nurse #11 in average performing unit, 12 years, Surgery).

Nurses are concerned for their patients under the conditions they are currently working under as they feel they cannot put in the best effort for their patients. For example this quotation captures this feeling: "I really think the staff has to be enough. So that we have the time and the mind… When people are overworked they're just not happy and the patients will think that the nurse is not caring". (Nurse #8 in low performing unit, 17 years, Hematology)

The staffing level was discussed by nurses in all units, however the average performing Hematology unit participants did not express the same sense of urgency as the other units because they felt that their staffing level had not changed much compared to other units. The following is a quotation from one of this unit's participants:

> "Right now it's all across the board like right now on our floor it just you know… director, manager, nurses, patient care techs, you know like we have peaks and valleys and stuff like that. Like right now we are kind of in a bit of a valley where we probably need more staff and stuff like that but as far as making sure we have the numbers to support the patients in the bed yeah we got that" (Nurse #13 in average performing unit, 3 years, Hematology)

Nurses in this unit did stress though that their patients are sicker now, they feel the acuity of their patients has increased over time. This is discussed in the next section as one of the factors that has led to their perception of increased workload.

Increased workload emerged during the interviews and it was mostly brought up when the nurses discussed the issue of insufficient staffing. The perception of increased workload by nurses stems from different factors mentioned in the interviews: increased patient acuity, increased time documenting in electronic medical record, increased time performing safety checks with patients and inadequate patient to nurse ratio. The increased patient acuity comments mainly came from the two hematology units, one was an average performing unit and the other one was low performing unit. The following quotation captures the feeling of how acuity has increased over time due to the evolving treatment of cancer and how patients that end up as inpatients are sicker than they were before:

> "Our staffing level has stayed the same these past five years that I've been here, however our patients are becoming sicker more acute and requiring a lot from us so it's at times it feels very overwhelming because you're a lot busier. There's a lot more to look at we are taking care of a patient there are a lot more interventions we have to do in assessments and so sometimes it can feel overwhelming. We had a lot of patients who would come in and just receive chemotherapy and then go home but now we have a lot more patients who stay here for extended periods of time, who need more assistance and not just walking around and able to you know… so that has been increasingly difficult and staff have talked about how much harder our shifts have become" (Nurse #12 in average performing unit, 5 years, Hematology).

There were some quotations from surgery units as well but their tone did not have the same sense of urgency as the ones from the hematology units. The following is a quotation from a nurse in a surgery unit: “But I think as a whole at [the institution] the safety environment is good I mean because there are certain times when it is the acuity is really high and the staffing may be short but that’s not all the time” (Nurse #14 in average performing unit, 4 years, Surgery).

Another factor in the increased workload was time spent working in the EHR (Electronic Medical Record). Many nurses discussed the EHR when discussing workload. The feeling across all units was that the implementation of the EHR was great for safety but as a result it increased workload because it required more time doing documentation and the medication administration required more checks using a scanner and required an additional nurse. The following are two quotations demonstrating this contradiction: “A lot of stuff that we haven’t done before since the EPIC we have to do it. So a lot is being put on the nurse since EPIC. Just documentation it takes a lot of time” (Nurse #11 in average performing unit, 12 years, Surgery). On the contrary, this quotation expresses the benefits of the EHR:

> “It’s good. Like EPIC right? I think the MAR is really good like if you scan a med and if it’s incorrect or the dose is wrong it will let you know. I think it’s good that the providers can provide real-time orders and everything. I think going from paper to electronic was a good change but I will say when there is downtime, I feel like chaos just erupts because people are so used to technology now that we don’t know what to do when the technology is down for a couple of hours” (Nurse #10 in low performing unit, 2 years, Hematology).

Finally, some nurses expressed concern that the Patient-to-Nurse ratio is inadequate. The following quotation captures this concern, plus other concerns discussed in this theme with workload and staffing:

> "We need more time actually because we are double checking everything we have to look at the order we have to scan everything so we need more time to spend with the patient to do the correct things that the other side so when we have a shortage of staff because of the patient ratio has down now we have four patients but if it's three we can do better" (Nurse #1 in high performing unit 1, 13 years, Surgery).

Although there are some differences between units mainly in the level of urgency expressed, this theme of insufficient staffing and increased workload was prevalent across all units regardless of the type of unit or their ranking in the HCAHPS patient satisfaction scores. Remarkably, the nurses expressed an admirable sense of resilience toward their responsibility to the patients and their safety. The next theme discusses how consistent they all were in identifying the main safety risks their patients are facing during their care.

Nurses identified safety risks: Falls, medication, response of staff and infection control

The nurses were consistent across units in the types of safety risks that were mentioned in the interviews. Although it may be argued that this is simply the nurses' job, it was notable how similar the responses were and how the nurses did not hesitate to spell out these risks

immediately when asked what they did to keep patients safe. This also is a reflection of the actions of nursing leadership, ingraining this behavior in the nursing staff to keep patients safe.

Preventing falls was the risk most mentioned. Their motivation is two-fold: to keep their numbers down because their unit is being measured for falls events and because they care about the patients' well-being. Many nurses mentioned a bed alarm, which also demonstrates the institution's commitment to safety and fall prevention by investing in technology to aid nurses in responding to potential fall situations. The following quotation is an example of how they try to prevent falls:

> "Our patient population is at really high risk for falls based on CNS involvement and medications that we give so we have lots of processes in place that we're showing fall videos, we're put on bed alarms and all these things to try and drop our fall rates" (Nurse #6 in low performing unit, 8 years, Hematology).

Nurses highlighted the importance they give to communicating with the patient about the medication. This quotation is an example, "Explaining to them. I think like what medications we are giving them and why and the side effects" (Nurse #4 in high performing unit, 2 years, Surgery). The administration of medication is a standardized process which requires two nurses and is aided by scanning technology which helps them prevent errors. This also demonstrates the institution's commitment to safety in this process. The following quotation describes the process nurses follow: "The double checking… with our chemotherapies we double check with the two nurse check and to make sure that the patient right patients are getting the

chemotherapy, the right dosage, the right route" (Nurse #12 in average performing unit, 5 years, Hematology).

Most of the nurses and all patients associated the prompt response for help with safe care. Many of the quotations associated with the "call button" were in the context of needing help to use the bathroom. This was mostly mentioned in the surgery units. The following is a nurse quotation indicating the importance of responding to calls and making sure patients have access to the call button at all time: "You keep the call bell at the patient's reach and make sure whenever we go there that the patient has the call bell in hand or there is an attendant at the bedside that is one thing" (Nurse #1 in high performing unit, 13 years, Surgery).

Finally, another risk commonly mentioned was infection control. Most of the quotations were associated with proper hand washing and a few with cleaning of incisions and IV lines in surgery units. For example, "Prevent infection and hand-washing technique and the sanitary station of the hands in before and after getting into the patient's room" (Nurse #5 in high performing unit, 10 years, Surgery).

This theme is a reflection of the work that the institution is doing to support a nursing safety culture. The level of consistency seen across all nurses in identifying the main safety risks can only be accomplished with a systematic effort by nursing leadership to highlight the importance of these safety risks and make them part of the nurses' daily responsibilities and unit metrics. This leads to the next theme which is the favorable safety climate in which nurses are operating.

Safety climate domains are favorable for nurses

In this theme, several aspects of the nursing safety climate are presented through mostly positive quotations across all domains for nurses to provide safe care for patients. This section is organized by each of the safety culture domains being studied. Some differences were found within each domain by nurses expressing different opinions but overall the comments were positive in each domain.

There is a strong sense of teamwork within most units in which nurses help each other spontaneously. The following quotation captures the spirit of teamwork in the high and average performing nursing units recognizing when someone needs help:

> "Teamwork is one of the reasons why I have been in this unit for these five years. We really look out for one another and not just here at work but personally as well and if we see that an assignment is too hard for one nurse and the nurse is struggling we immediately jump in. We don't have to sit and wait for that nurse to ask us for help. We approach them and ask: What can I do? I see you are overwhelmed… How can I help you?" (Nurse #12 in average performing unit, 5 years, Hematology)

Many nurses mentioned increased workload and they describe how they are coping with it by supporting each other and recognizing it without waiting to be asked. The low performing hematology unit in the HCAHPS did have some nurses that qualified the teamwork assessment mentioning that sometimes everyone is busy and some nurses are more helpful than others but overall they felt that when it came to safety there was good teamwork. The following are the quotations from nurses of this unit: "For colleagues I always make myself available if they need

me to help with anything, but sometimes I feel like everyone is so busy they feel like they have to do everything on their own and you know" (Nurse #10 in low performing unit, 2 years, Hematology); and the following quotation captures some of the personal differences within the team in this unit:

> "Teamwork I think, there's always some people not as good. But in general it's pretty good. The floor is very busy there are times when we don't have time to help anybody. You are stuck in the patient room and you're doing your own stuff. Generally I think we are good" (Nurse #8 in low performing unit, 17 years, Hematology).

