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Perceptions of Pediatric Hospital Safety Culture in the U.S.: A Secondary Data Analysis of the 2016 Hospital Survey on Patient Safety Culture

Pamela J. Gampetro
Loyola University Chicago

LOYOLA UNIVERSITY CHICAGO

PERCEPTIONS OF PEDIATRIC HOSPITAL SAFETY CULTURE IN THE U.S.: A SECONDARY DATA ANALYSIS OF THE 2016 HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

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PAMELA J. GAMPETRO

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ABSTRACT

This study explored differences in conceptualizing safety cultures in pediatric hospitals and specialty units from an interprofessional perspective on a national level. Errors in the pediatric population can quickly cause harm and frequently lead to adverse events (AEs). Research has explored the problems of patient harm and identified strategies to prevent those harms; but sustainable improvements, particularly in pediatric settings, have not been achieved. This cross-sectional descriptive study used national data from the Hospital Survey on Patient Safety Culture's 2016 dataset developed by the Agency for Healthcare Research and Quality measuring 12 dimensions of safety culture. The extracted sample included responses from 6,862 pediatric registered nurses (RNs), physician assistants/nurse practitioners (PAs/NPs), physicians (MDs) and Administrators/Managers across the U.S. Analysis determined that the overall safety culture in pediatric hospitals and specialty units was neutral to poor in the U.S. from the perception of RNs, PAs/NPs, MDs and Administrators/Managers. RNs, PAs/NPs and MDs had similar perceptions of safety culture for 9 of the 12 dimensions, which differed from those of their Administrators/Managers. Within this group of frontline professionals, RNs and MDs differed in their perceptions of safety culture for 7 of the 12 dimensions. Despite these findings, professionals continued to report AEs suggesting that even within the poor safety culture milieu, these professional groups were concerned about their young patients' care needs and strived to improve the quality and safety of patient care. Hospitals with adequate staffing and a nonpunitive response to errors were found to be related to the professionals' overall perception of safety.

Findings from this study have the potential to guide future research on improving safety cultures within pediatric care settings by developing strategies to address gaps in nursing and medical education, practice management and hospital policy development.

CHAPTER ONE

INTRODUCTION

Healthcare in the U.S. has been shown to be wasteful, unreliable and error-prone, leading to morbidity and mortality rates that are unwarranted and at costs that are unsustainable (Ziedel, 2011). In the United States, patients' expectations of high quality care are not always supported as the healthcare system is a paradox of excellent, technologically advanced treatments coupled with poor health outcomes that stem from adverse events (AEs) or preventable errors (Zeidel, 2011). An AE is an injury caused by medical care. Adverse events do not imply error, negligence, or poor quality of the care but rather that an undesirable clinical outcome occurred as a result of some aspect of diagnosis or therapy, and not due to an underlying disease process (National Patient Safety Foundation, 2015).

In the last decade, researchers have focused on preventing the occurrence of such events in the adult setting. There has been a paucity of research that addresses the factors that contribute to AEs or errors in pediatric settings (Cimiotti, Barton, Gorman, Sloane, & Aiken, 2014; Grant, Donaldson, & Larsen, 2006; Woods, Thomas, Holl, Altman, & Brennan, 2005).

Studies have determined that the safety culture within and throughout the U.S. healthcare system needs to be improved to effectively address the unprecedented levels of patient harm (James, 2013; Makary & Daniel, 2016; Nanji, Patel, Shaikh, Seger, & Bates, 2016; National Patient Safety Foundation, 2015; Sorra & Dyer, 2010). The definition of safety culture that has been widely accepted throughout literature is the "product of individual and group values,

attitudes, perceptions, competencies and patterns of behavior that determine the commitment to and the style of proficiency of an organization's health and safety management" (Health and Safety Commission, 1993; National Patient Safety Foundation, 2015, p. xii).

This chapter will discuss the overall problem of patient safety in the U. S. and how issues relating to patient safety affect the pediatric population. In addition, the impact that a hospital's safety culture has on the safety of patients will be examined, with a particular emphasis on the safety culture within pediatric care facilities. This chapter will conclude with this study's hypotheses and research questions.

Patient Safety is a Public Health Issue

For over 15 years, patient safety in the U.S. has remained a critical public health issue (Aspden, Corrigan, Wolcott, & Erickson, 2004; Chassin & Loeb, 2013; Kohn, Corrigan, & Donaldson, 1999; National Patient Safety Foundation, 2015). This section will discuss the significance of patient safety in the U.S., followed by an assessment of the financial burden of errors on both patients and the healthcare system. A review of factors within the current healthcare system that have contributed to this public health concern will complete this section.

Significance of Patient Safety

Following the release of a landmark report by the Institute of Medicine, Congress charged the Agency for Healthcare Research and Quality (AHRQ) to improve the safety of patient care and reduce medical errors (MEs) through research and collaborative partnerships with healthcare institutions across the country (Aspden et al., 2004; Kohn et al., 1999; Larrison, Xiang, Gustafson, Lardiere, & Jordan, 2017; National Patient Safety Foundation, 2015; Sedman et al., 2005). An ME is "an act of commission (doing something wrong) or omission (failing to

do the right thing) that leads to an undesirable outcome or potential for such an outcome" (National Patient Safety Foundation, 2015, p. xii). Research has estimated that in a New York cohort, up to 98,000 (3.7%) people died following patient safety failures related to medical therapy, with further research suggesting that this figure was grossly underestimated (Kohn et al., 1999; National Patient Safety Foundation, 2015; Takata, Mason, Taketomo, Logsdon, & Sharek, 2008).

To update these findings, James (2013) performed a systematic review of literature on studies published between 2008 and 2011 that identified hospital-related AEs. James (2013) found that over 440,000 patients each year suffered from a preventable AE that contributed to their death (James, 2013). It has been estimated by researchers that MEs are the third largest cause of death in the U.S. (Makary & Daniel, 2016). The AHRQ (2015) found that one in ten patients could experience an AE that could result in harm such as an infection, pressure ulcer, fall or adverse drug event, leading to additional medical care (National Patient Safety Foundation, 2015; AHRQ, 2015). Although there has been progress in reducing some hospital-acquired conditions, the U.S. has been ranked behind most industrialized countries on many measures relating to patient care outcomes, quality and efficiency (Davis, Stremikis, Squires, & Schoen, 2014; Sutcliffe, Paine, & Pronovost, 2016).

U.S. Healthcare Continues to Rank Last

In a comparative analysis evaluating the perceptions of hospitalized patients and physicians about their experiences, researchers concluded that the U.S. healthcare system ranked consistently last out of the 11 high income countries for access, quality and outcomes, with this ranking unchanged from similar analyses completed in 2004, 2006, 2007, 2010, 2014 and 2017

(Schneider, Sarnak, Squires, Shah, & Doty, 2017). This report also ranked the U.S. last in healthcare outcomes, of which included the occurrence of serious reportable events (SREs). SREs are unmistakable, serious, usually preventable, devastating to patients and indicate there was a serious underlying organizational safety problem related to the incident (National Quality Forum, 2011). Examples of SREs would be the death or grave injury of a patient associated with a medication error, blood product or fall while under hospital care (National Quality Forum, 2011). An intraoperative or immediate postoperative death of a normal healthy person would be another SRE (Lembitz & Clarke, 2009).

The occurrence of SREs within the surgical suite will be highlighted in this section. This will be followed by a discussion on how MEs are associated with the misdiagnosing of patients' conditions and the significant financial burden such errors place on the U.S. healthcare system. This section concludes with an orientation to the current safety culture within U.S. hospitals and how this culture has contributed to the poor care experienced in the U.S.

SREs cause reimbursement denial. In an effort to motivate hospitals to accelerate improvements surrounding the safety of patient care, the Centers for Medicare and Medicaid Services (CMS) adopted a nonreimbursable policy for particular incidents patients may experience (Lembitz & Clarke, 2009). The National Quality Forum publishes a list of SREs with the intent of facilitating uniform and comparable public reporting that enables systematic learning on procedures that have been shown to improve the overall quality and safety of healthcare organizations and systems (National Quality Forum, 2011).

Patients are harmed during surgical procedures. Undergoing surgical procedures in the U.S. places patients at high risk for experiencing an AE. (Lembitz & Clarke, 2009; Nanji et

al., 2016). In a prospective observational study, randomly selected surgical procedures were observed at a 1,046-bed tertiary care academic medical center with the purpose of identifying medication errors and adverse drug events (Nanji et al., 2016). Following observation of 227 operations, retrospective chart reviews were performed on all cases. During the 277 observations, 3,671 medication administrations were observed. Upon a chart review of these medication administrations, 193 (5.3%) were implicated in medication errors or adverse drug events, which were missed during the observational phase of the study. Of these medication errors or adverse drug events, 153 (79.3%) were preventable and 40 (20.7%) were nonpreventable (Nanji et al., 2016). Of these 153 errors, 99 (64.7%) were serious and 51 (33.3%) were significant with 3 (2.0%) considered life threatening (Nanji et al., 2016). 'Serious' was defined as an event with the potential to cause symptoms that were associated with a level of harm that was not life threatening. 'Significant' was defined as an event that had the potential to cause patients harmful symptoms but posed little or no threat to their overall function. 'Life threatening' was an event that had the potential to cause symptoms that if not treated would place the patient at risk of death (Nanji et al., 2016). In other words, one in 20 perioperative medication administrations included a medication error or an adverse drug event (Nanji et al., 2016). Researchers found that more than one third of the medication errors led to observed adverse drug events with the remaining two thirds having the potential for patient harm (Nanji et al., 2016). These findings were found to be a markedly higher percentage than that found in previous retrospective studies that examined errors in operative suites, suggesting that this trend was not decreasing (Nanji et al., 2016; National Patient Safety Foundation, 2015).

Patients are harmed through diagnostic errors. Many patients experience MEs through diagnostic errors, which have been linked to regrettable outcomes (National Patient Safety Foundation, 2015; Singh & Thomas, 2014). In a retrospective analysis of three previously published clinic-based population databases, researchers estimated the frequency of diagnostic errors in the adult population following the synthesis of data from three previous clinic-based population studies (Murphy et al., 2014; Singh & Thomas, 2014). These publications were chosen as each used similar conceptual definitions for diagnostic errors (Singh et al., 2012). This population-based analysis concluded that over 5% of the U.S. adult outpatient population, or over 12 million patients, experienced a diagnostic error annually. This equates to approximately one in every 20 adults. Of this group, half of the estimated errors had the potential to cause significant harm, such as prescribing the wrong medication dose to an infant or child. Such foundational evidence is pivotal in encouraging health care organizations and policy makers to significantly strengthen efforts to measure such occurrences and derive new processes to reduce diagnostic errors (Singh & Thomas, 2014).

Medical errors create a significant cost burden. Along with the pain and suffering experienced from MEs by patients and families, researchers at the Institute of Medicine found that such poor outcomes have created a significant cost burden to the U.S. healthcare system. This monetary liability was estimated at over $10 billion a year and may be greatly under-estimated due to the difficulty of approximating costs relating to "unreliable, highly variable, and poorly coordinated care" (Kohn et al., 1999; Zeidel, 2011, p. 2). The U.S. spends more on healthcare than 11 leading industrialized countries, such as Canada, Norway and the United Kingdom (U.K.), but only ranks seventh in the quality of that care (Schneider et al., 2017).

In research by Schneider et al. (2017) at the Commonwealth Fund, it was noted that payment systems in the other countries surveyed rewarded high quality care monetarily when collaborative approaches to managing chronic conditions were demonstrated. With the passage of the Affordable Care Act (ACA) in the U.S., similar initiatives were implemented, with new policies introduced over a period of years. Such strategies were designed to encourage comparable measures regarding the quality and efficiency of patient care.

Although the ACA supports programs that are concerned with the development of preventive health measures for persons with various chronic conditions, such as diabetes, hypertension and asthma, the delivery models, policies and payment arrangements that are intended to enhance the overall quality of care have impacted hospital's financial structures speeding organizations to consolidate or close their doors (Barlas, 2014; Davis, Collins, Stremikis, Rustgi, & Nuzum, 2009; Davis et al., 2014). To date, improvements in diagnosing, treating and caring for patients through provisions within the ACA have yet to be aligned with a reduction in the cost of care or an improvement in the quality, efficiency and safety of patient care (Davis et al., 2009; Davis et al., 2014). With revisions to the ACA anticipated, hospitals face great uncertainty regarding future reimbursements. This uncertainty will impact patient's access to care and care delivery, setting the groundwork for a public health crisis. With competitive market forces, payment incentives, evolving Medicare and Medicaid Services, and developing regulatory standards from The Joint Commission, there is a strong impetus for health systems to accelerate learning cultures and adopt best practices that reduce healthcare costs (Martin & Abore, 2016).

Poor hospital safety cultures negatively affect care. A hospital's poor safety culture will negatively affect the care at that institution. As noted on page two of this chapter, a safety culture has been defined as the "product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to and the style of proficiency of an organization's health and safety management" (Health and Safety Commission, 1993; National Patient Safety Foundation, 2015, p. xii).

Research from multiple studies found that a hospital's safety culture is linked to the number of AEs and MEs reported at that facility, thereby affecting the quality of patient care (DiCuccio, 2015; Hansen, Williams, & Singer, 2011; Mardon, Khanna, Sorra, Dyer, & Famolaro, 2010; Sorra, Khanna, Dyer, Mardon, & Famolaro, 2012). In a systematic review of 17 studies, DiCuccio (2015) found that evidence supported the relationship between a safety culture and nurse-sensitive patient outcomes at both the hospital and nursing unit levels, supporting the concept that a poor safety culture is associated with poor patient outcomes.

A study by Sorra et al. (2012) evaluated 519 records from the Hospital Survey on Patient Safety Culture (HSOPSC) comparative database and an additional 927 records from the Consumer Assessment of Healthcare Providers and Systems (CAHPS) database (Sorra et al., 2012). This analysis found that a relationship existed between a hospital's care team and the safety culture patients perceived (Sorra et al., 2012). In this study, patients' positive perception of a hospital's safety culture tended to have a positive effect on the assessment of their care, as reflected in the CAHPS hospital surveys (Sorra et al., 2012).

Conversely, such findings suggest that hospitals with poor safety cultures would be perceived badly by patients, with this perception reflected in their care experience. Research by

Sorra et al. (2012) suggests that a hospital's safety culture is critical to providing the perception of quality patient care.

The Joint Commission. Understanding the relationship between a hospital's safety culture and the occurrence of errors was the impetus behind the development of the ten hospital standards that organizations must realize before achieving accreditation by The Joint Commission (2012). One of these recommendations directs leaders to provide opportunities for employees to participate in safety and quality initiatives (The Joint Commission, 2008b; The Joint Commission, 2012). In addition, The Joint Commission recommends administrators and managers develop a code of conduct for their institution that defines acceptable behaviors and behaviors that are disruptive, which undermine a safety culture (The Joint Commission, 2008b; The Joint Commission, 2012). These new standards also advised hospitals and health systems to create programs that periodically measure their institution's safety culture and systematically design improvement plans that are measured over time.

Summary

Despite efforts to improve the quality and efficiency of patient care, the U.S. healthcare system remains unsafe and has been regularly ranked last among studied nations (National Patient Safety Foundation, 2015; Schneider et al., 2017; Zeidel, 2011). Patients are being harmed at alarming rates in both inpatient and outpatient settings, with the actual number of errors not accurately measured. With poor care outcomes having been linked to a negative safety culture, improving the culture could improve care outcomes and patients' overall care experiences (DiCuccio, 2015; Hansen et al., 2011; Mardon et al., 2010; Sorra & Dyer, 2010; Sorra et al., 2012).

In advancing knowledge regarding safety culture, health care organizations can facilitate the development of safer health systems that support practitioners in providing quality care. Such new knowledge has the potential to reduce morbidity and mortality rates and improve patient's perceptions of their care.

Unsafe Patient Care Is a Systems Issue

The current healthcare system is wasteful and error prone (Zeidel, 2011). There is urgency for organizational leaders and practitioners to engage in the transformation of hospitals into environments where all patients receive the best quality of care every time they are admitted (Hines, Luna, Lofthus, Marquardt, & Stelmokas, 2008). Improving patient safety requires a total systems approach where leadership unfailingly prioritizes the organization's safety culture and the well-being of all members of the patient care team (AHRQ, 2013; Clancy, Margolis, & Miller, 2013; National Patient Safety Foundation, 2015; Zeidel, 2011).

Today in the U.S., patient care has become technically complex with care poorly integrated between specialties and within hospital units (James, 2013). Practitioners are required to provide more care with fewer resources while keeping in mind the organization's productivity pressures and budgetary constraints (Milton, 2013; Peterson, Teman, & Connors, 2012). In an effort to influence improvements at a systems level, many healthcare leaders have adopted a safety model developed by high-reliability organizations (HROs).

An HRO is a system that operates in hazardous conditions, such as in nuclear power plants or flying an aircraft, but involves fewer AEs than other systems operating in similar environments (Reason, 2000). High reliability is established by supporting particular human practices that build a climate of trust and respect among workers. There is a coordination of

work, both upstream and down, creating elements in daily practices that shape organizational cultures. Such principles empower individuals to recognize problems early and manage them decisively (Sutcliffe et al., 2016). Under this system, hospital leadership can support the successful reduction of errors in high-risk environments through the use of standard protocols, checklists, pre- and post-procedural briefings, incident reporting and daily huddles (Goldenhar, Brady, Sutcliffe, & Muething, 2013; Henrickson, Wadhera, & Elbardissi, 2009; Pronovost et al., 2006; Sutcliffe et al., 2016). Although many organizations and clinicians within the healthcare milieu have embraced such improvement plans, the implementation and success of these initiatives have been fragmented. Healthcare persists with low-reliability lacking fundamental underpinnings such as teamwork, error reporting and process improvement techniques found in HROs (Sutcliffe et al., 2016). High-reliability organizations are systems that operate in hazardous conditions and have fewer than their share of AEs. Such systems have an intrinsic "safety health" that can withstand operational dangers while still achieving their intent (Reason, 2000, p. 770).

Healthcare Lacks Underpinnings of Trust and Respect

Today's U.S. healthcare leaders have made progress towards improving care outcomes, but lack a firm understanding of how to achieve high reliability (Sutcliffe et al., 2016). High reliability organizations are designed to work within systems that anticipate, contain and recover from mistakes (Weick & Sutcliffe, 2015; Weick, Sutcliffe, & Obstfeld, 1999). High-reliability organizations work to understand the nature of the employees' work and create detailed operating procedures with contingency plans that use the tools of science and technology to shape employee behaviors with the goal of avoiding errors (Sutcliff et al., 2016). With minimal

scrutiny, HROs can influence safety by cultivating practices within a climate of trust and respect, where workers pass along communications that are necessary to thoughtfully organize reliable performance (Sutcliff et al., 2016). Such interactions are moments where trust is generated and where dialogue between professionals can sharpen or hinder one's sensitivity to unexpected discrepancies.

It is within such atmospheres that vigilant direction regarding safety issues between the hospital's management and healthcare teams can exist, enabling employees to recognize emerging problems early and manage them more decisively (Sutcliff et al., 2016). It is within such atmospheres that cultures of trust develop, which has been lacking in U.S. hospitals and healthcare systems (Sutcliff et al., 2016).

High-performance work environments within HROs. Hospital settings are considered high performance work environments (Combs, Liu, Hall, & Ketchen, 2006; Huselid, 1995). In such environments, strategic human resource management dedicates specific practices that can affect positive changes in organizational-wide practices (Combs et al., 2006). Examples of such enhancements include incentive compensation for hospital employees or training for care management units that are highly specialized. Additional improvements focus on improving hospital unit work environments and encouraging employees' participation in the development of patient care delivery models (Combs et al., 2006). To improve high-performance work environments, two interactive overlapping processes must be considered (Combs et al., 2006; Delery & Shaw, 2001). First, employees must be given the knowledge, skills and training to perform their job tasks. Secondly, the internal social structure, or organizational culture, must facilitate communication and cooperation among employees creating the socio-relational

foundation that can identify and manage complications decisively (Combs et al., 2006; Evans & Davis, 2005; Sutcliffe et al., 2016). It is this social-relational foundation that contributes to a hospital's safety culture but is currently lacking in this country's attempt to reform patient care. If healthcare administrators, managers and practitioners are to adopt practices from this ultra-safe model, they must genuinely and systematically work to establish a culture that is built on the social-relational foundation other HROs have found to be effective (Sutcliffe et al., 2016).

Inadequate Understanding of Medical Errors as a Systems Issue

When a patient's care goes well, the acts of competent physicians are celebrated, despite the organization and complexity of the care (Dekker, 2011; Gawande, 2002). When errors occur, human ineptness points to persons providing direct patient care, blaming individuals for having failed to hold the complex, pressurized, organizational patchwork together (Dekker, 2011; Gawande, 2002). For sustained improvements to be realized, hospital leadership must gain an understanding of the system factors that influence decision-making and the delivery of patient care, both of which are primary steps in reducing errors (Grant et al., 2006; Mardon, et al., 2010; Peterson et al., 2012). With factors identified that influence patient safety, healthcare leaders can focus concerted efforts on improving front-line employees' psychological, behavioral and situational perceptions of the care environment, which has been found to be effective in supporting safety cultures in other ultra-safe organizations (Sutcliff et al., 2016).

Impediments to Developing a Culture of Safety

The U.S. has created an environment in which interdisciplinary team members are unable to sustain their deep capacity for quality, compassionate care due to obstructed settings that do not support a culture of trust (Shapiro, Whittemore, Lawrence, & Tsen, 2014). As an HRO,

hospitals must maintain a commitment to safety at all levels, from frontline employees to hospital leadership. Barriers to a hospital's safety culture include ineffective teamwork through siloed care, poor communication and disruptive behaviors, which will be discussed further in this section.

Professional Silos Impede Safety Culture

Historically within the U.S. healthcare setting, patient harms were considered inevitable, professional silos were considered natural, and patients were kept safe by individual heroism rather than thoughtful designs (Pronovost, Ravitz, Stoll, & Kennedy, 2015; Zeidel, 2011). A silo refers to "a system, process, or department that operates in isolation from others" ("Silo," 2018). As a result of such silos, one professional group, such as the neurology team, may not understand the particular facts of another specialty, such as hematology, although both are involved in treating a cancer diagnosis for their mutual patient. This lack of collaboration between staff at all levels of care hinders the culture of healthcare institutions (Peterson et al., 2012).

Following the introduction of safety initiatives by healthcare organizations throughout the U.S., silos have been maintained and contribute to the inadequately coordinated, highly variable care and ineffective practices within institutions and between professionals (Pronovost et al., 2015). It is such poorly coordinated interdisciplinary care that creates the troubling hospital culture that contributes to patient harm (Fewster-Thuente & Velsor-Friedrich, 2008; AHRQ, 2013; National Patient Safety Foundation, 2015; Pronovost et al., The Joint Commission, 2008b; 2015; Zeidel, 2011).

The term interprofessional is defined as a model of team communication and collaboration that takes place among many disciplines and is used in the planning of patient-

focused care (Siarkowski-Amer, 2013). The defining attributes of collaborative care include having a shared influence in the care of a patient that is based on knowledge and the shared authority of professional roles (Fewster-Thuente & Velsor-Friedrich, 2008; Henneman, Lee, & Cohen, 1995, Kraus, 1980). Interprofessional communication is a critical process used by healthcare professionals to collaborate on the delivery of healthcare services (Siarkowski-Amer, 2013). This model of team communication and collaboration takes place among the many disciplines involved in the planning of patient-focused care and can be practical in academic as well as healthcare settings (Siarkowski-Amer, 2013). Poor communication can result in MEs and AEs due to the lack of transparency in care and creates an unsafe work environment for hospital employees (Shapiro et al., 2014; The Joint Commission, 2008b). Communication that is disrespectful and disruptive will hinder the development of a safety culture, as this section will discuss further.

Disruptive Behaviors Impede Safety Cultures

The U.S healthcare milieu has a history of tolerance and indifference to poorly coordinated interprofessional care that creates the troubling hospital culture that contributes to patient harm (Porto & Lauve, 2006; The Joint Commission, 2008b). Such conduct is seen in profane and disrespectful language, demeaning behaviors, sexual innuendos, racial or ethnic jokes and outbursts of anger. These actions can undermine a caregiver's self-confidence, disrupt patient care and create a patient safety concern (Porto & Lauve, 2006). Porto and Lauve (2006) found that 40% of clinicians remained quiet or passive during patient care events involving disruptive behaviors rather than question an intimidating individual's decision (Institute of Safe Medication Practices, 2003; Porto & Lauve, 2006; The Joint Commission, 2008b).

Intimidating and disruptive behaviors exist in both genders and among various levels of healthcare professionals, such as administrators, pharmacists, therapists and support staff (Institute of Safe Medication Practices, 2003; Rosenstein & O'Daniel, 2005). These negative actions decrease job satisfaction and ultimately increase the occurrence of preventable AEs, as well as the cost of care (Mark et al., 2007; Profit et al., 2014; Rosenstein & O'Daniel, 2005; The Joint Commission, 2008b). Incivility negatively influences employee's health, job satisfaction, productivity, turnover rate and commitment to their profession. Qualified clinicians, administrators and managers may seek alternative employment in more professional environments when surrounded by such negative behavior (Rosenstein & O'Daniel, 2005; The Joint Commission, 2008b).

A negative work environment also creates a financial burden for the healthcare organization, which is estimated at $23.8 billion annually in the U.S. This amount covered direct and indirect costs such as absenteeism, turnover, lost productivity and legal action associated with uncivil and violent workplace behaviors (Sheehan, McCarthy, Barker, & Henderson, 2001; Spence-Laschinger, Wong, Cummings, & Grau, 2014). Intimidating and disruptive behaviors contributes to medical errors and the psychological distress of professionals, which is reflected in the safety culture of the institution (The Joint Commission, 2008b).

Poor Teamwork Impedes Safety Cultures

Poor teamwork within a facility can also impede the safety culture at that institution. To examine the relationship between an organization's culture, interprofessional teamwork and job satisfaction, researchers surveyed 272 employees that were involved in patient care. This was a multicenter, cross-sectional study that took place in Germany (Korner, Wirtz, Bengel, & Goritz,

2015). Following the analysis of the survey data, investigators found a hospital's culture influenced how interprofessional teams worked together, which in turn impacted job satisfaction (Korner et al., 2015). In addition, an employee's job satisfaction influenced their personal attitudes and care practices, which impacted the quality and safety of patient treatments and clinical outcomes (Korner et al., 2015). Korner et al. (2015) found that interprofessional teamwork was supported by an organization's culture, which was an independent predictor of the employee's job satisfaction (Korner et al., 2015).

Summary

The efforts to create an environment that promotes safety has been impeded in the U.S. with disruptive behaviors that prevent team members to sustain their sincere desire to deliver quality, compassionate care. Excellence in care requires effective communication and teamwork, which integrates organizational functions, professional groups and care specialists into one coherent team (Grant et al., 2006). For quality and safety measures to improve in the U.S., healthcare organizations must recognize and evaluate the disruptive behaviors that threaten patient safety and understand the perceptions of their institution's safety culture to determine priority areas to improve (Sorra & Dyer, 2010; The Joint Commission, 2008b).

Healthcare for Children Can Be Unsafe

The pediatric population is susceptible to and is at a high risk of experiencing AEs due to their small size, dependence on adult communication, need for individually calculated medication dosages and unique physiological status (Cimiotti et al., 2014; Kaushal, Bates, Abramson, Soukup, & Goldman, 2008; Leonard, 2010; Woods et al., 2005). In this section, the multiple factors that place children at a high risk for AEs and MEs will be discussed, which

include the risk factors associated with the care of this unique and vulnerable population. This section will conclude with a discussion on parental perceptions of their child's care and how the hospital's safety culture impacts that view.

Pediatric Specialty is More at Risk for Errors

Children are more at risk of experiencing AEs due to multiple risk factors. With an estimated 1.8 million children admitted to hospitals annually in the U.S. (Cimiotti et al., 2014), it is imperative to understand the nuances related to safety concerns within the pediatric population. In an attempt to understand the significant role AEs play in this specialty group, investigators examined a subset of data taken from the Utah-Colorado study, representing over 3,700 pediatric hospitalizations (Woods et al., 2005). They found that 1% of hospitalized children had experienced an AE, of which 0.6% were preventable (Woods et al., 2005). If extrapolated to the entire nation, that figure would represent 70,000 children experiencing an AE annually, of which 42,000 would have been preventable (Leonard, 2010; Woods et al., 2005).

Pediatric epidemiology differs from that of adults. Neonates and infants who experience lengthy hospitalizations and complex medication schedules, and who are critically ill, are at an increased risk for an adverse drug error. This greater risk is due to the general lack of evidence on pharmacotherapeutic interventions in this unique population and the lack of neonate-specific medication formulations (Chedoe et al., 2007). In addition, neonates are at an increased risk for an adverse drug error due to their immature hepatic, renal and immune systems that alter the pharmacological activity of drugs, which may further complicate their care management (Chedoe et al., 2007; Leonard, 2010; The Joint Commission, 2008a). The hospitalized child has a three times greater chance of experiencing an adverse medication error than an adult, which is

equivalent to one out of every 6.4 medication orders (Kaushal et al., 2008; Marino, Reinhardt, & Eichelberger, 2004). These figures are disturbing because such errors were found to be preventable (Kaushal et al., 2008; Kaushal et al., 2001; Marino et al., 2004).

Pediatric dosing is tailored based on the child's weight and the proficiency of a practitioner to perform such weight-based calculations (Gonzales, 2010; Kaushal et al., 2008; Leonard, 2010; Marino et al., 2004; The Joint Commission, 2008a). Often children are treated in predominantly adult-centered care facilities, where staff may not be adequately trained in safe pediatric medication practices (Leonard, 2010). Such training does not guarantee error avoidance, as skills in compounding medications and calculating weight-based doses may not be reinforced due to the infrequency of providing care to this population (Leonard, 2010).

Children's communication is significantly limited. Due to their developmental age, communication is challenging for the very young, placing them at risk for an AE (Gonzales, 2010). Most pediatric patients are incapable of expressing to professionals any symptoms they are experiencing or concerns they have relative to their care. For instance, symptoms such as itching in the throat or having difficulty swallowing could be symptomatic of an allergic reaction (Gonzales, 2010). If the child is unable to communicate effectively, such symptoms could lead to a sentinel event if not addressed in a timely manner.

The Joint Commission defines a sentinel event as a patient safety event that reaches a patient and results in death, permanent harm or severe temporary harm, in which interventions are required to sustain life (The Joint Commission, 2016). Children unable to effectively communicate are at an increased risk of experiencing such events due to their inability to express symptoms through words. These young patients are often sedated or intubated, preventing their

ability to cry, which may be their only effective mode of communicating discomfort at their young ages.

Frequently, communication for this population is done through surrogates, such as the patient's parents or guardians, who in turn must have an accurate assessment of their child's experiences to effectively intervene on their behalf. When caring for neonates, infants and children, clinicians must evaluate nonverbal, as well as verbal cues, to effectively assess the progress and effect of treatments.

Woods et al. (2005) found that infants and children had a greater chance of experiencing a diagnostic-related preventable error compared with a non-elderly adult. This may be due to the varied presentation of symptoms this population experiences or their inability to communicate their symptoms effectively, as was mentioned earlier. This risk of diagnostic-related errors has led parents to become more active in their children's care throughout their hospitalization (Woods et al., 2005).

Research regarding the association of the pediatric interventions and AEs and MEs is limited. The equipment and medications used in pediatric care may contribute to AEs and MEs (Clancy et al., 2013). Most drugs, biologic agents and medical devices used in children's care have been tested and marketed for the adult population through randomized controlled trials (Clancy et al., 2013). Similar testing modalities are used less often for the pediatric population due to multiple factors (Clancy et al., 2013). For instance, many chronic conditions for the pediatric population are rare, limiting the number of providers who accurately treat the disorder (Clancy et al., 2013; Gonzales, 2010). In addition, research to improve care practices for such conditions involves the study of care encounters within this population. The strict regulatory and

consenting procedures for participation in pediatric research are unappealing to investigators, thereby limiting investigative interests and the ability of developing evidence-based care practices (Clancy et al., 2013).

Hospital Safety Cultures Experienced Negatively by Parents and Guardians

Schmidt (2010) identified the concept of "watching over" in the adult hospital setting. In this study nurses were found to "watch over" their patient's care to assure the desired outcomes were achieved (Schmidt, 2010). Parents and guardians of hospitalized children have perceived the risks that surround their children's care and have responded with similar needs to "watch over" their child's care during hospitalizations (Cox et al., 2013). Cox et al. (2013) uncovered this phenomenon in the pediatric specialty whereby 39% of parents surveyed agreed or strongly agreed that they needed to "watch over" the care of their children during hospitalizations to be assured their children were safe. This need was of particular necessity during the change of work shifts or during any transition of their child's care, such as from one department to another (Cox et al., 2013).

Another study examined the proportion of parental concern about MEs during their child's hospitalization and whether there was an association between such a concern and the parent's self-efficacy when interacting with the physicians (Tarini, Lorano, & Christakis, 2009). This study found that approximately two-thirds of the parents surveyed believed they needed to "watch over" their child's care to aid in preventing errors (Tarini et al., 2009). A bivariate analysis found that when interacting with physicians, nonwhite parents who were fluent in English were significantly ($p = 0.002$) more concerned about medical errors and perceived the need to "watch over" their child, as they were concerned the care was not safe.

Finally, researchers found that parents often reported MEs and preventable MEs that were not otherwise documented in the child's electronic medical record (Khan et al., 2016). Of the 383 parents surveyed, 34 parents (8.9%) reported safety incidents. Following a chart review, 62% of those incidents, or 23 cases, were determined by physician reviewers to be MEs. Another 24%, or nine cases, were related to the quality of their child's care. Khan et al. (2016) determined that 30% of the 34 cases found, or 1.8 out of every 100 admissions, was involved in an ME that caused harm in the pediatric population, supporting the parental concerns (Cox et al., 2013; Tarini et al. 2009). Pediatric complications often relate to longer admissions that not only drive up the cost of care but also increase the chance that additional complications may occur (American Academy of Pediatrics, 2011; Zeidel, 2011). Tarini et al. (2009) suggests that to better understand an organization's current safety systems, hospital leadership may want to invite the participation of families in the evaluation process.

Summary

Many safety initiatives have focused on improving healthcare in the adult population, but there have been limited advances specifically addressing the complex nature of the pediatric population and their particular risk for AEs and MEs (Cimiotti et al., 2014; Cox et al., 2013; Kaushal, 2008; Marino et al., 2004; Peterson et al., 2012; Woods et al., 2005). Care for a hospitalized child requires explicit communication skills that hone in on both verbal and nonverbal cues. Medications and care methodologies need to be tailored to the pediatric population with additional considerations for their unique physiological status (Peterson et al., 2012).

Pediatric practitioners are rendering care in environments that are increasingly complex

with multiple opportunities to cause unintended harm through interprofessional care that is poorly communicated and coordinated (American Academy of Pediatrics, 2011). Such complexities contribute to high rates of MEs, which can increase the cost and length of a hospital stay and intensify parental anxieties surrounding their child's care practices (American Academy of Pediatrics, 2011; Khan et al., 2016; Tarini et al., 2009; Zeidel, 2011). Although multiple efforts to improve the quality and safety in patient care have been introduced, there has not been a sustainable improvement within pediatric settings (Kaushal et al., 2008; Kaushal et al., 2001; Leonard, 2010; Peterson et al., 2012; Woods et al., 2008).

Research suggests that AEs "may result from problems in the practice, products and procedures, or systems" found within the hospital milieu (Leape, Bates, & Cullen, 1995; Reason, 2000; Xuanyue, Yanli, Hao, Pengli, & Mingming, 2013, p. 43). Supporting safe care and reducing MEs and AEs in the clinical practice environment requires system wide actions that involve all levels of management and healthcare teams to actively participate in performance improvement and risk management (Smits, Christiaans-Dingelhoff, Wagner, Van der Wal, & Groenewegen, 2008; Xuanyue et al., 2013). Hospitals existing within blame-free environments will encourage employees to learn from their mistakes and create improvements in practices that will prevent future human and system errors (Kohn et al., 1999; National Patient Safety Foundation, 2015; Shapiro, et al., 2014). Thus, improving a hospital's safety culture could impact the communication and collaboration patterns of healthcare providers, thereby reducing the occurrence errors.

Research Is Needed to Improve Pediatric Hospitals' Safety Culture

A successful safety culture is hindered in the U.S. by the combination of complex care

processes, intricate healthcare technologies and professional fragmentation with traditional siloed care that is augmented by a well-entrenched hierarchical authoritarian structure with vague accountability, thereby creating barriers to teamwork and individual accountability (Brilli et al., 2010; Hughes, 2008; Zeidel, 2011). The U.S. is far behind other countries with regards to improvements in the quality and safety of health care, but with provisions within the ACA specifically addressing deficits in communication and collaboration, a decline in SREs and improved health outcomes can be expected. Much of the literature regarding patient safety culture within hospital settings has been focused on adult settings. There is a paucity of research regarding the safety culture within pediatric hospital settings. With the safety of pediatric care not well studied, understanding methods and practices that will improve care delivery to this population is crucial.

A child's safety during their hospitalization can be related to the safety culture experienced by employees and practitioners within that HRO. The way people relate to one another in work environments will account for the kind of information and level of safety they ultimately produce; and to improve the pediatric hospital safety culture, a total systems approach is required (Weick & Sutcliffe, 2015; Weick, Sutcliffe, & Obstfeld, 1999). This approach would be one that transforms interprofessional communication and collaboration patterns within organizations that surround the care of this vulnerable population (Clancy et al., 2013; National Patient Safety Foundation, 2015). By gaining a greater understanding of the concept of safety culture within the pediatric hospital setting, key stakeholders have the potential to gain knowledge leading to marked improvements in the morbidity and mortality rates for children.

With fewer errors, less time will be required by specialists and staff to remedy and report events resulting in fewer hospitalizations and lower healthcare costs.

Research surrounding a hospital's safety culture has not examined the nuances that pertain to the pediatric specialty, or the professional subcultures unique to the pediatric care setting. Research in understanding the perceptions of safety culture in the pediatric hospital setting will provide a distinct view that can prioritize safety initiatives and guide future research and policy development specific to this population. Such improvements will impact the occurrence of AEs and MEs, improving the quality and safety of patient care.

Research Aims and Hypotheses

The central aim for this study is to describe the safety culture of pediatric settings. It is hypothesized that the safety culture of a pediatric hospital or hospital unit is perceived differently based on professional role within that institution. In addition, it is hypothesized that the safety culture of pediatric hospitals or hospital units impact outcomes including the perceived Frequency of Event Reporting and Overall Perceptions of Safety.

Four professionals groups (RNs, PAs/NPs, MDs and Administrators/Managers) were chosen due to the strategic impact each has on the quality and safety of patient care and the fact that the survey identified those roles. This study will examine 2016 data from U.S. pediatric hospitals and specialty units and will address four research aims.

Aim 1: Describe the 10 safety culture dimensions and two outcome dimensions as perceived by RNs, PAs/NPs, MDs and Administrators/Managers employed within U.S. pediatric hospitals and specialty units.

Aim 2: Determine whether there is a significant difference in the perception of the 10

safety culture dimensions and two outcome dimensions as experienced by RNs, PAs/NPs, MDs and Administrators/Managers working within pediatric hospitals and specialty units.

Hypothesis: There is a difference in the perception of the 10 safety culture dimensions and two outcome dimensions as experienced by pediatric RNs, PAs/NPs, MDs and Administrators/Managers working within U.S. pediatric hospitals and specialty units.

Aim 3: Determine the association between 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between the 10 safety culture dimensions and one outcome dimension: Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Aim 4: Determine the association between the 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

CHAPTER TWO

CONCEPTUAL AND THEORETICAL FRAMEWORKS AND LITERATURE REVIEW

A hospital's safety culture is the overall behavior of individuals and organizations that is based on common beliefs and values (Cooper, 2000; Nieva & Sorra, 2003; Xuanyue, et al., 2013). A positive safety culture guides the many discretionary behaviors of healthcare professionals toward viewing patient safety as a priority. To improve a hospital's safety culture, it is first crucial to understand how this concept is defined. Therefore, the first half of this chapter will examine the philosophical and theoretical underpinnings of safety culture and how this concept is understood within the context of a hospital's safety culture. It will also describe the theoretical framework used for this study.

The second half of this chapter will review current literature on the theme of safety culture with an emphasis on initiatives and research surrounding the pediatric safety culture in U.S. hospitals. Most of the research regarding the culture of institutions is related to adult care and identifying the problems associated with poor safety culture, as described in Chapter One. Little research has been published devoted to the safety culture of hospitals and hospital units that care for the pediatric population.

Philosophical and Theoretical Base of Hospital Safety Culture

The origin of hospital safety culture can be traced to the ancient and medieval philosophical tenets of Socrates, Aristotle, Cicero and Ockham. These great minds brought forward the introspective dimension that individuals can choose to do the right act, for the right

reason. In healthcare, this notion is carried one step further. When managing the infirm, one must *primum non nocere* ["First do no harm"] (Beauchamp & Childress, 2013, p. 8). This phrase partly defines the principle of nonmaleficence, a directive to all healthcare practitioners to use sound clinical judgment when treating the infirm (Beauchamp & Childress, 2013). This historical philosophical perspective will guide a discussion of contemporary theoretical models found to be successful in the development of a safety culture and an overview of how such models can support current hospital safety initiatives.

Philosophical Development of Right Reason: Socrates (469 B.C. – 399 B.C.)

Socrates believed true wisdom would come to each of us when we realize how little we understand about life, ourselves, and the world around us. He stated, "an unexamined life is not worth living" (Audi, 2001e, p. 860) and encouraged introspection in all areas that concern day-to-day life. Within his school of Socratic Intellectualism, moral goodness or virtue were considered an exclusive kind of knowledge with the implication that if one knows what is good and evil, one cannot fail to be a good person and act in a morally upright way (Audi, 2001e). It was here that Plato (427 B.C.-347 B.C.), a student of Socrates, began the exploration of good and virtue (Audi, 2001d).

Aristotle (384 B.C. – 322 B.C.)

Aristotle, studying Socrates under Plato, discussed the concept of an innate truth in his two heralded works, the *Nicomachean Ethics* and the *Politics* (Audi, 2001a). In these works, Aristotle sought to remind individuals that to be virtuous, one must choose actions in the right way. He held that most agents innately know the right action unless they are evil or malicious (Audi, 2001a). In contrast to Plato's ideal of moral goodness, Aristotle believed goodness was

innate. Rational self-government was based on the belief that morally virtuous actions involve the agent's free coordination of choice for the right reason. This choice can be influenced by a person's emotional makeup and moral character (Audi, 2001a). With rational self-government, when one knows what is to be true, one has a responsibility to act on that knowledge (Audi, 2001a). Aristotle adds to this discussion by focusing on individuals' free choice based on justification, or "right reason," guided by their innate moral character (Audi, 2001a).

Marcus Tullius Cicero (106 B.C. – 43 B.C.)

Marcus Tullius Cicero was a great Roman philosopher, lawyer, statesman, orator and genius of the written word, with tenets similar to those supported by the writings of the classical Greek philosophers (Lane, 2014). In his discussion of Plato's, *The Republic* (52 B.C.), Cicero states that true law is right reason and is universal, unchanging and everlasting (Audi, 2001b; Lane, 2014). Cicero reflected an understanding of the classical philosophers by noting that right reason, or universal laws of behavior, commands people to their duty to do what is right and follow that law and prohibits them from doing otherwise (Audi, 2001b; Lane, 2014).

William of Ockham (1287 A.D. – 1347 A.D.)

William of Ockham, England, was a prominent medieval philosopher and Catholic monk who combined these classical Greek and Roman philosophies with his beliefs in Christianity. Ockham believed in "a modified right reason theory," where one's cognitive faculties, such as the senses and intellect, were always working, and through such perceptions, a God-given power would provide the innate knowledge for judgments that would direct a person's behavior (Audi, 2001c, p. 629; Spade & Panaccio, 2016). Ockham's principle of parsimony suggests that actions do not need to be complex. With a parsimonious model, the chance of introducing

inconsistencies, ambiguities and redundancies in a process can be reduced, thereby increasing the probability of problem solving (Gans, 2004). Therefore, choosing the right reason is God-given and parsimonious if one uses cognitive abilities to focus on the innate knowledge of an issue.

Immanuel Kant (1724 – 1804)

The early teachings of Socrates, Aristotle, Cicero and William of Ockham are consistent with deontological *Kantian* traditions. According to Kant, the principle of duty is absolute and would trump any situation that may conflict with other ethical considerations (Benjamin & Curtis, 2010). Kant believed man is grounded in reason and, as part of a balanced, authentic life, has a supreme duty to respect other human beings and do what is innately right (Benjamin & Curtis, 2010). All philosophers discussed above supported the belief that individuals choose the right reason guided by individual virtue (Aristotle) or with a duty to follow universal laws (Plato Cicero, Ockham, and Kant).

Individualism and Solidarity in the New World

Following the European enlightenment period of the 17th and 18th centuries, settlers were anxious to arrive in America to start new lives in an environment that celebrated independence. Around the time of the Revolutionary War, these settlers began to feel a tension between the tenets of individualism and those of solidarity (Sabin, 2012). Individualism supports the freedom of parties to speak in reasonable, deliberate, respectful manners and to act in solidarity for the good of the whole (Sabin, 2012). Solidarity is defined as a feeling of cohesiveness and unity that is recognized by persons who share the same interests and goals. These individuals that are united by the same goals come together in groups to perform acts they agree are correct ("Solidarity," 2016). These concepts of individualism and solidarity provide the

foundation for the political and moral thinking of today's U.S. health policies where individualized care and professional silos obscure the free exchange of data crucial to coordinated care ("Silo," 2018; Sabin, 2012; Zeidel, 2011).

Medical care in the U.S. was built on the tradition of individualism, which values independent reasoning over the collaboration of thoughts (Bleakley, 2010). For example, physicians have been educated to develop their unique skills by handcrafting a specific diagnostic and treatment regimen optimized for each individual patient (Zeidel, 2011). This paradigm, also called the "Craft Model," supports tailored treatment plans that are fashioned by medical providers to deliver the best outcomes for their patients (Zeidel, 2011). However, the Craft Model lacks collaboration of care. Without a collaborative approach to care, what is the right reason for a specific treatment in one specialty may not align well with another. It is this lack of collaboration and the associated limited communication that has led to the high rates of errors, poor outcomes and massive waste of healthcare resources seen in the U.S. today (Bleakley, 2010; Chassin & Loeb, 2013; National Patient Safety Foundation, 2015; Kohn et al., 1999; Zeidel, 2011).

Systematic improvements must be developed and maintained in all levels of hospital care. A culture must be articulated in which everyone is working to improve care practices daily, and where empowered frontline staff seeks to improve the processes of care. Through systematic improvements, multidisciplinary teams will create protocols that will reduce variation in care practices, leaving variation of practices required by the individual needs of patients (Zeidel, 2011).

Summary of Philosophical Arguments

Socrates believed that true wisdom was available to every person, if they took time to examine their world around them. It was through this examination that Socrates understood that one recognized what was good and evil in one's actions. Aristotle suggested that for man to be wise and virtuous, wisdom must be used to select the right action for the right reason. Cicero built upon this, but from a Platonic perspective by weaving the concept of universal laws into this discussion. According to Cicero, such laws, when combined with an innate understanding of right and wrong, command people to veer from wrongdoing. Ockham introduced a modified right reason and interjected the notion that man's actions do not need to be complex. Through God-given powers, Ockham claimed, it will become acutely apparent to man what actions are deemed acceptable. Such deontological principles guide healthcare practitioners today to *primum non nocere* (Benjamin & Curtis, 2010).

The U.S. medical model has historically aligned with the philosophical tenets of right reason. However, through individualistic principles unique to the U.S., healthcare providers tailor patient care goals consistent with professional goals held within specialties. Such individualized care has created siloed care, which has contributed to poor interprofessional communication (Leape et al., 2009).

The philosophical tenet of right reason is foundational to creating a safety culture where professional goals are consistent between professions, and each profession serves to meet their patients' needs. The lack of collaboration seen in today's healthcare milieu has created a tension between professionals, which has contributed to patient harm. The concept of safety culture is grounded in the philosophical beliefs of right reason. To improve the collaborative practices of

healthcare professionals, understanding how safety culture is perceived within professional domains may guide future research and policy development in patient safety.

Concept of Hospital Safety Culture

The concept of interest for this study is the safety culture of hospitals, specifically pediatric hospitals or hospital units. This section will include a safety culture conceptual model developed by the U.K.'s Health and Safety Executive (2005) from the writings of Cooper (2000). This model has been adopted and discussed in the landmark report *To Err is Human* (Kohn et al., 1999) and has been referenced most recently by the National Patient Safety Foundation (2015).

In addition, Reason's (2000) theoretical model of safety within high-reliability organizations (HRO) and how this model relates to the occurrence of AEs within hospital settings will also be presented, providing the justification for studying safety culture as it relates to AEs. This section will conclude with a description of the conceptual framework used for this study, which was derived from the Agency for Healthcare Research and Quality's (AHRQ) Hospital Survey of Patient Safety Culture (HSOPSC).

Safety Culture Conceptual Model

Safety culture is a subculture of an organization's culture. Organizational culture is defined as the shared behaviors, beliefs, attitudes and values regarding the goals, functions and procedures that are characteristic to a particular organization (Cooper, 2000). It is believed that with a well-developed and business-specific organizational culture, managers and employees alike will be committed to becoming more efficient in their performance, thereby improving the overall productivity of the organization (Cooper, 2000).

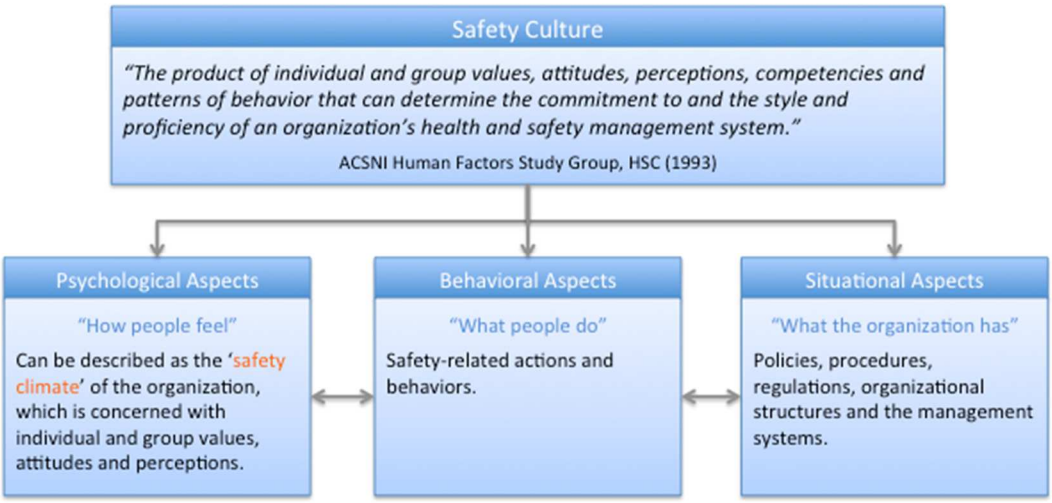
Within organizations, subcultures emerge, creating hierarchical levels and organizational

roles that often do not reflect the behaviors, beliefs, attitudes or values being shared by the organization as a whole (Cooper, 2000). Such subcultures either align or are at odds with the dominating culture of the organization. Therefore, one organizational culture does not exist; instead, there is a dominant culture made up of multiple subcultures. A hospital safety culture would be one such subculture.

A safety culture is defined as "the product of individual and group values, attitudes, competencies and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety programs" (see Figure 1) (Cooper, 2000, p. 114; National Patient Safety Foundation, 2015, p. xii; Health and Safety Executive, 2005, p. 4). An organization displaying a positive safety culture characteristically ensures that communications are founded on mutual trust and shared perceptions of the importance of safety. There is a communal confidence in the efficacy of the preventive measures found within the organization (Health and Safety Executive, 2005).

As depicted in Figure 1, an organization's safety culture has three interrelated facets: the psychological aspects, the behavioral aspects and the situational aspects. The arrows connecting these sub-concepts reflect how they interrelate, with no sub-concept mutually exclusive from the others (Cooper, 2000; Health and Safety Executive, 2005). The graphic also portrays each sub-concept of a safety culture. A discussion of the psychological, behavioral and situational aspects of a safety culture, and how each category might be viewed in the healthcare milieu, follows this graphic.

Figure 1. Safety culture abstraction developed by the United Kingdom's Health and Safety Executive (2005)



Psychological aspects are concerned with "the way people feel" about the safety environment and the safety management systems. They include the beliefs, attitudes, values and perceptions of individuals and groups at all levels of the organization. This sub-concept is often termed the organization's safety climate (Cooper, 2000; Health and Safety Commission, 1993; Health and Safety Executive, 2005; Jordan et al., 2009). A safety climate reflects how individuals perceive their social environment within the organization and has an impact on their individual psychological well-being (James & James, 1989; Jordan et al., 2009). For example, when members of an organization, or unit within the organization, share the same perceptions of an event or an environment, an organizational climate emerges. These perceptions can characterize how individual employees see their roles, how they relate to one another, and the sense of fairness that is perceived within the organization (Glisson et al., 2008; Jordan et al., 2009). Organizational climates with high role conflict and poor perceived fairness and clarity deter the development of a positive safety culture (Jordan et al., 2009).

Behavioral aspects of safety culture are related to "what people do" within the organization (Cooper, 2000; Health and Safety Commission, 1993; Health and Safety Executive, 2005). This sub-concept includes safety-related activities, actions and behaviors. In a hospital setting, behavioral aspects might be related to a hand-washing procedure that would be performed prior to patient care. Another example of a safety-related activity would be the correct documentation in the patient's electronic medical record of the time that medication was administered. These, and a multitude of other staff activities, directly impact a hospital's overall safety.

Situational aspects of an organization's culture are the third sub-concept. They include the policies, operating procedures, management communication and workflow systems that are prevalent within the patient care system of the hospital (Cooper, 2000; Health and Safety Commission, 1993; Health and Safety Executive, 2005). These traits are sometimes referred to as corporate factors. An example of a situational aspect would be the presence of an outdated policy on medication administration. In this case, if a nurse followed an outdated policy, the current and approved medication administration process would be violated and could cause patient harm. Another example would be related to the reporting hierarchy for a critical lab value. In most hospitals, policies regarding the delivery of a critical lab value state that the result must be reported to a licensed independent practitioner (LIP). A LIP is a physician or nurse practitioner who is permitted by law, regulation, or his or her organization to provide care to patients without direction or supervision (The Joint Commission, n.d.). If this policy is not followed, information could be given to an unauthorized employee, delaying treatment and causing patient harm. To prevent errors in care management, a hospital's policies, operating procedures, management

communication and workflow systems must be current, accessible and followed by the care team.

This uncomplicated model has been well accepted for over a decade and provides a useful graphic depicting the concept of safety culture (Health and Safety Executive, 2005; National Patient Safety Foundation, 2015). Since an organization's safety culture is associated with AEs and MEs, healthcare has shown an increased interest in this topic as a means to reduce the potential for both large-scale adversities, such as the bacterial contamination of hospital units and accidents associated with routine care (Cooper, 2000; Etchegaray & Thomas, 2012; Singla, Kitch, Weissman, & Campbell, 2006; Xuanyue et al., 2013).

To truly understand the factors that impact the safety of children's care, it is important to study the overall safety culture of hospitals and hospital units and the professional safety subcultures experienced by particular groups and specialties.

The Reason Model: Linking Safety Culture and Adverse Events

The Reason Model introduces the concept of AEs as they relate to safety culture. AEs were once thought of as a singular occurrence with unique etiologies and outcomes, but Reason (1990) suggests that such consequences occur from multiple events that are involved in the complex socio-technological systems where humans collaborate with scientific and high-tech processes. Reason (1990) was confident that when such events occurred, front-line operators, such as the nursing staff, were rarely to blame. Major disasters that took place within a wide range of high risk organizations (HRO), such as nuclear power plants, chemical installations, spacecraft missions, commercial and military aircraft, offshore oil platforms and railway networks, all share a number of important features in their safety breaches (Reason, 1990).

Errors in these HROs occurred within systems that employed precise coordination of many human and mechanical elements, with automated shutdown mechanisms and physical barriers in place to prevent catastrophic events (Reason, 1990). Accidents in these HROs were found to arise from multiple conflicting events that occur in sequence and that together breach the system's defense mechanisms (Reason, 1997). Humans played a dominant role in these failures, even when faulty equipment caused a breach. Reason (1997) found that once the cause of a system's failure was examined, investigators frequently found that human interventions could have prevented or mitigated the disastrous outcome (Reason, 1997).

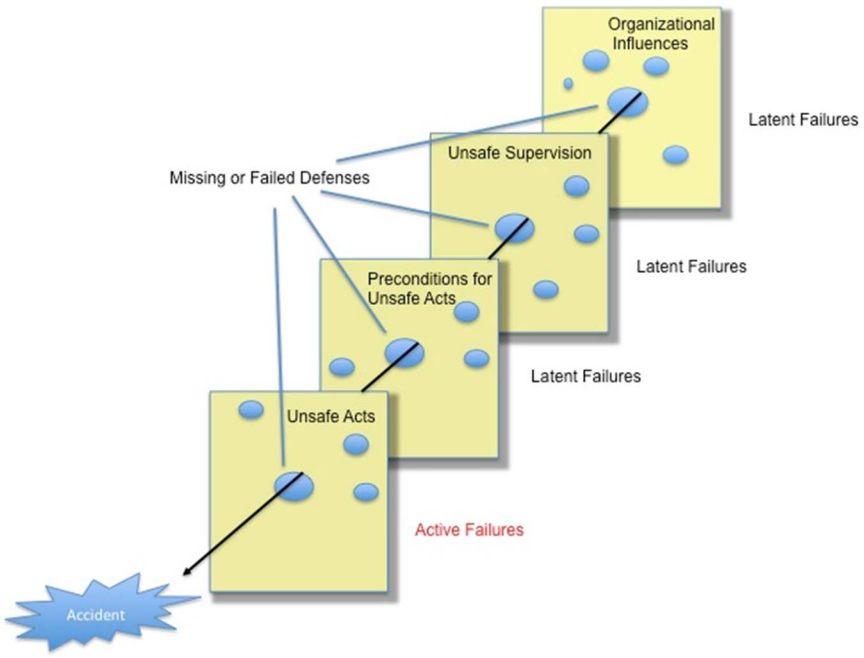
Swiss Cheese Model/Human Factor Model with Active and Latent Conditions

After closely examining the failures surrounding several catastrophes, Reason (1998) developed the Swiss Cheese Model (Figure 2) that divided the causal proceedings leading to AEs into active and latent conditions. Active conditions, or activities at the sharp end of care, are errors and violations that have an immediate negative effect and are often associated with front-line workers (Dekker, 2011; Reason, 1990). In a hospital, active conditions would involve, but are not limited to, the activities of pharmacists, the nursing staff and physicians. The failure of medical equipment, such as an x-ray machine or a bedside rail, can also be examples of an active condition.

Latent conditions are errors that stem from decisions or actions that may have lain dormant for a period of time but become evident when triggered by an active condition. For example, a latent condition could be a lapse in communication between professionals or policies that are no longer relevant to care (Reason, 1990). Latent conditions (Dekker, 2011) are present in the system at all times, long before AEs are recognized (see Figure 2; Reason, 1990).

Although it is difficult to change the values, attitudes and perceptions of their workforce, organizations can change the conditions in which people work. Reason (1990) recognized a need for HROs to develop a safety culture that empowers personnel to speak up and report errors and near misses in a nonpunitive environment. This includes identifying both latent and active conditions. A safety culture relates to other organizational cultures. Specifically, a safe culture is an informed culture, which in turn depends upon creating an effective reporting culture (Reason, 1998). This reporting culture must then be supported by a just culture that is willing to learn from near misses and errors. Employees that work in just cultures trust that reporting an incident will not be met with a punitive response from management (Reason, 1998).

Figure 2. Reason's (1998) Swiss Cheese Model/Human Factor Model depicting latent and active conditions preceding accidents



Note: see https://tinyurl.com/ycun92pq.

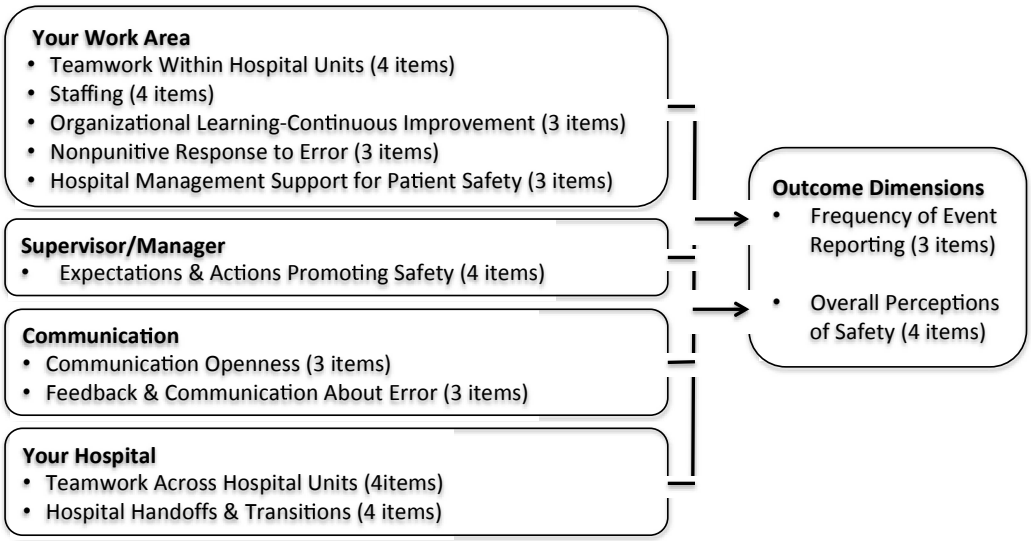
To achieve an informed culture, employees must feel free to report errors or near misses (Reason, 1998). These reporting systems must be confidential, de-identified and collected by a separate agency. Once reported, the system needs to collect, analyze and disseminate the knowledge that is gained from incidents in rapid, useful and intelligent reports. These reports are valuable for cultures that welcome learning because they provide suggestions on prospects that may improve their organization's ability to function safely (Reason, 1998). Reason's Model (1998) places hospital leadership in crucial positions to successfully decrease the occurrence of AEs by developing reporting systems where employees can learn from errors. This model provides the theoretical justification for studying the association of safety culture to errors that impact patients' safety.

Hospital Survey on Patient Safety Culture Conceptual Model

The AHRQ created a survey with the purpose of identifying the latent conditions that lead to AEs in patient care, which led to the AHRQ HSOPSC conceptual model. A sample of this survey can be seen in Appendix A. The AHRQ literature review, tool development and psychometric analyses are described in detail later in this chapter. The HSOPSC conceptual model is based on an employee's individual's perceptions of safety culture working in a hospital setting, as shown in Figure 3 (Blegen, Gearhart, O'Brien, Sehgal, & Alldredge, 2009; Sorra & Dyer, 2010; Sorra & Nieva, 2004). Through factor analysis, researchers grouped individual's perceptions of safety culture into four categories: "Your Work Area," "Supervisor/Manager," "Communication" and "Your Hospital." Within these four structures were 10 dimensions describing the employees' perception of safety culture. There were also two dimensions functioning as outcome measures: "Frequency of Event Reporting" and "Overall Perceptions of

Safety" (Sorra & Nieva, 2004), totaling 10 safety culture dimensions and two outcome dimensions (see Appendix B). The 42 items in the tool operationalize each dimension. A detailed description and an example of each dimension will follow.

Figure 3. HSOPSC conceptual model



Your Work Area category of safety culture. Through factor analyses, researchers identified five dimensions that measure the perceptions of safety culture that pertain to an employee's work area (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). Work areas, or units, are defined as areas of the organization that are not considered departments and provide specialized patient care ("Hospital units," 2012). Examples are the intensive care unit, a surgical unit, or the neonatal intensive care unit. The definition of each dimension, along with examples of hospital scenarios operationalizing the concept, will provide clarification and are discussed below.

1. Teamwork Within Hospital Units. In this dimension, all levels of staff within a unit, such as the neonatal care unit, support one another, treat each other with respect, and work

together as a team (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). When caring for a neonate, the nursing staff may develop clear care goals. These goals and treatment options would need to be passed onto other staff members, from shift to shift, to maintain safe care. In such a unit, nursing staff needs to respect and support one another and collaborate on care methods and goals for the well-being of the neonate.

2. Staffing. The Staffing dimension examines staffing practices at the institution and whether there is enough staff to handle the workload. The items in this dimension also probe to understand whether individuals believe that the work hours scheduled for their unit are appropriate and support quality patient care (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). Finally, this dimension evaluates whether patient care teams are made up of temporary staff and if such *ad hoc* staffing is best for their patient population. Research has shown that care is safer when nurse-to-patient ratios are reasonable (Siarkowski-Amer, 2013). Nurses perceive a safe work environment when management understands the safety needs that surround patient care and the importance of adequate staffing (Siarkowski-Amer, 2013).

3. Organizational Learning-Continuous Improvement. In this dimension, researchers sought to examine whether employees believed their organization learns from mistakes and whether such errors have the possibility of leading to changes that can elevate the effectiveness of a hospital (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). An example of Organizational Learning-Continuous Improvement could be related to medication administration. If medication was delivered to the wrong patient, a root cause analysis of the event could identify the origin of the error and changes could be instituted to improve that process. This practice of learning from mistakes can only take place in environments that value

and promote safe patient care.

4. Nonpunitive Response to Error. This dimension assesses the extent to which staff members perceive that any mistakes they have made would not be held against them and kept in their personnel files (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). As before, in the event a medication error has occurred, an employee would report this error if he or she believed there would be no punitive actions taken. For this error to have occurred, there likely was a flaw in the system. To actively participate in improving a flawed system, employees need to believe there will be no repercussions if they are to report such deficiencies (Reason, 2000). With such transparent work environments, a culture of safety can flourish.

5. ***Hospital Management Support for Patient Safety.*** This dimension assesses whether hospital management provides a work climate that promotes patient safety and confirms that patient safety is a top priority (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). As was defined earlier in this chapter, an organization's climate is a distinct construct that is concerned with the way hospital employees perceive the social setting within the organization (Denison, 1996; Jordan et al., 2009). A safety culture would have an environment supported with actions of hospital management that clearly demonstrates to the staff that safety is a top priority. Such actions might be seen with management actively supporting appropriate nurse-to-staff ratios or a pay scale that is competitive, thereby improving the safety climate.

Supervisor/Manager category of safety culture. Through factor analyses, researchers identified this category as having one factor, or dimension, that measured employees' perceptions of their supervisors' or managers' expectations, actions and willingness to promote patient safety and safe care (Blegen et al., 2009; Sorra & Nieva, 2004). This category was

defined by the perception of hospital supervisors and managers listening to staff's suggestions on ways to improve patient safety. In addition, this dimension inquires whether employees believe these suggestions are seriously considered and eventually implemented in future practices guidelines (see Figure 3). Hospitals with strong safety cultures employ supervisors and managers that actively praise their staff for following patient safety procedures and reward employees that promote safe care (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). An example of a reward might be a financial bonus to any employee who speaks up when a breach in safety procedures has been witnessed. Employees must believe they are safe when they report such events with such actions appreciated by their supervisors and managers.

Communication category of safety culture. Communication can be defined as the exchange of information, thoughts and feelings among people using speech or other means (Kourkouta & Papathanasiou, 2014). Through factor analyses, researchers identified two factors, or dimensions, that measure the perceptions of safety culture that pertains to communication within the hospital: Communication Openness and Feedback and Communication About Error. These dimensions are discussed below (see Figure 3) (Blegen et al., 2009; Sorra & Nieva, 2004).

1. Communication Openness. In this dimension, staff members freely speak up if they see something that negatively affects patient care and are free to question authority about a safety breach (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). A work environment with intimidating and disruptive behaviors preventing communication can foster errors (The Joint Commission, 2008b). An example of Communication Openness might involve a nurse questioning an aspect of a physician's care. With open communication, the physician would not be offended by this question, but through interprofessional dialogue, would clarify the reason for

the decision, improving the nurse's understanding and comfort level with the treatment (Sorra et al., 2016; The Joint Commission, 2008b).