There were also some comments with a more negative tone in this particular low performing hematology unit regarding teamwork. Some of the comments related to nurse approachability and others to the interaction with physicians and advanced practice providers (APPs). The following are examples of quotations from this unit:

> "The doctors became better but then compared now they're better with the with you know what the we do APPs sometimes they are, some of them are like not that friendly and they are interrogating nurses when they ask questions. Sometimes nurses feel like they are demeaning… is that the term? That you don't know what you're talking about why are you calling me?" (Nurse #9 in low performing unit, 15 years, Hematology).
>
> "Some team members are more willing to provide help and you know they're not, I was going to say hiding but, tucked away in a corner I guess you can say. But most of the nurses that I work with are not like that. The more veteran nurses, the older nurses are

the ones who are more tucked away in the corner versus I guess the younger" (Nurse #10 in low performing unit, 2 years, Hematology).

Perhaps associated with team attitude in this particular low performing unit are several comments about lack of confidence in some of the young nurses. Every single nurse interviewed in this unit expressed that nurse lack of confidence in front of the patient is one of the things that would make patients feel unsafe. The following is an example of quotation from a nurse in this unit:

> "When you have kind of a newer nurse that seems a little unsure of themselves that that would make anybody apprehensive about the care that they are supposed to receive that night you know just like, do you know what's going on you know. I've seen it personally too whenever patients after a baby nurse will go in there and there they're just not as sure of themselves they'll just keep on getting on call light with the 1,000,000,001 questions and you know that it's just them not feeling safe" (Nurse #7 in low performing unit, 6 years, Hematology).

There are many factors that could explain this. The feeling that not everyone is approachable and many don't offer to help unless they are asked may be slowing their learning curve. Another factor is the complexity of the treatments in this unit and the higher acuity of patients that has been discussed in the earlier section about workload.

A different aspect of teamwork was mentioned in the interviews, this is teamwork across units and collaboration. Nurses had mostly positive things to say about collaborating with other units and departments. The laboratory was mentioned a few times as the one that they had the most

concerns with but the tone was mostly of support and understanding. The following are quotations that reflect this:

> "Specially the departments that we have to work with regularly I think it's natural because you like we work with pharmacy regularly, we work with physical therapy regularly and occupational therapy regularly and when you work with them regularly you have a relationship and because of that it's just the communication and openness and the understanding of each other is a lot more apparent versus there are areas that we don't with as often but it's good overall" (Nurse #3 in high performing unit, 17 years, Surgery).

> "So the relationship and the communication between pharmacy in our floors is great I think, I never had any issues. They're pretty promptly making sure things are done correctly. I feel like there is a poor relationship and poor communication between lab and this floor" (Nurse #10 in low performing unit, 2 years, Hematology).

Nurses were overall complimentary to their direct management and they felt supported when it came to safety. While concerns with management's response have been discussed in the insufficient staffing theme, when it came to being supported for decisions nurses made about safety they all felt supported by their direct management. However, nurses did have mixed responses when discussing upper management. The following are some quotations from nurses about their direct management:

> "The unit is quite big on safety and management is always backing us up if we have to do something because of safety they appreciate that you know. We are doing

everything for safety you know. They are always emphasizing that not only in this floor but everywhere. It's just our culture" (Nurse #11 in average performing unit, 12 years, Surgery).

"Our associate director would go around the unit and making sure no objects were extracting the hallway. She would check on us and see how we were doing personally if we needed to take a break away a mental break away from the pod" (Nurse #12 in average performing unit, 5 years, Hematology).

Nurses also mentioned senior leadership and mixed responses were obtained. Many nurses are not exposed to what upper management does directly so they had different perceptions of how much support is coming from above their direct managers in their unit. Some felt that upper management's actions were visible in their units and others thought that upper management was disconnected with nurses the individual units. The following quotations are examples of this:

"I don't really have a lot of interaction with them so I don't have an opinion but I mean I guess they really do care because they delegate down to the CNL and the managers who then you know they're implementing policies and requirements and practice changes and stuff so yeah" (Nurse #13 in average performing unit, 3 years, Hematology)

"I think it is, but I also think everything is numbers driven. Like as far as do they really care about the patient or is it just another number on you know the total amount of… we have as many falls this month, you know hospital acquired bedsores, things like that so I think the ultimate goal is and I hope I am not being naïve but I think the goal is

patient safety but it seems like it's all numbers just driven which is concerning to me" (Nurse #14 in average performing unit, 4 years, Surgery).

All nurses without exception in all units felt they could speak up for safety and stop the process whenever there was a safety risk identified. This is another sign of a favorable safety culture, when nurses feel supported by management for speaking up and stopping their colleagues from doing something that will risk the patients' safety. The following are quotations that describe how comfortable nurses felt communicating about safety: "I feel perfectly safe to stop the line because I'm doing my job. Even if anyone blames me. I'm satisfied as long as I do but the best benefit of the patient" (Nurse #5 in high performing unit, 10 years, Surgery); "I feel I have no problem stopping anyone if I feel like there's a safety issue for the patient and I feel like our management is always backs us up if they feel it were making the right decision" (Nurse #6 in low performing unit, 8 years, Hematology).

Nurses also mentioned the practice of documenting safety events frequently. The following are quotations related to the practice of writing up safety events: "When that happens we do a safety report and it's just policy we have to document the fall and whether we discovered it or if someone else discovered it and what was done, who is notified" (Nurse #3 in high performing unit, 17 years, Surgery); "I think that's one of the best things that we have also that our staff don't feel like putting in incident reports is punitive so they feel more free to speak up when they see problems and bring it to someone's attention"(Nurse #6 in low performing unit, 8 years, Hematology).

The following quotation is related to the next domain discussed "Non Punitive Response to Error", since many of the nurse comments made the association of non-punitive action with being free to speak up or document PSN events (which is the institution's software system used to report safety events). The following quotation is an example of this:

> "I think it is actively supportive. What I like about here is that if you make a mistake or if there is an issue, it's addressed, we learn from it and we move on, there's no penalizing aspects so here we have on the on the floor if there's an issue or something arises, whatever level we do a PSN" (Nurse #13 in average performing unit, 3 units, Hematology).

Similar to Communication Openness, nurses felt comfortable about not being punished for a mistake with few exceptions which will be discussed in this section. Many shared examples of past occurrences and how they were handled by management. The following are examples of these quotations:

> "And I feel like our leadership stands behind us if there are mistakes that happen if we have good explanations as to why it happened how it happened they're very good at supporting us of course sometimes we make mistakes with no good reason and they're also very good you know understand that people make mistakes and that we just need to go forward and figure out how to fix it so it doesn't continue to happen" (Nurse #6 in low performing unit, 8 years, Hematology).

It was noticed that there were not as many positive comments about non punitive response to error safety from the surgery unit with average performance interviews compared to the other

units. Since positive management support comments were shared in all units, it is difficult to conclude if this domain of non-punitive response to errors was weak in this particular unit. The following set of contradicting quotations are from one nurse who appeared to be very reserved in the responses to questions about this area: “I feel supported. If there is a legitimate need to stop the line there shouldn’t be any thoughts by anybody against that. I feel that way. I hope that to be true” (Nurse #14 in average performing unit, 4 years, Surgery). This was followed by a more qualified statement from the same nurse in regard to speaking up: “Depending on the person there might be some pushback I am sure. Depending on what the timing… it’s hard to … these hypotheticals are difficult I wish I had an actual example. I feel somewhat confident” (Nurse #14 in average performing unit, 4 years, Surgery).

A different nurse in this unit had a positive comment similar to the other units.

> “The unit is quite big on safety and management is always backing us up if we have to do something because of safety they appreciate that you know. We are doing everything for safety you know. They are always emphasizing that not only in this floor but everywhere. It’s just our culture” (Nurse #11 in average performing unit, 12 years, Surgery)

There was variation in how nurses are being informed but all nurses do mention that they are being informed somehow of errors in other units and the hospital in general. The following are some quotations from each unit showing examples of this variation:

> “Yes we have what we call information station in the morning or night nurses and day nurses come together and our leadership will present any current initiatives and those

include any incident reports that come from throughout the whole institution that they want us to be aware of we recently did one on hypoglycemia so that has been a big topic" (Nurse #12 in average performing unit, 5 years, Hematology).

"No it's just like… What I hear in our bi-weekly staff meetings and the charges meetings it's mostly our numbers that we're concerned about unless it's a major thing. I think I heard about a blood transfusion thing on one of the G zone floors but then I'm not always in the loop on some stuff" (Nurse #14 in low performing unit, 4 years, Surgery).

To summarize this theme of a favorable safety culture, the nurses overall are operating in a work environment where they feel they can speak up for safety, they are supported by management, they rely on each other and they are being informed about errors. The domain that was not included here was Organizational Learning, which captures the feeling that the institution is learning from its mistakes by making improvements. This domain can also be considered positive for nurses, since they made indirect comments in this area throughout the interviews, for example by sharing how investments in technology (EPIC medical record system, fall sensors in beds, scanning for medication administration, etc.) are signs that the institution is making improvements in safety.

Patients mentioned many of the same things that nurses mentioned during their interviews and acknowledged some aspects of the safety culture that nurses are operating under. The following section reveals the results of the themes from the patient interviews.