2. Feedback and Communication About Error. In this dimension, staff are informed of errors and provide feedback on how errors can be prevented. In addition, staff are informed of changes that were put into place to prevent future events (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). An example of this dimension could involve a manager discussing the occurrence of an error with a practitioner who made the error. This nonpunitive discussion would involve all members implicated in the event. If changes were deemed necessary, the new processes instituted would be communicated throughout the hospital to prevent similar occurrences in the future.

Your Hospital category of safety culture. This category evaluates the perceptions individual employees have of the hospital where they are currently employed. Through factor analyses, researchers identified this category as having two factors, or dimensions, that measured employees' perceptions of their hospital (Blegen et al., 2009; Sorra & Nieva, 2004). This category contains two dimensions: "Teamwork Across Hospital Units" and "Hospital Handoffs and Transitions" (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). A description of these dimensions and examples of how each dimension might be experienced within a hospital setting will clarify this aspect of the conceptual framework and are discussed below.

1. Teamwork Across Hospital Units. In this dimension, hospital units cooperate and coordinate with one another to provide the best care for patients. This dimension includes whether hospital systems foster teamwork between hospital units or between specialty groups (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). Here the differences between

individual issues and system issues are set aside for the well-being of the patient. To accomplish such solidarity, patient care teams must effectively collaborate with teams in other units, explicitly articulating and agreeing upon goals, objectives, roles, processes and outcomes (Siarkowski-Amer, 2013). Clearly defined and deliberate strategies and systems must be in place to navigate the sometimes unavoidable ideological differences between team members across units that can create a sub-safety culture. For example, if a practitioner in hematology does not clearly articulate a patient's important clinical findings to a surgeon prior to surgery, the fact that the patient is a hemophilic might be overlooked, placing the patient at an increased risk of experiencing an unnecessary bleeding during surgery. Clear, effective communication between such hospital units is necessary to assure patient care is safe from one specialty to another.

2. Hospital Handoffs and Transitions. This dimension relates to whether practitioners believe important patient information is transferred from one care provider to another across hospital units and during the change of shifts (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). A handoff is defined as the process of transferring the responsibility for care from one practitioner to another or from one unit to another ("Handoffs and signouts," 2016). Transitions are defined as the movement of patients between health care practitioners and settings, such as hospital units and across medical specialties, as their condition and care needs change ("Handoffs and signouts," 2016). For example, a patient might receive care from a physician in an outpatient setting, then transition to a hospital physician or specialist and work with a distinct nursing team during an inpatient stay before once again transitioning to a skilled-care facility (The Joint Commission, 2012).

If during one of these transitions or handoffs a patient experiences an adverse reaction to a medication, this event should be passed on to the care teams on the following shifts, or between units if the patient is transferred. If this information is not passed forward, the transition or handoff could compromise the patient's safety. Ineffective transitions and handoffs often originate from poor hospital cultures and lead to an increase in errors, hospital readmission rates and cost of care (Medicare Payment Advisory Commission, 2008; The Joint Commission, 2012).

Outcomes dimensions. As described in Chapter One, a hospital's safety culture affects quality outcomes at that institution and whether errors are reported (DiCuccio, 2015; Hansen et al., 2011; Mardon et al., 2010; Sorra et al., 2012; Sorra & Nieva, 2004). Quality outcomes are often related to the occurrence of SREs, as discussed in Chapter One. Examples of such events would be a patient's death or serious injury following the unsafe administration of a blood product and a patient's death or serious injury associated with a medication error (National Quality Forum, 2011). The HSOPSC has two dimensions that address outcomes and are discussed below (see Figure 3).

1. Frequency of Event Reporting. This dimension evaluates staff's perception of how frequently events are reported. Errors are measured from three perspectives: how often mistakes are caught and reported before they affect the patient, how often mistakes that have no potential harm to a patient are reported, and how often mistakes are reported that could have harmed a patient, but did not (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010).

For instance, a physical therapist may have provided care to the wrong patient. This therapy provided no harm to the patient. The therapy was an ME, but may not have been reported, as the patient was not harmed. Not reporting such an error could cause problems for

other patients that may have experienced a similar mishap or may have been harmed when the wrong care was provided. Understanding why this care was provided to the wrong patient would be of interest to the organization and to healthcare personnel.

2. Overall Perceptions of Safety. This outcome dimension is defined as the general sense individuals have of their organization's error-prevention procedures and systems (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). The National Patient Safety Foundation (2015) defines patient safety as "the freedom from accidental or preventable injuries produced by medical care" (p. xii). This dimension examines the perceptions individuals have regarding the care they deliver and whether the safety of patients is sacrificed due to procedures and systems that fail to support their care. Employees who believe management lacks a true concern for safety is problematic for hospitals, causing job dissatisfaction, high turnover rates for employees and patient harm (Sarac, Flin, Mearns, & Jackson, 2011; Siarkowski-Amer, 2013).

Summary

Hospital employees have perceptions of safety culture that are created through the interweaving of 10 dimensions that together form the values, attitudes, perceptions, competencies and patterns of behavior found within their facility and their work units (see Figure 3). These perceptions fall into four unique categories (Your Work Area, Supervisor/Manager, Communication, Your Hospital) that determine healthcare professionals' commitment to and the style and proficiency of their hospital's health and safety management systems (Health and Safety Commission, 1993; Health and Safety Executive, 2005). The 10 safety culture dimensions within these categories impact the two outcome dimensions, labeled Frequency of Event Reporting and Overall Perceptions of Safety (Hansen et al., 2011; Mardon et al., 2010).

Perceptions of safety culture have been found to influence employees' reporting of safety events and their view of their hospital's overall safety (DiCuccio, 2015; Sorra & Nieva, 2004). Research identified that hospital staff will more frequently report an error in nonpunitive cultures and where feedback regarding change is proposed as a result of the report (Sorra & Nieva, 2004; The Joint Commission, 2008b). Such findings suggest that more AEs would be reported in hospitals with positive safety cultures (Sorra & Nieva, 2004).

The factor structures for the 10 safety culture dimensions and two outcome dimensions found within the HSOPSC have been identified by multiple psychometric analyses, supporting the conceptual model (see Figure 3) and will be described further in the Literature Review.

Literature Review

The literature review was based on a literature search using several sources and approaches. First, reviews of safety culture instruments that are used to measure the culture of healthcare organizations were identified and examined (see Appendix C). The databases of the Health and Psychosocial Instrument (HAPI) and PsychINFO were used to locate the actual tool and the supportive psychometric testing. In addition, multiple attempts were made through emails and phone calls to researchers familiar with these tools to obtain any reliability and validity data that would support these instruments.

Next, publications from the AHRQ's HSOPSC *Research Reference List* (2016) on the psychometric properties of the tool were included (see Appendix D). This was an international search that uncovered surveys that were adapted for particular cultures and then compared to the original tool. Of interest to this study were survey composites linked to the safety culture within pediatric freestanding hospitals or hospital units (AHRQ, 2016).

Finally, the electronic databases of PubMed and CINAHL were used to systematically identify peer-reviewed articles that described the concept and theoretical framework of hospital safety culture within pediatric freestanding hospitals or hospital units (see Appendix E). The key terms used to identify pertinent studies were "hospital safety culture" and "organizational culture," published in English regarding hospital care in the U.S. within the past ten years, for the population ranging from birth through 18 years of age. Also included in this review were articles that assessed the pediatric hospital safety culture found within the AHRQ's HSOPSC *Research Reference List* (2016). Throughout the research process, studies were identified from bibliographies of pertinent articles focusing on the central concept of safety culture within the pediatric care setting, as highlighted in Chapter One.

Review of Safety Culture Instruments

The Joint Commission's directive to hospital leadership to progressively monitor safety culture is of great importance to healthcare organizations across the country (The Joint Commission, 2017). Administering a survey can be an efficient methodology for such monitoring as long as the survey is valid, reliable, accessible, easy to understand and easy to administer and interpret. Thus, a review of the current safety culture tools that are available for the healthcare milieu will be the next phase of this literature review, along with the name of the tool selected for this study.

There are 45 tools available that evaluate an organization's safety culture (Singla et al., 2006). These tools were used in industries such as nuclear power plants, the railways industry and in aviation. There were nine surveys identified in this literature review that examined the safety culture within hospital settings. These nine surveys were

then evaluated further for this study. A description of these surveys, the number of subscales examined, the target population and available reliability and validity findings are found in Appendix C. A brief discussion on each tool will assist in identifying the final safety culture tool that was used in this research.

Safety culture instruments for healthcare. Of these nine surveys, seven were publicly available and quantitatively assessed patient safety cultures in healthcare settings (Appendix C) (Singla et al., 2006). The Press Ganey Safety Culture survey (2009) is a proprietary survey that was included in this review because it was administered to pediatric practitioners (Peterson, et al., 2012). The Press Ganey survey evaluates 13 dimensions of safety culture measured on a Likert scale, which are listed in Appendix C. Multiple attempts were made both through email and over the phone to obtain additional information on the tools constructs, but these attempts went unanswered. Thus, the reliability and validity of this tool are not known.

The Veteran Affairs Patient Safety Culture Survey (PSCS) contains 65 questions and covers 14 dimensions of safety culture measured on a five-point scale (Appendix C) (Singla et al., 2006). The survey emphasizes management commitment, nonpunitive response, overall perceptions of safety, work pressure, detection infrastructure, human factors and compliance with rules and procedures. Psychometric properties were completed on this tool, but this author was not able obtain them (T. Tawzer, personal communication, March 14, 2017).

The Veterans Health Administration Patient Safety Questionnaire consists of 112 questions and examines 18 dimensions measured on a five-point Likert scale (Appendix

C). This was reportedly developed from instruments in current use, with an emphasis on management commitment, overall perceptions, nonpunitive response to error, reporting, human factors and communication openness. Psychometrics of this tool has not been reported (Singla, et al., 2006).

The HSOPSC (see Appendix A) has 42 questions and measures 12 safety culture dimensions on a five-point Likert scale (Appendix B) (Blegen et al., 2009). Following a pilot study, the survey was found to display high internal consistency by factor analysis with acceptable reliability (0.63–0.84) (Sorra & Nieva, 2004). This tool emphasizes institutional and managerial commitment to safety, handoffs and transitions and teamwork. Multiple psychometric analyses in the U.S. and worldwide confirm acceptable reliability and validity of this tool (Blegen et al., 2009; Nie et al., 2013; Robida, 2013; Vlayen, Hellings, Claes, Abdou, & Schrooten, 2015).

The Teamwork and Patient Safety Attitudes Survey has 24 questions measured on a five-point Likert scale (Appendix B). Analysis of this tool's psychometric properties yielded four factors: (a) employees' perception of teamwork, (b) collaboration and decision-making, (c) interdepartmental or unit teamwork, and (d) the assertiveness of hospital leaders. The primary focus of this tool is on communication openness and teamwork (Kaissi, Johnson, & Kirschbaum, 2003; Singla et al., 2006).

The Operating Room Management Attitudes Questionnaire (ORMAQ) contains 60 questions, uses a five-point Likert scale, and addresses 14 dimensions of safety culture with an emphasis on teamwork, communication openness and employees' beliefs about errors and AEs in the operating room (see Appendix C) (Flin, Fletcher, McGeorge,

Sutherland, & Patey, 2003). Psychometric analysis demonstrated low reliability and an inter-item matrix that was too low for exploratory factor structures. The specificity of the tool's audience would make this a poor choice for this study (Flin et al., 2003).

Another specifically designed survey evaluating healthcare safety culture was the Trainee Supplemental Survey, developed by Boston Children's Hospital (Appendix C) (Singla et al., 2006). This survey contains 41 questions using a five-point Likert scale and covers six dimensions primarily focusing on the adequacy of communication, training and supervision of resident physicians (Singla et al., 2006). Psychometrics were not reported on this tool (Singla et al., 2006). Once again, the specificity of this survey's focus hinders its value in assessing the various professional roles in this proposed study.

The Safety Attitude Questionnaire (SAQ) was developed at the University of Texas following widespread interest in measuring the attitudes of providers (Appendix C) (Sexton et al., 2006). Developers modeled this tool after a questionnaire developed for commercial aviation, which examines the communication and collaborative decision-making processes that takes place within airline crew performance (Sexton et al., 2006). The SAQ is a 65-item tool measured on a five-point Likert scale. Demographic information on the sample was also collected. This tool can be used by healthcare organizations to measure caregiver attitudes relating to six patient safety domains that were identified through pilot testing and exploratory factor analyses (see Appendix C). Although the SAQ has demonstrated good psychometric properties, has been widely accepted by researchers, and is publicly available for use, it does not have a publicly available database, which is necessary for this research (E. Sedlock, personal

communication, January 3, 2017; Sexton et al., 2006).

The last survey highlighted is the Culture of Safety Survey developed by Weingart, Farbstein, David and Phillip (2004). This tool had 27 questions measured on a five-point Likert scale and evaluated hospital leadership, salience, a nonpunitive environment and the reporting and communication mechanisms within the institution (Appendix C) (Weingart, Farbstein, David & Phillip, 2004). There were no psychometric properties reported on this tool.

Although research specific adaptations have been made to many of these tools, modified versions were not included in this review. From the nine surveys identified for healthcare use, only the HSOPSC and the SAQ carried solid psychometric evidence, were publicly available, were widely used, and evaluated multiple safety culture dimensions, which are necessary components for this research (Etchegaray & Thomas, 2012; Halligan & Zeceivic, 2011; Singla et al., 2006; Sorra & Dyer, 2010).

Conclusion of research on safety culture instruments. The HSOPSC is the only publicly available survey with a national database accepted worldwide, with reliable and valid psychometric findings (Hellings, Schrooten, Klazinga, & Vleugels, 2010; Occelli et al., 2013; Smits, et al., 2008; Vlayen, et al., 2015; Waterson, Griffiths, Stride, Murphy, & Hignett, 2010). In addition, Westat® cleans and manages the national database, which is available upon request (see Appendix F). Westat® is an independent contractor that provides a national repository for this tool (Westat®, 2017). The HSOPSC is a self-administered tool that is funded by the AHRQ, requires 10–15 minutes to complete, and is available in electronic or paper format allowing for easy administration and minimal intrusion into an employee's daily routine (Sorra & Nieva, 2004). These key factors were

pivotal in the selection of the HSOPSC for this research in which the perceptions of pediatric hospital administrators and practitioners across the U.S. will be assessed. A discussion on the development of this instrument will provide further evidence to support the tool's psychometric properties.

Review of the Development of the HSOPSC: Pilot Study

The underlying construct, or phenomenon, that the HSOPSC was designed to measure was the latent variables of the hospital culture of patient safety (Waltz, Strickland, & Lenz, 2010). The HSOPSC was developed to estimate at one point in time the actual magnitude of this unobservable construct (Waltz et al., 2010). Researchers were interested in developing a short survey instrument that was based on this phenomenon of interest, measuring meaningful, independent and reliable safety culture dimensions (Sorra & Nieva, 2004). The tool was designed to measure the attitudes and actions that are appropriate and inappropriate in a facility and to illuminate what processes and procedures regarding patient safety are rewarded and punished (Sorra & Dyer, 2010). This task was sponsored by the Medical Errors Workgroup of the Quality Interagency Coordination Task Force (QuIC) and was funded and supervised by the AHRQ (Sorra & Nieva, 2004).

Literature review for pilot tool. To develop the tool, the Medical Errors Workgroup of the Quality Interagency Coordination Task Force began with a literature review in areas related to the management of accidents in the nuclear and manufacturing industries, employees' health and safety, organizational climate and culture, safety climate and culture, MEs and event reporting (Sorra & Nieva, 2004). In addition, surveys of existing safety climate and safety

culture, including published and unpublished tools and those available across the Internet, were also reviewed (Sorra & Nieva, 2004; Sorra & Dyer, 2010).

Two psychometric analyses were also conducted on previously published healthcare safety culture surveys to guide the development of the HSOPSC's key dimensions of safety culture (Sorra & Nieva, 2004; Waltz, et al., 2010). One survey was developed and administered by Westat® for the Medical Event Reporting System for Transfusion Medicine (MERS-TM). The second study was developed and administered by the Veterans Health Administration (VHA) (Sorra & Nieva, 2004). This dataset consisted of 6,161 staff responses from 160 VHA hospitals across the country (Sorra & Nieva, 2004). These two datasets were analyzed independently with the psychometric findings presented to AHRQ in a technical report (Burr, Sorra, & Nieva, 2002; Sorra & Nieva, 2002). Results from this report significantly influenced the safety culture dimensions and types of items that were included in the HSOPS pilot version (Sorra & Nieva, 2004).

Testing pilot tool. Based on the literature review, including the examination of published and unpublished safety culture instruments and the psychometric analyses from the MERS-TM and the VHA safety culture surveys, key dimensions of a hospital's safety culture were identified for inclusion in the draft version of the tool (Sorra & Nieva, 2004). The draft survey was then cognitively tested and reviewed by researchers, hospital administrators and hospital employees from various areas and units regarding how they experienced their hospital's safety culture (Sorra & Nieva, 2004).

At the conclusion of these reviews, a pilot survey was produced, including two single-item outcome measures and 14 multiple item dimensions of patient safety (Sorra & Nieva, 2004).

The survey contained items and questions that used a five-point Likert scale for agreement (strongly disagree to strongly agree) or frequency (never to always) (Sorra & Nieva, 2004). This tool was pilot-tested with 21 hospitals from six states that varied by teaching status and bed size (see Table 1) (Sorra & Nieva, 2004).

Table 1. Pilot Study: Teaching Status and Bed Size of 21 Hospitals

Hospital	< 300 Beds	301-500 Beds	> 500 Beds
Teaching	5	3	6
Non-Teaching	5	1	1

There were 4,983 surveys administered, with 1,437 (29%) surveys completed. Respondents were mostly female (81%). Most had direct interaction with patients, averaging 43 years old; were currently working in the intensive care unit (18%), surgical unit (15%), general medicine (12%) or other hospital units (14%); and had worked at their respective hospital for an average of 10 years (Sorra & Nieva, 2004).

Psychometric analysis of pilot tool. The goal for researchers was to have three to five items, or questions, measuring each safety culture dimension. The analysis included exploratory factor analysis (EFA), confirmatory factor analysis (CFA), fit indices, composite scores with intercorrelations, and internal consistency reliability coefficient for the 12 safety culture dimensions identified in the confirmatory factor model (Sorra & Nieva, 2004).

Exploratory factor analysis and principal component extraction of pilot tool. An EFA was performed in which researchers evaluated the dimensionality of the survey (Sorra & Nieva, 2004). To maximize the independence of the dimensions within the survey, PCA along with

varimax rotation were used (DeVellis, 2012). The EFA with the PCA identified the multiple dimensions in the tool and suggested many of the a priori item groupings identified in the literature review did, in fact, fall into 14 distinct factors, with acceptable eigenvalues that were greater than or equal to 1.0. The total variance explained by these 14 factors was 64.5%, with most items loading highly on one factor (having factor-loading greater than or equal to 0.40) (DeVellis, 2012; Sorra & Nieva, 2004).

Confirmatory factor analysis of pilot tool. In this analysis, researchers were interested in the fit of the model they proposed and how the specific number of factors and items loaded onto each factor (Sorra & Nieva, 2004). This fit of the data was validated by a number of indices including the goodness-of-fit index (GFI), the adjusted GFI (AGFI), the normalized fit index (NFI), and the non-normalized fit index (NNFI), with indices at or above 0.90 (Sorra & Nieva, 2004). The root mean square of approximation (RMSEA) was 0.4, which is considered a good fit, as the closer the RMSEA is to zero, the better the fit (Sorra & Nieva, 2004). After further refinement, researchers arrived at a final confirmatory factor model featuring 12 dimensions (two outcome dimensions and 10 safety culture dimensions), with each dimension having three to four items, or questions, for a total of 42 questions in the survey (Sorra & Nieva, 2004).

Composite scores and intercorrelations of pilot tool. The validity of an instrument is the best approximation of the truth (Trochim & Donnelly, 2008). By obtaining the mean of the responses to each item, composite scores were created for the 12 dimensions (Sorra & Nieva, 2004). Items were both positively and negatively worded. All negatively worded items were first reverse coded so that a higher score would indicate a more positive response for all cases (Sorra & Nieva, 2004). All questions used 5-point Likert scales with composite scores ranging from

1.0–5.0 (1 being a low score and 5 being a high sore). After calculating these composites scores, the safety culture dimensions were correlated with one another. In this pilot study, the intercorrelations fell within the expected moderate to high range of 0.23–0.60, which supported the tool's parsimony and construct validity (Sorra & Nieva, 2004). Dimensions with correlations less than 0.20 were considered weakly related to each other. Dimensions with high correlations at or above 0.85 suggest the items were measuring the same concept, with items needing to be either combined or eliminated.

Reliability of pilot tool. The twelve dimensions were found to have acceptable reliability (defined as a Cronbach's alpha greater than or equal to 0.60), with coefficients ranging from 0.6–0.84 (see Table 2) (Sorra & Nieva, 2004). The Staffing dimension had the lowest reliability, with a Cronbach's alpha of 0.63 (Sorra & Nieva, 2004). In a report by the Institute of Medicine (2003), appropriate levels of staffing were identified as a major theme for improving patient's safety during hospitalizations. Although recognized as low, this composite was retained due to the importance staffing was given in that report.

Table 2. Pilot Study Reliability Findings (Sorra & Nieva, 2004, p. 53)

Patient Safety Culture Dimension	Cronbach's ∝	Items or Questions per Dimension
1. Communication Openness	0.72	3
2. Feedback and Communication About Error	0.78	3
3. Frequency of Event Reporting	0.84	3
4. Hospital Handoffs and Transitions	0.80	4
5. Hospital Management Support for Patient Safety	0.83	3

Table 2 (cont.)

6. Nonpunitive Response to Error	0.79	3
7. Organizational Learning-Continuous Improvement	0.76	3
8. Overall Perceptions of Safety	0.74	4
9. Staffing	0.63	4
10. Supervisor/Manager Expectations and Actions Promoting Safety	0.75	4
11. Teamwork Across Hospital Units	0.80	4
12. Teamwork Within Hospital Units	0.83	4

Conclusion of pilot study. In conclusion, the final HSOPSC includes 12 dimensions and 42 items, along with additional demographic questions, with solid psychometric properties supporting a valid and reliable instrument. Reliability coefficients ranged from 0.63–0.84, with construct validity of individual dimensions reflected in correlations in the moderate to high range of 0.23–0.60 (see Appendix D). This testing provided solid evidence supporting this tool's use for this research study (Sorra & Nieva, 2004).

Hospital Survey on Patient Safety Culture: A Review of Psychometric Analyses

There were 26 psychometric studies found on the AHRQ's HSOPSC *Research Reference List* (AHRQ, 2016). Five of these studies were eliminated due to specific criteria that were related to the study's research objectives or because the original HSOPSC had been adapted. In the end, 21 psychometric studies were chosen for this evaluation. All psychometric studies were performed in adult facilities: three national and 18 international (see Appendix D). To date, there are no psychometric studies that were performed on data from pediatric hospital or hospital units.

U.S. Psychometric Testing Post-Pilot Study

In 2006, a comparative database was funded by the AHRQ to serve as a central repository for HSOPSC hospital data (Sorra & Dyer, 2010). This database was developed following a voluntary public call for data submission. From this call, data were collected from 382 hospitals, representing over 100,000 hospital survey respondents, and the first comparative database was created (Sorra & Dyer, 2010). In 2007, this database was released to the public with results on the survey's items and composite scores (Sorra & Dyer, 2010).

To evaluate the factors indicating the dimensions of this tool, Sorra and Dyer (2010) performed a psychometric analysis of secondary data from the 2007 database. They examined the multilevel psychometric properties of the tool to determine if the survey constructs could assess patient safety culture at the individual, unit and hospital levels (Sorra & Dyer, 2010). The database consisted of responses from 331 U.S. hospitals; 2,267 hospital units; and 50,513 respondents. The psychometric analysis examined the "psychometric properties of the survey's items and composites, item factor loadings, intraclass correlations (ICCs), design effects, internal consistency reliabilities and multilevel confirmatory factor analyses" as well as the intercorrelations among hospitals (Sorra & Dyer, 2010, p. 1). The analysis confirmed the multilevel nature of the data supporting the 12 dimensions and 42 items found in the pilot study, justifying the categories depicted in the model (see Figure 3) (Sorra & Nieva, 2004; Sorra & Dyer, 2010).

All levels of analysis had acceptable psychometric properties "defined as Cronbach's alpha equal to or greater than .60" (Sorra & Nieva, 2004, p. 62). Also, one hospital-level model dimension for "Supervisor/Manager Expectations and Actions Promoting Patient Safety" had a

low composite (CFI = 0.82). The psychometrics for all other dimensions in this scale were good (Sorra & Dyer, 2010). The average dimension intercorrelations were moderate at 0.42 at the individual level, 0.50 at the unit level and 0.56 at the hospital level (Sorra & Dyer, 2010). The overall psychometric properties support the items and dimensions for this tool. The HSOPSC has been considered reliable and valid in the U.S. and internationally (see Appendix D).

International Review of Psychometric Performance

The HSOPSC is one of the most commonly used surveys for the measurement of safety culture in healthcare settings (Vlayen et al., 2015), with extensive evidence that even after its translation for international use, it demonstrates good psychometric properties (Bodur & Filiz, 2010; Eiras, Escoval, Grillo, & Silva-Fortes, 2014; Hedskold et al., 2013; Ito et al., 2011; Moghri et al., 2012; Nie et al., 2013; Nordin, Wilde-Larsson, Nordstrom, & Theander, 2013; Occelli et al., 2013; Olson, 2008; Sarac et al., 2011; Smits et al., 2008; Vlayen et al., 2015).

Reliability of survey. The survey was found to demonstrate overall good reliability (Cronbach's alpha > 0.70) both nationally and internationally, with only one dimension (Staffing) falling below the acceptable level of a Cronbach's alpha (Blegen et al., 2010; Eiras et al., 2014; Hedskold et al., 2013; Nie et al., 2013; Nordin et al., 2013; Occelli et al., 2013; Sarac et al., 2011; Vlayen et al., 2015). Thus, when using this tool in the future, Blegen et al. (2010) suggested users should consider using alternative methods for evaluating the Staffing dimension.

Research also found that when using the French and Dutch translations in psychiatric hospitals, the psychometrics of the tool were again acceptable and valuable in this unique setting (Vlayen et al., 2015). Researchers in Sweden used the HSOPSC in both hospital and primary care settings with reliability composites ranging from 0.66–0.87, which is also considered

acceptable (Hedskold et al., 2013). Hedskold et al. (2013) believed that having one tool that measures the patient safety culture throughout various care settings would be valuable in Sweden because it would allow for comparisons within the country's national care system's safety improvement programs (Hedskold et al., 2013).

Validity of survey. In addition to consistently acceptable published reliabilities, the international HSOPSC surveys demonstrated good validity, with factor analyses supporting between 10–12 dimensions at the individual, unit and hospital levels (Ito et al., 2011; Robida, 2013; Sorra & Dyer, 2010). In fact, a study conducted in Iran that was translated into Farsi had factor structures identical to those of the original study (Moghri et al., 2012). In the majority of studies, researchers found that the 12 dimensional structures proposed in the original HSOPSC model should be adjusted in translated versions, with the assistance of factor analyses, to address the particulars of each population.

Poorly performing translations of survey. Three international studies reported poor performances of translated surveys (Haugen et al., 2010; Perneger, Staines, & Kundig, 2014; Pfeiffer & Manser, 2010). Perneger et al. (2014) noted that such suboptimal findings could be a reflection of problems with the translation process or more general difficulties with the instrument itself. In a German study, Pfeiffer and Manser (2010) found that many items in the survey were not applicable to nonclinical staff (i.e., clerical staff and housekeeping) and therefore suggested a survey be created to assess patient safety culture relevant to this population within the care team. Haugen et al. (2010) found the psychometric properties of the Norwegian version needed further investigation before being used in surgical domains.

Of particular interest, Waterson et al. (2010) found that the questionnaire may have measured different constructs of patient safety culture that were particular within the U.K. This team used the original HSOPSC for their study (Waterson et al., 2010). They found that in their model, the "Overall Perceptions of Safety" and "Staffing" were linked. This may be attributed to the increased tendency to associate staffing levels with patient safety in the U.K., as compared to U.S. staffing norms (Waterson et al., 2010). Waterson et al. (2010) commented that the national healthcare system combined with specific cultural differences that exist between the U.S. and the U.K. may have limited the extent to which the HSOPSC is applicable outside the U.S., emphasizing that a country's unique culture impacts the survey constructs (Waterson et al., 2010).

Considerations for tool development. Researchers cautioned against the impulse of drawing conclusions when comparing data between different countries (Eiras et al., 2014; Najjar et al., 2013; Nie et al., 2013; Vlayen et al., 2015). Multiple studies found that differences exist in safety culture perceptions due to the uniqueness of each society and these differences should be considered when safety culture tools are applied in different settings and within distinct healthcare systems (Najjar et al., 2013; Nie et al., 2013; Pfeiffer & Manser, 2010; Waterson et al., 2010). Pfeiffer and Manser (2010) suggested the development of a survey to measure if these differences are explained by cultural uniqueness, or whether nuances within countries' healthcare systems would explain such variations.

Of interest were comments made by Sarac et al. (2011) who noted that healthcare delivery not only risks harming patients but also can cause harm to healthcare staff. Sarac et al. (2011) suggested examining the effects a hospital's safety culture has on patients with the current

tool, but added that this tool should be adapted to appraise how the safety culture of an institution impacts the hospital staff (Sarac et al., 2011). As was discussed in Chapter One, disruptive behaviors create a negative culture within hospitals and have been shown to cause injury to workers.

Summary of U.S. and International Psychometric Analyses

The HSOPSC has met more of the specified psychometric criteria than other instruments owing to its systematic testing and worldwide acceptance (Hellings et al., 2010). Reliability of the HSOPSC in the U.S. and international studies has ranged from 0.60–0.88, with CFAs supporting the 12 dimensions of safety culture determined in the pilot study (Hedskold et al., 2013; Nordin, et al., 2013; Occelli et al., 2013; Sorra & Nieva, 2004). This tool has acceptable psychometric properties measuring group culture as well as attitudes of individuals (Blegen et al., 2009; Sorra & Dyer, 2010).

Researchers found that the results provide evidence to help relevant stakeholders within the healthcare milieu develop effective strategies that may assist in improving quality of care and ensuring patient safety (Hellings et al., 2010; Robida, 2013; Nie et al., 2013). The HSOPSC was valuable as a common instrument for assessing healthcare systems regarding national patient safety improvement initiatives and heightening patient safety awareness within organizations (Bodur & Filiz, 2010; Hedskold et al., 2013). This tool provides the ability to examine safety culture from an individual's perspective, where stakeholders can learn from past events (Nordin et al., 2013; Sarac et al., 2011).

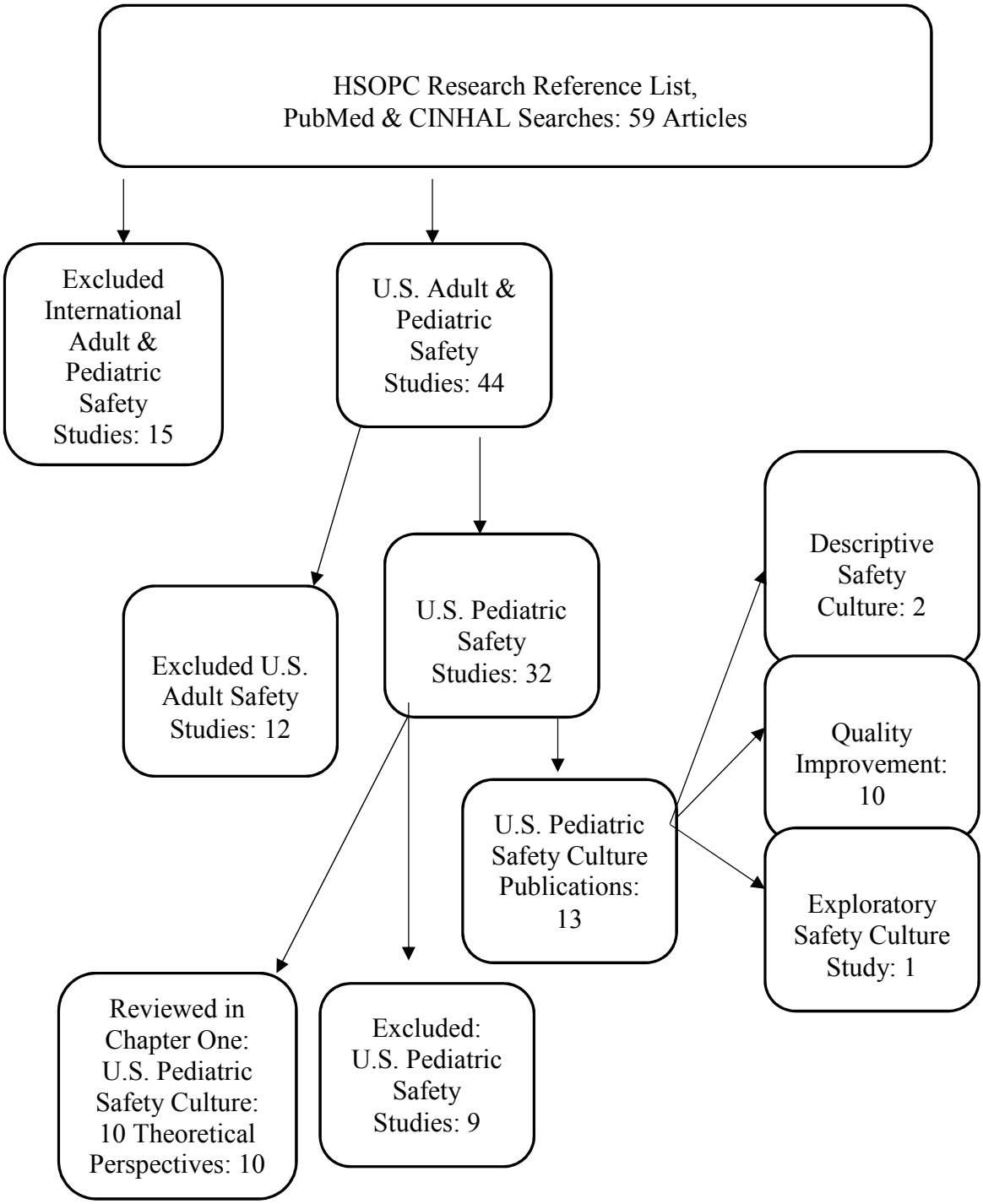
Limitations of U.S. and international surveys. There are some limitations to this tool. The adapted international versions did not perform as well as the original tool. This could be due

to a shift in the meaning of items and questions following translation (Perneger et al., 2014). In addition to language nuances, there was a cultural uniqueness relating to safety culture that should also be considered when applying safety culture tools in different cultural settings (Nie et al., 2013; Waterson et al., 2010). Findings in one study indicated that the national and healthcare specific differences in the U.K. might have limited the extent to which the U.S. version was applicable (Waterson et al., 2010). The HSOPSC model must be adjusted to reflect cultural differences within populations being studied. Researchers must use caution when comparing measurements between cultures and countries (Eiras, et al., 2014; Najjar et al., 2013).