Table 7. Nurse themes summary

Nurse Themes Summary

1) Nurse burden: Workload and Insufficient staffing is the highest safety priority

   Insufficient staff factors:
   - Unpredictable nurse absence call-ins
   - Insufficient nurses and nursing assistants
   - Increasing nurse turnover

   Workload factors:
   - Patient acuity is increasing
   - Nurses spending more time in electronic health record
   - Nurse-to-patient ratio increasing

2) Nurses identified safety risks
   - Preventing falls was the most mentioned risk
   - Medication administration: use of EHR, nurse checks and communication with patient
   - Response of staff: responding to calls and having call button accessible to patients
   - Infection control: hand washing, sanitation and using personal protective equipment

3) Safety climate domains are favorable for nurses
   a. Teamwork
      - Strong sense of teamwork within most units
      - Low performing unit had some comments about nurses lack of disposition to help and young nurses possibly displaying lack of confidence with patients
      - Teamwork across departments positive except working with the Laboratory
   b. Management support
      - All nurses felt supported when it came to safety
      - Some nurses had mixed feelings about upper management support
   c. Communication openness
      - All nurses felt confident about speaking up for safety
      - All nurses were encouraged to document safety events
   d. Non punitive response to error
      - All nurses felt comfortable about not being punished
      - Average performing surgery unit had some mixed comments
   e. Feedback and communication about error
      - Nurses reported variation in how errors are reported but all are being informed somehow

Themes resulting from patient interviews

Three themes will be discussed in this section. The first two are themes that emerged from the responses to the open interview questions and the third was the result of responses to probing questions about the safety culture domains. The following are the three patient themes: safety risks; communication and caring and nurse teamwork.

Patients identified safety risks

Patients acknowledged the teaching information nurses gave about the safety risks and they recognized the discipline the nurses follow to perform certain tasks to keep patients safe. It was like a mirror image of what the nurses said when identifying the safety risks during their care. The following sections describe the patients' quotations used when identifying the safety risks: Medication administration, response of staff and falls.

Patients appreciated the safety of the process and the communication during their medication administration to let them know what was being done to them. Patients identified some of the peripheral activities that occur in the medication administration process such as the patient identification, the use of the electronic medical record and equipment such as the scanner, and the communication throughout the process with the nurse. For example, "I mean they always you know double check everything, medications, they always asked for my name and my MRN number. They do that. The scanning. I feel safe here" (Patient #16 in high performing unit,

Surgery). The following quotation is from a daughter of a patient expressing similar sentiments: "They tell her and they explain the procedure on her, what medicine she's on, her diet, what she can have, what she can't, so I think that's great when they come and tell you what they're doing to her and what can be done" (Daughter of Patient #23 in average performing unit, Hematology).

All patients associated the prompt response to help with safe care. The following patient quotations capture the perception of safety of the responsiveness to the call button and having access to it not only for bathroom help but for anything else that is needed.

> "They definitely don't want me to try to get up by myself to get to use the restroom. Use a call button for everything even if it's just to reposition myself in the bed. They've just been very attentive to all my needs. They adjust my bed, they walked me to the bathroom and back from the bathroom and make sure I have a call button at all times". (Patient #25 in average performing unit, Surgery).
>
> "Always see if they're busy with other patients it will be a little bit longer wait than normally would but it's never been an issue for me and there always usually pretty prompt and when they don't respond to my calls are usually very apologetic and it's not a big deal for me" (Patient #22 in average performing unit, Hematology).

Preventing falls is clearly an activity that is ingrained in the nurses' safety activities and patients corresponded to that by bringing this up when asked about the things that staff did to make them feel safe. It was clear that patients were on board with the nurses when it came to preventing falls and they recognized the genuine interest by the nurses to keep them safe. The

nurses were effective in making sure patients were always conscious of the risk of falling at any time. Many patients pointed to the sign in their room "Call, don't fall" when speaking about fall prevention. The following patient quotations seem to be a direct response to the nurse quotations about falls:

> "First off I've never been in the hospital where they make you watch a fall video and sign the thing and every couple of days and they have you rewatch it and re-sign it so normally they just come in put you in a bed and hope you don't fall. They check on you quite regularly and they constantly ask you if you need anything. You don't have to constantly holler for them if you need anything" (Patient #19 in low performing unit, Hematology).
>
> "They're always wanting to make sure that I call them when I try to get up will because they don't want me to fall. Even though I may tell them I can do it on my own independently they say they trust me but they still want to make sure call us to let us know. I thought that was really great because they just care. A lot of nurses would probably say okay will if you say you can do it I trust you. So I don't think it's a trust matter they just care about my safety" (Patient #22 in average performing unit, Hematology)

To summarize this theme of safety risks identified, it was interesting to see the same consistency and promptness of the answers from patients across all units, as it was when nurses mentioned these safety risks. This shows that the efforts that nurses have put into this has been effective, by also ingraining these safety risks in the patients' awareness during their

stay. Communication was mentioned by patients throughout their answers, which leads to the next theme about communication and caring.

Communication and caring from nurses is appreciated

Patients appreciated the fact that nurses explained everything they were doing to them. It was interesting that patients associated safety with the communication of nurses because this was a response to questions about what made them feel safe. For example in this quotation the patient focused solely on communication, "People are nice, they took care of me. They let me know everything I need to know about myself" (Patient #23 in average performing unit, Hematology). The following are additional quotations regarding the type of communication the patients experienced from nurses taking care of them:

> "They do everything I expect them to do because in some places they just come in and rush and don't tell you nothing. They just go about doing what they want to do and not what the patient wants so I appreciate everything and I thank them for everything they do" (Patient #17 in high performing unit, Surgery).
>
> "Yesterday for example there was an issue on the floor where it took a few nurses to help but they made sure the patient service coordinator came in to check on you and that patient service coordinator let you know that they were having an issue in another room. It wasn't something serious could you wait they said so the communication was always there" (Patient #26 in average performing unit, Surgery).

Patients also felt that nurses genuinely cared for them. These quotations capture the caring that patients felt from the nurses which made many patients and spouses emotional when discussing: “They’re genuinely concerned, their caring just comes out from everything they do so I don’t feel anybody really is just faking it. They seem like they’re interested in me right away, you can’t fake that” (Patient in average performing unit, Hematology). Additional quotations about caring:

> “I think I could just tell that there is different concern that I didn’t feel well and came in with this pain and had vomiting they really cared and wanted me to feel better and really checked on me and wanted me to improve and so it was kind of a genuine concern for my well-being as a person and not just a patient to move through a system” (Patient #21 in high performing unit, Surgery).
>
> “I think it’s been fantastic it’s been very attentive care from the nurses I don’t think there’s been one nurse that I have a complaint about and I feel like that has been my experience every time I’ve been here so I appreciate that a lot. They’re very attentive they’re very compassionate there very sensitive to my needs and I couldn’t have asked for a better staff to take care of me will have been here.” (Patient #22 in average performing unit, Hematology)

Many patients and family members became emotional and even tearful when talking about how nicely the nurses had treated them. It was fascinating to see such display of appreciation for nurses, who in turn had expressed worries about not doing a good enough job for their patients. This experience is something that cannot be captured by analyzing survey scores and it adds to the benefit of the qualitative study portion for this research.

Patients noticed nurses work as a team

Teamwork is the only safety culture domain which was mentioned by the patients specifically when describing how the nurses and nurse assistants respond to calls and handle shift handoffs. They noticed it in how they cover for each other, how they get along and how they perform their shift handoff. The following are quotations from patients recognizing the teamwork effort by the nurses:

> "No I mean if I'm needing something outside of when they normally come and check I normally know they're probably dealing with another patient and whenever I pause and tell him hey I need my nurse, either the one that comes in checks to vitals is right here to see what I need and if she can't help me then she'll say hold on and I will get your nurse and she will come right over so… I don't feel neglected. My needs are being met. I'm happy" (Patient #19 in low performing unit, Hematology).
>
> "They are very good I am very impressed with her handover procedure because in my industry we have handover procedures and I've seen consistency and that as well because they come in about the same time they go over the skin check they go over but your issues are they are in your room for sometimes up to 15 minutes on the handover and then before they leave they let you know when they're expected to come back because they have other rooms to go" (Patient #26 in average performing unit, Surgery).

Teamwork was noticed in different forms by patients, and it resembled what nurses said about their feelings toward teamwork of helping each other out without being asked. Although some nurses did mention that not all nurses were approachable and some young nurses appeared to

not be confident, patients did not notice those things. Patients also did not notice the nurses' concerns with insufficient staff with the same sense of urgency that nurses did. This will be discussed in the next theme.

Figure 8. Patient themes summary

Patient Themes Summary

1) Patients identified safety risks
   Acknowledged same safety risks as nurses
   - Medication administration: patients appreciated the nurse checks and communication
   - Response of staff: patients associated prompt response to help with safe care
   - Falls: patients acknowledged the nurses' efforts to teach them about fall prevention

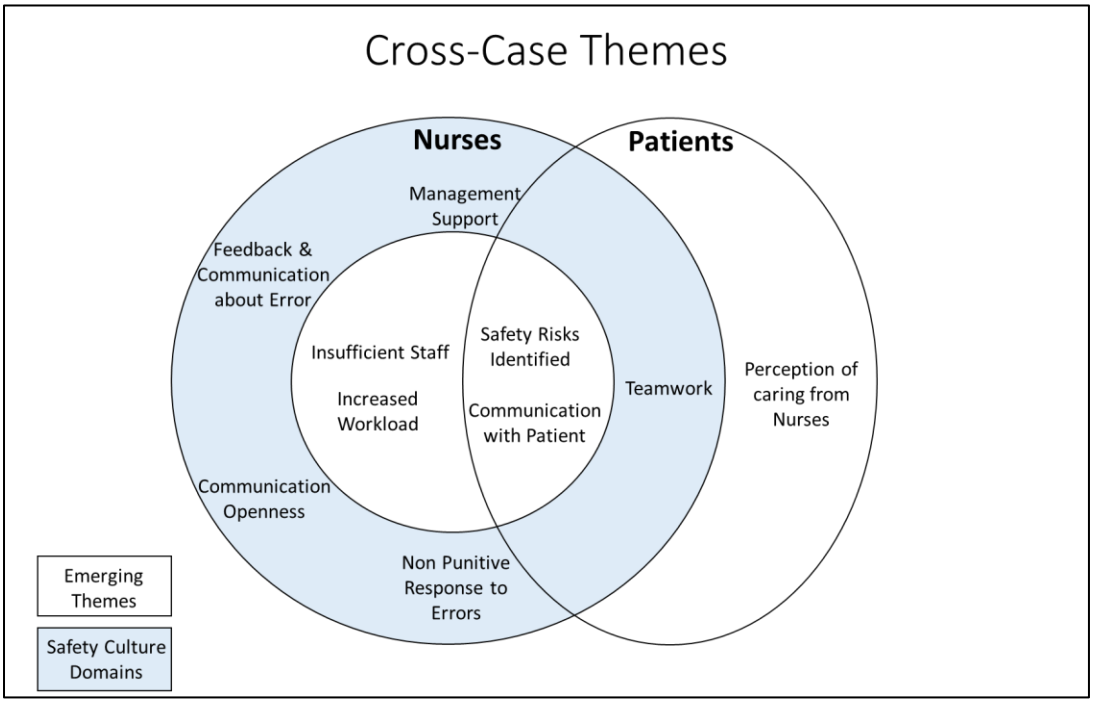
2) Communication and caring from nurses is appreciated
   - Many patients and family members got emotional when expressing nurse appreciation
   - Difficult to measure these patients' feelings in surveys

3) Patients noticed nurses work as a team
   - Patients said nurses had different personalities but did not notice some of the issues nurses mentioned about nurse disposition and young nurses' confidence in the low performing unit

Cross-Case Themes: Nurses and Patients

In this section, the nurse and patient themes were analyzed together with the purpose of identifying combined themes that explain how nurse and patient perceptions related to each other. The interview guides had some questions worded similarly for nurses and patients which were designed to identify related themes.

Figure 9 – Diagram with cross-case themes



For example, nurses were asked “What do you do to help keep patients and colleagues safe at this institution?” and patients were asked “What did staff members do that made you feel safe?” Probing questions were added to both nurse and patient interviews to obtain responses on the nurse safety culture domains and the patient HCAHPS satisfaction domains in order to identify relevance of these domains and possible relationships between nurses and patients. Not all domains were relevant and not all of them had a clear relationship. For example the HCAHPS domains of “Discharge Information” and “Care Transitions” were not mentioned unless a probing question was asked for both nurses and patients. Neither nurses nor patients seem to have the discharge process and transition to home care in the forefront when asked about safety. However, there were many codes and themes that did explain nurse and patient perceptions.

Diagram 6 shows the nurse and patient themes placed in two circles. The nurses' circle includes the HSOPS domains in a shaded outer circle depicting the indirect effect it has on safety culture. Of these domains, Teamwork is the only one directly inside the patient circle because this is the only domain that patients specifically recognized. Patients recognized that nurses work well as a team. Inside the nurses' smaller circle is the theme of insufficient staff and increased workload together, which is outside the patient circle because this is something that patients don't perceive. There is a continuous loop relationship in which increased workload will lead to the perceived need for more staff, which in turn leads to increased workload due to insufficient staff and so on. During the interviews most patients thought that staffing was adequate. Some patients did say that they noticed it but it did not affect their level of care.

Safety Risks and Communication with Patient are in the intersection of the circles because both nurses and patients identified the same safety risks and patients recognized communication as a factor that made them feel safe during their stay. Patients were happy with the communication of nurses and the personal relationship they developed with them. All patients expressed gratitude towards the nurses and the institution for their experience in the institution. This lead to a perception of caring from nurses which is the last theme in the patient circle.

To summarize the diagram, nurses perceive an increase in workload and insufficient staff, which they believe increases the safety risk in the main tasks they perform to take care of patients. In order to mitigate these risks, nurses rely on each other through teamwork, they establish a caring relationship with the patient through effective communication and the institution's personal service excellence standards, and they are supported by the institution's safety

climate through Management Support, Open Communication, Feedback and Communication about Error and Non-punitive Response to Errors.

The following is a summary of the combined themes that emerged in the analysis:

Overall Cross-Case Theme: Nurses overcome workload and staffing challenges, which increase perceived safety risk, through their personal commitment to patient care and by leveraging the institution's supportive safety climate, resulting in perceived safe care by patients and feelings of caring.

The following are individual cross-case themes:

- Nurses are concerned with increased acuity of patients and insufficient staffing but patients perceive personal caring from nurses, which may be a way nurses are inadvertently compensating for their perceived work challenges.

- Patients recognized the same perceived safety risks that nurses are working diligently to prevent when asked about perception of safe care: fall prevention, medication administration, and response of staff (call button and bathroom help).

- Teamwork is the only safety culture domain which was mentioned by the patients specifically when describing how the nurses and nurse assistants respond to calls and handle shift handoffs.

B. Study Results for Quantitative Study

In this section, the descriptive statistics, correlation analysis and regression models for the quantitative study are presented and discussed. The descriptive statistics for the data used in the study are in Table 11. Under the "X – Independent Variables" are the scores for each of the 14 nursing units' safety culture domains from the employee survey, under the "Y-Dependent Variables" are the pooled patient satisfaction survey (HCAHPS) for May, June and July 2017 and the covariate data is for that same period of time. For the unit type, "1" is Surgery, "2" is Hematology and "3" is Medical.

Table 9. Descriptive statistics

	Unit (n=14)	Mean % Score	Std. Dev.	Min.	Max
Independent Variables (Employee Survey)	Teamwork	73.2	6.9	61.0	83.0
	Management Support	62.2	7.8	47.3	71.0
	Communication Openness	74.5	8.0	55.7	87.3
	Feedback & Communication about Error	88.6	5.8	77.0	95.0
	Organizational Learning	85.6	5.9	75.0	95.0
	Non Punitive Response to Error	23.6	9.2	7.0	48.0
Dependent Variables (HCAHPS)	Response of Hospital Staff	72.3	8.7	46.8	83.3
	Communication about Medicines	71.1	5.4	61.5	81.3
	Discharge Information	90.8	5.5	80.4	100.0
	Care Transitions	66.8	4.8	60.3	78.1
Covariates	Total FTEs	30.6	11.0	18.4	46.9
	Avg. HPPD	10.3	1.2	8.6	12.1

Reviewing the descriptive statistics, the Management Support and Non Punitive Response to Error domain mean scores were lower compared to the other independent variable means. The Management Support domain mean had 3 survey items, one of which was a negatively worded

question. The Non Punitive Response to Error domain had just one question and it was also negatively worded. The internal consistency of the Management Support domain items was tested using the 709 individual responses to determine if this negatively worded item should be dropped due to respondents not answering it properly. The Cronbach's alpha was 0.55, which was somewhat lower than the 0.7 threshold typically used. Since there were only 3 items in this domain, the alpha was moderately below the threshold and there was no good reason other than speculation that respondents may have answered it incorrectly, it was decided to leave it as part of the Management Support domain. Similarly, the Non Punitive Response to Error domain was left as is because it had only one item, therefore the internal consistency of this domain could not be assessed and there was no clear evidence that respondents misunderstood the item. Cronbach alphas above 0.7 were calculated for the other two domains that had 3 items each: Teamwork (0.76) and Communication Openness (0.72).

Table 10 displays the correlation analysis between all variables. Many significant correlations resulted within the safety culture domains.