Reviews of Database Literature

The search for peer-reviewed research employed the online databases of CINAHL, PubMed, ProQuest and the AHRQ's HSOPSC *Research Reference List*, along with personal and professional resources (see Figure 4 and Appendix E). Of the 59 abstracts found in these searches, 15 international studies were excluded. Only studies evaluating the culture in U.S. pediatric hospitals were selected, as the central concept for this study is specific to this population. Comparing the U.S. safety culture to other international cultures is limited. Adjustments would have to occur to the HSOPSC that would reflect the cultural differences that are unique to each country as to accurately reflect the perceptions safety culture of each population (Waterson et al., 2010). Of the remaining 44 publications, 12 were omitted since they were concerned with adult safety, with another nine eliminated because they referenced pediatric safety and not a hospital's safety culture surrounding pediatric care. Although 10 articles focusing the perspectives on safety culture in the pediatric care setting were uncovered,

Figure 4. Findings from searches of PubMed, CINAHL and the HSOPSC Research Reference List



these were presented earlier, in Chapter One. In the end, there were 13 U.S. publications that were isolated into three discrete categories. These categories are qualitative research, descriptive research and quality improvement (QI) projects with an interest in improving hospital's safety culture. A discussion of each category will follow.

Exploratory research to improve pediatric safety culture. Of these 13 studies, only one was an exploratory qualitative study where 88 providers from 11 EMS agencies participated in 14 focus groups (Leonard et al., 2012). Leonard et al. (2012) identified barriers and motivators to participate in research using focus groups consisting of pediatric emergency medical service providers (see Appendix D). This study found that in the emergency department an organization's culture was a factor in whether pediatric providers participated in research but did not discuss the overall safety culture within the ED or the individual agencies.

Descriptive research to improve pediatric safety culture. Two publications related to the care of neonates by Profit et al. (2012a). This research found that the safety cultures within neonatal intensive care units (NICUs) varied in terms of the location of the NICUs and the position of the staff member within this specialty. The first publication was a descriptive cross-sectional study that described staff members' assessment of safety culture in 12 NICUs. This was a convenience sample with the goal of exploring the variability of these perceptions within and between these NICUs (Profit et al., 2012a). Staff members included critical care and other physicians, fellows and residents, critical care registered nurses, charge nurses, nurse managers, pharmacists, respiratory therapists and nursing assistants and aides (Profit et al., 2012a). The safety culture of these units was measured using the ICU version of the SAQ. Researchers

found that significant variations in safety culture existed among NICU caregivers, with scores related to the perceptions of management (3%–80% positive; mean 33.3%) and stress recognition on the job (18%–61% positive; mean 41.3%) having the least positive scores. Such findings suggest caregivers perceive a lack of support from hospital management, with management unaware of the stressful conditions that surround the care of this population. Physicians viewed safety culture in a more positive light than nurses and ancillary personnel. The composite scores were higher between physicians and nurses ($p = 0.04$) and between physicians and ancillary personnel ($p = 0.02$) (Profit et al., 2012a). Of particular interest was that the ICU version of the SAQ scored the NICU higher than the adult ICU cohorts evaluated in a previous study at the same institutions (Profit et al., 2012a). This suggests that in spite of the aforementioned statistics, when compared to adult care facilities, NICUs had a more positive safety culture than that in adult care units (Profit et al., 2012a).

The second study by the same team evaluated the extent to which the ICU version of the SAQ was consistent in detecting the perceptions of safety culture across 12 NICUs (Profit et al., 2012b). This was a descriptive cross-sectional analysis of secondary data evaluating 547 (86%) responses to the SAQ (Profit et al., 2012b). Researchers found that of the 15 correlations between pairs of safety culture domains, two pairs had strong correlations ($p \geq 0.7$), seven pairs had moderate correlations ($p = 0.4$-0.69), three pairs had weak correlations ($p = 0.2$–0.39), with another three pairs showing no correlation at all ($p \leq 0.2$). Such findings reinforced the largely consistent performance in NICUs across the dimensions of safety culture as measured by this tool, also supporting the

tool's usefulness for comparative performance assessments among NICUs (Profit et al., 2012b).

Quality improvement initiatives to improve pediatric safety culture. There were 10 studies that highlighted QI strategies in pediatric settings. These projects were multifaceted with the collective goal of improving the safety of care provided to infants and children. Authors of these publications understood that the hospital's patient safety culture impacted the quality of care (Buck, 2008; Donnelly, Dickerson, Goodfriend, & Muething, 2009; Edwards, Scott, & Richardson, 2008; Mayer et al., 2011). With that in mind, many QI programs addressed plans to improve hospital care processes with initiatives that focused on creating collaborative practices that broke through hierarchal, autonomous traditions, with the goal of improving outcomes for children.

Quality improvement for children in deteriorating health. Strategies were developed to improve prevention, detection and correction of deteriorating infants and children through QI initiatives (Hayes et al., 2012; Sheth et al., 2016). A QI project by Hayes et al. (2012) took place throughout 20 U.S. hospitals in which a comprehensive change package was introduced to improve care strategies and track the effectiveness of interventions on patients' progress. Changes were based on the Institute for Healthcare Improvement's (IHI) plan-do-study-act model (PDSA), emphasizing small tests of change over time (Hayes et al., 2012; Langley et al., 2009). These efforts began with the implementation of foundational communication techniques, such as SBAR (situation, background, assessment, recommendation), and transitioned to more complex changes, such as the introduction of a rapid response team for deteriorating children. Although the

HSOPSC was used to measure the safety culture perceived by multidisciplinary team members at the onset and conclusion of the project, only three safety culture dimensions in the HSOPSC were targeted: "Communication Openness," "Hospital Handoffs and Transitions," and "Nonpunitive Response to Error." After one year, each hospital was analyzed separately. Findings indicated that improvements were found in all three dimensions for 14 of the 21 hospitals' studies. The only statistically significant improvement for these 14 hospitals was seen in "Nonpunitive Response to Error" (39% for positive responses at onset; 47% positive response following QI initiatives; $p = .02$). Such findings imply that the other two dimensions, "Communication Openness" and "Hospital Handoffs and Transitions," were not significantly changed.

Quality improvement and the I-Pass Project. Sheth et al. (2016) conducted a similar QI project with the goal of improving interprofessional communication by establishing a reliable handoff system during the rescue of deteriorating children. As with the Hayes et al. (2012) QI project, researchers implemented the PSDA model to bring about needed change (Langley et al., 2009). To improve the efficiency and safety of children's transfers from the cardiac intensive care unit (CICU) to an acute care setting, the I-PASS (I-illness severity, P-patient summary, A-action list, S-situation awareness and contingency plans, S-synthesis by receiver) handoff process was introduced (Moore, 2014; Sheth et al., 2016).

Another aspect of the QI initiative was to understand the perceptions of safety culture within the institution. This was done by administering the HSOPSC before initiatives began (2012) and again at the conclusion of the project (2014). Although the

sample was small (46 respondents in 2012; 83 respondents in 2014), the provider's safety culture scores significantly improved for the handoff/transitions domain of the survey with the implementation of the I-PASS process (Sheth et al., 2016). Sheth et al. (2016) also reported an improvement of family and provider satisfaction but did not provide a description of how this was measured or evaluated. In summary, the targeted QI initiatives did improve the efficiency of transfer from the CICU to an acute care setting, which was measured by improved HSOPSC scores and provider and family satisfaction (Sheth et al., 2016).

Quality improvement and serious safety events. Muething et al. (2012) and Peterson et al. (2012) conducted QI initiatives to understand the cultural and system changes necessary to reduce serious safety events (SSE). Muething et al. (2012) conducted a QI project within a large urban pediatric hospital. Senior leadership was actively involved in this plan, with interventions focusing on error prevention, restructuring of the patient safety governance, a new root-cause analysis process, the implementation of a common database for errors, and an opportunity to learn from errors (Muething et al., 2012). There were specific strategic interventions for those areas considered high-risk, such as the NICU. Outcome measures were the rate of SSEs and the change in patient safety culture (Muething et al., 2012). This team administered the entire HSOPSC, along with personal interviews, to better understand the safety culture perceptions within the organization.

After interventions were implemented, the number of SSEs per 10,000 adjusted

patient-days decreased from a mean of 0.3–0.9 patient days ($p < 0.0001$). The number of days between SSEs increased from a mean of 19.4 at baseline to 55.2 ($p < 0.0001$) (Muething et al., 2012). Initially, many safety culture dimensions exhibited a decrease in positive responses. For example, the patient safety grade dipped from 82.6% in 2005 to 76.6% in 2007, but increased substantially to 84.0% in 2009 following the introduction of QI strategies (Muething et al., 2012). Similar findings were noted with regards to other dimensions such as Communication Openness, Feedback and Communication About Error, Supervisor and Manager Expectations Promoting Safety, and Frequency of Event Reporting (Muething et al., 2012).

Such drops in measures have been described in other research evaluating adult facilities. Hellings et al. (2010) found that in the dimensions of Organizational Learning-Continuous Improvement and Hospital Handoffs and Transitions, scores declined over time, although the exact measures were not supplied. Tiessen (2008) performed a QI in a Canadian community hospital. This study noted a decline in the perceptions of QI initiatives between the 2005 and 2007 staff evaluations. This drop was related to employees' perception of senior management's involvement in patient safety issues and their commitment to improving the safety culture of the institution. Tiessen (2008) suggested this decline might be due to the many organizational changes that took place during 2007, which included cost cutting measures and system changes that directly impacted staffing and caused staff reductions. These changes were likely responsible for the poor response rate (35%) seen in 2007 and the overall poor morale of staff (Tiessen, 2008).

Press Ganey Safety Culture survey and serious safety events. A study in Michigan sought to improve the safety culture of a 200-bed children's hospital through a QI initiative addressing processes, practices and measures to sustain improvements (Peterson et al., 2012). This was a two-year initiative beginning in 2008. Hospital leadership used the safety culture change model developed by the Healthcare Performance Improvement (HPI), a consulting firm in Norfolk, Virginia. This program was intended to create a new safety leadership infrastructure that fostered transparency of both data and safety event details (Peterson et al., 2012). The leading causes for errors were system-based and found in the hospital's culture. Employees were not voicing safety concerns due to intimidation (54%), poorly developed or nonexistent processes (23%), and the lack of policies and protocols to report errors (12%) (Peterson et al., 2012). As was seen in previous initiatives, the number of safety events rose after staff were trained on the QI processes (SSE = 0.81 per 10,000 patient days), with events decreasing by 68% (SSE = 0.26 per 10,000 patient days) at the final phase of the project (Hellings et al., 2010; Muething et al., 2012; Peterson et al., 2012; Tiessen, 2008). This initial increase in the reporting of errors suggests that after training on the QI process, employees were more aware of safety issues and reported events more readily. The number of events decreased over time, suggesting that real improvement requires time and refinement.

Quality improvement and safety teams. Safety teams were developed in many institutions to improve patient outcomes. Runy (2007) described the development of a SSE reduction team at a freestanding children's hospital, with a goal to eliminate SSEs

by 2010. This team developed a series of QI interventions, such as processing root cause analyses and error-prevention training for clinicians, to reach that goal. Runy (2007) did not identify how their institution evaluated their safety culture.

Delta Team quality improvement initiative. Along with other QI initiatives, leadership within another healthcare system understood the importance of creating a safe care environment for their NICU population. Hospital leaders addressed units and practices associated with poor care outcomes prospectively, through system-based solutions (Schwoebel & Creely, 2010). Similar to the team created by Runy (2007), this organization created the Delta Team in which patient safety advocates and peer educators were empowered to actively participate in developing programs that drive patient safety at the unit level (Schwoebel and Creely, 2010). This team focused on implementing staff-driven solutions that build safety cultures within the NICU (Schwoebel & Creely, 2010). The HSOPSC was used to operationalize this concept and aided to identify and track areas in need of improvement (Schwoebel & Creely, 2010). Through the Delta Team's efforts, several successful projects were developed that contributed to a safe NICU environment. These included the improvement of capillary specimen processing, reducing bloodstream infection and a systematic approach to hyperbilirubinemia (Schwoebel & Creely, 2010). Although specific statistics supporting these improvements were not given, it was noted that for the last 12 months, no neonate experienced a bloodstream infection (Schwoebel & Creely, 2010).

Summary of quality improvement initiatives. Many QI plans created safety teams and introduced processes, such as SBAR and I-PASS, to improve the interprofessional

collaboration and communication skills of care teams. These changes followed a variety of QI strategies with a particular attention to pediatric care practices (Buck, 2008; Hayes et al., 2012; Muething et al., 2012; Peterson et al., 2012; Runy, 2007; Schwoebel & Creely, 2010; Sheth et al., 2016). This evidence suggests that hospital leadership have become cognizant of how a hospital's safety culture impacts patient care and the unique safety concerns within pediatric care settings. Quality improvement initiatives provide a synergistic effect on the safety culture of institutions, leading to improved levels of staff involvement, accountability and transparency at both the leadership and unit levels of care (Peterson et al., 2012).

Summary of Literature Review

This review of literature examined peer-reviewed studies that pertained to the concept of a pediatric hospital safety culture within the last 10 years. The publications indicated that efforts to improve the pediatric safety culture require concerted work from hospital leaders and front-line staff to improve care collaboration (Buck, 2008; Dickenson et al., 2012; Peterson et al., 2012). Multifaceted approaches to improving pediatric care were associated with significant improvements in the hospital's safety culture as measured by the HSOPSC, the SAQ and the Press Ganey Safety Culture Survey (Hayes et al., 2012; Muething et al., 2012; Peterson et al., 2012; Profit et al., 2012b; Schwoebel & Creely, 2010; Sheth et al., 2016). Collaborative models involving multiple specialty teams can accelerate improvements (Hayes et al., 2012). Through QI efforts on event identification, researchers found an increase in the reporting of safety events, with enhanced transparency and improved dimensions of safety culture at each institution

(Dickenson et al., 2012; Hayes et al., 2012; Muething et al., 2012; Peterson et al., 2012; Schwoebel & Creely, 2010).

There is a repetitive, resonating voice from these studies affirming that to improve care for children, the safety culture in hospitals must improve. Changing the safety culture of any hospital takes time. To achieve these goals, a multifaceted interprofessional approach that is supported by hospital leadership and front-line providers is necessary.

Gaps in Research

This literature review has uncovered gaps in the current research. Over a 10-year period, 59 studies evaluating the safety culture in pediatric facilities were found internationally, with the majority of research occurring from 2010 to 2016. From this review, it is clear that research concerned with the pediatric hospital safety culture is in the early stages of development. Continued research on the effectiveness of improving the safety culture of pediatric hospital's and hospital units, and how the safety culture impacts patient outcomes is crucial (Muething et al., 2012; Profit et al., 2012a; Sheth et al., 2016).

Although there have been multiple research studies that utilized the HSOPSC to measure the perceptions of a hospital's safety culture as it relates to adult care and care outcomes, only recently has there been an influx of studies evaluating similar outcome measures from the perceptions of pediatric care team members within hospital settings. In addition, much of the research in safety culture has not differentiated between the safety cultures that exist within specialties. This review of literature notes a lack of research regarding the hospital safety culture

within the pediatric specialty and how a poor safety culture impacts the care outcomes of this unique population.

Another gap is related to recent QI projects focused on improving the quality and safety of pediatric care. As was demonstrated in Chapter One, the pediatric care environment has challenges specific to this population. With age dependent physical and emotional needs, practitioners must consider multiple physiologic challenges when delivering care. The Joint Commission found that MEs are potentially more harmful and occur more often in children than in the adult population (Gonzales, 2010; The Joint Commission, 2008a). Although QI initiatives have shown improvements in outcomes and patient's satisfaction with care, additional studies are needed to further evaluate what interventions significantly improve the safety culture in the pediatric care settings (Mardon et al., 2010; Muething et al., 2012; Profit et al., 2012a; Sheth et al., 2016).

Of interest in this review of literature was the fact that there were no comparative effectiveness research (CER) studies to determine whether the safety culture impacted patient care outcomes, care collaboration and the satisfaction of the hospital staff. A CER study synthesizes evidence that compares the benefits and harms of new methods to treat and monitor a clinical condition ("Comparative effectiveness research," 2017). Research using a methodology of this kind is needed to measure the effectiveness of interventions that target safety culture, improving the quality and safety of care in pediatric settings. Such findings could inform evidence-based guidelines in promoting quality care practices that are safe in pediatric hospital settings.

Finally, there was no review of interprofessional perspectives at a national level that examined the unique viewpoints of key stakeholders such as administrators, managers, MDs, NP/PAs and RNs. These unique perceptions are created not only through personal values, attitudes and beliefs, but also through philosophies that impacted them during their academic and clinical experiences, which are formative for each professional group. Exploring differences in the conceptualization of safety culture from these perspectives will help target current and future education and care strategies to create a unified safety culture within pediatric care settings. To date, there is a gap in the patient safety literature that examines the safety culture within pediatric hospitals and specialty units on a national level from the perception of RNs, PAs/NPs, MDs and Administrators/Managers. This study will address this gap.

CHAPTER THREE

METHODS

Introduction

This chapter will present a detailed description of the methods used to address the Aims and hypotheses. Methods include a description of the study design, the research sample, the measures taken to protect human rights, and a description of the secondary data source (i.e., the 2016 Agency for Healthcare Research and Quality's (AHRQ) Hospital Survey on Patient Safety Culture (HSOPSC) comparative database). This chapter will conclude with descriptions of the variables and details regarding the procedures used for data collection, data cleaning and the data analyses. There are four research aims in this study:

Aim1: Describe the 10 safety culture dimensions and two outcome dimensions as perceived by RNs, PAs/NPs, MDs and Administrators/Managers employed within U.S. pediatric hospitals and specialty units.

Aim 2: Determine whether there is a significant difference in the perception of the 10 safety culture dimensions and two outcome dimensions as experienced by RNs, PAs/NPs, MDs and Administrators/Managers working within pediatric hospitals and specialty units.

Hypothesis: There is a difference in the perception of the 10 safety culture dimensions and two outcome dimensions as experienced by pediatric RNs, PAs/NPs, MDs and Administrators/Managers working within U.S. pediatric hospitals and specialty units.

Aim 3: Determine the association between 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between the 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Aim 4: Determine the association between the 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

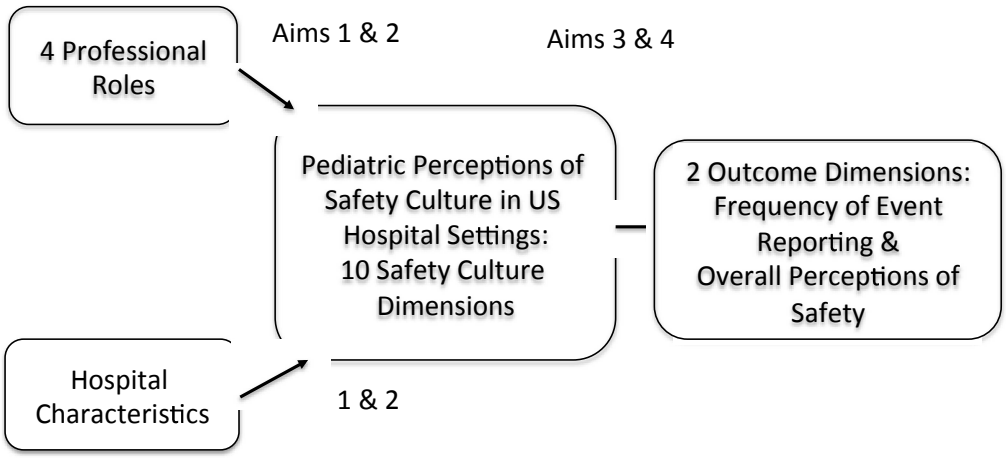
Hypothesis: There is an association between 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

Conceptual Model for Analysis

A conceptual model provides a clear and logical relationship for these four aims (see Figure 5) (Hulley, Cummings, Browner, Grady, & Newman, 2013). In the conceptual model for this study, 10 safety culture dimensions and two outcome dimensions comprise employees' perceptions of safety culture are described in Aim 1. These perceptions of safety culture were represented by four groups of healthcare professionals working within pediatric hospitals or specialty units throughout the U.S. Aim 2 determined whether there was a significant difference in these perceptions per professional group. The association of 10 safety culture dimensions to the two outcome dimensions was examined in Aim 3 (Frequency of Events Reported) and Aim 4 (Overall Perceptions of Safety). For these analyses, three covariates were introduced: (a) the bed

size of the hospital, (b) whether the hospital was a teaching or non-teaching facility, and (c) the region within the U.S. where the hospital was located. These characteristics and their impact on the two outcome dimensions were also examined in Aim 3 and Aim 4.

Figure 5. Conceptual model for analysis



Research Design and Study Sample

This study was a retrospective, descriptive cross-sectional clustered design using a nonprobability convenience sample from the AHRQs HSOPSC 2016 comparative database (Famolaro et al., 2016; Hulley et al., 2013; Trzesniewski, Donnellan, & Lucas, 2011). Surveys were administered and cleaned by each hospital, following specific instructions. Data were then submitted to a central location managed by Westat®, where a second level of cleaning was performed. This final dataset represented hospitals throughout the U.S. that self-selected to participate in the HSOPSC comparative database.

Obtaining the Hospital Survey on Patient Safety Culture Database

Westat®, an independent contractor, provided a national repository for this tool (Westat, 2017). To obtain the database for this study, Westat® required a formal written request, which was approved (see Appendix F). The 2016 U.S. HSOPSC dataset was approved and received electronically in June 2017 from Westat®.

Human Subjects Protection

Hospital leadership had the freedom to choose what population would be asked to participate in the HSOPSC, with individual participation being voluntary. The organizations also had the freedom to choose whether to participate in the comparative database. All participating hospitals submitted individual-level survey data. All hospital leadership that submitted data for the 2016 Comparative Database signed a data use agreement maintained at Westat® allowing their de-identified data to be made accessible for healthcare research (Sorra et al., 2016). Copies of the databases were downloaded into a protected server maintained by Loyola University Chicago, and all written material were stored in a locked cabinet, with the researcher having the sole key.

Although human subjects were involved in the data collection, only de-identified data were used for this research, which were supplied by Westat® (Sorra et al., 2016). Upon review, this study was found exempt by the Internal Review Board at Loyola University Chicago (see Appendix G).

Description of the HSOPSC Comparative Database

The HSOPSC was made available to the public by AHRQ in November 2004 (Sorra & Nieva, 2004). In 2006, the agency made an open call to hospitals throughout the U.S. for the

voluntary submission of their hospital survey data. From this request, hospital leadership willingly submitted data from over 100,000 respondents for the initial 2007 comparative HSOPSC database (Famolaro et al., 2016). The AHRQ also created a central repository for comparative databases and contracted with Westat® to maintain these datasets. From 2007-2014, HSOPSC data were collected yearly. In 2014, the call for data collection was extended to every two years (Famolaro et al., 2016).

In the 2016 dataset, the American Hospital Association's designation of a children's hospital was included in the AHRQ's data collection for the first time. Previously, the designation of whether a hospital was a freestanding pediatric hospital was not part of the demographics. Although these data were collected by the survey, to protect hospital's anonymity, the data were not made available to this researcher. The identification of pediatric professionals on an individual level was available to this researcher in the 2016 HSOPSC dataset, which was of particular interest for this study.

Hospitals followed AHRQ's strict guidelines before submitting data for the comparative database (Famolaro et al., 2016). A description of how the surveys were administered, how the study populations were selected, how the survey data were analyzed, and how comparative datasets were created are described below (Famolaro et al., 2016). It is important to note that the survey implementation guidelines were to be adhered to by hospital researchers and there was no way to validate that hospitals followed the guidelines verbatim.

Hospital Guidelines in Implementing the Survey

Each hospital distributed surveys as web surveys, on paper, or as a combination of the two. As mentioned in Chapter Two, items and questions that used a five-point Likert scale for

agreement (strongly disagree to strongly agree) or frequency (never to always) were contained in the HSOPSC (Sorra & Nieva, 2004). Paper surveys were distributed at staff meetings, emphasizing hospital leadership's support of the project. Surveys dispensed electronically utilized respondent's emails through web-based distributions, introducing each to the project, with scheduled notifications reminding staff to participate in the study by completing the survey (Sorra et al., 2016). All web-based surveys were pretested prior to administration by using the same type of computers hospital staff used, as well as testing the administration of the survey with various Internet browsers (Explorer, Safari, Firefox, Chrome, Mozilla and Opera) and display settings (Sorra et al., 2016).

Historically, AHRQ stated that average response rates had been slightly higher for paper administration, although comparative data demonstrated hospitals preferred administering the surveys via the web (Sorra et al., 2016). Surveys were given individually and anonymously. If multiple hospitals were surveyed, a hospital-level identifier was assigned to track the surveys from each facility and to allow for the production of feedback reports for each hospital (Sorra et al., 2016). Hospitals were able to use outside vendors for the collection of data and were allowed up to 10 weeks to complete their project (Sorra et al., 2016).

Survey population selection. The survey queried hospital staff. The project directors determined the selection of the sample from this population, with the selected sample closely representing the population at that facility (Sorra et al., 2016). For hospitals with populations of physicians and staff of 500 or less, AHRQ recommended that a consensus survey should be conducted in which information is gathered from all hospital employees (Famolaro et al., 2016). For hospitals with physicians and staff from 501–999, AHRQ recommended a minimum of 500

respondents participate in the survey. For institutions with physicians and staff from 1,000–2,999, it was recommended that a minimum of 600 respondents participate (Sorra et al., 2016). These target sample sizes were based on the assumptions that the sample was simple random or systematic random, with a response rate of 50% and a confidence interval +/- 5% (Sorra et al., 2016).

Samples included staff in particular professional categories, such as nursing, or in particular units, such as the operating room or the pediatric unit (Sorra et al., 2016). When the sample was determined by research teams, a list consisting of participants' first and last names, internal addresses, hospital areas or units, and their staffing category or job title was created and stored in a secured location within their facility. In addition, researchers who conducted web-based surveys or used emails to send pre-notifications also kept records of participants' email addresses in a similar location that was secure (Sorra et al., 2016). Employees who no longer worked at the facility, were on administrative or sick leave, or who left the facility were removed from the list by hospital researchers prior to administering the survey (Sorra et al., 2016).

Analysis and first level of data cleaning by hospitals. The first data cleaning for the comparative database took place at the hospital level. Researchers at hospitals and hospital organizations either conducted their own data entry, analysis and report preparation or contracted with a company to do the same. When the paper surveys were returned, researchers excluded surveys that had blank areas or contained the same answer for all the questions. Also, surveys that were illegible, mismarked or had double responses were excluded and discarded (Sorra et al., 2016).

Creating datasets. Once the surveys were cleaned, a response rate was calculated and a dataset was created. The data for paper survey administration were entered into a data file using SAS®, SPSS®, Microsoft Excel®, or by sending the data in an easily imported file to Westat®, using the electronic address of databasesonsafetyculture@westat.com. All data were stored on the Westat® protected server (Sorra et al., 2016).

For paper survey administration, surveys were de-identified with numbers assigned to all surveys and all information linking the number to a respondent's name destroyed (Sorra et al., 2016). For web surveys, hospital personnel involved in the survey administration assured participants that responses were coded and captured accurately in computer-based data files and that surveys were administered anonymously (Sorra et al., 2016). Although there was the ability at the end of the survey for free text comments, these comments were not captured in the AHRQ dataset and therefore were not included in this study.

Second level of data cleaning by Westat®. Westat® conducted a second cleaning of data. In this process, Westat® ran response frequencies on each hospital's data looking for outliers, missing variables or other anomalies (Sorra et al., 2016). When data problems were noted, hospitals were contacted and asked to make corrections and resubmit their data (Sorra et al., 2016). Each participating hospital was sent a copy of its data frequencies to verify that the dataset Westat® received was correct (Sorra et al., 2016). All respondents supplying the same answers within or across survey sections with a nondifferentiation in ratings, or who answered only demographic items, were deleted before analysis (Sorra et al., 2016). Westat® also excluded hospitals that did not administer the entire survey, did not ask what unit the respondent worked in, or only had one unit that responded to the survey (Sorra et al., 2016; Sorra & Dyer,

2010). Units within hospitals were dropped if there were fewer than three respondents or if the unit was identified as "other" or "many different work units." In these cases, individuals did not belong to the same unit and therefore should not be grouped together for analysis (Sorra & Dyer, 2010; Sorra et al., 2016).

Justification of Sample Size

The 2016 HSOPSC dataset has been shown to have an adequate sample size for this study with data collected between June 2013 and July 2015. Within the dataset, there were 680 hospitals that submitted data from 447,584 respondents (Famolaro et al., 2016). Of that subset, 31,509 (7%) of respondents worked in 102 children's hospitals and pediatric hospital units registered by the American Hospital Association (Famolaro et al., 2016). Data representing the responses of pediatric organizational leaders and practitioners can be extracted from the main dataset, thereby providing the study samples for this research. The 2016 U.S. database supports the statistical power to test complex multivariable analyses for this study (Trzesniewski et al., 2011).

Development of the 2016 HSOPSC Pediatric Datasets

To address the aims, pediatric variables were filtered from the 2016 U.S. HSOPSC dataset creating pediatric subsets for RNs, PAs/NPs, MDs and Administrators/Managers. These pediatrics subsets could then be merged into one large pediatric dataset, as required for analysis. Details on how the data were transformed to filter pediatric variables are described below.

Variables

There are two independent variables—professional role and hospital characteristics—and 12 dependent variables—the 10 safety culture dimensions and the two outcome dimensions. Each will be conceptually and operationally defined below.

Independent Variables

The responses of persons that self-identified as having worked within a pediatric hospital or work area, at one of the four professional levels (RNs, PAs/NPs, MDs and Administrators/Managers), were the independent variables. These professional groups were studied for their effects on the dependent variables, the 12 safety culture dimensions.

Extraction of the independent variables. Section A in the HSOPSC includes questions related to each respondent's work area or unit (see Appendix B). Respondents self-identified the department or clinical area of the hospital where they spent most of their work time or provided most of their clinical services, with pediatric specialty as an option. This was initially coded as 'e' in the original survey and dataset, but transformed to '6' for statistical analysis (see Appendix B) (Famolaro et al., 2016).

The covariates of hospital bed size, teaching status and region within the U.S. were demographic characteristics relating to the four types of professionals and were also extracted from the original dataset. These covariates were chosen to determine whether the perceptions of RNs, PAs/NPs, MDs and Administrators/Managers differed depending on the size, location and teaching status of their pediatric hospital or specialty unit within the U.S. These three covariates were also independent variables in the analyses.

Dependent Variables

Extraction and transformation of dependent variables. The 10 safety culture dimensions and two outcome dimensions were the dependent variables, described in detail in Chapter Two (see Figure 3). Table 3 outlines each dimension and the associated nomenclature that identifies the items or questions in the survey that pertains to each dimension. For example,

the four items or questions that pertain to the dimension of Teamwork Within Hospital Units can be found within the HSOPSC, in section A, items 1, 3, 4 and 11 (see Table 3 and Appendix B).

Table 3. HSOPSC Categories, Culture Categories, Dimensions and Items

Safety Culture Dimensions	Survey Items and Questions
Teamwork Within Hospital Units	A1, A3, A4, A11
Organizational Learning-Continuous Improvement	A6, A9, A13
Staffing	A2, A5, A7, A14
Nonpunitive Response to Error	A8, A12, A16
Hospital Management Support for Patient Safety	F1, F8, F9
Supervisor/Manager Expectations and Actions Promoting Safety	B1, B2, B3, B4
Feedback and Communication About Error	C1, C3, C5
Communication Openness	C2, C4, C6
Teamwork Across Hospital Units	F2, F4, F6 F10
Hospital Handoffs and Transitions	F3, F5, F7, F11
Two Outcome Dimensions	
Frequency of Event Reporting	D1, D2, D3
Overall Perceptions of Safety	A10, A15, A17, A18

The items and questions in the HSOPSC were measured for agreement (strongly disagree to strongly agree) or frequency (never to always) using a five-point Likert scale (Sorra & Nieva, 2004). Items included in the survey (see Appendix B) were both positively worded ("People

support one another in this unit") and negatively worded items ("We have patient safety problems in this unit") (Famolaro et al., 2016). Prior to release of the 2016 HSOPSC dataset, Westat® transformed negatively worded responses to a positive Likert scale (Famolaro et al., 2016).

Dimensions

The following section conceptually and operationally defines the dependent variables, which are the safety culture dimensions. The corresponding items and questions in the survey that relate to each dimension are also listed below (Sorra et al., 2016; Sorra & Nieva, 2004).

Your Work Area. Hospital units, or Work Areas, were defined as places within the organization that were not considered departments and provide specialized patient care ("Hospital units," 2012). Examples were the intensive care unit, a surgical unit, or the NICU. Work Area includes five dimensions, which are defined and operationalized below.

1. "Teamwork Within Hospital Units" is defined as the hospital staff within a unit being supported by, and respectful of, one another. This was operationalized with survey items A1, A3, A4 and A11.
2. "Staffing" is defined as perceived adequate staff numbers to meet workload in order to provide quality patient care. This was operationalized with survey items A2, A5, A7 and A14.
3. "Organizational Learning-Continuous Improvement" is defined as the perception that employees can learn from their mistakes, which in turn can lead to positive changes. This was operationalized with survey items A6, A9 and A13.