Table 10. Correlation matrix for all independent and dependent variables (** p<0.01 ; * p<0.05)

Domain	Teamwork	Management Support	Communication Openness	Feedback & Communication about Error	Organizational Learning	Non Punitive Response to Error	Response of Hosptial Staff	Communication about Medicines	Discharge Information	Care Transitions
Teamwork	1									
Management Support	0.758**	1								
Communication Openness	0.734**	0.803**	1							
Feedback & Communication about Error	0.178	0.268	0.315	1						
Organizational Learning	0.590*	0.619*	0.533*	0.422	1					
Non Punitive Response to Error	0.539*	0.542*	0.701**	-0.019	0.218	1				
Response of Hosptial Staff	0.384	0.210	0.038	-0.522	0.036	0.159	1			
Communication about Medicines	-0.264	-0.412	-0.061	-0.527	-0.691**	0.239	-0.052	1		
Discharge Information	0.159	-0.213	-0.013	-0.151	-0.191	-0.059	-0.039	0.361	1	
Care Transitions	0.288	0.079	0.029	-0.213	-0.075	0.304	0.566*	-0.103	0.185	1

Teamwork, Management Support and Communication Openness were highly positively correlated with each other with p value < 0.01. This means that the units with high scores in teamwork, also had high scores in Management Support and Communication Openness. Another high positive correlation was between Communication Openness and Non Punitive Response to Error with p value < 0.01. The correlation of Non-Punitive Response to Error with Teamwork and Management Support were also positive and medium to high with a p value < 0.05. Finally, Organizational Learning also had medium to high positive correlation with Teamwork, Management Support and Communication Openness with significance of p value < 0.05.

In the patient domains there was only one significant positive medium to high correlation between Response of Hospital Staff and Care Transitions with p value < 0.05. Units with patients that perceived high Response of Hospital Staff also perceived high Care Transition effort from the unit staff. Finally, there was only one significant correlation between a nurse safety culture domain and a patient HCAHPS survey domain: Organizational Learning and Communication about Medicines. This was a negative correlation which was also high with p value < 0.01. It is difficult to explain this negative relationship in which units with high perception that the organization was learning from its safety mistakes also scored low with patients who supposedly perceived there was lower effort in communicating about medicines.

Table 11 shows the regression results for the combination of all Safety Culture Domains and HCAHPS Domains. The calculations include the three covariates of HPPD, FTE and Unit Type. The calculations were done without covariates and similar results were found.

Table 11. Regression Models Results

HCAHPS Domains	Response of Hospital Staff			Communication about Medicines			Discharge Information			Care Transitions		
Safety Culture Domains	Beta	95% CI	P-value	Beta	95% CI	P-value	Beta	95% CI	P-value	Beta	95% CI	P-value
Teamwork	0.557	(-0.362,1.475)	0.200	-0.169	(-0.668, 0.330)	0.458	0.212	(-0.383,0.806)	0.436	0.222	(0.307,0.752)	0.361
Management Support	0.077	(0.935,1.088)	0.865	-0.291	(-.745,0.163)	0.178	-0.049	(-.660,0.563)	0.859	-0.006	(-0.560,0.547)	0.980
Communication Openness	-0.080	(-1.157, 0.997)	0.868	-0.234	(-0.745,0.277)	0.322	-0.058	(-0.708,0.592)	0.842	-0.133	(-0.713,0.446)	0.610
Feedback & Communication about Errors	-0.059	(-1.787,0.607)	0.289	**-0.570**	**(-1.027,-0.113)**	**0.021**	-0.454	(-1.140,0.231)	0.165	0.045	(-0.658,0.749)	0.886
Organizational Learning	0.300	(-1.084,1.685)	0.631	-0.544	(-1.099,0.010)	0.053	-0.378	(-1.170,0.414)	0.303	-0.004	(-0.772,0.764)	0.991
Non Punitive Response to Errors	0.045	(-0.967,1.056)	0.921	-0.124	(-0.625,0.377)	0.583	-0.126	(0.729,0.477)	0.643	-0.070	(-0.480,0.620)	0.777

The results indicate that there is only one significant negative association, that between Feedback & Communication about Errors and Communication about Medicines (Beta Coefficient = -0.570; p-value= 0.021). This relationship cannot be explained logically because it is negative. The expectation was to find positive associations between safety culture domains and the HCAHPS domains. These results will be discussed in more detail the next section.

IV. DISCUSSION

In this section, the results for the quantitative study and qualitative study are discussed in the context of the study research question and hypothesis statements. The results are compared with other studies and unexpected findings are revealed. The key findings that will be discussed in the next sections are that 1) workload and staffing are the highest safety priority for nurses; 2) Teamwork is an important safety culture domain; 3) patients perceived safe care; and 4)

there was no quantitative association between nursing safety culture and patients' perception of safety.

Workload and staffing are the highest safety priority for nurses

Nurses felt their workload has been increasing and the staffing level was not appropriate to provide the safest care. Workload and number of staff per units were covariates in the quantitative study but they did not have an effect in the regression models. As revealed in the nurse quotations of the qualitative study within the theme of "Workload and Insufficient staff is highest safety priority", nurses are worried about turnover in their units, about not providing the best care possible and about the priority their management is placing in addressing their increasing workload and staffing needs. Staffing is one of the safety culture domains in the HSOPS survey instrument. Since questions about staffing were not included in the employee survey, it was not analyzed as a domain in this study. However, workload and staffing emerged from the nursing interviews as the main concern for patient perception of safety. There is supporting evidence from studies that lower levels of nurse exhaustion, and adequate staffing and nurse-to-patient ratios are associated with higher patient satisfaction (Kutney-Lee et al., 2009; Leiter, Harvie, & Frizzell, 1998; J. Sorra et al., 2014); Vahey, Aiken, Sloane, Clarke, and Vargas (2004). A consideration is that leaders of healthcare organizations focus on evaluating their nursing staffing needs to enable them to continue to emanate the caring that patients perceive. Caring is a theme that emerged from the patient interviews in this study. There is evidence from studies that unfavorable work conditions, which involve higher workload for

nurses, is associated with compassion fatigue, which is a condition in healthcare providers that has been studied extensively and can be defined as the "cost of caring" (Boyle, 2011; Yoder, 2010). Emotional interaction in the hospital is crucial, as (Vuori, 1991) contended that patients assess hospital care on the affective aspects of care when they considered technical aspects are adequate.

Teamwork is important

The Teamwork domain had the largest coefficient (but it was not significant) in the regression models when associated with Response of Hospital Staff (responses to call button and bathroom help) and it was also the domain that had the highest frequency code used in the qualitative study among the domains for nurses and patients. Teamwork was discussed positively by nurses and patients and it was mentioned by patients when they described how nurses responded to their needs. Teamwork was one of the differences in the low performing unit compared to the other units in the qualitative analysis: Nurses not being always accessible and lack of confidence of young nurses in front of patients (because they are discouraged to ask for help) was discussed by nurses in this low performing unit and not in the other units. Based on the quantitative study results, Teamwork had the most number of significant correlations with the other safety culture domains of Management Support, Communication Openness, Non Punitive Response to Error and Organizational Learning. This makes sense, as having good leadership in the unit will foster teamwork along with these other factors that make up a favorable safety culture. Teamwork is an important factor in safety culture of the institution,

therefore an important consideration for leadership of healthcare organizations is to foster nurse teamwork to improve safety culture and patient satisfaction. This is confirmed by studies that have demonstrated that there is a positive association between different aspects of teamwork and patient satisfaction and perception of safety (Debehnke & Decker, 2002; Meade et al., 2006; Meterko et al., 2004).

Patients perceive safe care

The quantitative study results did not yield a positive significant association between safety culture domains and patients' perception of safety domains. Regardless of the quantitative study results, the patients in the institution feel safe and perceive safe care from nurses, as determined by the qualitative study. They identified the main safety risks, they appreciated the frequent and effective communication from nurses for everything they do with them, and they felt that nurses genuinely cared about them. Based on the results of the qualitative study, the domains of Management Support, Communication Openness, Non-Punitive Response to Errors, Staff Informed about Errors and Organizational Learning are domains that the patients did not perceive directly when interacting with nurses (unlike the Teamwork domain which was mentioned by patients in the interviews). However, nurses had a mostly positive perception of all those safety domains which resulted in the theme of "safety climate is favorable" in the qualitative study. Studies have supported that a favorable nursing work environment and leadership are associated with increased patient satisfaction and patient care (Havig et al., 2011; Kroposki & Alexander, 2006; McCutcheon et al., 2009). A consideration for healthcare

organizations is to foster a positive work environment which will encompass positive leadership, management support and open communication, to improve patient perception of safety.

No quantitative association between nursing safety culture and patients' perception of safety

There was no significant association between nursing safety culture, as measured on the HSOPS safety questions of the institutional employee opinion survey, and patients' perception of safety during their inpatient care, as measured by responses on the inpatient HCAHPS survey.

None of the correlations between domains of safety culture and had a significant association with any domains of the patients' perception of safety. Evidence from another quantitative study using the same domains as this study, identified significant associations between the safety culture domains of Teamwork, Management Support, Feedback and Communication about Error, Non-punitive response to error and Organizational Learning with the patient satisfaction domains of staff responsiveness and communication about medicines (Gerhart, 2008; J. Sorra et al., 2014). These studies used a much larger sample size to analyze individual respondents (287 care providers and 216 patients) and hospital scores (73). The significant effect sizes found in a study that used the same instruments and scoring scale as this study ranged between 0.26 and 0.52; that study also had many negative coefficients between -0.13 and - 0.02 between multiple safety culture domains and the patient satisfaction domain of "Discharge Information" but were not significant (J. Sorra et al., 2014). When comparing the effect sizes found in this study with the effect sizes in the mentioned study, the effect sizes

found in this study are comparable in size although the range is larger from -0.57 to 0.56, compared to -0.08 to 0.54 in the mentioned study, and there was only one significant coefficient which was negative. However, as mentioned in the methods section, the effect sizes expected were higher in this study, given the small sample size of 14.

The only significant association in the regression analysis was between Feedback & Communication about Errors and Communication about Medicines and it was negative. The interpretation of this association, is that the higher nurses' perception they are being informed about errors, the lower patients' perception they are being informed about medicines. This relationship cannot be explained logically because it is negative. The qualitative study indicated that medication administration was the code most used for patients and they acknowledged that nurses did a good job of communicating what they were doing including medications. It is difficult to explain this negative relationship because positive associations were expected. Similarly, there was only one significant correlation between a nurse safety culture domain and a patient HCAHPS survey domain which was also negative: Organizational Learning and Communication about Medicines. It is difficult to explain this negative relationship in which units with high perception that the organization was learning from its safety mistakes also scored low with patients who perceived there was lower effort in communicating about medicines.

There was only one relationship identified in the qualitative analysis which implied a possible statistical association, which was that of Teamwork and Response of Hospital Staff. Several of the themes discussed in the qualitative analysis were related to the HCAHPS domains of "Response of Hospital Staff" and "Communication about Medicines" for both patients and

nurses, more positive and significant associations could have been expected for those domains with the Safety Culture domains but many had negative coefficients and none were significant with the exception of the one previously discussed.

V. CONCLUSION

The research conducted in this study was to evaluate the relationship between inpatient nursing work safety culture and patient perception of safety during their care in nursing units of a specialty academic hospital using a mixed methods approach. In the quantitative study, the main finding was that there was no relevant significant relationship found between any of the nurse reported safety culture and patient reported perception of safety domains.

In the qualitative study, the safety culture domains were discussed by nurses in a positive way resulting in a theme of favorable safety culture in the nursing units. Teamwork was mentioned by nurses and patients and acknowledged its importance for safety. The perception of Teamwork was identified to make a difference between the high and low scoring units. Increasing workload and insufficient staffing was the most important concern from the nurses for safety. Patients had a positive perception of safety as they spoke positively about all the domains. Patients also perceived caring from nurses during their care which made them feel safe. In conclusion, the qualitative study revealed that in a favorable nursing safety culture, patients also have a positive perception of safety. It is difficult to isolate this conclusion by domain to detect specific associations between them. The overall sense is that if nurses are comfortable in their work environment, they will perform to their capability and patients will perceive their caring and compassion making them feel safe in all aspects. Caring seems to be

the bridge between the two sides, which if lost, can deteriorate the patients' perception of safety and perhaps will be reflected in lower scores their patient satisfaction survey.

The findings in this study contribute to the research of the association of nursing safety culture and patient satisfaction. The mixed methods approach in this study is helpful to complement the quantitative study. The findings in this qualitative study attempt to explain themes within the safety culture domains, the performance of nurses and patients' perception of safety and satisfaction through feelings of caring. Future studies are recommended to explore the dynamic of these interactions. Is good leadership the glue that holds all safety culture domains together and makes them favorable? Is Teamwork the most influential domain? Is there an association between low safety culture and high compassion fatigue? How do feelings of caring from nurses affect how patients respond to surveys? Although this study was done in surgery and non-surgery units of one academic specialty hospital, the findings and these questions for future research are applicable to any inpatient setting in a hospital because the components of safety culture and the interactions described can be found there regardless of the type of care.

VI. APPENDICES

Appendix A

Consenting and Interview Script for Staff

Introduction to consent:

Hello, my name is Miguel and I am an employee in the Office of Performance Improvement, as well as a doctoral student in the school of public health. I am conducting a study to evaluate the relationships between patient and staff perceptions of safety culture. You are being asked to participate in this study because you are a nurse on an inpatient unit with either the highest, lowest or median scores on the Press Ganey Patient Satisfaction survey. If you participate you will complete a one-time interview that will last from 30-60 minutes. The interview will be recorded and transcribed but your responses will be anonymous. I will also ask you for some basic demographic information including your age, race, gender, and how long you have been a nurse in general, and specifically at this institution. At the completion of the interview you participation in the study will be complete. All data will be analyzed and reported at an aggregate level, meaning your participation and identity will not be revealed. You do not have to participate in this study. Or if you choose to participate you can refuse to answer any question or to stop the interview at any time without penalty.

Are you interested in participating?

If yes,

Please take time now to review the consent form, which you will need to sign to participate. I will give you time now to review it in detail and then answer any remaining questions.

Once consent signed:

To review, you are consenting to participate in an interview at one time about your perception of safety culture. This interview will be audio recorded and will last approximately 1 hour. You can refuse to answer any questions and can stop the interview at any time without penalty. Do I have your permission to continue?

If yes, activate recorder, let participant know they are now being recorded, and start the interview.

Interview Questions (may include additional probes based on participant responses):

1. Describe the culture of safety
    a. Tell me about an experience where the culture of safety protected a patient, a staff member or you.

    b. What do you do to help keep patients and colleagues safe at this institution?
2. Tell me the last time you used “stop the line” when you identified a risk?
    a. How supported do you feel in stopping a process if a safety concern is present?
3. What types of situations do you perceive as making patients feel unsafe at this institution?
    a. Tell me about a recent safety event that occurred on your unit.
4. Do you think patients receive safe care at our institution?
5. Do you feel safe as an employee of this institution?

Appendix B

Qualitative Interview Guide for Patients

The Narrative Interview Guide uses an informally structured, conversational approach to produce detailed accounts rather than brief answers regarding a particular topic. As such, the interview will rely heavily on reflective interviewing technique to prompt participants to give more detail or description about certain topics or issues that they raise.

You are being asked to participate in this interview because we are interested in learning more about your experience during your hospitalization, particularly related to your safety and the quality of your care. This interview will be audio recorded and will last approximately 1 hour. You can refuse to answer any questions and can stop the interview at any time without penalty.

Questions will include but are not limited to the following:

1. Tell me about your care experience during your hospitalization.
    a. What did staff members do that made you feel safe?
    b. What experiences have you had that made you feel safe?

2. Tell me about any concerns you have or had during this experience.
    a. What about your hospitalization made you feel unsafe at any time?

Reflective interviewing technique will be used throughout the interview to ask for clarification on any topics or issues raised by respondents during the interview process. Probing questions will be used to follow-up on salient responses and content from participants.

Appendix C - First cycle codes

First Cycle Codes	Domain	Source Survey
Management Support	Management Support	HSOPS Nursing Safety Culture
Management responds to adverse events only	Management Support	HSOPS Nursing Safety Culture
Senior management actions show safety priority	Management Support	HSOPS Nursing Safety Culture
Teamwork across units - collaboration	Teamwork	HSOPS Nursing Safety Culture
Teamwork within unit - rely on colleagues	Teamwork	HSOPS Nursing Safety Culture
Non Punitive Response to Errors	Non Punitive Response to Errors	HSOPS Nursing Safety Culture
Free to speak up for safety	Communication Openness	HSOPS Nursing Safety Culture
Free to stop work if unsafe conditions	Communication Openness	HSOPS Nursing Safety Culture
Positive changes due to errors	Organizational Feedback	HSOPS Nursing Safety Culture
Staff informed about errors	Feedback & Communication about Error	HSOPS Nursing Safety Culture
Bathroom Help	Response of Hospital Staff	HCAHPS Patient Satisfaction
Call Light	Response of Hospital Staff	HCAHPS Patient Satisfaction
Education	Discharge Information	HCAHPS Patient Satisfaction
Home Care Transition	Care Transitions	HCAHPS Patient Satisfaction
Medication Administration	Communication about Medicines	HCAHPS Patient Satisfaction

Appendix D. Nurse interview code frequency by unit

		High	Average	Average	Low	
		Surgery	Hematology	Surgery	Hematology	
Rank	**Code**	n=5	n=2	n=2	n=5	Total
1	Staffing Level	27	8	7	15	57
2	Teamwork within unit - rely on colleagues	26	8	4	9	47
3	Management Support	15	7	6	18	46
4	Falls	13	3	4	15	35
5	Workload	18	4	2	9	33
6	EHR	8	3	3	15	29
7	Free to speak up for safety	10	4	1	13	28
7	Free to stop work if unsafe conditions	10	2	7	9	28
8	Staff informed about errors	8	4	2	8	22
9	Medication Administration	11	1	2	6	20
9	Non Punitive Response to Errors	6	5	0	9	20
10	Teamwork across units - collaboration	6	5	2	6	19
11	PSN	7	1	1	9	18
11	Senior management actions show safety priority	8	2	2	6	18
11	Team Attitude	0	0	1	17	18
12	Technology	10	2	0	5	17
13	Call Light	11	1	2	2	16
13	Infection Control	10	1	0	5	16
14	Home Care Transition	12	0	1	2	15
14	Two RN Check	5	1	0	9	15
15	Lack of confidence	0	0	1	13	14
15	Walking Patient	13	0	0	1	14