4. "Nonpunitive Response to Error" is defined as staff understanding that any mistakes they had made in the past would not be held against them, and that written reports of such events would not be kept in their personnel file. This was operationalized with survey items A8, A12 and A16.
5. "Hospital Management Support for Patient Safety" is defined as the staff's perception that their hospital management provided a work climate that promoted patient safety and confirmed to employees that patient safety was a top priority. This was operationalized with survey items F1, F8 and F9.

Supervisor/Manager. This category is defined as a person who guides hospital employees as a team. This category was defined by one dimension, which are described and operationalized below.

1. "Supervisor/Manager Expectations and Actions Promoting Safety" is defined as the perception hospital staff has of their supervisors and managers regarding activities that improve patient safety. This was operationalized with survey items B1, B2, B3 and B4.

Communication. Communication is defined as the exchange of information, thoughts and feelings among people using speech or other means while providing patient care (Kourkouta & Papathanasiou, 2014). This category had two dimensions, which are defined and operationalized below.

1. "Feedback and Communication About Error" is defined as the staff's perception of being informed of recent errors and receiving feedback on how such errors can be prevented. In addition, staff believed that they were informed of changes that were put into place to prevent future events. This was operationalized with survey items C1, C3 and C5.

2. "Communication Openness" is defined as staff members perceiving they could freely speak up if they saw something that negatively affected patient care. They also were free to question authority. This was operationalized with survey items C2, C4 and C6.

Your Hospital. The hospital category refers to the institution in which sick or injured persons are given medical or surgical treatment and where respondents of the survey were employed ("Hospitals," 2017). This category had two dimensions, which are defined and operationalized below.

1. "Teamwork Across Hospital Units" is defined as hospital units cooperating and coordinating patient care activities with one another, in the best interest of their patients. This dimension also includes whether hospital systems foster teamwork between hospital units. This was operationalized with items or questions F2, F4, F6 and F10.
2. "Hospital Handoffs and Transitions" is defined as a dimension that relates to whether practitioners believe important patient information has been transferred from one care provider to another, across hospital units and during the change of shifts. This was operationalized with items or questions F3, F5, F7 and F11.

Outcome Dimensions

There were two additional dependent variables, which were the outcome dimensions: "Frequency of Event Reporting" and "Overall Perceptions of Safety." These dimensions are defined and operationalized below.

1. "Frequency of Event Reporting" is defined as the staff's perception of how frequently errors occur and the prevalence of reporting such errors. This outcome dimension was operationalized with survey items D1, D2 and D3.

2. "Overall Perceptions of Safety" is defined as the general sense employees had of their organization's error prevention procedures and systems. This outcome dimension was operationalized with items or questions A8, A10, A15 and A17.

Data Analysis

The 2016 HSOPSC dataset was obtained from Westat®, which contained responses from all levels of hospital employees in all specialty areas throughout the country. Data related to the pediatric setting was extracted from that dataset and further divided into professional groupings of pediatric administration/managers, MDs, PAs/NPs and RNs. Data were analyzed by using the latest version of the statistical software program SPSS®. In the following section, the assumptions for parametric testing will be discussed. This will be followed by the research aims and analyses that are pertinent to address each aim.

Large Datasets and Testing Assumptions

A cross-sectional study of secondary data is well suited for describing variables and their distribution patterns. Secondary data, or data collected for other reasons, provides researchers the ability to evaluate quality markers within institutions over time (Burkhart, et al., 2016). Such methods can identify the impact of quality innovations that are independent of other variables within the organization's settings (Burkhart, et al., 2016). Large samples, such as that in this study, provide the statistical power to test complex multivariable and multivariate analyses and provide the opportunity to investigate low prevalence behaviors on small population subgroups typically understudied (Trzesniewski et al., 2011). This design was valuable in providing descriptive information about the prevalence of safety culture from representatives of the pediatric care specialty at a national level (Hulley et al., 2013; Trzesniewski et al., 2011). Such

information has historically been valuable for policy research for which typical goals are to provide findings specific to target policy audiences, such as that within the pediatric specialty (Trzesniewski et al., 2011). A cross-sectional study of secondary data is well suited for describing the perceptions and distribution patterns of safety culture dimensions from the viewpoint of RNs, PAs/NPs, MDs and Administrators/Managers in U.S. pediatric hospitals and specialty units. The assumptions were that the sample was random or systematic random, with a response rate of 50% and a confidence interval of +/− 5% (Sorra et al., 2016).

Aim 1 and Analysis

Describe the 10 safety culture dimensions and two outcome dimensions as perceived by RNs, PAs/NPs, MDs and Administrators/Managers employed within U.S. pediatric hospitals and specialty units.

Analysis was conducted using descriptive statistics, including mean, standard deviation and sample size (Pallant, 2010).

Aim 2: Hypothesis and Analysis

Determine whether there is a significant difference in the perception of the 10 safety culture dimensions and two outcome dimensions as perceived by RNs, PAs/NPs, MDs and Administrators/Managers working within pediatric hospitals and specialty units.

Hypothesis: There is a significant difference in the perception of the 10 safety culture dimensions and two outcome dimensions as perceived by RNs, PAs/NPs, MDs and Administrators/Managers working within pediatric hospitals and specialty units.

Analysis for Aim 2 involved several steps using multivariate analysis of variance (MANOVA) and post hoc tests using multivariate analysis of covariance (MANCOVA) and

Tukey's Honestly Significant Different (HSD) pairwise comparisons. Such testing compares the groups, underscoring whether the mean differences between the groups on the combination of dependent variables may have occurred by chance (Field, 2011; Pallant, 2010). MANOVA provided data noting whether there was a statistically significant difference between the four professional groups as they relate to the 10 safety culture dimensions and two outcome dimensions. MANCOVA provided data noting whether there was a statistically significant difference between the four professional groups as they relate to the 10 safety culture dimensions and two outcome dimensions, using a 4 x 12 matrix (roles by dimensions), considering three hospital covariates of bed size, teaching status and region within the U.S.

Tukey's (HSD) was included to provide a more stringent one-way between-groups analysis of variance (ANOVA) due to the large number of different comparisons and to guard against a Type 1 error, particularly due to large differences in group sample sizes (Pallant 2010). In summary, the MANCOVA controlled for the covariates, while the Tukey's HSD did not control for the covariates. Both tests were used to evaluate differences across professional roles. Testing was performed at the 0.05 level of significance. It was determined at the onset of this study that the Likert scales would be considered interval measures (Jamieson, 2004; Knapp, 1990).

Aim 3: Hypothesis and Analysis

Determine the association between 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between the 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Analysis for Aim 3 involved parametric testing with partial correlations between the 10 safety culture dimensions and the first outcome dimension of the perceived Frequency of Event Reporting by pediatric practitioners in the U.S. while controlling for the impact of the Overall Perceptions of Safety. Partial correlation was used to explore the relationships between two variables while statistically controlling for a confounding variable (Pallant, 2010). This test is useful when it is suspected that a relationship between two variables may be influenced by a confounding variable (Pallant, 2010). A positive correlation indicates that when one variable increases, so does the other. A negative correlation indicates that as one variable increases, another will decrease (Pallant, 2010). A partial correlation allows for control of the possible effects of other confounding variables by removing these variables. This allows a more accurate picture of the relationship between the variables of interest (Pallant, 2010). It is noted that although a relationship between the two variables may be detected, findings are descriptive and does not indicate causality (Pallant, 2010).

Aim 4: Hypothesis and Analysis

Determine the association between the 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

Analysis for Aim 4 is similar to that for Aim 3. The association will be determined between the 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety while controlling for the impact of the perceived Frequency of Event Reporting (Pallant, 2010). Once again it is noted that although a relationship between the two variables may be detected, findings are descriptive and does not indicate causality (Pallant, 2010).

CHAPTER FOUR

RESULTS

This chapter presents the analysis and findings for this study. It begins with a description of the sample, followed by the analysis findings of the four study aims.

Sample

The 2016 database had a total of 447,584 hospital staff respondents, of which 6,862 identified as working within the pediatric specialty. Within the pediatric specialty, there were 397 Administrators/Managers, 832 MDs, 341 PAs/NPs and 5,292 RN (see Table 4). Pediatric registered nurses had the largest number of responses (77.1 %), followed by MDs (12.1%), administrators/managers (5.8%) and PAs/NPs (5 %).

Table 4. Sample per Professional Level

Respondent Category	N	Percent
Administrators/Managers	397	5.8
Physicians	832	12.1
Physician assistants/Nurse practitioners	341	5.0
Registered Nurses	5,292	77.1
Total	6,862	100

Samples were taken from five regions in the U.S.: New England and Mid-Atlantic, South Atlantic, East Central, West Central and Mountain and Pacific (see Table 5). The majority of these responses from pediatric employees were found in the New England/Mid-Atlantic and South Atlantic regions of the U.S. with a combined total of 3,355 responses (48.8%). The region where pediatric hospitals and specialty units were located was considered a covariate in this analysis.

Table 5. Frequency and Percent of Responses per U.S. Region

Region	Frequency of Responses	Percent
New England/Mid-Atlantic	1,639	23.8
South Atlantic	1,716	25.0
East Central	1,549	22.5
West Central	952	13.8
Mountain & Pacific	1,019	14.8
Missing*	13	0.19
Total	6,875	100

* Missing data due to program calculations within SPSS

The bed size of the hospital where pediatric professionals were employed was a consideration in this study (see Table 6). Hospitals with 300 beds or more accounted for 55.6%, or 3,823 responses from pediatric RNs, PA/NPs, MDs and Administrators/Managers. The size of the hospital was the second covariate in this study.

Table 6. Frequency and Percent of Responses per Bed Size of U.S. Pediatric Hospitals

Bed Size	Frequency of Responses	Percent
6-49	212	3.1
50-99	550	8.0
100-199	930	13.5
200-299	1,360	19.8
300-399	621	9.0
400 and more	3,202	46.6
Missing*	13	0.19
Total	6,875	100

*Missing data due to program calculations within SPSS

A third covariate within the 2016 HSOPSC data subsets was whether pediatric hospitals or specialty units were located within a teaching or nonteaching facility, creating the third covariate in this analysis (see Table 7). In this sample, there were 83.1 % of the responses employed at teaching hospitals.

Table 7. Frequency and Percent of Responses per Teaching Status of U.S. Pediatric Hospitals

Type of Hospital	Frequency of Responses	Percent
Non-Teaching	1,163	16.9
Teaching	5,712	83.1
Missing*	13	0.19
Total	6,875	100

*Missing data due to program calculations within SPSS

Aim 1 Findings

Descriptive statistics of the four professional groups are presented per dimension. When analyzing data for the descriptive means and standard deviations, as well as for MANOVA, MANCOVA, and for partial correlations, SPSS® drops all surveys that were not answered completely. Therefore, the final sample sizes used for the multiple analyses were below that found in the descriptive statistics due to SPSS® program calculations. For the sample of RNs, there were 732 (14%) fewer responses in the analysis when compared to the original descriptive statistics. For the sample of PAs/NPs, there were 87 (26%) fewer responses in the analysis when compared to the original descriptive statistics. For the sample of MDs, there were 200 (24%) fewer responses in the analysis when compared to the original descriptive statistics. For the sample of Administrators/Managers, there were 70 (18%) fewer responses in the analysis when compared to the original descriptive statistics.

Teamwork Within Hospital Units

As shown in Table 8, this dimension had an overall mean of 4.14 with a standard deviation of 0.66. All professional groups, on average, rated this dimension very high, with only one professional group (RNs) rating this dimension below the overall mean.

Table 8. Teamwork Within Hospital Units per Professional Group

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	4.10	0.675
PA/NP	254	4.4	4.14	0.604
MD	632	11.0	4.24	0.613
Adm/Mgr	327	5.7	4.38	0.582
Total	5773	100	4.14	0.664

Staffing

As shown in Table 9, this dimension had an overall mean of 2.66 with a standard deviation of 0.536. All professional groups, on average, rated this dimension low, with two professional groups (PAs/NPs and Administrators/Managers) rating this dimension below the overall mean.

Table 9. Staffing per Professional Group

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	2.67	0.535
PA/NP	254	4.4	2.62	0.540
MD	632	11.0	2.74	0.506
Adm/Mgr	327	5.7	2.56	0.580
Total	5773	100	2.66	0.536

Organizational Learning-Continuous Improvement

As shown in Table 10, this dimension had an overall mean of 3.86 with a standard deviation of 0.655. All professional groups, on average, rated this dimension high, with two professional groups (RNs and PAs/NPs) rating this dimension below the overall mean.

Table 10. Organizational Learning-Continuous Improvement

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.83	0.662
PA/NP	254	4.4	3.85	0.622
MD	632	11.0	3.91	0.598
Adm/Mgr	327	5.7	4.22	0.585
Total	5773	100	3.86	0.655

Nonpunitive Response to Error

As shown in Table 11, this dimension had an overall mean of 2.71 with a standard deviation of 0.933. All professional groups, on average, rated this dimension low, with one professional group (RNs) rating this dimension above the overall mean.

Table 11. Nonpunitive Response to Error

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	2.77	0.938
PA/NP	254	4.4	2.60	0.849
MD	632	11.0	2.53	0.851
Adm/Mgr	327	5.7	2.24	0.890
Total	5773	100	2.71	0.933

Hospital Management Support for Patient Safety

As shown in Table 12, this dimension had an overall mean of 3.41 with a standard deviation of 0.485. All professional groups, on average, rated this dimension above neutral, with one professional group (RNs) rating this dimension below the overall mean.

Table 12. Hospital Management Support for Patient Safety

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.39	0.495
PA/NP	254	4.4	3.43	0.452
MD	632	11.0	3.46	0.448
Adm/Mgr	327	5.7	3.59	0.381
Total	5773	100	3.41	0.485

Supervisor/Manager Expectations and Actions Promoting Safety

As shown in Table 13, this dimension had an overall mean of 2.96 with a standard deviation of 0.408. Means around 3.0 were considered neutral. All professional groups, on

average, rated this dimension neutral, with two professional groups (PAs/NPs and MDs) rating this dimension below the overall mean.

Table 13. Supervisor/Manager Expectations and Actions Promoting Safety

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	2.96	0.412
PA/NP	254	4.4	2.91	0.412
MD	632	11.0	2.94	0.402
Adm/Mgr	327	5.7	2.97	0.352
Total	5773	100	2.96	0.408

Communication Openness

As shown in Table 14, this dimension had an overall mean of 3.23 with a standard deviation of 0.448. All professional groups, on average, rated this dimension neutral, with two professional groups (RNs and PAs/NPs) rating this dimension below the overall mean.

Table 14. Communication Openness

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.21	0.452
PA/NP	254	4.4	3.28	0.417
MD	632	11.0	3.27	0.407
Adm/Mgr	327	5.7	3.43	0.437
Total	5773	100	3.23	0.448

Feedback and Communication About Error

As shown in Table 15, this dimension had an overall mean of 3.80 with a standard deviation of 0.802. All professional groups, on average, rated this dimension high, with two professional groups (RNs and PAs/NPs) rating this dimension below the overall mean.

Table 15. Feedback and Communication About Error

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.77	0.807
PA/NP	254	4.4	3.71	0.750
MD	632	11.0	3.80	0.774
Adm/Mgr	327	5.7	4.17	0.729
Total	5773	100	3.80	0.802

Teamwork Across Hospital Units

As shown in Table 16, this dimension had an overall mean of 3.10 with a standard deviation of 0.332. All professional groups, on average, rated this dimension neutral, with little differences between the means of the four professional groups.

Table 16. Teamwork Across Hospital Units

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.10	0.332
PA/NP	254	4.4	3.08	0.371
MD	632	11.0	3.08	0.295
Adm/Mgr	327	5.7	3.07	0.370
Total	5773	100	3.10	0.332

Hospital Handoffs and Transitions

As shown in Table 17, this dimension had an overall mean of 2.64 with a standard deviation of 0.792. All professional groups, on average, rated this dimension low, with one professional group (Administrators/Managers) rating this dimension below the overall mean.

Table 17. Hospital Handoffs and Transitions

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	2.65	0.780
PA/NP	254	4.4	2.72	0.793
MD	632	11.0	2.65	0.837
Adm/Mgr	327	5.7	2.46	0.854
Total	5773	100	2.64	0.792

Frequency of Event Reporting

As shown in Table 18, this dimension had an overall mean of 3.80 with a standard deviation of 0.811. All professional groups, on average, rated this dimension high, with two professional groups (PAs/NPs and MDs) rating this dimension below the overall mean.

Table 18. Frequency of Event Reporting

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.81	0.811
PA/NP	254	4.4	3.63	0.842
MD	632	11.0	3.74	0.790
Adm/Mgr	327	5.7	3.98	0.783
Total	5773	100	3.80	0.811

Overall Perceptions of Safety

As shown in Table 19, this dimension had an overall mean of 3.01 with a standard deviation of 0.411. All professional groups, on average, rated this dimension neutral, with one professional group (RNs) rating this dimension above the overall mean.

Table 19. Overall Perceptions of Safety

Professional Group	Sample Size	Percent	Mean	Standard Deviation
RN	4560	79.2	3.02	0.413
PA/NP	254	4.4	2.97	0.374
MD	632	11.0	2.98	0.392
Adm/Mgr	327	5.7	2.99	0.435
Total	5773	100	3.01	0.411

Aim 2 Findings

Determine whether there is a significant difference in the perception of the 10 safety culture dimensions and two outcome dimensions as perceived by pediatric RNs, PAs/NPs, MDs and Administrators/Managers working within pediatric hospitals and specialty units. MANOVA and MANCOVA pairwise comparisons along with post hoc testing using and Tukey's HSD were used per dimension for each set of professional groups. Tables reflecting these comparisons will follow.

Multivariate Testing

MANOVA and MANCOVA were run to determine if a statistical significance was present between the safety culture dimensions and RNs, PAs/NPs, MDs and Administrators/Managers. There was a statistical significance between the four professional

groups and the 12 safety culture dimensions, which include the two outcome dimensions, using MANOVA and controlling for the covariates of bed size, teaching status and geographic region using MANCOVA (see Table 20). There was a statistically significant difference for both analyses.

Table 20. Multivariate Statistics for Professional Groups

Statistical Test	Test	Value	F	Hypothesis df	Error df	Sig.
MANOVA	Wilks' Lambda	0.95	8.94	36	17013	< 0.001
MANCOVA	Wilks' Lambda	0.95	8.40	36	17261	< 0.001

Teamwork Within Hospital Units

As shown in Table 21 for MANOVA, there were statistically significant differences between RNs-MDs, PAs/NPs-MDs, RNs-Administrators/Managers, PA/NPs-Administrators/ Managers and MD-Administrators/Managers. When controlling for covariates (MANCOVA), statistical significance did not change for the six pairings. When controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MD- Administrators/ Managers. Using Tukey's HSD post-hoc test, statistical significance changed for the pairwise comparison between the PAs/NPs-MDs for this dimension, going from statistically significant to insignificant. There were no statistically significant differences between RNs-PAs/NPs for the Teamwork Within Hospital Units dimension.

Table 21. Pairwise and Post-Hoc Testing of Professional Groups for Teamwork Within Hospital Units Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.362	0.307	0.799
RN & MD	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & MD	**0.045**	**0.037**	0.185
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**< 0.001**
MD & Adm	**< 0.003**	**0.004**	**0.014**

Note: Bold type indicates $p < 0.05$

Staffing

As shown in Table 22, there were statistically significant differences among professional groups for the Staffing dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-MDs, PAs/NPs-MDs, RNs-Administrators/Managers and MDs-Administrators/Managers. Similarly, when controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-MDs, PAs/NPs-MDs, RNs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences for RNs-PAs/NPs and PAs/NPs-Administrators/Managers for the Staffing dimension.

Table 22. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Staffing Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.145	0.177	0.462
RN & MD	**0.002**	**0.001**	**0.011**
PA/NP & MD	**0.002**	**0.002**	**0.013**
RN & Adm	**0.001**	**0.002**	**0.004**
PA/NP & Adm	0.241	0.264	0.643
MD & Adm	**< 0.001**	**< 0.001**	**< 0.001**

Note: Bold type indicates $p < 0.05$

Organizational Learning-Continuous Improvement

As shown in Table 23, there were statistically significant differences between professional groups for the Organizational Leaning and Continuous Improvement dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. Similarly, when controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-MDs, RNs-Administrators/ Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences between RNs-PAs/NPs and PAs/NPs-MDs for the Organizational Learning-Continuous Improvement dimension.

Table 23. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Organizational Learning-Continuous Improvement Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.490	0.649	0.901
RN & MD	**0.003**	**0.004**	**0.017**
PA/NP & MD	0.280	0.214	0.702
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**< 0.001**
MD & Adm	**< 0.001**	**< 0.001**	**< 0.001**

Note: Bold type indicates $p < 0.05$

Nonpunitive Response to Error

As shown in Table 24, there were statistically significant differences between professional groups for the Nonpunitive Response to Error dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-PAs/NPs, RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. Similarly, when controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-PAs/NPs, RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There was no statistically significant difference for PAs/NP-MDs.

Table 24. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Nonpunitive Response to Error Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	**0.004**	**0.010**	**0.020**
RN & MD	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & MD	0.303	0.281	0.732
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**< 0.001**
MD & Adm	**< 0.001**	**< 0.001**	**< 0.001**

Note: Bold type indicates $p < 0.05$

Hospital Management Support for Patient Safety

As shown in Table 25, there were statistically significant differences between profession roles for the Hospital Management Support for Patient Safety dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/ Managers. Similarly, when controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences between RNs-PAs/NPs and PAs/NPs-MDs.

Table 25. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Hospital Management Support for Patient Safety Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.227	0.390	0.621
RN & MD	**0.002**	**0.004**	**0.012**
PA/NP & MD	0.484	0.371	0.897
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**0.001**
MD & Adm	**< 0.001**	**< 0.001**	**< 0.001**

Note: Bold type indicates $p < 0.05$

Supervisor/Manager Expectations and Actions Promoting Safety

As shown in Table 26, there were no statistically significant differences between the four professional groups for the Supervisor/Manager Expectations and Actions Promoting Safety dimension.

Table 26. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for Supervisor/Manager Expectations and Actions Promoting Safety Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.063	0.152	0.245
RN & MD	0.175	0.345	0.528
PA/NP & MD	0.400	0.481	0.835
RN & Adm	0.560	0.290	0.937
PA/NP & Adm	0.067	0.067	0.257
MD & Adm	0.182	0.138	0.541

Communication Openness

As shown in Table 27, there were statistically significant differences between the professional groups for the Communication Openness dimension. When controlling for covariates (MANCOVA), there was a statistically significant difference between RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/ Managers. Similarly, when controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-MDs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences between RNs-PAs/NPs and PAs/NPs-MDs for the Communication Openness dimension.

Table 27. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Communication Openness Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.720	0.734	0.984
RN & MD	**< 0.001**	**< 0.001**	**0.002**
PA/NP & MD	0.089	0.092	0.323
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**0.001**
MD & Adm	**< 0.001**	**< 0.001**	**< 0.001**

Note: Bold type indicates $p < 0.05$

Feedback and Communication About Error

As shown in Table 28, there were statistically significant differences for the Feedback and Communication About Error dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. Similarly, when controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences between RNs-PAs/NPs, RNs-MDs and PAs/NPs-MDs for the Feedback and Communication About Error dimension.

Table 28. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Feedback and Communication About Error Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.149	0.099	0.471
RN & MD	0.402	0.532	0.836
PA/NP & MD	0.083	0.073	0.307
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**0.001**
MD & Adm	**< 0.001**	**< 0.001**	**< 0.001**

Note: Bold type indicates $p < 0.05$

Table 29. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Teamwork Across Hospital Units Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.254	0.249	0.665
RN & MD	0.148	0.146	0.470
PA/NP & MD	0.871	0.867	0.998
RN & Adm	0.084	0.077	0.309
PA/NP & Adm	0.761	0.746	0.990
MD & Adm	0.582	0.563	0.947

Teamwork Across Hospital Units

As shown in Table 29, there were no statistically significant differences between the four professional groups for the Teamwork Across Hospital Units dimension.

Hospital Handoffs and Transitions

As shown in Table 30, there were statistically significant differences between professional groups for the Hospital Handoffs and Transitions dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. When controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences between RNs-PAs/NPs, RNs-MDs and PAs/NPs-MDs for the Hospital Handoffs and Transitions dimension.

Table 30. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Hospital Handoffs and Transitions Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.158	0.214	0.492
RN & MD	0.996	0.745	1.000
PA/NP & MD	0.222	0.205	0.613
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**< 0.001**
MD & Adm	**0.001**	**< 0.001**	**0.003**

Note: Bold type indicates $p < 0.05$

Frequency of Event Reporting

As shown in Table 31, there were statistically significant differences between professional groups for the perceived Frequency of Event Reporting dimension. When controlling for covariates (MANCOVA), there were statistically significant differences between RNs-PAs/NPs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. When controlling for multiple comparisons (Tukey's HSD), there were statistically significant differences between RNs-PAs/NPs, RNs-Administrators/Managers, PAs/NPs-Administrators/Managers and MDs-Administrators/Managers. There were no statistically significant differences between RNs-MDs and PAs/NPs-MDs for the perceived Frequency of Event Reporting dimension.

Table 31. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the perceived Frequency of Event Reporting Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	**0.001**	**0.001**	**0.003**
RN & MD	**0.040**	0.063	0.168
PA/NP & MD	0.067	0.065	0.260
RN & Adm	**< 0.001**	**< 0.001**	**< 0.001**
PA/NP & Adm	**< 0.001**	**< 0.001**	**< 0.001**
MD & Adm	**0.001**	**< 0.001**	**0.003**

Note: Bold type indicates $p < 0.05$

Overall Perceptions of Safety

As shown in Table 32, there were no statistically significant differences between the four professional groups for the Overall Perceptions of Safety dimension.

Table 32. Pairwise and Post-Hoc Testing of RNs, PAs/NPs, MDs and Administrators/Managers for the Overall Perceptions of Safety Dimension

Professional Groups	Pairwise MANOVA	Pairwise MANCOVA	Multiple Comparisons Tukey's HSD
RN & PA/NP	0.069	0.086	0.264
RN & MD	0.060	0.061	0.235
PA/NP & MD	0.615	0.673	0.958
RN & Adm	0.250	0.309	0.658
PA/NP & Adm	0.538	0.528	0.927
MD & Adm	0.836	0.753	0.997

Aim 3 Findings

Determine the association between 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between the 10 safety culture dimensions and the outcome dimension of perceived Frequency of Event Reporting within U.S. pediatric hospitals and specialty units.

Analysis for this aim involved parametric testing with partial correlations between the 10 safety culture dimensions within U.S. pediatric hospital and specialty units and one group of all

four pediatric professionals (RNs, PAs/NPs, MDs and Administrators/Managers) while controlling for Overall Perceptions of Safety (see Table 33). The percent of variance that the 10 dimensions account for of the perceived Frequency of Event Reporting dimension range from 0.88% to 24.4% as shown in Table 33. The following will discuss each dimension.

Table 33. Partial Correlations of the Percent of Variance Contributing to perceived Frequency of Event Reporting When Controlling for Overall Perceptions of Safety

Safety Culture Dimension	Percent of Variance Contributing to Perceived Frequency of Event Reporting	Percent of Variance Contributing to Perceived Frequency of Event Reporting Controlling for Overall Perceptions of Safety
1. Teamwork Within Hospital Units	9.24*	9.30*
2. Staffing	0.88*	0.97*
3. Organizational Learning: Continuous Improvement	15.29*	15.29*
4. Nonpunitive Response to Error	7.08*	7.34*
5. Hospital Management Support for Patient Safety	4.71*	4.67*
6. Supervisor/Manager Expectations and Actions Promoting Safety	0.31*	0.29*
7. Communication Openness	8.01*	8.01*

*$p < 0.001$

Table 33 (cont.)

Safety Culture Dimension	Percent of Variance Contributing to Perceived Frequency of Event Reporting	Percent of Variance Contributing to Perceived Frequency of Event Reporting Controlling for Overall Perceptions of Safety
8. Feedback and Communi-cation About Errors	24.40*	24.40*
9. Teamwork Across Hospital Units	0.03*	0.03*
10. Hospital Handoffs and Transitions	10.82*	10.96*

*$p < 0.001$

Teamwork Within Hospital Units

Teamwork Within Hospital Units accounted for 9.24% of the variance for the perceived Frequency of Event Reporting by the four professional groups (see Table 33). When controlling for the effects of Overall Perceptions of Safety, the change in the variance increased to 9.30%, confirming that the perceptions of Teamwork Within Hospital Units accounted for a meaningful variance of the perceived Frequency of Event Reporting dimension by the group of four professional groups.

Staffing

The Staffing dimension within hospital units accounted for 0.88% of the perceived Frequency of Event Reporting by the four professional groups (see Table 33). When controlling for the effects of the Overall Perceptions of Safety outcome dimension, the change in the variance increased to 0.97%, an increase of 10.2%, confirming that the perceptions of Staffing

consistently accounted for a weak variance of the perceived Frequency of Event Reporting dimension by the group of four professionals.

Organizational Learning-Continuous Improvement

The Organizational Learning-Continuous Improvement dimension within hospital units accounted for 15.29% of the variance of the perceived Frequency of Event Reporting by the group of four professionals. There was no change in variance when controlling for the effects of Overall Perceptions of Safety outcome dimension, confirming that perception of the Organizational Learning-Continuous Improvement dimension accounted for a meaningful variance of the perceived Frequency of Event Reporting by the group of four professionals.

Nonpunitive Response to Error

The Nonpunitive Response to Error dimension within hospital units accounted for 7.08% of the variance of the perceived Frequency of Event Reporting by the group of four professionals. When controlling for the effects of Overall Perceptions of Safety dimension, the change in the variance increased to 7.34%, an increase of 3.7%, confirming that the perception of the Nonpunitive Response to Error dimension accounted for a meaningful variance of the perceived Frequency of Event Reporting by the group of four professionals.

Hospital Management Support for Patient Safety

The Hospital Management Support Promoting Patient Safety dimension within hospital units accounted for 4.71% of the variance of the perceived Frequency of Event Reporting by the group of four professionals. When controlling for the effects of Overall Perceptions of Safety, the change in the variance decreased to 4.67%, a decrease of 0.85%, confirming that the

perception of Hospital Management Support Promoting Patient Safety dimension accounted for a mild variance of the perceived Frequency of Event Reporting by the group of four professionals.

Supervisor/Manager Expectations and Actions Promoting Safety

The Supervisor/Manager Expectations and Actions Promoting Safety dimension within hospital units accounted for 0.31% of the variance of the perceived Frequency of Event Reporting by the group of four professionals. When controlling for the effects of Overall Perceptions of Safety, the change in the variance decreased to 0.29%, a decrease of 6.5%, confirming that perception of the Supervisor/Manager Expectations and Actions Promoting Safety dimension accounted for a weak variance of the perceived Frequency of Event Reporting by the group of four professionals.

Communication Openness

For the dimension of Communication Openness within hospitals, the perceived Frequency of Event Reporting by the group of four professionals accounted for 8.01% of the variance. When controlling for the effects of Overall Perceptions of Safety, there was no change in the variance confirming that the perception of Communication Openness dimension accounted for a meaningful variance of the perceived Frequency of Event Reporting by the group of four professionals.

Feedback and Communication About Error

For the dimension of Feedback and Communication About Error within hospitals, the perceived Frequency of Event Reporting by the group of four professionals accounted for 24.4% of the variance. When controlling for the effects of Overall Perceptions of Safety, there was no change in the variance confirming that the perception of the Feedback and Communication

About Error dimension accounted for a strong variance of the perceived Frequency of Event Reporting by the group of four professionals.

Teamwork Across Hospital Units

For the dimension of Teamwork Across Hospital Units, the perceived Frequency of Event Reporting by the group of four professionals accounted for 0.03% of the variance. When controlling for the effects of Overall Perceptions of Safety, there was no change in the variance confirming that the perception of the Teamwork Across Hospital Units dimension accounted for a weak variance of the perceived Frequency of Event Reporting by the group of four professionals.

Hospital Handoffs and Transitions

For the dimension of Hospital Handoffs and Transitions, the perceived Frequency of Event Reporting by the group of four professionals accounted for 10.82% of the variance. When controlling for the effects of Overall Perceptions of Safety, the change in the variance increased to 10.96%, an increase of 1.3%, confirming the perceptions of Hospital Handoffs and Transitions accounted for a meaningful variance of the perceived Frequency of Event Reporting by the group of four professionals.

Aim 4 Findings

Determine the association between the 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

Hypothesis: There is an association between 10 safety culture dimensions and the outcome dimension of Overall Perceptions of Safety within U.S. pediatric hospitals and specialty units.

Analysis for this aim involved parametric testing with partial correlations between the 10 safety culture dimensions within U.S. pediatric hospitals and specialty units and one group of four pediatric professionals (RNs, PAs/NPs, MD and Administrators/Managers) while controlling for the perceived Frequency of Event Reporting (see Table 34).

Table 34. Percent of Variance Contributing to Overall Perceptions of Safety When Controlling for the Perception of the Frequency of Event Reporting

Dimension	Percent of Variance Contributing to Overall Perceptions of Safety	Percent of Variance Contributing to Overall Perceptions of Safety Controlling for Frequency of Event Reporting
1. Teamwork Within Hospital Units	0.001*	0.01*
2. Staffing	4.12*	4.20*
3. Organizational Learning: Continuous Improvement	0.27*	0.25*
4. Nonpunitive Response to Error	2.04*	2.34*
5. Hospital Management Support for Patient Safety	0.38*	0.36*
6. Supervisor/Manager Expectations and Action Promoting Safety	1.46*	1.44*
7. Communication Openness	0.13*	0.10*
8. Feedback and Communi-cation About Errors	0.06*	0.03*
9. Teamwork Across Hospital Units	0.90*	0.90*
10. Hospital Handoffs and Transitions	0.27*	0.37*

*$p < 0.05$

The percent of variance that the 10 dimensions account for of the Overall Perceptions of Safety dimensions range from 0.001–4.20 as shown in Table 34. The following will discuss each dimension.