Appendix E. Patient interview code frequency by unit

		High	Average	Average	Low	
		Surgery	Hematology	Surgery	Hematology	
Rank	**Code**	n=3	n=3	n=3	n=3	Total
1	Medication Administration	6	2	4	2	14
2	Call Light	5	3	2	3	13
2	Shift Handoff	3	5	2	3	13
3	Falls	1	5	4	2	12
3	Home Care Transition	5	3	2	2	12
4	Communication	4	4	1	2	11
5	Caring	2	4	2	2	10
5	Staffing Level	1	1	5	3	10
6	Teamwork within unit - rely on colleagues	3	3	2	1	9
7	Attitude with Patients	1	2	1	4	8
8	Bathroom Help	3	0	2	2	7
9	Patient Identification	4	0	1	0	5
10	Lifting Patients	3	0	0	1	4
10	Patient Rounding	0	0	4	0	4

Appendix F. Links to survey instruments

HSOPS survey

https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/hospital/index.html

HCAHPS survey

https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS.html

REFERENCES

Abrahamson, K., Hass, Z., Morgan, K., Fulton, B., & Ramanujam, R. (2016). The Relationship Between Nurse-Reported Safety Culture and the Patient Experience. *J Nurs Adm, 46*(12), 662-668. doi:10.1097/NNA.0000000000000423

Alqubaisi, M., Tonna, A., Strath, A., & Stewart, D. (2016). Exploring behavioural determinants relating to health professional reporting of medication errors: a qualitative study using the Theoretical Domains Framework. *Eur J Clin Pharmacol, 72*(7), 887-895. doi:10.1007/s00228-016-2054-9

Ayanian, J. Z., & Weissman, J. S. (2002). Teaching hospitals and quality of care: a review of the literature. *Milbank Q, 80*(3), 569-593, v.

Benjamini, Y., & Hochberg, Y. (1995). Controlling the False Discovery Rate: A Practical and Powerful Approach to Multiple Testing. *Journal of the Royal Statistical Society. Series B (Methodological), 57*(1), 12.

Benn, J., Koutantji, M., Wallace, L., Spurgeon, P., Rejman, M., Healey, A., & Vincent, C. (2009). Feedback from incident reporting: information and action to improve patient safety. *Qual Saf Health Care, 18*(1), 11-21. doi:10.1136/qshc.2007.024166

Blegen, M. A., Gearhart, S., O'Brien, R., Sehgal, N. L., & Alldredge, B. K. (2009). AHRQ's hospital survey on patient safety culture: psychometric analyses. *J Patient Saf, 5*(3), 139-144. doi:10.1097/PTS.0b013e3181b53f6e

Boulding, W., Glickman, S. W., Manary, M. P., Schulman, K. A., & Staelin, R. (2011). Relationship between patient satisfaction with inpatient care and hospital readmission within 30 days. *Am J Manag Care, 17*(1), 41-48.

Bradley, E. H., Holmboe, E. S., Mattera, J. A., Roumanis, S. A., Radford, M. J., & Krumholz, H. M. (2004). Data feedback efforts in quality improvement: lessons learned from US hospitals. *Qual Saf Health Care, 13*(1), 26-31.

Brown, D. S., & Wolosin, R. (2013). Safety culture relationships with hospital nursing sensitive metrics. *J Healthc Qual, 35*(4), 61-74. doi:10.1111/jhq.12016

Cohen, J. (1992). A power primer. *Psychol Bull, 112*(1), 155-159.

Creswell, J. (2003). *Research Design* (2nd ed.). United States of America: SAGE Publications, Inc.

Debehnke, D., & Decker, M. C. (2002). The effects of a physician-nurse patient care team on patient satisfaction in an academic ED. *Am J Emerg Med, 20*(4), 267-270.

Deitrick, L. M., Bokovoy, J., & Panik, A. (2010). The "dance" continues ... evaluating differences in call bell use between patients in private rooms and patients in double rooms using ethnography. *J Nurs Care Qual, 25*(4), 279-287. doi:10.1097/NCQ.0b013e3181dde039

DiCuccio, M. H. (2015). The Relationship Between Patient Safety Culture and Patient Outcomes: A Systematic Review. *J Patient Saf, 11*(3), 135-142. doi:10.1097/PTS.0000000000000058

Dodek, P. M., Wong, H., Heyland, D. K., Cook, D. J., Rocker, G. M., Kutsogiannis, D. J., . . . Canadian Researchers at the End of Life, N. (2012). The relationship between organizational culture and family satisfaction in critical care. *Crit Care Med, 40*(5), 1506-1512. doi:10.1097/CCM.0b013e318241e368

Doyle, C., Lennox, L., & Bell, D. (2013). A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. *BMJ Open, 3*(1). doi:10.1136/bmjopen-2012-001570

Gandhi, T. K., Graydon-Baker, E., Huber, C. N., Whittemore, A. D., & Gustafson, M. (2005). Closing the loop: follow-up and feedback in a patient safety program. *Jt Comm J Qual Patient Saf, 31*(11), 614-621.

Gardner, J. K., Thomas-Hawkins, C., Fogg, L., & Latham, C. E. (2007). The relationships between nurses' perceptions of the hemodialysis unit work environment and nurse turnover, patient satisfaction, and hospitalizations. *Nephrol Nurs J, 34*(3), 271-281; quiz 282.

Garon, M. (2012). Speaking up, being heard: registered nurses' perceptions of workplace communication. *J Nurs Manag, 20*(3), 361-371. doi:10.1111/j.1365-2834.2011.01296.x

Gerhart, S. F. (2008). The Relationship between Care Provider Perceptions of Safety Culture and Patient Perceptions of Care on Three Hospital Units. UMI No. 3339189.

Giordano, L. A., Elliott, M. N., Goldstein, E., Lehrman, W. G., & Spencer, P. A. (2010). Development, implementation, and public reporting of the HCAHPS survey. *Med Care Res Rev, 67*(1), 27-37. doi:10.1177/1077558709341065

Glickman, S. W., Boulding, W., Manary, M., Staelin, R., Roe, M. T., Wolosin, R. J., . . . Schulman, K. A. (2010). Patient satisfaction and its relationship with clinical quality and inpatient mortality in acute myocardial infarction. *Circ Cardiovasc Qual Outcomes, 3*(2), 188-195. doi:10.1161/CIRCOUTCOMES.109.900597

Goldstein, E., Farquhar, M., Crofton, C., Darby, C., & Garfinkel, S. (2005). Measuring hospital care from the patients' perspective: an overview of the CAHPS Hospital Survey development process. *Health Serv Res, 40*(6 Pt 2), 1977-1995. doi:10.1111/j.1475-6773.2005.00477.x

Greenberg, C. C., Regenbogen, S. E., Studdert, D. M., Lipsitz, S. R., Rogers, S. O., Zinner, M. J., & Gawande, A. A. (2007). Patterns of communication breakdowns resulting in injury to surgical patients. *J Am Coll Surg, 204*(4), 533-540. doi:10.1016/j.jamcollsurg.2007.01.010

Gurland, B. H., Merlino, J., Sobol, T., Ferreira, P., Hull, T., Zutshi, M., & Kiran, R. P. (2013). Surgical complications impact patient perception of hospital care. *J Am Coll Surg, 217*(5), 843-849. doi:10.1016/j.jamcollsurg.2013.06.015

Havig, A. K., Skogstad, A., Kjekshus, L. E., & Romoren, T. I. (2011). Leadership, staffing and quality of care in nursing homes. *BMC Health Serv Res, 11*, 327. doi:10.1186/1472-6963-11-327

Health and Safety Commission of Great Britain. (1993). Retrieved from Organising for safety: third report of the ACSNI (Advisory Committee on the Safety of Nuclear Installations) Study Group on Human Factors. HSE Books. Sudbury, England:

Hoffmann, B., Muller, V., Rochon, J., Gondan, M., Muller, B., Albay, Z., . . . Gerlach, F. M. (2014). Effects of a team-based assessment and intervention on patient safety culture in general practice: an open randomised controlled trial. *BMJ Qual Saf, 23*(1), 35-46. doi:10.1136/bmjqs-2013-001899

Hospital Consumer Assessment of Healthcare Providers and Systems. (2017). Retrieved from https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/HospitalQualityInits/HospitalHCAHPS.html

Hospital Survey on Patient Safety Culture. (2018). Retrieved from https://www.ahrq.gov/sops/quality-patient-safety/patientsafetyculture/hospital/index.html

Huang, D. T., Clermont, G., Kong, L., Weissfeld, L. A., Sexton, J. B., Rowan, K. M., & Angus, D. C. (2010). Intensive care unit safety culture and outcomes: a US multicenter study. *Int J Qual Health Care, 22*(3), 151-161. doi:10.1093/intqhc/mzq017

Isaac, T., Zaslavsky, A. M., Cleary, P. D., & Landon, B. E. (2010). The relationship between patients' perception of care and measures of hospital quality and safety. *Health Serv Res, 45*(4), 1024-1040. doi:10.1111/j.1475-6773.2010.01122.x

Kingston, F. (2011). *Nurse Likelihood to report a pediatric medication error: Examination of the "pre-reporting" period.* (PhD Dissertation), The University of Texas School of Public Health, (3464803)

Knapp, R. M. (2006). Quality and safety performance in teaching hospitals. *Am Surg, 72*(11), 1051-1054; discussion 1061-1059, 1133-1048.

Kroposki, M., & Alexander, J. W. (2006). Correlation among client satisfaction, nursing perception of outcomes, and organizational variables. *Home Healthc Nurse, 24*(2), 87-94; quiz 95-86.

Larrabee, J. H., & Bolden, L. V. (2001). Defining patient-perceived quality of nursing care. *J Nurs Care Qual, 16*(1), 34-60; quiz 74-35.

Larrabee, J. H., Ostrow, C. L., Withrow, M. L., Janney, M. A., Hobbs, G. R., Jr., & Burant, C. (2004). Predictors of patient satisfaction with inpatient hospital nursing care. *Res Nurs Health, 27*(4), 254-268. doi:10.1002/nur.20021

Litaker, D., Mion, L., Planavsky, L., Kippes, C., Mehta, N., & Frolkis, J. (2003). Physician - nurse practitioner teams in chronic disease management: the impact on costs, clinical effectiveness, and patients' perception of care. *J Interprof Care, 17*(3), 223-237. doi:10.1080/1356182031000122852

Manser, T. (2009). Teamwork and patient safety in dynamic domains of healthcare: a review of the literature. *Acta Anaesthesiol Scand, 53*(2), 143-151. doi:10.1111/j.1399-6576.2008.01717.x

Mardon, R. E., Khanna, K., Sorra, J., Dyer, N., & Famolaro, T. (2010). Exploring relationships between hospital patient safety culture and adverse events. *J Patient Saf, 6*(4), 226-232. doi:10.1097/PTS.0b013e3181fd1a00

Mark, B. H., L.; Belyea, M.; Bacon, C.; YunKyung, C.; Jones, C. (2008). Exploring Organizational Context and Structure as Predictors of Medication Errors and Patient Falls. *Journal of Patient Safety, 4*(2), 12.

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

Meade, C. M., Bursell, A. L., & Ketelsen, L. (2006). Effects of nursing rounds: on patients' call light use, satisfaction, and safety. *Am J Nurs, 106*(9), 58-70; quiz 70-51.

Meddings, J., Reichert, H., Greene, M. T., Safdar, N., Krein, S. L., Olmsted, R. N., . . . Saint, S. (2016). Evaluation of the association between Hospital Survey on Patient Safety Culture (HSOPS) measures and catheter-associated infections: results of two national collaboratives. *BMJ Qual Saf*. doi:10.1136/bmjqs-2015-005012

Meterko, M., Mohr, D. C., & Young, G. J. (2004). Teamwork culture and patient satisfaction in hospitals. *Med Care, 42*(5), 492-498.

Miles, M. H., M; Saldana, J. . (2014). *Qualitative Data Analysis: A Methods Resource Book* (3rd ed.). United States of America: SAGE Publications, Inc. .

Naveh, E., & Katz-Navon, T. (2014). Antecedents of willingness to report medical treatment errors in health care organizations: a multilevel theoretical framework. *Health Care Manage Rev, 39*(1), 21-30. doi:10.1097/HMR.0b013e3182862869

Neal, A., & Griffin, M. A. (2006). A study of the lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels. *J Appl Psychol, 91*(4), 946-953. doi:10.1037/0021-9010.91.4.946

Okuyama, A., Wagner, C., & Bijnen, B. (2014). Speaking up for patient safety by hospital-based health care professionals: a literature review. *BMC Health Serv Res, 14*, 61. doi:10.1186/1472-6963-14-61

Rabol, L. I., Andersen, M. L., Ostergaard, D., Bjorn, B., Lilja, B., & Mogensen, T. (2011). Republished error management: Descriptions of verbal communication errors between staff. An analysis of 84 root cause analysis-reports from Danish hospitals. *Postgrad Med J, 87*(1033), 783-789. doi:10.1136/pgmj.2010.040238rep

Rainer, J. (2015). Speaking up: factors and issues in nurses advocating for patients when patients are in jeopardy. *J Nurs Care Qual, 30*(1), 53-62. doi:10.1097/NCQ.0000000000000081

Rajaram, R., Chung, J. W., Kinnier, C. V., Barnard, C., Mohanty, S., Pavey, E. S., . . . Bilimoria, K. Y. (2015). Hospital Characteristics Associated With Penalties in the Centers for Medicare & Medicaid

Services Hospital-Acquired Condition Reduction Program. *JAMA, 314*(4), 375-383. doi:10.1001/jama.2015.8609
Raup, G. H. (2008). The impact of ED nurse manager leadership style on staff nurse turnover and patient satisfaction in academic health center hospitals. *J Emerg Nurs, 34*(5), 403-409. doi:10.1016/j.jen.2007.08.020
Reiman, T., Pietikainen, E., & Oedewald, P. (2010). Multilayered approach to patient safety culture. *Qual Saf Health Care, 19*(5), e20. doi:10.1136/qshc.2008.029793
Saleh, A. M., Darawad, M. W., & Al-Hussami, M. (2015). The perception of hospital safety culture and selected outcomes among nurses: An exploratory study. *Nurs Health Sci, 17*(3), 339-346. doi:10.1111/nhs.12196
Sammer, C. E., RN, PhD; Lykens, Kristine, PhD; Singh, Karan P, PhD; Mains, Douglas A, DrPH; Lackan, Nuha A, PhD. (2010). What is Patient Safety Culture? A Review of the Literature. *Journal of Nursing Scholarship, 42*(2), 10.
Sandelowski, M. (2000). Whatever happened to qualitative description? *Res Nurs Health, 23*(4), 334-340.
Singer, S., Lin, S., Falwell, A., Gaba, D., & Baker, L. (2009). Relationship of safety climate and safety performance in hospitals. *Health Serv Res, 44*(2 Pt 1), 399-421. doi:10.1111/j.1475-6773.2008.00918.x
Singla, A. K. M., MPH; Kitch, Barrett T. MD, MPH; Weissman, Joel S. PhD; Campbell, Eric G. PhD. (2006). Assessing Patient Safety Culture: A Review and Synthesis of the Measurement Tools. *Journal of Patient Safety, 2*(3), 11.
Sorra, J., Khanna, K., Dyer, N., Mardon, R., & Famolaro, T. (2014). Exploring relationships between patient safety culture and patients' assessments of hospital care. *J Nurs Adm, 44*(10 Suppl), S45-53. doi:10.1097/NNA.0000000000000118
Sorra, J. S., & Dyer, N. (2010). Multilevel psychometric properties of the AHRQ hospital survey on patient safety culture. *BMC Health Serv Res, 10*, 199. doi:10.1186/1472-6963-10-199
Sutcliffe, K. M., Lewton, E., & Rosenthal, M. M. (2004). Communication failures: an insidious contributor to medical mishaps. *Acad Med, 79*(2), 186-194.
Tevis, S. E., Schmocker, R. K., & Kennedy, G. D. (2014). Can patients reliably identify safe, high quality care? *J Hosp Adm, 3*(5), 150-160. doi:10.5430/jha.v3n5p150
Tjia, J., Mazor, K. M., Field, T., Meterko, V., Spenard, A., & Gurwitz, J. H. (2009). Nurse-physician communication in the long-term care setting: perceived barriers and impact on patient safety. *J Patient Saf, 5*(3), 145-152. doi:10.1097/PTS.0b013e3181b53f9b
Tsai, T. C., Joynt, K. E., Orav, E. J., Gawande, A. A., & Jha, A. K. (2013). Variation in surgical-readmission rates and quality of hospital care. *N Engl J Med, 369*(12), 1134-1142. doi:10.1056/NEJMsa1303118
Unruh, L., & Hofler, R. (2016). Predictors of Gaps in Patient Safety and Quality in U.S. Hospitals. *Health Serv Res, 51*(6), 2258-2281. doi:10.1111/1475-6773.12468
Vrbnjak, D., Denieffe, S., O'Gorman, C., & Pajnkihar, M. (2016). Barriers to reporting medication errors and near misses among nurses: A systematic review. *Int J Nurs Stud, 63*, 162-178. doi:10.1016/j.ijnurstu.2016.08.019
Weaver, S. J., Weeks, K., Pham, J. C., & Pronovost, P. J. (2014). On the CUSP: Stop BSI: evaluating the relationship between central line-associated bloodstream infection rate and patient safety climate profile. *Am J Infect Control, 42*(10 Suppl), S203-208. doi:10.1016/j.ajic.2014.05.020
Wen, J., & Schulman, K. A. (2014). Can team-based care improve patient satisfaction? A systematic review of randomized controlled trials. *PLoS One, 9*(7), e100603. doi:10.1371/journal.pone.0100603

Westbrook, K. W., Babakus, E., & Grant, C. C. (2014). Measuring patient-perceived hospital service quality: validity and managerial usefulness of HCAHPS scales. *Health Mark Q, 31*(2), 97-114. doi:10.1080/07359683.2014.907114

Wong, C. A., Cummings, G. G., & Ducharme, L. (2013). The relationship between nursing leadership and patient outcomes: a systematic review update. *J Nurs Manag, 21*(5), 709-724. doi:10.1111/jonm.12116

Yin, R. (2014). *Case Study Research: Design and Methods* (5th ed.). United States of Amercia: SAGE Publications, Inc. .