Teamwork Within Hospital Units

For the Teamwork Within Hospital Units dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.001% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance increased to 0.01%, confirming that perceptions of Teamwork Within Hospital Units had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Staffing

For the Staffing dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 4.12% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance increased to 4.20%, an increase of 0.08%, confirming that perceptions of Staffing had a mild effect on Overall Perceptions of Safety reported by the group of four professionals.

Organizational Learning-Continuous Improvement

For the Organizational Learning-Continuous Improvement dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.27% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance decreased to 0.25%, a decrease of 7.4%, confirming that perceptions of Organizational Learning-Continuous Improvement had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Nonpunitive Response to Error

For the Nonpunitive Response to Error dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 2.04% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance increased to 2.34%, an increase of 14.7%, confirming perceptions of Organizational Learning-Continuous Improvement had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Hospital Management Support Promoting Safety

For the Hospital Management's Support Promoting Safety dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.38% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change decreased to 0.36%, a decrease of 5.3%, confirming perceptions of Hospital Management Support Promoting Safety had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Supervisor/Manager Expectations and Actions Promoting Safety

For the Supervisor/Manager Expectations and Actions Promoting Safety dimension, the Overall Perceptions of Safety reported by the group of four professionals accounted for 1.46% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance decreased to 1.44%, a decrease of 0.15%, confirming that perceptions of Supervisor/Manager Expectations and Actions of Management Promoting Safety had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Communication Openness

For the Communication Openness dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.13% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance decreased to 0.10%, a decrease of 23.1%, confirming that perceptions of Communication Openness had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Feedback and Communication About Error

For the dimension of Feedback and Communication About Error, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.06% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance decreased to 0.03%, a decrease of 50%, confirming perceptions of Feedback and Communication About Error had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

Teamwork Across Hospital Units

For the Teamwork Across Hospital Units dimension, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.90% of the variance. When controlling for the effects of the perceived Frequency of Event Reporting, there was no change in the variance confirming that employee's perception of Teamwork Across Hospital Units had a weak effect on Overall Perceptions of Safety as reported by the group of four professionals.

Hospital Handoffs and Transitions

For the dimension of Hospital Handoffs and Transitions, Overall Perceptions of Safety reported by the group of four professionals accounted for 0.27% of the variance. When

controlling for the effects of the perceived Frequency of Event Reporting, the change in the variance increased to 0.37%, an increase of 37%, confirming employee's perception of Hospital Handoffs and Transitions had a weak effect on Overall Perceptions of Safety reported by the group of four professionals.

CHAPTER FIVE

DISCUSSION

For this study, a secondary data analysis of the 2016 HSOPSC database was performed to describe the safety culture within U.S. pediatric hospitals and specialty units from the perceptions of RNs, PA/NPs, MDs and Administrators/Managers. It was hypothesized that the safety culture of a pediatric hospital or hospital unit was perceived differently based on professional groups within that institution. In addition, it was hypothesized that the safety culture of pediatric hospital or hospital units was associated with the perceived Frequency of Event Reporting and Overall Perceptions of Safety within those institutions.

Chapter Five will begin with the limitations of the study followed by a presentation of the findings as they relate to current hospital leadership, nursing practice, healthcare policy and healthcare's academic institutions. The chapter concludes with considerations on future research surrounding safety cultures within pediatric hospital settings.

Limitations of Study

There are inherent limitations in the use of secondary data; thus, the study design included several limitations. This was a descriptive, cross-sectional design, which presents a snapshot of the perception of safety culture and does not reflect causality (Hully et al., 2013). This was a convenience sample of hospitals that self-selected to participate in the database

(Hully et al., 2013). Under the requirements put forth by AHRQ, only hospitals that administered the survey independently were included in the database. However, although these hospitals were not randomly selected samples of all U.S. hospitals, the characteristics of the participating hospitals (i.e., teaching status, bed size, region within the U.S. and whether the hospital was a nongovernment not for profit institution) were reported to be similar to those within the distribution of hospitals registered by the American Hospital Association (Sorra et al., 2016).

Another limitation was how the surveys were administered. Investigators overseeing survey distribution were not required to undergo any training; therefore, there was no way to validate that each hospital followed AHRQs data collection procedures. Although there were specific administrative guidelines for hospital officials to follow, there was no way to ensure compliance with the guidelines.

The surveys were also administered in a combination of methods, which would be another limitation. Hospitals used paper surveys, Web-based and a combination of the two, with these various modes leading to disparities of the responses (Famolaro et al., 2016). Some hospitals conducted a census survey, while others surveyed only particular populations within the facility. AHRQ required hospitals with less than 500 physicians and staff to administer a census survey, and the methods used per hospital are not available (Famolaro et al., 2016). Therefore, there is no process to evaluate if these data collection methods affected the results of this study's data.

Another weakness is that the AHRQs 2016 database provided by Westat® could have been incomplete, inaccurate or measured in ways not ideal for addressing the research aims of this study. Such important variables were limitations and could not be measured or recorded

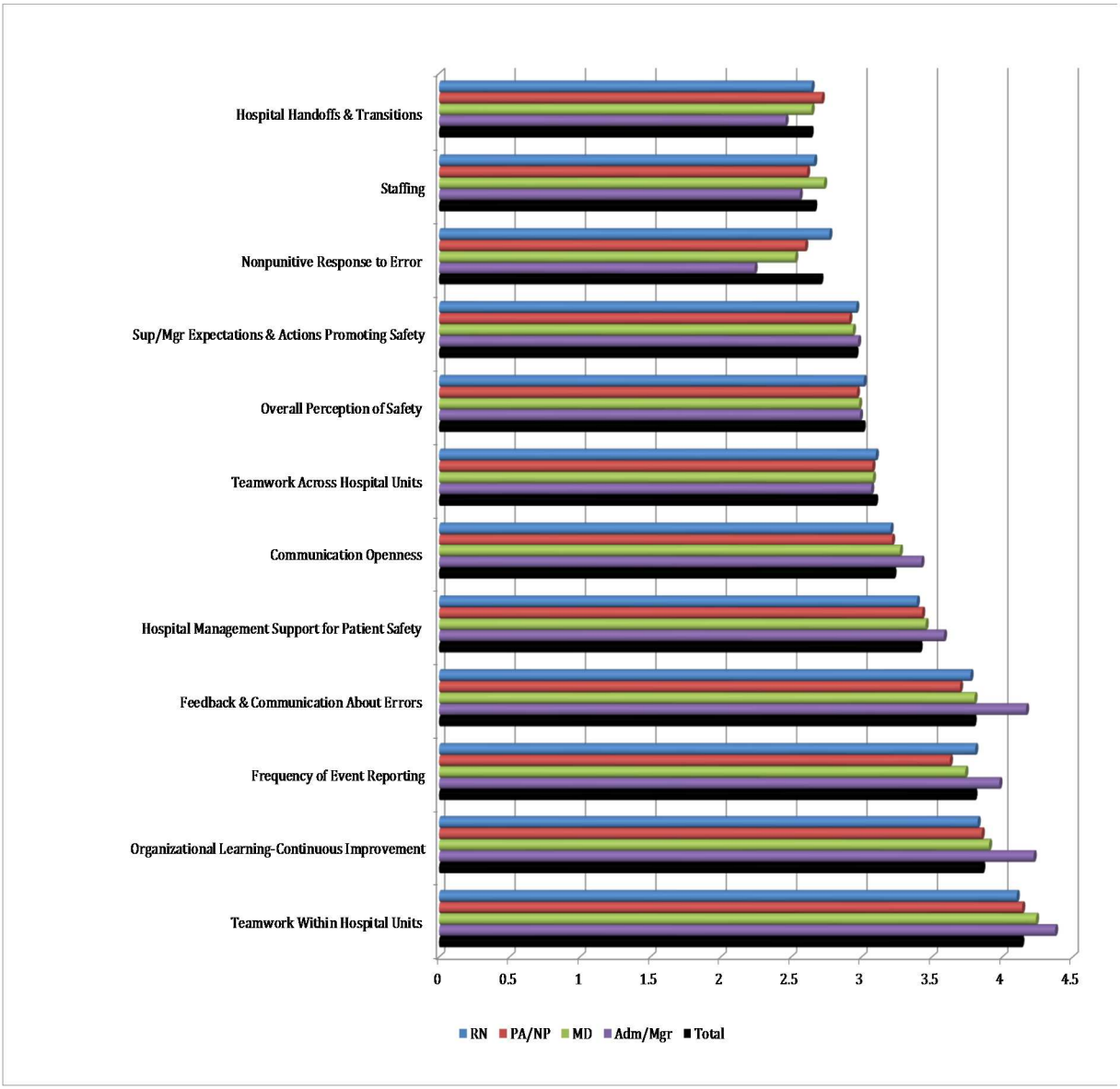
(Hulley et al., 2013). However, Westat® did provide a detailed description of the data cleaning methods.

Finally, PAs/NPs were chosen, as they form a predetermined professional category in the HSOPSC dataset. This study does not provide a strategy that compares the perspectives of NPs to PAs or compare the NP and PA perspectives with other professional groups. There could be inconsistencies within these two professional groups that might have altered the findings.

Discussion of Findings

A graphical summary of the overall means for each professional group is presented per dimension in Figure 6. Dimensions will be discussed based on their overall means of professional respondents, categorized as high (means ≥ 3.3), neutral (means from 2.8–3.2), or low (means ≤ 2.7).

Figure 6: Descriptive means for professional groups and 12 safety culture dimensions



The following sections will provide an integration of the research findings for Aims 1-4, as summarized in Table 35.

Table 35. Pediatric HSOPSC 2016 Unit Measures, Categories and Findings for Aims 1-4

Safety Culture Dimensions	Measure of Unit or Hospital	Category	Aim 1 Mean of Prof Groups	Aim 2 Differences Between Roles	Aim 3 % of Variance for Frequency of Event Reporting	Aim 4 % of Variance for Overall Perceptions of Safety
Teamwork Within Hospital Units	Unit	Work Area	4.14	Frontline-Adm RN-MD	9.24	0.01
Organizational Learning-Continuous Improvement	Unit	Work Area	3.86	Frontline-Adm RN-MD	15.29	0.25
Feedback and Communication About Error	Unit	Communi-cation	3.80	Frontline-Adm	24.40	0.03
Hospital Management Support for Patient Safety	Unit	Work Area	3.41	Frontline-Adm RN-MD	4.67	0.36
Communication Openness	Unit	Communi-cation	3.23	Frontline-Adm RN-MD	8.01	0.10
Teamwork Across Hospital Units	Hospital	Hospital	3.10	No differences	0.03	0.90
Supervisor/ Manager Expectations and Actions Pro-moting Safety	Unit	Supervisor-Manager	2.96	No differences	0.29	1.44
Nonpunitive Response to Error	Unit	Work Area	2.71	Frontline-Adm RN-MD	7.34	2.34
Staffing	Unit	Work Area	2.67	Frontline-Adm RN-MD PA/NP-MD	0.98	4.20
Hospital Handoffs and Transitions	Hospital	Hospital	2.64	Frontline-Adm	10.96	0.37
Outcome Dimensions						
Frequency of Event Reporting	Unit	Outcome Measure	3.80	Frontline-Adm RN-MD		
Overall Perceptions of Safety	Unit	Outcome Measure	3.01	No differences		

Safety Culture Dimensions with High Means

There were five dimensions with high overall means of professional respondents (≥ 3.3). Teamwork Within Hospital Units, Organizational Learning-Continuous Improvement, Hospital Management Support for Patient Safety, Feedback and Communication About Error, and the perceived Frequency of Event Reporting (see Figure 6). These high means suggest that respondents perceived their work areas or unit positively. The supportive findings for each dimension as they relate to the four aims are found in Table 35 and are described below.

Teamwork Within Hospital Units. This dimension measures the degree to which employees perceive they support one another, treat each other with respect, and work together as a team (Blegen et al., 2009; Sorra & Dyer, 2010). Findings indicated that all four professional groups rated this dimension high with an overall mean of 4.14. However, frontline professionals rated this dimension statistically significantly lower than hospital Administrators/Managers. This indicates that frontline professional groups agree that teamwork exists in units, but this perception is less than that of Administrators/Managers. It is also interesting to note that RNs and MDs perceived this dimension differently, with RNs rating this dimension significantly lower than MDs. Teamwork Within Hospital Units related to one outcome measure with 9.24% of the variance accounting for the perceived Frequency of Event Reporting. This indicates that when Teamwork Within Hospital Units was perceived, groups were more apt to report adverse events. However, this dimension has a very weak variance accounting for 0.01% of Overall Perceptions of Safety, suggesting that a positive unit culture did not impact professionals' perception of safety (see Table 35).

Findings of this study are inconsistent with what was found in the literature in that the

literature did not report Teamwork Within Hospital Units high, or positive, in pediatric hospitals and specialty units. Peterson et al. (2012) examined the perceptions of safety culture within the NICU and found that these unique sites faced barriers related to teamwork. Such barriers included siloed care with vertical structuring that allowed for little collaboration. Sustainable improvements in interprofessional collaboration demand committed leaders and resource allocation that support improvement efforts at the bedside (Weingart et al., 2013; World Health Organization: Health workforce, 2010).

The positive safety culture found in this research could be related to QI initiatives recently established to improve children's safety, along with The Joint Commission's (2008b) focus on creating more cooperative work environments (Korner et al., 2015; Sheth et al., 2016; Thomas & Galla, 2013). This study indicated a discrepancy between Administrators/Managers and frontline professionals, indicating a need for further research to determine the cause or the specificity of these differences.

Organizational Learning-Continuous Improvement. This dimension measures the degree to which employees believed their organization learns from mistakes and whether such errors have the possibility of leading to changes that can elevate the effectiveness of hospital care (Blegen et al., 2009; Sorra & Dyer, 2010). Findings indicated that all professional groups rated this dimension high with the overall mean of 3.86. This indicates that pediatric professionals perceived their units as having positive safety cultures where employees learned from their errors. Once again, the means of frontline professionals are statistically significantly lower than those of hospital Administrators/Managers, with RNs rating this dimension statistically significantly lower than MDs. Organizational Learning-Continuous Improvement was related to

one outcome measure with 15.29% of the variance accounting for the perceived Frequency of Event Reporting (see Table 35). This indicates that AEs were reported when professionals perceived they worked within a learning culture and where improvements in children's care were the end result. However, this dimension has a very weak variance accounting for 0.25% of Overall Perceptions of Safety, suggesting that the positive culture did not impact the perception of safety for these professionals (see Table 35).

These findings support Reason's Swiss Cheese Model/Human Factor Model (1998) that states that human failures are evident. Therefore, to improve a system, human errors must be addressed within nonpunitive environments that encourage learning through system-oriented appraisals that are shared throughout the organization (Reason, 1990; The Joint Commission, 2008b). This study indicated a discrepancy between Administrators/Managers and frontline professionals, indicating a need for further research to determine the cause or the specificity of these differences.

Feedback and Communication About Error. This dimension measures the degree to which staff are informed of errors, are provided feedback on how errors can be prevented, and are informed of changes that were put into place to prevent future events (Blegen et al., 2009; Sorra & Dyer, 2010). All professional groups viewed Feedback and Communication About Error positively, with an overall mean of 3.80, but frontline professionals rated this dimension statistically significantly lower than hospital Administrators/Managers (see Table 35). Feedback and Communication About Error related to one outcome measure with 24.40% of the variance accounting for the perceived Frequency of Event Reporting. This large variance suggests that when professionals perceived environments where they could learn from errors, they were more

likely to report errors. This dimension has a very weak variance accounting for 0.03% of Overall Perceptions of Safety indicating Feedback and Communication About Error had a very weak impact on professionals' perception of safety within the unit (see Table 35). The lack of a relationship between the perceptions of these four professional groups may indicate that although frontline professionals are reporting errors, real change in promoting children's safety was not perceived. This study indicated a discrepancy between Administrators/Managers and frontline professionals, indicating a need for further research to determine the cause or the specificity of these differences.

Error reporting must be done within respectful settings that recognize the benefit of such communication (American Academy of Pediatrics, 2011; National Patient Safety Foundation, 2015; World Health Organization: Health workforce, 2010). Findings from this study demonstrate the need for leadership within pediatric hospitals and specialty units to strengthen relationships between all professional groups where learning from mistakes takes place through system-oriented assessments that are shared throughout the organization (American Academy of Pediatrics, 2011; Reason, 1990).

Hospital Management Support for Patient Safety. This dimension measures the degree to which hospital management provides a work environment that promotes patient safety, confirming patient safety is a top priority (Blegen et al., 2009; Sorra & Dyer, 2010). All professional groups viewed Hospital Management Support for Patient Safety somewhat positively, with an overall mean of 3.41, but frontline professionals viewed this dimension statistically significantly lower than hospital Administrators/Managers (see Figure 6). Also, RNs viewed Hospital Management Support for Patient Safety significantly lower than did MDs.

Hospital Management Support for Patient Safety is related to one outcome measure with 4.67% of the variance accounting for the perceived Frequency of Event Reporting, suggesting that having the support of management did influence the reporting of AEs within the unit (see Table 35). This dimension had a very weak variance accounting for 0.36% of Overall Perceptions of Safety, suggesting that positive work areas and units had little impact on professionals' perception of safety (see Table 35).

Findings from this study are consistent with The Joint Commission's 2017 Sentinel Event Report where the commission set standards that address the perception discrepancy between frontline professionals and that of hospital leadership. In this report, The Joint Commission affirmed that hospital "leadership's first priority is to be accountable for effective care while protecting the safety of patients, employees, and visitors" (The Joint Commission, 2017, p. 1). Findings indicate that this standard is not being met. This study indicated a discrepancy between Administrators/Managers and frontline professionals, supporting a need for further research to determine the cause or the specificity of these differences, particularly in pediatric settings.

Safety Culture Dimensions with Neutral Means

There were four dimensions with neutral means (2.8–3.2): Communication Openness, Overall Perceptions of Safety, Teamwork Across Hospital Units, and Supervisor/Manager Expectations and Actions Promoting Patient Safety. A discussion of the findings that support each dimension will follow. Overall, these neutral means suggest similar perceptions of safety culture exist between the four professional groups.

Communication Openness. This dimension measures the degree to which respondents perceive that staff members can freely speak up if they see something that negatively affects

patient care and are free to question authority about a safety breach (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). All professional groups perceived this dimension as neutral, with an overall mean of 3.23, indicating that staff members were unsure about their ability to freely speak up and report a safety breech within their hospital work area or unit (see Table 35). Frontline professionals viewed this dimension statistically significantly lower than hospital Administrators/Managers. Such findings demonstrate that frontline professionals may be more hesitant to report safety breaches than what was perceived by hospital administrators/managers. In addition, RNs viewed Communication Openness significantly lower than MDs, indicating inconsistent perceptions of communication between these two professional groups. Communication Openness is related to one outcome measure with 8.01% of the variance accounting for the perceived Frequency of Event Reporting. This finding implies that professionals are willing to report errors in hospital milieus they perceive as having transparent communication and reporting systems. Communication Openness had a very weak variance accounting for 0.10% of Overall Perceptions of Safety, suggesting that the transparency of communication within the unit did not impact professionals' perception of safety (see Table 35).

These findings are consistent with previous research, which has identified that poor work environments that lack open communication has contributed to 80% of the sentinel events influencing the continuity and planning of care (Rosenstein, 2011; The Joint Commission, 2008b; Weingart et al., 2013). Failures in communication are the leading cause of AEs in the healthcare setting (Weingart et al., 2013). To reduce errors, a systems approach addressing obstructive communication must be implemented (National Patient Safety Foundation, 2015; Rosenstein, 2011; The Joint Commission, 2008b). This study indicated a discrepancy between

Administrators/Managers and frontline professionals, indicating a need for further research to determine the cause or the specificity of these differences.

Teamwork Across Hospital Units. This dimension measures the degree to which respondents believe that hospital units cooperate and coordinate with one another to provide the best care for patients and whether hospital systems foster teamwork between hospital units (Blegen et al., 2009; Sorra & Dyer, 2010). All respondents perceived this dimension as neutral, with an overall mean of 3.10, with no statistically significant differences among respondent professional groups (see Table 35). This suggests that all professional groups were uncertain as to whether children's care was coordinated during hospital transfers between units and specialty services. This poor recognition of Teamwork Across Hospital Units is in sharp contrast to the positive perception of the Teamwork Within Hospital Units dimension. As discussed earlier, Teamwork Within Hospital Units rated safety culture highly within hospital units. Teamwork Across Hospital Units had very weak variances for both outcome dimensions with 0.03% of the variance accounting for Frequency of Event Reporting and 0.90% of the variance accounting for Overall Perceptions of Safety. This study found that all professional levels recognized that the transition processes were weak in pediatric care facilities but, interestingly, did not relate to the perception of safety outcomes (see Table 35).

Larrison et al. (2017) states that formal partnerships alone do not create seamless integration between healthcare providers. True collaboration and care integration requires resolving differences in organizational culture, workflow and information sharing (Larrison et al., 2017; Li & Robertson, 2011). Errors during patient transfers are well supported in the literature, and research indicated that by introducing standardized handoff tools with scripted

transport processes, the transitioning of a child across hospital units improved (Bleakley, 2010; Baines, DeBruijne, Langelaan, & Wagner, 2013; Chassin & Loeb, 2013; National Patient Safety Foundation, 2015). Such improvements addressed the latent failures within the hospital systems, boosting communication across hospital units (Reason, 1990). By implementing changes in the care process, improved care practices were demonstrated across hospital settings (Peterson et al., 2012; Weingart et al., 2013). Findings from this study found neutral means and no statistical significance for this dimension indicating further research to determine the cause or specificity for such perceptions within pediatric settings is necessary.

Supervisor/Manager Expectations and Actions Promoting Safety. This dimension evaluated hospital staff's perception of their supervisor or manager's expectations and actions towards promoting patient safety and their willingness to promote safe care (Blegen et al., 2009; Sorra & Dyer, 2010). All respondents perceived this dimension as neutral, with an overall mean of 2.96, with no statistically significant differences among respondents (see Table 35). In addition, this dimension accounted for very weak variances for the two outcome dimensions examined, with 0.29% of the variance accounting for Frequency of Event Reporting and 1.44% of the variance accounting for Overall Perceptions of Safety. Such neutral findings suggest that leadership in promoting safety culture is perceived as weak in pediatric hospitals and specialty units and does not relate to safety outcomes (see Table 35).

Recent publications on organizational leadership state that hospital administrators and managers have an essential role in the development of environments that encourage error reporting in an effort to identify safety hazards (Health and Safety Executive, 2005; Reason, 1990; The Joint Commission, 2017). Having leaders who are visible and committed to patient

safety is vital to building a safety culture (Health and Safety Executive, 2005; The Joint Commission, 2017). Findings indicate that leadership visibility was perceived as neutral in this study, suggesting that frontline professionals found their unit supervisors and managers disinterested or unengaged in establishing a culture of safety. Leadership needs to seek and inspire others through transparent communication and accepting the responsibility for any safety flaws. Supervisors/Managers must lead by example, placing the well-being of patients and employees one of their core values (American Academy of Pediatrics, 2011; National Patient Safety Foundation, 2015; The Joint Commission, 2017; Townsend, 2007). More research is needed to better understand the forces driving these neutral perceptions to improve collaborative pediatric work settings.

Safety Culture Dimensions with Low Means

There were three dimensions with low means (≤ 2.7): Nonpunitive Response to Error, Staffing, and Hospital Handoff and Transitions. These low means suggest that respondents perceived a negative safety culture within their work areas or unit. A discussion of the findings for each dimension will follow.

Nonpunitive Response to Error. This dimension is defined as staff understanding that any mistakes they had made in the past would not be held against them, and that written reports of such events would not be held in their personnel file (Blegen et al., 2009; Sorra & Dyer, 2010). Within pediatric hospitals and specialty units, all frontline professional groups rated this dimension low, with an overall mean of 2.71 (see Table 35). This indicates that respondents generally felt their mistakes were held against them with reports retained in their personnel files. Frontline professionals rated this dimension higher than Administrators/Managers. When

comparing particular professional groups, RNs rated this dimension higher than MDs. This indicates that frontline respondents perceived their work areas and units as less punitive environments than did their Administrators/Managers, with RNs having a less punitive perception than MDs. Nonpunitive Response to Error related to both outcome dimensions with 7.34% of the variance, accounting for the perceived Frequency of Event Reported and 2.34% of variance, accounting for Overall Perceptions of Safety. This demonstrates that even within punitive work environments, frontline professionals are concerned about safety and will report errors within their work areas and units (see Table 35).

These findings are inconsistent with previous research in which employees have been found to not voice safety concerns, or report errors due to intimidating, poorly developed, or nonexistent processes that lack policies and protocols for reporting (Peterson et al., 2012). This shift could be explained by the recent attention placed on hospitals to encourage employees to speak up. Hospitals now concentrate on creating environments that collect, analyze and disseminate data about medical errors and AEs within nonpunitive settings (American Academy of Pediatrics, 2011; The Joint Commission, 2008b). Only those who intend to harm or deliberately fail to observe hospital policies and procedures are to be held accountable (American Academy of Pediatrics, 2011). This study indicated a discrepancy between responses of Administrators/Managers and frontline professionals, indicating further research is necessary to determine the cause or the specificity of these differences.

Staffing. This dimension measures respondent perceptions of whether there is enough trained staff to handle the workload (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). The overall mean for Staffing is low at 2.66, with significant differences between

professional groups. MDs rated safe staffing significantly higher than RNs, PA/NPs and Administrators (see Table 35). This indicates poor and diverse perspectives of safe staffing to handle the workload. Staffing has a very weak variance accounting for 0.97% of the perceived Frequency of Events Reported. However, this dimension did account for 4.20% of the variance of Overall Perceptions of Safety, indicating that Staffing was perceived as a small component of overall safety (see Table 35).

These findings are consistent with the literature. Research has identified that children's care is safer when there is an adequate nurse-to-patient ratio (Siarkowski-Amer, 2013). Findings from this study suggest that hospital leadership within pediatric care settings has yet to address the critical need for safe staffing with well-trained professionals. For perceptions to improve, the staffing needs within work areas and units must be addressed with appropriate care ratios and educational preparation.

These findings are also consistent with research in the adult hospital setting, indicating that adequate and prepared nursing staff improved hospital work environments and lowered hospital mortality (Aiken et al., 2011; Siarkowski-Amer, 2013). This suggests that adequate staffing for low patient-to-nurse ratios can markedly improve both patient outcomes and the work environments for the nursing staff (Aiken et al., 2011; Siarkowski-Amer, 2013). A key step to improving children's safety during hospitalizations may lie in hospital leadership's ability to recognize the necessity of providing adequate nurse-to-patient ratios within all pediatric care settings. Further research to determine the cause or the specificity of these differences is necessary.

Hospital Handoffs and Transitions. This dimension relates to whether practitioners believe important patient information has been transferred from one care provider to another, across hospital units and during the change of shifts (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). The overall mean for this dimension is 2.64, the lowest mean of the 12 dimensions, suggesting that the handoff and transition processes were poor (see Table 35). Once again, frontline professionals perceive this dimension more problematic than did the Administrators/Managers. This suggests that the perception of errors that occurred when children were transferred from one unit to another, or from one specialty to another, were perceived more negatively by frontline professionals than by Administrators/Managers. These findings are similar when compared to the dimension of Teamwork Across Hospital Units, where frontline professionals perceived the poor delivery of important patient information between units and specialties. Hospital Handoffs and Transitions is related to one safety culture outcome dimension, with 10.96% of the variance accounting for the perceived Frequency of Event Reporting. This implies that patient information was perceived as being lost during the handoff and transition process, but this did not impact a professional's willingness to report such errors. Hospital Handoffs and Transitions had a very weak variance accounting for 0.37% of Overall Perceptions of Safety indicating this dimension did not impact employees' perception of their organization's error prevention procedures and systems (see Table 35).

These findings are consistent with current patient safety literature. Children's care is highly specialized, which can lead to inadequate treatments through poorly coordinated transfer processes. The transfer of pertinent health information is fragmented or nonexistent in the U.S., increasing the risks of an AE to patients of all ages (Baines et al., 2013; Cox et al., 2013;

National Patient Safety Foundation, 2015; World Health Organization: Health workforce, 2010; Peterson et al., 2012; Zeidel, 2011). These findings also support the need for more QI initiatives, in that QI initiatives have introduced processes that improve poor handoff procedures, thereby reducing errors in children's care. In a QI study by Sheth et al., (2016), the I-PASS handoff process was introduced and found to be successful in improving the efficiency and safety of children's transfers (Moore, 2014). Instituting similar practices should be considered throughout U.S. pediatric care milieus to avert preventable errors that may occur during transfer processes (Baines et al., 2013; Cox et al., 2013; National Patient Safety Foundation, 2015; Zeidel, 2011). This study indicated a discrepancy between Administrators/Managers and frontline professionals, indicating a need for further research to determine the cause or the specificity of these differences

Outcome Dimensions

There are two outcome dimensions that were analyzed: Frequency of Event Reporting and Overall Perceptions of Safety. The findings for each will be discussed below.

Frequency of Event Reporting. This dimension measures the staff's perception of how frequently errors are reported, regardless of degree of harm (Blegen et al., 2009; Sorra & Dyer, 2010). This research found that event reporting took place when teamwork was strongly perceived within the unit. All professional groups rated this outcome dimension high, with an overall mean of 3.80. Frontline professionals rated this dimension significantly lower than Administrators/Managers (see Table 35). This implies that hospital Administrators/Managers differ in their perception of the volume and efficacy of error reporting as it contributes to the safety culture of the hospital. These findings are consistent with publications that suggest

positive safety settings were related to increased reporting of medication errors and the willingness of professionals to advocate for patient safety (DiCuccio, 2015; Hansen et al., 2011; Mardon et al., 2010; Sorra et al., 2012; The Evidence Center, 2011).

Overall Perceptions of Safety. This dimension is defined as the general sense individuals have of their organization's error-prevention procedures and systems (Blegen et al., 2009; Sorra & Dyer, 2010). All professional groups perceived the institutions' Overall Perceptions of Safety as neutral, with an overall mean of 3.01, and no statistically significant differences between the professional groups (see Table 35). This implies that all respondents agree that safety culture is neither poor nor embraced by their organizations.

Summary

It is interesting to note that only the dimensions of Staffing and Nonpunitive Response to Error related to respondents' Overall Perceptions of Safety—Staffing accounting for 4.20% of variance, and Nonpunitive Response to Error accounting for 2.34% of the variance. This suggests that appropriate staffing and a nonpunitive environment helps to minimally support a perception of safety. These findings are consistent with existing research. A study from Canada found that nursing leadership and staffing levels had an impact on nurses' perceptions of their hospital organizations which in turn impacted behaviors directly affecting patient outcomes (Spence-Laschinger & Leiter, 2006; The Evidence Center, 2011). Research by Clarke, Sloane and Aiken (2002) also found that nurses on units with inadequate staffing and poor organizational support, compared with nurses on well-staffed units, were twice as likely to report risk factors, injuries and near-misses. The safety culture of the work area or unit directly affects professionals' perception of safety (Spence-Laschinger & Leiter, 2006; The Evidence Center,

2011). Of note is the lack of relationships between eight dimensions of safety culture and Overall Perceptions of Safety. To understand these findings further research is warranted.

Implications for Hospital Cultures, Leadership and Pediatric Practice

Findings support that significant differences exist between the perceptions of safety culture between frontline professionals and Administrators/Managers within U.S. pediatric hospitals. In addition, an understanding of the perception of the pediatric safety culture in the US has a wide-range of implications for organizational leadership, healthcare policy, nursing practice, and educational systems that support future pediatric care professionals.

Safety Climates and Safety Cultures

A safety culture is "the product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that can determine the commitment to and the style and proficiency of an organization's health and safety management system" (see Figure 1) (Health and Safety Commission, 1993; Health and Safety Executive, 2005; National Patient Safety Foundation, 2015, p. xii). "Organizational climate is a distinct construct concerned with the way organizational members *perceive* the social environment within that organization and its impact on their individual psychological well-being" (Jordan et al., 2009, p. 3; see also James & James, 1989). These include the attitudes, values and perceptions of individuals and groups at all levels of the organization (see Figure 1) (Health and Safety Commission, 1993; Health and Safety Executive, 2005). When employees share perceptions within the organization and work area, a climate emerges (Glisson, Landsverk, et al., 2008; Glisson, Schoenwald, et al., 2008; Jordan et al., 2009; Kapp & Parboteeah, 2008; Neal & Griffin, 2006).

Jordan et al., (2009) found that residential treatment center climates displaying high role

conflicts and a low appreciation for justice, equality and role clarity obstruct the development of positive professional associations and can contribute to poor patient outcomes. Singer et al. (2009) had similar findings and went on to state that frontline professionals with better perceptions of safety climate were predictive of having lower risks of experiencing patient safety events.

This study found that frontline professionals shared common perceptions about their work areas and units that contributed to the overall culture. In comparison, Administrators/ Managers viewed these same dimensions either substantially more negatively or positively than frontline professionals and were not perceived as being part of the healthcare team (see Figure 6 and Table 35). This disconnect between professional groups may lead to policies that may fail to support hospitals' safety culture due to a lack of fully appreciating the complexities surround children's care on the part of hospital Administrators/Managers. There is a need for all parties involved in children's care to collaborate on the best evidence-based practices for that care, putting aside economic measures that could fuel managerial conclusions.

For a full understanding of the stressors and necessities frontline professionals experience at the sharp end of care, hospital leaders must become more familiar with care practices so that policies and regulations that support the situational aspects of the institution's safety culture are suited for the tasks (Health and Safety Executive, 2005). Townsend (2007) recommends leaders to work alongside their employees to not only understand what pressures surround the position, but to partner with employees. It is by devoting a day, a week, or two days a month in working within the NICUs or the hospital kitchen, as a clerk or dietary line worker, that will inform leaders of the nuances surrounding patient care. Through effective delegation of important

matters, hospital Administrators/Managers can create cultures in which people grow (Townsend, 2007).

Implications for Leadership Policy and Practice

This research uncovered a substantial gap between the perceptions of hospital leaders and frontline professionals for 9 of the 12 dimensions. By strengthening the relationships between these professional groups, the safety culture within the pediatric hospital settings could improve, thereby impacting the quality of care (DiCuccio, 2014). This research also found that frontline professionals perceived hospital leaders as being unsympathetic to the stressors of their profession, rating their hospitals and specialty units neutral or low for 7 of the 12 dimensions (see Figure 6 and Table 35).

Hospital Handoffs and Transitions had the lowest means of the 12 dimensions. When evaluating scores on specific items in this dimension, frontline professionals differed from Administrators/Managers that believed, "Things 'fall between the cracks' when transferring patients from one unit to the another" and that "Important patient care information is often lost during shift changes" (Appendix A). Frontline professionals went on to show their frustration in delivering quality care when rating specific items in the Staffing dimension. For this dimension, frontline professionals recognized care processes for infants and children that were not understood by their hospital Administrators/Managers. Frontline professionals perceived that there was not "…enough staff to handle the workload," that "Staff in this unit work longer hours than is best for patient care," and that staff worked in "…crisis mode, trying to do too much, too quickly" (Appendix A).

This gap between frontline professionals and the Administration/Management was consistent with the literature. Research found that organizations with dominant cultures characterized by hierarchical managerial systems report more negative safety cultures than those with more team focused governances (Hannah, Schade, Lomely, Ruddick, & Bellamy, 2008; Prenestini, Calciolari, Lega, & Grilli, 2015). Excellent "leadership requires risk taking, innovation, self-awareness, and ingenuity" (Burkhart, Solari-Twadell, & Hass, 2008, p. 33). For the safety cultures to improve within pediatric care settings, hospital administrators and managers must take steps to better understand the pediatric care milieu and develop policies and care practices that support programs such as TeamSTEPPS®, to improve interprofessional practices. TeamSTEPPS® is an evidenced based set of teamwork tools designed to optimize interprofessional team functions to improve patient outcomes (AHRQ, 2017).

Leadership Qualities

Townsend (2007) defines a leader as one who "manifests vision, integrity, and courage in a consistent pattern of behavior that inspires trust, motivation and responsibility on the part of followers, who in turn become leaders themselves" (p. XIII). Healthcare leaders have a responsibility to provide environments supporting effective care, while protecting the safety of patients, employees and visitors (The Joint Commission, 2017). A hierarchal structure can reduce the volume of communication, as certain possible channels may not be available. With the flow of patient care information impeded, the exchange of crucial data necessary to improving the safety culture within children's care facilities is also hampered (Hannah et al., 2008; Reason, 2000; Singer et al., 2009; The Joint Commission, 2017). Reason's Swiss Cheese

Model/Human Factor Model (1998) guides leaders to improving care outcomes through the identification of latent factors that hinder success.

Given the gap between frontline professionals and hospital leadership, it is necessary to change how these groups relate. The human condition is difficult to change but organizations can change the conditions in which human's work (Reason, 1990). The focus in HROs is on minimizing variability and its effects. In doing so, hospital employees must be empowered to speak up and report errors and near misses (American Academy of Pediatrics, 2011; Reason, 2000). This study found 5 of the 12 dimensions supported teamwork and interprofessional collaboration in which care professionals learned from their errors. These positively rated dimensions were Teamwork Within Hospital Units, Organizational Learning-Continuous Improvement, Feedback and Communication About Error, Frequency of Event Reporting and Hospital Management Support for Patient Safety. With high safety culture ratings, frontline professionals were found to perceive their work areas and units as learning cultures, in which there was high degree of error reporting.

Organizations with just cultures reward employees and encourage the reporting of errors through nonpunitive work environments and reward incentives (American Academy of Pediatrics, 2011; Reason, 2000). By recognizing latent failures, improvements in the situational aspects of an organization's culture have the potential to be achieved, reinforcing positive safety cultures.

Leadership Must End Punitive Practices

This research found that all respondents viewed their work area or unit as having punitive cultures with the dimension of Nonpunitive Response to Error rated low. For a culture that learns

from its errors, leadership must promote just cultures that operate within cultures that value event reporting (American Academy of Pediatrics, 2011). Organizations with a just culture reward employees and encourage reporting errors through nonpunitive work environments with reward incentives (American Academy of Pediatrics, 2011; Reason, 2000). Previous research has identified that hospital staff will hesitate to report an error in punitive cultures and where feedback regarding change is not addressed (Burhans & Alligood, 2010; Sorra & Nieva, 2004; The Joint Commission, 2008b). Hospitals too often penalize staff for blameless acts while failing to implement processes for those responsible for serious errors (Chassin & Loeb, 2013). The act of blaming individuals within the care environment must be discarded for hospital cultures to improve (Barata, Benjamin, Mace, Herman, & Goldman, 2007; Buck, Kurth, & Varughese, 2014; Brilli, Allen, & Allen, 2014; Landro, 2010; Martin & Abore, 2016; Mueller, 2014; Suresh & Edwards, 2012). Hospital leaders in the pediatric milieu have yet to succeed in creating cultures where employees learn from errors, which may explain the lack of trust among hospital staff (Chassin & Loeb, 2013). More research is needed to guide leaders in methods to create nonpunitive learning environments that support safety cultures.

Policies Impact Error Reporting

Findings indicated that learning cultures within nonpunitive environments are associated with the reporting of more AEs. This is consistent with the literature in which the fear of retaliation was found to deter error reporting and undermined the safety culture within hospital settings worldwide (Institute of Safe Medication Practices, 2003; The Joint Commission, 2008b; Leape, 2006; World Health Organization: Health workforce, 2010). Findings from this research support the premise that event reporting will increase when individuals can learn from the event

within nonpunitive cultures, and where communication within their units is transparent. However, the low rating for the Nonpunitive Response to Error dimension indicates a need for policies that support the safe reporting of events or concerns that can lead to patient harm.

Research suggests that event reporting is found in environments where management is perceived as supportive. Patients still suffer from preventable harm every day (Chassin & Loeb, 2013; Rosenstein, 2011). Three attributes must exist for a safety culture to fully support high reliability and consistent safe care: trust, report and improve (American Academy of Pediatrics, 2011; Chassin & Loeb, 2013; Reason & Hobbs, 2003). Employees must exhibit enough trust in their peers and hospital administrators/managers to report errors and unsafe conditions (American Academy of Pediatrics, 2011; Reason & Hobbs, 2003). Such trust is established through organizations that value how employees feel, creating cultures that support reporting behaviors and respond in timely ways to solve identified harms. These improvements are communicated consistently to employees who first reported the issue, and then throughout the establishment (Chassin & Loeb, 2013). Organizations with a just culture have nonpunitive work environments with reward incentives for event reporting (American Academy of Pediatrics, 2011; Reason, 2000). This study found that frontline professionals continued to report events even within safety cultures they rated as negative. Further research is needed to determine the professional ethics and motivations behind these actions and practices that support reporting.

Policies Impacting Situational Aspects of Safety Culture

Findings indicated that five of the 12 dimensions rated pediatric hospitals and specialty units as having strong psychological and behavioral aspects of safety culture but require more development of situational aspects of children's care with more effective hospital leadership (see

Figure 1). Seven of the 12 dimensions rated the safety culture of pediatric hospitals and specialty units as neutral to low with perceptions of frontline professionals apart from those of Administrators/Managers. This gap represents a weakness within the situational aspects of the safety culture model contributing to poor safety cultures. Improving the situational aspects of a safety culture are essential to guide individuals through hospital policies, procedures, regulations and organizational structures for the delivery of safe patient care.

Findings from this study suggest that a lack of integration between the psychological, behavioral and situational aspects of safety culture has contributed to the nation's poor safety culture within pediatric care facilities. The situational aspect of a hospital's safety culture must support organizational structures that values learning within respectful, caring environments. With such understanding, policy improvements that relate to situational aspects of an organization's safety culture can be developed and integrated into care processes. A non-hierarchal management model would support the concept of collective wisdom in which professionals are heard for the sole purpose of improving their patient's care (Carter, 2016). Such steps will not only improve the safety of children's care but the safety culture within pediatric hospitals and specialty units for all professional groups.

Implications for Interprofessional Collaboration

Findings in this study found that although the unit culture was strong for collaboration within hospital units, with five of the 12 dimensions that support cooperative care having positive ratings, the overall pediatric hospital culture was poor in the U.S. For these five dimensions, the psychological and behavioral aspects of a safety culture were found to be positive for frontline professionals, but this cooperative work environment was not demonstrated

between frontline staff and hospital Administrators/Managers (see Figure 6 and Table 35). Although frontline professionals clustered in their perceptions, for the remaining seven dimensions, they rated each neutral or low, suggesting poor safety cultures. These poor safety cultures were also found in the responses from Administrators/Managers, with this group once again not part of the cooperative care environment.

For effective collaboration, hierarchical interactions must be transformed, allowing for open communication, cooperation, assertiveness, negotiation and the coordination of children's care (Fewster-Thuente & Velsor-Friedrich, 2008; Chassin & Loeb, 2013; World Health Organization: Health workforce, 2010; Wells, Johnson & Salyer, 1998). Such models place a value on the unique knowledge and experiences each professional group brings to the pediatric team (Siarkowski-Amer, 2013).

Healthcare differs from other high-tech industries in that human factors that can cause errors are more widespread (Catchpole, 2013). Healthcare carries conflicting inherent goals from preserving life and relieving distress, to achieving efficiency and patient satisfaction (Catchpole, 2013). Still largely dependent on human interaction, healthcare is more complex than other broadly equivalent HROs such as aviation (Catchpole, 2013). The care of hospitalized children involves complex exchanges between professionals and specialties with care teams trained within and between hospital work areas and units. Team performance is optimized through understanding the goal and performance expectations surrounding patient care with informed communication practices (Mayer et al., 2011).

Previous research found that communication throughout hospital units exists within hospital cultures that respect and learn from competent professionals at all levels of care

(American Academy of Pediatrics, 2011). Additional research is needed in ways to improve collaboration between pediatric professional groups and across pediatric specialties within learning cultures that strive for excellence.

Interprofessional Collaboration Impacted by Roles

This study found teamwork and collaboration were perceived similarly between RNs and PAs/NPs for 9 of the 12 dimensions and between PAs/NPs and MDs for 8 of the 12 dimensions (Table 35). Other parings between professional groups differed in their perceptions. Findings uncovered that the perception of teamwork differed between RNs and MDs for 6 of the 12 dimensions and between each of the frontline professionals and hospital Administrators/ Managers for 9 of the 12 dimensions. This variability in the perception of communication has been shown in the literature to undermine collaboration efforts between these professional groups and contribute to inadequate collaboration practices, poor patient satisfaction and preventable AEs (Rosenstein, 2011; The Joint Commission, 2008b; Salas et al., 2008; Siedlecki & Hixson, 2015; Thomas & Galla, 2013; Tillet, 2013).

Poor teamwork impacts the effectiveness, safety and outcome of children's care (American Academy of Pediatrics, 2011). To improve interprofessional communication, hospitals are introducing evidence-based frameworks such as that of TeamSTEPPS® (AHRQ, 2017; Thomas & Galla, 2013). Such interactive interprofessional programs have been found to improve patient safety through incremental and transformational changes that enhances teamwork in hospital work areas and units (AHRQ, 2017; Thomas & Galla, 2013). Introducing such programs into the pediatric care milieu would assist in bridging communication gaps between RNs and MDs as well as support current collaborative practices.

Improving collaboration is supported by a meta-analysis by Salas et al. (2008) in which team training was found to be an appropriate intervention for influencing team processes and performance (Salas et al., 2008). This study found that it is crucial for hospital administrators and managers to lead their employees by promoting, implementing and sustaining evidence-based frameworks such as that of TeamSTEPPS®. Through such initiatives, leadership can drive and monitor changes within their organization through activities that are aligned with their mission and vision (Thomas & Galla, 2013).

This study also uncovered that RNs viewed themselves apart from the roles of PA/NPs for two dimensions: Nonpunitive Response to Error and the perceived Frequency of Event Reporting. For these dimensions, RNs perceived their errors were held against them with reports placed in their personnel file, which was not the perception of PAs/NPs. The roles of RNs and PAs/NPs differ. Often PAs/NPs work within the physician medical model, and other times within the hospital's managerial structures. Such role variations could account for the differences between RNs and PAs/NPs. Additional research is needed to further understand these findings.

Implications for Nursing Practice

There are particular implications, derived from this study, that impact nursing care. Nurses perceive that they are part of the pediatric care team within supportive safety cultures. Frontline providers perceiving the culture of safety for nine of the 12 dimensions similarly supported this perception. In addition, nurses were found to report AEs as a means to correct poor care processes and learn from errors. This was highlighted in the dimension Feedback and Communication About Error, where 24.4% of the variance accounted for the perceived

Frequency of Event Reporting. The implications of these findings will be discussed further below.

Nursing Profession and Supportive Hospital Cultures

A hospital's culture plays a large role in determining whether employees perceive their environment to be happy and healthy (Tsai, 2011). Nurse executives can influence organizational culture and foster not only high-quality care but also environments that encourage the personal growth of the nursing staff (Burkhart et al., 2008). When the interactions between professional groups are successful, enormous contributions are seen within the team through effective communication and collaborative practices. Such accomplishments are not only valuable to the organization by improved patient care, but enrich individuals' personal enjoyment in their positions (Leape et al., 2009; Tsai, 2011). Nurses that work within teams that value their work find their roles satisfying (Tsai, 2011). Additional efforts by hospital leadership to improve interprofessional collaboration have the potential to create positive hospital safety cultures for pediatric nurses in the U.S. that can ultimately improve patient care.

Nurses and Disruptive Care Milieus

The dimension of Nonpunitive Response to Error measured whether professionals believed their mistakes were held against them and whether these errors were addressed punitively. Findings for this dimension found that nurses believed their errors were held against them, and that reports of such errors would be placed in their personal file and revisited at the time of their review. Siedlecki and Hixson (2015) found that such negative perceptions have been shown to impact the delivery of patient care. These researchers establish a relationship between how nurses perceived interactions within the clinical setting and within their practice

environments, which impacted the quality of patient care (Siedlecki & Hixson, 2015). Negative work cultures often led to poor care delivery.

Feeling safe to report an error in a nonpunitive work setting is necessary in HROs. High-reliability organizations have pioneered the business of recognizing errors through effective communication and teamwork, which enables personnel at all levels of care to contribute to the identification of indicators that may contribute to patient harm (Institute of Medicine, 2003; National Patient Safety Foundation, 2015). Although RNs perceived themselves as part of the interprofessional team, there were differences between how they perceived collaborations between the other professional groups in this study. This study supports the need for continued efforts to improve communication between professional groups in nonpunitive care settings with programs such as TeamSTEPPS® to improve the quality of care in pediatric settings.

Implications for Education

This study has implications for U.S. academic settings. In this study, the differing perceptions regarding safety culture among four professional groups within pediatric hospital settings highlight the need for interprofessional education to prepare a "collaborative practice-ready" workforce (World Health Organization: Health workforce, 2010, p. 7). For collaborative practices to ensue, the health workforce must be better prepared. Educational programs that concentrate on improving collaborative practices and decreasing punitive practices would begin to address some of the deficiencies this study has found. The World Health Organization (World Health Organization: Health workforce, 2010) and its partners recognize innovative educational strategies are needed in the area of interprofessional collaboration. Healthcare leaders carry a willingness to contextualize, commit and champion interprofessional education through new

learning strategies that improve attitudes and interpersonal skills regarding teamwork and collaboration (Parsell & Bligh, 1999; Vandergoot, Sarris, Kirby, & Ward, 2017; World Health Organization: Health workforce, 2010). Such interprofessional learning takes place "when two or more professions learn with, from and about each other to improve collaboration and the quality of care" (Vandergoot et al., 2017, p. 1; Centre for the Advancement of Interprofessional Education, 2002). The workforce needs "collaborative practice-ready" practitioners from different professional backgrounds that are trained to work together with patients, families, careers and communities to supply excellence in care (Reed et al., 2017; World Health Organization: Health workforce, 2010, p. 7). Integrated health and education policies will promote such effective educational practices and shape effective culture and attitudes of health workers (World Health Organization: Health workforce, 2010). Through IPL, evidence-based frameworks such as Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) have the potential to transform organizational cultures within medical and nursing academic institutions, increasing their understanding of their specific professional roles for team-based care, which can be applied in the practice setting (Reilly et al., 2014; Thomas & Galla, 2013; Reed et al., 2017).

Implications for Future Research

This study explored the differences in conceptualizing safety cultures within pediatric hospitals and specialty units from interprofessional perspectives on a national level. Findings suggest that within the pediatric hospital setting, a positive safety culture exists but these perceptions differ by professional role and between hospital units and specialty services. To

determine the nuances surrounding these professional groups and how they relate to the 12 safety culture dimensions in pediatric care facilities, additional research is required.

Educational Research Promoting Interprofessional Collaborative Learning

This study found that safety culture perspectives are unique to professional levels and that collaboration between professionals remains poor. Such findings support the need for additional research that is dedicated to operationalizing the concepts of safety culture within collaborative learning environments that employ effective interprofessional communication techniques that improve collaboration. Models such as that of the TeamSTEPPS® has been successful in improving communication and teamwork skills between healthcare professionals (Mayer et al., 2011; Reed et al., 2017). Implementation research designed to determine the best strategies to improve interprofessional communication within the pediatric care setting has the potential to improve the safety culture in these unique settings.

Pediatric Safety Cultures Improved Through Evidence-Based Research Strategies

Research is needed to develop, implement and test strategies that improve the safety culture within pediatric hospitals and specialty units. A combination of qualitative and quantitative designs would explore the many factors that underlie cultural values and the deeper social assumptions that underlie the descriptive findings of this study (Sorra & Dyer, 2010; Vlayen et al., 2015). Although many studies support evidence-based clinical practices that validate better quality care in controlled environments, translating these findings into practice has been found to be challenging due to the many variables that affect organizational culture and the multifactorial attributes of the pediatric care domain (American Academy of Pediatrics, 2011; Burkhart et al., 2016; Gawande, 2002; Woods et al., 2005). Secondary data analysis of

objective data from safety culture questionnaires and electronic health records provides an opportunity to evaluate quality indicators over time and can identify the impact innovations may have independent of organizational and patient-related variables (Burkhart et al., 2016; Butler & Hupp, 2016; Larrison et al., 2017; Martin & Abore, 2016).

In addition to quantitative studies, qualitative approaches involving observations, focus groups, and interviews should be initiated (Burkhart & Vlasses, 2017; Leonard et al., 2012; Sheth et al., 2016). Burkhart and Vlasses (2017) evaluated nurse-led, patient-centered, interprofessional teams that worked collaboratively to understand the needs of an underserved population. This qualitative participatory action research (PAR) used a method called photovoice, which revealed deeper values and challenges of patient participants as well as congruence between patient and provider perspectives. A PAR that evaluates pediatric professionals' perspectives regarding practice environments and how hospital leadership supports their efforts would provide valuable new knowledge for safety culture literature and health care system redesigns (Burkhart & Vlasses, 2017).

There are inherent stressors in the pediatric specialty due to the high risks and children (The Joint Commission, 2008a). Pediatric hospitals and specialty units must continue to research the emotionally charged situations that involve infants and factors that support positive safety cultures and seek out areas of weakness to prospectively address any care limitations through systems-based solutions.

Research Examining Differences Between Adult and Pediatric Safety Culture

Research is necessary to compare the safety culture perceptions of pediatric professionals to professionals within the adult care setting. Items and dimensions that support a positive safety

culture in an adult setting could be compared to findings in this study highlighting practices that are shared or are contrary. Once shared, findings would be valuable new knowledge for each care setting, with adult practitioners learning from successful care practices of pediatric providers, and vice versa. With such comparisons, successful care strategies could be identified, shared and implemented in an effort to construct environments that are consistent, unified and safe for patients of all ages. These strategies could be particularly helpful in hospitals that treat both adults and children.

Further Understanding for Overall Perceptions of Safety and Poor Variance Findings

Research is needed in examining the factors surrounding the little to no variance accounted for by Overall Perceptions of Safety for the dimensions examined—Teamwork Within Hospital Units, Organizational Learning-Continuous Improvement, Hospital Management Support Promoting Safety, Communication Openness, Feedback and Communication About Error, Teamwork Across Hospital Units, and Hospital Handoffs and Transitions. Findings suggest that these dimensions did not impact respondents' Overall Perceptions of Safety. This is curious, as it is inconsistent with the overall conceptual framework of the HSOPSC and requires more research to understand this finding and determine what additional factors may relate to Overall Perceptions of Safety.

Supportive Institutional Policy Development

Finally, additional studies examining the relationships between frontline professionals and that of hospital Administrators/Managers are necessary. This study found a gap exists in the understanding of the care environment as experienced by frontline professionals and hospital leadership. Hospital Administrators/Managers develop the policies, procedures, regulations,

organizational structures and managerial systems that contribute to a safety culture (Health and Safety Executive, 2005). To improve the safety culture within pediatric care facilities today, research is needed to determine strategies to improve relationships between frontline professionals and the hospital administrator and managers that develop the policies and procedures directing care. It is with such non-hierarchal initiatives that the gap between frontline professionals and hospital leadership is minimized. Improving such relationships can only be achieved by working alongside care professionals, where an understanding of their job specificities is appreciated. Additional research between these groups could identify areas that if addressed would improve safety culture perspectives within the pediatric care setting, creating quality environments that are supportive and reliable.

Conclusion

In creating safety cultures, hospital practitioners are guided by the principled ethical culture to *primum non nocere,* where the adherence to rules, laws and standards is the ethical criterion that underlies all care (Beauchamp & Childress, 2013, p. 8; Victor & Cullen, 1987). This straightforward principle can be traced back to the philosophical tenets of Socrates, Aristotle, Cicero and Ockham, who introduced an introspective dimension for individuals to choose to do the right act, for the right reason (Audi, 2001e; Audi, 2001a; Audi, 2001b; Audi, 2001c). The principle of *primum non nocere* is supported by right reason and guides the altruistic motivation practitioners have in caring for and helping other human beings (The Joint Commission, 2008b).

Ethical frameworks value open discussions and support collaboration. These relationships carry the freedom and responsibility of making individual choices about safety by both the

employer and the employee (Kapp & Parboteeah, 2008). A distinct culture emerges when members of a work area share similar perceptions of conflict, justness and transparency within their roles (Glisson, Landsverk et al., 2008; James & James, 1989; Jordan et al., 2009). Creating cultures that include the values, attitudes and perceptions of hospital administrators/managers within pediatric care milieus will influence employees at all levels of care to comply with safety rules and participate in safety enhancing initiatives that prevent harm and improve the overall safety culture throughout the institution (Kapp & Parboteeah, 2008; Victor & Cullen, 1987).

For hospital safety cultures to become entrenched within U.S. pediatric care milieus, all levels of the care team, including administration/management, must appreciate and work within common ethical frameworks to ensure the best care is provided consistently to all persons, at all levels of care. In identifying gaps in pediatric hospital safety culture, this research can inform initiatives to guide nursing and interprofessional education, practice, policy and research toward the goal of improving care for children.

APPENDIX A

HOSPITAL SURVEY ON PATIENT SAFETY CULTURE (HSOPSC)

DIMENSIONS AND ITEMS/QUESTIONS

Category & Dimensions	HSOPSC Items/Questions
Work Area	
Organizational Learning-Continuous Improvement	We are actively improving patient safety Mistakes have led to positive changes here After we make changes to improve patient safety, we evaluate their effectiveness
Teamwork Within Hospital Units	People support one another in this unit When a lot of work needs to be done quickly, we work together as a team to get the work done In this unit, people treat each other with respect When one area in the unit gets busy, others help out
Hospital Management Support for Patient Safety	Hospital management provides a work climate that promotes patient safety The actions of hospital management show that patient safety is a top priority Hospital management seems interested in patient safety only after an adverse event happens (R)
Nonpunitive Response to Error	Staff feel their mistakes are held against them (R) When an event is reported, it feels like the person is being written up, not the problem (R) Staff worry that mistakes they make are kept in their personnel file (R)
Staffing	We have enough staff to handle the workload Staff in this unit work longer hours than is best for patient care (R) We use more agency/temporary staff than is best for patient care (R) We work in "crisis mode" trying to do too much, too quickly (R)
Supervisor/Manager	
Supervisor/Manager Expectations and Actions Promoting Safety	My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures My supervisor/manager seriously considers staff suggestions for improving patient safety Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts (R) My supervisor/manager overlooks patient safety problems that happen over and over (R)

Hospital	
Teamwork Across Hospital Units	Hospital units don't coordinate with each other (R) There is good cooperation among hospital units that need to work together (R) It is often unpleasant to work with staff from other hospital units Hospital units work well together to provide the best care for patients (R)
Hospital Handoffs and Transitions	Things "fall between the cracks" when transferring patients from one unit to another (R) Important patient care information is often lost during shift changes (R) Problems often occur in the exchange of information across hospital units (R) Shift changes are problematic for patients in this hospital (R)
Communication	
Feedback and Communication About Error	We are given feedback about changes put into place based on event reports We are informed about errors that happen in this unit In this unit, we discuss ways to prevent errors from happening again
Communication Openness	Staff will freely speak up if they see something that may negatively affect patient care Staff feel free to question the decisions or actions of those with more authority Staff are afraid to ask questions when something does not seem right (R)
Two Outcome Dimensions	
Frequency of Event Reporting	How often is a mistake reported that was corrected before affecting patients? When a mistake is made, but has no potential to harm the patient, how often is this reported? When a mistake is made that could harm the patient, but does not, how often is this reported?
Overall Perceptions of Safety	It is just by chance that more serious mistakes don't happen around here (R) Patient safety isn't sacrificed for productivity We have patient safety problems in this unit (R) Our procedures and systems prevent errors

(R) denotes reverse coding

(Sorra & Nieva, 2004; Blegen, Gearhart, O'Brien, Sehgal, & Alldredge, 2009)

APPENDIX B

HOSPITAL SURVEY ON PATIENT SAFETY CULTURE:

SAMPLE SURVEY

Hospital Survey on Patient Safety

Instructions

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

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

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

SECTION A: Your Work Area/Unit

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

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

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

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

Think about your hospital work area/unit...	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
1. People support one another in this unit	☐1	☐2	☐3	☐4	☐5
2. We have enough staff to handle the workload	☐1	☐2	☐3	☐4	☐5
3. When a lot of work needs to be done quickly, we work together as a team to get the work done	☐1	☐2	☐3	☐4	☐5
4. In this unit, people treat each other with respect	☐1	☐2	☐3	☐4	☐5
5. Staff in this unit work longer hours than is best for patient care	☐1	☐2	☐3	☐4	☐5

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

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

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

Think about your hospital work area/unit...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. People support one another in this unit	☐1	☐2	☐3	☐4	☐5
2. We have enough staff to handle the workload	☐1	☐2	☐3	☐4	☐5
3. When a lot of work needs to be done quickly, we work together as a team to get the work done	☐1	☐2	☐3	☐4	☐5
4. In this unit, people treat each other with respect	☐1	☐2	☐3	☐4	☐5
5. Staff in this unit work longer hours than is best for patient care	☐1	☐2	☐3	☐4	☐5

SECTION A: Your Work Area/Unit (continued)

Think about your hospital work area/unit...	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
6. We are actively doing things to improve patient safety	☐1	☐2	☐3	☐4	☐5
7. We use more agency/temporary staff than is best for patient care	☐1	☐2	☐3	☐4	☐5
8. Staff feel like their mistakes are held against them	☐1	☐2	☐3	☐4	☐5
9. Mistakes have led to positive changes here	☐1	☐2	☐3	☐4	☐5
10. It is just by chance that more serious mistakes don't happen around here	☐1	☐2	☐3	☐4	☐5
11. When one area in this unit gets really busy, others help out	☐1	☐2	☐3	☐4	☐5
12. When an event is reported, it feels like the person is being written up, not the problem	☐1	☐2	☐3	☐4	☐5
13. After we make changes to improve patient safety, we evaluate their effectiveness	☐1	☐2	☐3	☐4	☐5
14. We work in "crisis mode" trying to do too much, too quickly	☐1	☐2	☐3	☐4	☐5
15. Patient safety is never sacrificed to get more work done	☐1	☐2	☐3	☐4	☐5
16. Staff worry that mistakes they make are kept in their personnel file	☐1	☐2	☐3	☐4	☐5
17. We have patient safety problems in this unit	☐1	☐2	☐3	☐4	☐5
18. Our procedures and systems are good at preventing errors from happening	☐1	☐2	☐3	☐4	☐5

SECTION B: Your Supervisor/Manager

Please indicate your agreement or disagreement with the following statements about your immediate supervisor/manager or person to whom you directly report.

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

SECTION C: Communications

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

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

SECTION D: Frequency of Events Reported

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

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

SECTION E: Patient Safety Grade

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

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

SECTION F: Your Hospital

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

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

SECTION F: Your Hospital (continued)

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

SECTION G: Number of Events Reported

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

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

SECTION H: Background Information

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

1. How long have you worked in this hospital?

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

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

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

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

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

SECTION H: Background Information (continued)

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

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

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

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

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

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

SECTION I: Your Comments

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

THANK YOU FOR COMPLETING THIS SURVEY.

APPENDIX C

REVIEW OF SAFETY CULTURE TOOLS

Survey	Description	Dimensions/Factors	Target Population	Reliability	Validity
1. Safety Attitudes (SAQ) Questionnaire (ICU version) (Sexton et al., 2006)	65 Questions 5-point Likert Scale	Teamwork climate Safety climate Job satisfaction Stress recognition Perception of management Working conditions	Hospital Personnel	Raykov's *p* ICC of 0.90	Construct validity using factor analysis
2. Veteran Affairs, Patient Safety Culture Survey (PSCS) (Shiner et al., 20016)	65 Questions 5-point Likert Scale & Yes/no & uncertain scale	Overall Perceptions of Safety Nonpunitive Response to Error Education, training & resources Shame Communication and Openness Teamwork Within Hospital Units Teamwork Across Hospital Units Organizational Learning-Continuous Improvement Feedback and Communication About Error Job satisfaction Patient safety in comparison to other hospitals Perceptions of patient safety at your facility Senior management awareness and actions in promoting safety Frequency of Event Reporting	Hospital Personnel	Test-retest reliability with ICC 0.7 or greater for 13 of 14 dimensions	Not reported
3. Veterans Health Administra-tion Patient Safety Questionnaire	112 Questions 5-point Likert Scale	Management commitment Overall Perceptions of Safety Nonpunitive Response Reporting Human factors Communication and Openness	Hospital Personnel	Not available (sent request to library)	Not reported

4. AHRQ Hospital Survey on Patient Safety Culture (HSOPSC) (Sorra & Nieva, 2004)	42 items 5-point Likert Scale	Supervisor/Manager Expectations and Actions Promoting Safety Organizational Learning-Continuous Improvement Teamwork Within Hospital Units Communication Openness Feedback and Communication About Error Nonpunitive Response to Error Staffing Hospital Management Support for Patient Safety Teamwork Across Hospital Units Hospital Handoffs and Transitions Frequency of Event Reporting Overall Perceptions of Safety	Hospital Personnel	Cronbach's alpha was acceptable at 0.63–0.84	High internal consistency by factor analysis
5. Press Ganey Safety Culture Survey (Peterson et al., 2012)	Number of items not available	Overall Perceptions of Safety Frequency of Event Reporting Supervisor/Manager Expectations and Actions Promoting Safety Teamwork Within Hospital Units Communication Openness Feedback and Communication About Error Nonpunitive Response to Error Staffing Hospital Management Support for Patient Safety Teamwork Across Hospital Units Hospital Handoffs and Transitions Patient safety grade Number of events reported	Hospital Personnel	Not reported	Not reported
6. Teamwork & Patient Safety	24 closed items 5-point Likert Scale	Perceived effect of teamwork Support for team communication & decision making	Hospital Personnel	Cronbach's alpha 0.62–0.87	Construct validity using

Attitudes Questionnaire (Kaissi et al., 2003)		Level of teamwork in my department Leadership & assertiveness			factor analysis
7. Operating Room Management Attitudes Questionnaire (ORMAQ) (Flin, et al., 2003)	60 Questions 5-point Likert Scale	Leadership structure Confidence assertion Information sharing Stress & fatigue Teamwork Work values Error Organizational climate	Operating Room Personnel	Cronbach's alpha 0.18–0.54	Interitem matrix too low for exploratory factor analysis
8. Trainee Supplemental Survey for Children's Hospital in Boston (Singla et al., 2006)	41 Questions 5-point Likert Scale	Communication Openness Adequacy of training Supervision	Residents Training Programs	Not reported	Not reported
9. Culture of Safety Survey (Weingart et al., 2004)	34 Questions 5-point Likert Scale	Leadership Salience Nonpunitive environment Reporting & communication	Hospital personnel	Cronbach's alpha "poor" (range not reported); *t*-test not statistical significant for initial & follow up means	Not reported

APPENDIX D

HOSPITAL SURVEY ON PATIENT SAFETY CULTURE:

PSYCHOMETRIC ANALYSES

U.S. Citations	Purpose	Design	Sample	Reliability/Validity	Conclusion
1. Sorra & Nieva, 2004 Pilot study: Hospital survey on patient safety culture	Psychometric analysis of U.S. hospitals	Descriptive cross-sectional	21 hospitals 6 states 1,437 respondents from all staff levels	Cronbach ∝ For composites ranged from 0.63–0.83 Factor analysis found solid evidence supporting 12 dimensions and 42 items fit the data	-Confirmed existence of multiple dimensions -Evidence suggested many *a priori* item groupings fell into distinct factors -Released for public use in 2004
2. Blegen, et al., 2009 AHRQ's hospital survey on patient safety culture: Psychometric analysis	Psychometric analysis	Test-retest	1 unit in 3 hospitals	Cronbach ∝ For composites ranged from 0.48–0.83 Factor analysis found solid evidence supporting 11 factors after staffing was removed, and 42 items that fit the data. Staffing was included in 12 dimensions due to its significance to patient safety.	-Subscales measuring safety culture dimensions found to be moderately reliable & valid at the individual respondent level, reflecting the group level phenomenon of which tool was designed -Moderate to strong validity & reliability w/exception of Staffing -Useful in assessing safety culture across time, specialty, unit or institution -Did not link safety culture scores to independently measured outcomes

3. Sorra & Dyer, 2010 Multilevel psychometric properties of the AHRQ hospital survey on patient safety culture	Psychometric analysis of U.S. hospitals	Secondary analysis of 2007 HSOPSC database	331 U.S. non-teaching public hospitals	Cronbach ∝ For composites ranged from 0.62–0.85 Factor analysis found solid evidence supporting 12 dimensions and 42 items fit the data	-Acceptable psychometric properties at individual, unit & hospital levels of analysis -Instrument measuring group culture and not just individual attitudes

International Citations	Purpose	Design	Sample	Reliability/Validity	Conclusion
1. Vlayen et al., 2015 Measuring safety culture in Belgian psychiatric hospitals: Validation of the Dutch and French translations of the Hospital Survey on Patient Safety Culture	Psychometric analysis of Dutch & French translations for Belgian psychiatric hospitals	Test-retest	44 psychiatric hospitals with 6,658 national respondents at first test & 8,353 respondents at retest	Cronbach ∝ For composites ranged from 0.50–0.85 for Dutch & from 0.52–0.87 for the French translations Factor analysis found solid evidence supporting the original 42 items with12 dimensions that fit the data for Dutch & French translations	-Dutch & French translations of HSOPSC were found to be valid & reliable for measuring patient safety culture in psychiatric hospitals
2. Perneger et al., 2014 Internal consistency, factor structure and construct validity of the French version of the Hospital Survey on Patient Safety Culture	Psychometric analysis of French translation	Descriptive	1 Multisite hospital system 1171 hospital staff	Cronbach ∝ For composites ranged from 0.57–0.86 Factor analysis found solid evidence supporting 42 items with 10 dimensions, rather than the original 12 fit the data	-French version did not perform as well as original in psychometric analyses -Most coefficients lower in French version than U.S. version -May reflect shifts in item's meaning after translation

3. Eiras et al., 2014 The hospital survey on patient safety culture in Portuguese hospital: Instrument validity and reliability	Psychometric analysis of Portuguese translation	Descriptive	3 Hospitals with 1,323 staff respondents	Cronbach ∝ for composites ranged from 0.48–0.90 Factor analysis found solid evidence supporting 42 items with 10 dimensions fit the data	-Has acceptable reliability for 12 dimensions -Original model must be adjusted for Portuguese population scenarios -Portuguese tool in early stages of development
4. Nie et al., 2013 Hospital survey on patient safety culture in China	Psychometric analysis of Chinese translation	Descriptive	32 Hospitals 1160 respondents	Cronbach's α for composites ranged from 0.47-0.74 Factor analysis found solid evidence supporting 10 dimensions & 29 items fit the data	-Psychometric properties are acceptable & considered useful for measuring patient safety culture -Chinese version found a positive attitude towards patient safety culture exists -Uniqueness of safety culture should be considered when applying safety culture tools in different cultural settings

5. Nordin, 2013 Swedish hospital survey on patient safety culture: Psychometric properties & health care staff's perception	Psychometric analysis of Swedish version	Descriptive	9 Hospital healthcare divisions in a county council 2,120 staff	Cronbach ∝ for composites ranged from 0.60-0.87 Factor analysis found solid evidence supporting 12 dimensions & 44 items fit the data.	-Psychometric properties are acceptable & considered useful for measuring patient safety culture -Suitable for clinical research & allows for cross-national comparisons -To improve safety culture, it is imperative that stakeholders learn from prior events
6. Najjar et al., 2013 The Arabic version of the hospital survey on patient safety culture: a psychometric evaluation in a Palestinian sample	Psychometric analysis of Arabic translation	Descriptive	13 Hospitals 2,022 respondents	Cronbach's α for composites ranged from 0.63–0.84 Factor analysis found solid evidence supporting an 11-factor model fit the data & not original 12	-Resulted in an 11 factor, 42 item model -Good validity & acceptable reliability -Use caution when linking data of countries & cultures

7. Hedskold et al., 2013 Psychometric properties of the hospital survey on patient safety culture, HSOPSC, applied on a large Swedish health care sample	Psychometric analysis of Swedish translation	Descriptive	84,215 respondents from national database of hospital & primary care facilities; number of facilities not given	Cronbach's α for composites ranged from 0.66–0.87 Factor analysis found solid evidence supporting 14 dimensions, 48 items & 3 outcome measures fit the data	-Successfully used in hospitals & primary care -One common instrument allows comparisons within health care systems as tool assesses national patient safety improvement initiatives
8. Robida, 2013 Hospital survey on patient safety culture in Slovenia: A psychometric evaluation	Psychometric analysis of Slovenian translation	Descriptive	3 hospitals 976 responses	Cronbach's α for composites ranged from 0.36-0.88 Factor analysis found solid evidence supporting the original 12 factor model with 42 items is necessary to best judge patient safety fit the data	-After translation, the original 12-dimension model was a good fit for use in Slovenia

9. Occelli et al., 2013 Validation of the French version of the hospital survey on patient safety culture questionnaire. International	Psychometric analysis of French translation	Descriptive	7 Hospitals	Cronbach's α for composites ranged from 0.46–0.84 Factor analysis found solid evidence supporting a hypothesized model of 40 items & 10 dimensions fit the data	-Added 3 items to original survey - Considered valid & reliable -Will guide future research on the development of safety culture plans
10. Moghri et al., 2012 The psychometric properties of the Farsi version of the "hospital survey on patient safety culture" in Iran's hospitals	Psychometric analysis of Iran's translation	Descriptive	4 Academic hospitals 420 nurses, doctors, lab & radiology staff	Cronbach's α for composites ranged from 0.57–0.80 Factor analysis found solid evidence supporting with 12 dimensions & 42 items fit the data	-Considered valid & reliable for this population -Good tool identifying perceptions of safety culture in Iran's hospitals
11. Sarac et al., 2011 Hospital survey on patient safety culture: psychometric analysis on a Scottish sample	Psychometric analysis of Scottish National Health Service dataset	Descriptive	7 Hospital 1,969 staff	Cronbach's α for composites ranged from 0.64–0.84 Factor analysis found solid evidence support-ing the use of original 12 dimen-sions with 42 items fit the data.	-Found evidence supporting the use of original U.S. survey, without modifications - First step towards examining the safety culture as it relates to the hospital staff

12. Ito et al., 2011 Development and applicability of the hospital survey on patient safety culture (HSOPSC) in Japan	Psychometric analysis of Japanese version	Descriptive	13 Hospitals 6,396 staff respondents	Cronbach's α for composites ranged from 0.44-0.88 Factor analysis found solid evidence supporting 12 dimensions & 42 items fit the data	-Factor structure of Japanese & U.S. HSOPSC are close to identical -Japanese dis-plays acceptable levels of internal reliability/validity can be introduced in Japan.
13. Bodur & Filz, 2010 Validity and reliability of Turkish version of "hospital survey on patient safety culture" and perception of patient safety in public hospitals in Turkey	Psychometric analysis of Turkish version	Descriptive	3 Public hospitals 309 nurses & physicians	Cronbach's α for composites ranged from 0.57-0.86 Factor analysis found solid evidence supporting 10 dimensions with 42 items fit the data	-Valid & reliable in determining patient safety culture -Will be useful in tracking improvements & heightening patient safety culture awareness
14. Haugen et al., 2010 Patient safety in surgical environments: Cross-countries comparison of	Psychometric analysis of Norwegian version for the surgical setting in Netherlands	Descriptive	1 Hospital 575 surgical staff	Cronbach's α for composites ranged from 0.59-0.85 Factor analysis found when comparing to the 2004 U.S.	-Psychometric properties need further study to be regarded as reliable in surgical environments

psychometric properties and results of the Norwegian version of the hospital survey on patient safety				findings, 10 of 12 dimensions were lower in Norwegian study than the U.S. study.	-Surgical units in Norway & Netherlands are perceived more negatively than in U.S.
15. Waterson et al., 2010 Psychometric properties of the hospital survey on patient safety culture	Psychometric analysis of U.S. HSOPSC for use in U.K.	Descriptive	3 Hospital 1,437 surgical staff	Cronbach ∝ for composites ranged from 0.58-0.83 Factor analysis found solid evidence supporting 9 factors model for 27 items fit the data. Original model did not fit the U.K. data satisfactorily	-Caution needed when using U.S. HSOPSC version in U.K. -Findings indicate national & healthcare specific differences in the U.K. may limit the extent to which the U.S. version is applicable
16. Pfeiffer & Manser, 2010 Development of the German version of the hospital survey on patient safety culture: Dimensionality and psychometric properties	Psychometric analysis of German version	Descriptive	1 Academic hospital 568 staff	Cronbach ∝ for composites ranged from 0.63-0.84 Factor analysis found solid evidence supporting 8 factors with the number of items in the tool not appreciated	-Important to distinguish unit level from hospital level dimensions so added 2 dimensions on both levels -Allows for interventions to improve patient safety from unit & hospital levels

17. Olsen; Ovretveit & Sousa, Eds., 2008 Quality & safety improvement research: Methods & research practice from the international quality improvement research network	Psychometric analysis of Norwegian translation of U.S. version	Descriptive	1 Hospital 1,919 staff	Cronbach ∝ for composites ranged from 0.64-0.82 Factor analysis found solid evidence supporting 10 dimensions and 42 items fit the data. Researchers found there to be 4 measures, and not 2 as in the U.S. analysis	-Results complied with conventional reliability & validity criteria -Factorial structure of HSOPSC supports this version's use, in Norwegian hospitals
18. Smits et al., 2008 The psychometric properties of the 'HSOPSC' in Dutch Hospitals	Psychometric analysis of Dutch version	Descriptive	8 Hospi-tals 583 staff	Acceptable reliability scores and good construct (composites not provided) Factor analysis supports 11 items dimensions Items per dimension not mentioned	-Acceptable reliability & validity, which is similar to the original U.S. factor structure -The tool is appropriate instrument to assess patient safety culture in Dutch hospitals -Survey measures unit culture & not just individual attitudes

APPENDIX E

DATABASE REVIEW OF LITERATURE

U.S. Perspectives on Pediatric Safety Culture	
Author/Date of Publication	Perspectives
1. Butler & Hupp, 2016 Pediatric quality and safety: A nursing perspective	Nursing must maintain a commitment to safe, quality care. Nurses can influence organizations to elevate the quality & safety of patient care, which will result in improved outcomes. Nurse leaders have a responsibility to empower staff to participate in initiatives that improve the care environment so that care is collaborative with other disciplines. Hospital leadership can provide a culture & an environment for nurses on the frontline of care to actively participate in strategies & implementations that improve the quality & safety of care.
2. Martin & Abore, 2016 Measurement standards and peer benchmarking: One hospital's journey	A history of measurement standards & benchmarking, with a particular focus on the improving care in pediatric specialty, was led by AHRQ. Pediatric Quality Indicators (PQIs) developed by AHRQ, serves to benchmark institutions against valid, national standards in an effort to accelerate improvement efforts & inter-institutional communication regarding performance variation. Authors suggest measuring the safety culture of hospitals to better understand factors that hinder care will support patient safety initiatives, improving PQIs. The improvement efforts of two major children's hospitals are highlighted, both demonstrating measurable advances in organizational process & culture.
3. Brilli, Allen, & Davis, 2014 Revisiting the Quality Chasm	Authors present a strategic plan intended to inspire & motivate hospital staff to improve safety & quality improvement efforts. This initiative is understandable & from the perspective of the patient & family. The five dimensions of safe pediatric care would be framed around: "Do not harm me; Cure me; Treat me with respect; Navigate my care; & Keep us well" (p. 763-764).
4. Buck, Kurth, & Varughese, 2014 Perspectives on quality and safety in pediatric anesthesia	Improvement strategies must be supported by a strong organizational culture that is clearly articulated by leadership, within a learning culture that enables change processes by identifying, testing & evaluating already implemented procedures. HSOPSC assisted hospital leaders in the complexity of measuring their organization's safety culture, with the intention of continuous improvement. Authors suggest using the Model for Improvement (Langley et al., 2009) to assist in improvement processes

	such as tracking the safety of pediatric anesthesia & setting up quality improvement projects to monitor the efficacy & safety.
5. Dickenson et al., 2012 A systematic approach to improving medication safety in a pediatric intensive care unit	This is a review of literature & hospital experiences relating to medication errors in an ICU at a freestanding children's hospital. The goal was to improve medication safety in the pediatric ICU. Authors found that efforts of leadership & frontline staff were necessary to improve medication safety. The causes of errors are many & vary among institutions. Patient-centered standardized care principles that engaged staff were found to be key in improving patient safety.
6. Mueller, 2014 Quality and safety in pediatric hematology/oncology	Principles of quality & safety are the bedrock of pediatric hematology oncology care but errors continue to occur. Poor communication & punitive cultures with the fear of retribution remain problematic. This article reviews why specialists in pediatric hematology & oncology should lead the field of quality & safety in healthcare & outlines steps to assist in achieving this goal.
7. Surish & Edwards, 2012 Central line-associated bloodstream infections in neonatal intensive care: Changing the mental model from inevitability to preventability	Discusses prevalence of central line-associated blood stream infections (CLABSI) in the NICU, causing significant morbidity & mortality in this patient population. CLABSIs are now considered a preventable medical error. Examines steps an NICU can take to prevent them, suggesting a change in the mental model of care from one of inevitability to one that cultivates safety to empower staff.
8. Landro, 2010 New focus on averting errors: Hospital culture	Discussion on how the National Quality Forum has set standards for hospital personnel to address traumatized staffers that were involved in malpractice claims & errors causing patient harm. Hospitals with just culture strive to find a middle ground between blame-free & punitive cultures. New models of care promoting a just culture will assist in identifying risky behaviors or decisions long before the event reaches patient.
9. Buck, M. L, 2008 Improving pediatric medication safety part II: Evaluating strategies to prevent medication errors	This author describes an assessment of particularly effective initiatives that can improve the safety of medication administration for the pediatric population. Such approaches include computerized prescriber order entries, standardization of smart pump technology, improved oversight & prescriber education, & increasing parental involvement in the care process.

10. Delaney & Hardy, 2008 Challenges faced by inpatient child/adolescent psychiatric nurses	Authors discuss a work environment that was engineered by inpatient psychiatric nurses which was environmentally & psychologically safe for staff & adolescent patients. Researchers took the four dimensions that were involved with keeping adult units safe & adapted them to the child/adolescent inpatient psychiatric units. These dimensions were (1) Unit ideology; (2) the patient population & the experience of the staff interacting with that population; (3) maintaining a safe unit space with structured times; (4) reducing the need for restraints. This article discusses the challenges nurses face with each safety dimension & entrenched unit cultures that hinder positive changes.
11. Barata, Benjamin, Mace, Herman, & Goldman, 2007 Pediatric patient safety in the prehospital/emergency department setting	An overview of the problems & possible solutions that threaten pediatric safety in the emergency department (ED). Authors endorse a system's approach to improving safety culture where healthcare teams work to effectively collaborative, thereby reducing errors. Safe environments that provide quality care will reduce ED morbidity & mortality.

Qualitative Publications on Pediatric Safety Culture					
Study	Method	Sample	Aims	Findings	Limitations
Leonard et al., 2012 A qualitative assessment of factors that influence emergency medical services partnerships in prehospital research	Exploratory study using focus groups	14 focus groups involved 88 prehospital providers (EMS) from 11 agencies over 1 year (year not specified). Also 35 interviews with administrators & researchers conducted	Explore the barriers of participation in research at their particular agencies for EMS providers within the Pediatric Emergency Care Applied Research Network (PECARN) of hospitals	Researchers identified individual's knowledge, values & beliefs that may influence participation. 17 factors may reduce EMS staff's participation in research. These include organizational cultures towards change, as resistant cultures have organizational structures that may be unsupportive. Also, EMS staff may not have a clear purpose for the research, or be concerned that participating might harm the patient. 12 factors were identified that would increase the	Work is needed to validate & assess generalizability of developed model for prehospital settings not affiliated with PECARN

				likelihood of participation, such as if the research benefited patient care or improved care outcomes. Findings may help future researchers successfully plan, implement & complete prehospital research projects.	

Quantitative Publications on Pediatric Safety Culture

Study	Method	Sample	Aims	Findings	Limitations
Profit et al., 2012a Neonatal intensive care unit safety culture varies widely	Prospective cross-sectional utilizing SAQ	12 NICU's with 547 caregiver respondents between July & August 2004	Describe NICU caregiver assessments of safety culture, explore the variability of these perceptions within & between NICUs & test the association of these perceptions with caregiver characteristics.	Significant variation exists in safety culture dimensions among NICUs. Trend noted respondents' positions were associated with composite (p=0.06). When comparing position & composite, nurses & ancillary staff rated safety culture at 8.2 (p=0.04) & 9.5 (p=0.02) points less than physicians. There was wide	Sample was small & not random; Association between safety attitudes & other variables do not necessarily indicate causality; Results to be measured within context of its observational design. Findings may be confounded by unobserved variables: income, personal experiences

				variation (up to 20 points) in mean scores across dimensions. Across 12 NICUs, good teamwork climate reported by 54%, good safety climate 55%, & positive job satisfaction 63%. Lowest scores seen in positive perceptions of management 33%, administration supports daily efforts 37%, & sufficient staffing 43%. Findings suggest opportunities for safety culture improvements exists, as measured by the SAQ	
Profit et al., 2012b The safety attitudes questionnaire as a tool for benchmarking	Prospective cross-sectional utilizing SAQ	12 NICU's with 547 caregiver respondents between July & August 2004	Determine if SAQ dimensions of safety culture are consistent when used as a NICU performance measure	Safety culture permeates many aspects of patient care & organizational functioning. The SAQ may be useful for comparative performance	More research is needed to under-stand the NICU safety culture, clinical & operational processes & health outcomes

safety culture in the NICU				assessments among NICUs	

Quality Improvement Initiatives on Pediatric Safety Culture					
Study	Method	Sample	Aims	Findings	Limitations
Sheth et al., 2016 Change in efficiency and safety culture after integration of an I-PASS-supported handoff process	QI initiative using a pretest- posttest design of provider & family satisfaction surveys & HSOPSC following interventions to measure culture changes	122 Pediatric patient transfers from cardiovascular ICU to an acute care unit at a free standing children's hospital from 7/2012 to 1/2013	Determine if a standardized multidisciplinary handoff process (I-PASS) had an effect on care efficiency, safety culture & provider & patient satisfaction	Transfer efficiency improved from 378 +/- 167 minutes to 24 +/- 21 minutes, an 84% reduction in time. Provider's safety culture scores statistically improved: "Things fall between the cracks when transferring patients from one unit to another" had + response (39.8%, p=0.005) & "Problems often occur in the exchange of information across hospital units" had a + response (38.8%, p=0.031). Family satisfactions surveys improved: information	Additional studies needed to evaluate I-PASS handoff process & impact on patient harm, operational productivity & cost effectiveness

				conveyed 41% to 70% (p=0.02); opportunity to ask questions 46% to 74% (p<0.01); amount of information conveyed 50% to 73% (p=0.04); Provider satisfactions surveys improved: amount of information conveyed 34% to 41% (p=0.03); opportunity to ask questions 5% to 34% (p<0.01)	
Muething et al., 2012 Quality improvement initiative to reduce serious safety events and improve patient safety culture	Multifaceted Prospective QI using the HSOPSC to measure culture changes	1 urban pediatric freestanding hospital with >32,000 inpatient admissions in 2010	Multifaceted Implementation of cultural & system changes to reduce serious safety events (SSEs) within four years at	Approach associated with significant & sustained reduction of SSEs & improvements in patient safety culture	Multisite research necessary to better understand the impact of particular factors & significance of specific interventions
Hayes et al., 2012	Multifaceted QI study using 3 domains of the	20 children's hospitals identified 1-3 target units for	Establish reliable systems to rescue a deteriorating patient.	Researchers had mixed results & did not reach goal of	Patient deterioration is a complex process requiring sufficient

A multicenter collaborative approach to reducing pediatric codes outside the ICU	HSOPSC: "Communication Openness," "Nonpunitive Response to Error" & "Handoffs & Transitions"	study participation (i.e. ED, ICU & OR) from 7/2007 through 6/2008	The focus was on prevention, detection and correction	50% reduction in codes after 1 year due to variability of each facility. HSOPSC scored improved for 14 of 20 hospitals. Only statistically significant improvement seen in "Nonpunitive Response to Error" (39% to 47%, p=0.021) with remainder of surveys not statistically significant (p≤0.05). A collaborative model can accelerate improvements in safety culture	time & effort to achieve improved outcomes. Changing culture requires more time. This was not an RCT with no monitoring of sites to assure compliance
Peterson et al., 2012 A safety culture transformation: Its effects at a children's hospital	QI using the Press Ganey Safety Culture Survey to measure culture changes	Over 4,000 employees in one 200 bed pediatric hospital from 2008 to 2010	To improve pediatric patient safety by changing the safety culture & implementing processes, practices & measures to sustain innovations	System-based causes for failures were: culture-not voicing a concern due to intimidation 54%; poorly developed or nonexistent processes 23%; policy & protocol 12%; common human error, including critical thinking 33%;	Retrospective data on SSE for children were not available. Although the entire hospital system surveyed, data from children's hospital were not extractable. Some SSEs take time to improve, i.e., children's

				normalized deviance 21%; communication 17%; lack of attention to detail 17%; safety event reporting rose after staff trained on event identification and transparency enhanced. Synergistic effects of safety culture change initiatives led to new levels of involvement, accountability and transparency at leadership & unit levels	asthma & hand hygiene
Mayer et al., 2011 Evaluating efforts to optimize TeamSTEPPS® implementation in surgical and pediatric intensive care units	Multidisciplinary prospective QI project utilizing interviews, observations, surveys & clinical outcome data. HSOPSC to measure culture changes	Change teams championed by hospital leadership; Number of participants differs from unit/department & evaluation process; All staff from PICU, SICU & respiratory therapy participated; Sample size for	To improve team performance & patient outcomes by implementing a customized TeamSTEPPS® in 2 hospital micro-systems: the PICU & adult SICU; 3 surveys administered: HSOPSC, the Employee Opinion	A customized 2.5-hour version of TeamSTEPPS® training in the PICU & adult SICU demonstrated that training was successful. For purposes of this research, only dimensions selected from HSOPSC were "Teamwork Within	There was no control group to measure success of project. Perceptions of clinical outcomes can be swayed by a host of organizational influences & improvement initiatives. Direct causal relationship between positive

	PICU 18 to 50; for SICU 18 to 40 from 2006 through 2009	Survey (EOS) & Nursing Database of Nursing Quality Indicators (NDNQIs), along with personal interviews	Units", "Overall Perceptions of Safety" & "Communication Openness". For PICU: no significant change in median value for "Teamwork Within Units" in 2009 but significant improvement seen in median values for "Overall Perceptions of Safety" (F[2,95]=4.63, p-0.01) and "Communication Openness" (F[2,95]=22.99, p<0.01); Comparing PICU to SICU: no significant change in median values for "Teamwork Within Units" but significant improvement in median values of "Overall Perceptions of Safety " (X^2[2, N=140]=19.31, *p*=0.03) for 2009 and "Communication	changes & TeamSTEPPS® not determined

				Openness (X^2[2, N=140]=28.92, p=0.01) for 2009	
Schwoebel & Creely, 2010 Improving the safety culture of neonatal care through the development and implementation of a staff-focused delta team	Multifaceted Prospective QI using the HSOPSC to measure culture changes	University of PN Healthcare System (UPHS) of which 10% of staff represented the intensive care nursery from 2004 through 2008	Taskforce charged in 2004 to create a learning program for patient safety advocates, staff & educators that empower action at the unit level in the intensive care nursery (ICN) to improve patient safety.	Taskforce created a model to improve communication & unit-based inter-disciplinary safety with tools & techniques that identified & priori-tized safety concerns. The UPHS evaluated the ICN safety culture using the HSOPSC in 2008 prior to initi-ation of safety strate-gies & found that for dimensions of "Communication Openness" (AHRQ = 62%; UPHS =56%, ICN 73%) and "Teamwork Within Units" (AHRQ=79%; UPHS =72%, ICN 93%) the ICN scored higher than the university hospital	Creating a culture of patient safety will take time. Innovations will include parents & families into the safety model with patient safety material updated on a regular basis.

				system and national averages.	
Donnelly et al., 2009 Improving patient safety: Effects of a safety program on performance and culture in a department of radiology	Comprehensive prospective QI program using HSOPSC to measure culture changes & safety performance by measuring SSEs	"The number of institutional & radiology employ-ees who competed the survey was recorded" p. 187; project took place 2006-2008	Evaluate the effects of a program on safety performance & culture in a pediatric radiology department	Number of SSEs that in past involved radiology were an average of one every 200 days. After implementation of program, there was one event in 780 days (> 2 academic years) (p=0.037). Safety program had a positive effect on safety culture. A statistically significant positive change was seen in all 12 HSOPSC dimensions (p=0.05). No statistically	In radiology, SSEs are not common, thus no statistically significant improvement in number of days between SSEs. Program done in phases thus no way to determine the individual value of a particular component of program

				significant outcome measure of positive change seen in "Frequency of Event Reporting," suggesting that this report is cumbersome, time consuming and unpopular. The HSOPSC responses were seen to improve following the QI program.	
Edwards et al., 2008 Using staff perceptions of patient safety as a tool for improving safety culture in a pediatric hospital system	Test-retest evaluating QI initiatives that included the use of the HSOPSC to measure culture changes	Two inpatient facilities of Children's Healthcare: 1 academic (235 beds) & 1 community (195 beds) beginning in 1/2005 through 4/2006	A case study of the healthcare system's use of the HSOPSC to identify areas in need of improvement & measure the impact of QI projects on im-proving patient safety in particular areas	Survey was an effective tool for measuring & monitoring safety culture. The tool enabled identification of areas in need of improvement & measured impact of implemented initiatives in hospital. At both collections, responses were approximately evenly distributed. Overall, staff perceptions were positive, with mean dimension	Response rate was lower than desired; Also multiple improvement interventions were implemented during the study period preventing ability to deduce effect any particular intervention had on safety culture dimensions. Finally, 15 months is too short to change safety culture with validation of

		scores ranging from 3.09 to 3.98 (1-5 Likert scale, with 1 being worst). Friedman test showed significant differences across safety dimensions (x^2=490.18; p<0.001); "Teamwork Within Units" (μ=3.98; 95% CI 3.91 to 4.05) & "Organizational Learning-Continuous Improvement" (μ=3.77; 95% CI 3.71 to 3.83) had significantly higher scores (p<0.05) than 6 other dimensions. Low scores needing improvement were "Nonpunitive Response to Error" (μ=3.09; 95% CI 3.00 to 3.18), "Hospital Handoffs and Transitions" (μ=3.29; 95% CI 3.21 to 3.36), & "Teamwork Across Hospital	changes needing more time

				Units" (μ=3.28; 95% CI 3.20 to 3.38), confirming *a priori* beliefs	
Runy, 2007 How one hospital is cutting serious safety events	Multiyear QI project using simulations, safety coaching & error prevention training	One freestanding children's hospital from 2005 to 2010	To eliminate SSEs & improve safety culture	SSEs were reduced within the first year from an average of 17 per year to 14; statistical composites were not included in this article.	Conduct safety training through simulations for all operating rooms; complete error prevention training of ~6,000 front-line employees & establish a safety coach program in all in-patient units by 2008

APPENDIX F

WESTAT® DE-IDENTIFIED DATA RELEASE FORM

Agency for Healthcare Research and Quality (AHRQ)

Hospital Survey on Patient Safety Culture Comparative Database:
De-identified Data Request Form

Instructions
Please use this template to describe the research for which you require de-identified Hospital Survey on Patient Safety Culture data. Save this completed template with your last name in the file name (e.g., "Smith Data Request.doc") and submit to DatabasesOnSafetyCulture@ahrq.hhs.gov (Subject line: Data Request).

Note: Replication of statistics published in the *Hospital Survey on Patient Safety Culture Comparative Database Report* may not be possible due to post-hoc cleaning. (Documentation of post-hoc cleaning is provided with the data files.)

Contact Information of Data Requestor

Name: Pamela J. Gampetro
Title: Family Nurse Practitioner, PhD student
Organization: Loyola University Chicago
Address: 2532 Wellington Court, Evanston, 60201
Phone: 847-830-7877
Fax: n/a
Email: pgampetro@luc.edu

1. Which year(s)? _____ 2016_____

2. Title Secondary Data Analysis of Pediatric Care: Perceptions of Safety Culture in the U.S. in 2016

3. Abstract

Objectives: Children are more at risk of experiencing an adverse event (AE) than an adult while hospitalized due to their small size, dependence on adult communication, need for individually calculated medication dosages and unique physiological status. In pediatrics hospitalizations, medical errors are associated with significant increases in the length of stay, the cost of healthcare and death. Studies have evaluated the culture in adult facilities but little is known about the culture of pediatric healthcare.

It is hypothesized that the safety culture of a pediatric hospital or hospital unit is perceived in manners unique to particular staff positions within that institution.
It is also hypothesized that the safety culture of pediatric hospital or hospital units impacts the safety grade, as well as the number of events that are reported, within that institution.

Question 1: What is the predominant perception of safety culture, as defined by "your hospital", "your work area/unit", "your supervisor/manager" and "communication", as seen in the 2016 HSOPSC dataset for pediatric hospitals and specialty units?

Question 2: What is the predominant perception of safety culture, as defined by "your hospital", "your work area/unit", "your supervisor/manager" and "communication", as seen in the 2016 HSOPSC dataset for administrators/managers working in pediatric hospitals and specialty units?

Question 3: What is the predominant perception of safety culture, as defined by "your hospital", "your work area/unit", "your supervisor/manager" and "communication", as seen in the 2016 HSOPSC dataset for MDs working in pediatric hospitals and specialty units?

Question 4: What is the predominant perception of safety culture, as defined by "your hospital", "your work area/unit", "your supervisor/manager" and "communication", as seen in the 2016 HSOPSC dataset for NPs/PAs working in pediatric hospitals and specialty units?

Question 5: What is the predominant perception of safety culture, as defined by "your hospital", "your work area/unit", "your supervisor/manager" and "communication", as seen in the 2016 HSOPSC dataset for RNs working in pediatric hospitals and specialty units?

Aim 1: Describe the patient safety grades in pediatric hospitals and specialty units from the predominant perception of administrators/managers, MDs, NPs/PAs and RNs in 2016

Aim 2: Describe the number of events reported in pediatric hospitals and hospital unit's from the predominant perceptions of administrators/managers, MDs, NPs/PAs and RNs in 2016

Proposed Analysis: This is a descriptive cross sectional design of the Hospital Survey on Patient Safety Culture (HSOPSC) dataset. This research will examine the 12 dimensions of safety culture from the perceptions of pediatric administrators and MDs, NP's, PA's, RN's in 2016. Multivariate analysis will be applied with the aim of determining if there is a statistically significant difference in the 12 dimensions of safety culture from the perspective of administrators/managers, MDs, NPs/PAs and RNs in 2016. Post hoc testing will be performed. Independent sample t tests will be used to determine the statistical significance between the group means, null and alternative hypotheses.

Implications: A poorly perceived safety culture has been linked to increased medical error rates. Analyzing data from U.S. hospitals regarding the perceptions of safety culture will aide in identifying barriers to patient safety, which in time should be modified. A fuller understanding of the national tendencies surrounding a hospital's pediatric safety culture will enhance knowledge to vital stakeholders, leading to improvements in quality care and the reduction of adverse events.

Timeline: To be completed by 12/31/2017.

APPENDIX G

LOYOLA UNIVERSITY CHICAGO INTERNAL REVIEW BOARD

NOTICE OF IRB EXEMPTION OF A RESEARCH PROJECT

LOYOLA UNIVERSITY CHICAGO
Health Sciences Division
Institutional Review Board for the Protection of Human Subjects
2160 South First Avenue
Maywood, IL 60153

11/20/2017

NOTICE OF IRB EXEMPTION OF A RESEARCH PROJECT

Investigator	**Burkhart, Elizabeth**
LU Number	**209970**
Title	**Perceptions of Pediatric Hospital Safety Culture in the U.S. in 2016: A Secondary Data Analysis of the Hospital Survey on Patient Safety Culture**
Date of Review	**06/06/2017**
Action	**EXEMPT**
Reason	**45CFR46.101, (4) Category Existing data, specimens**
Comments	**1. The research uses a publicly held database that does not contain identifiers.**
	2. The project is IRB exempt.

This project has been determined to be EXEMPT from IRB review.
There are no reporting requirements associated with this project.

The Full Board will review this determination on 06/21/2017.
If the Board disagrees with this action, you will be notified by 06/28/2017.

Kenneth Craig Micetich, M.D.
Chairman
Institutional Review Board for the Protection of Human Subjects
Loyola University Health Sciences Division

REFERENCES

Agency for Healthcare Research and Quality (AHRQ). (2008). *Becoming a high-reliability organization: Operational advice for hospital leaders.* Rockville, MD: Agency for Healthcare, Research and Quality.

Agency for Healthcare Research and Quality (AHRQ). (2013). *Understand the science of safety.* Retrieved from https://tinyurl.com/y6w2ac27

Agency for Healthcare Research and Quality (AHRQ). (2015). *Annual hospital-acquired condition rate and estimates of cost savings and deaths averted from 2010 to 2013* (16-0006-EF). Washington, DC: Government Printing Office. Retrieved from https://www.ahrq.gov/sites/default/files/publications/files/hacrate2013_0.pdf

Agency for Healthcare Research and Quality (AHRQ). (2016). *Surveys on patient safety culture research reference list*. Content last reviewed October 2016. Retrieved from https://tinyurl.com/y8hyue4t

Agency for Healthcare, Research and Quality (AHRQ). (2017). About TeamSTEPPS®. Retrieved from http://www.ahrq.gov/teamstepps/about-teamstepps/index.html

Aiken, L. H., Cimiotti, J. P., Sloane, D. M., Smith, H. L., Flynn, L., & Neff, D. F. (2011, December). The effects of nurse staffing and nurse education on patient deaths in hospitals with different nurse work environments. *Medical Care*, *49*(12), 1047-1053. Retrieved from http://dx.doi.org/10.1097/MLR.0b013e3182330b6e

American Academy of Pediatrics. (2011). *Policy statement—Principles of pediatric patient safety: Reducing harm due to medical care*. Retrieved from http://tiny.cc/v7jpmy

Aspden, P., Corrigan, J. M., Wolcott, J., & Erickson, S. M. (2004). Magnitude of the problem. In R. Briere & A. Decatur (Eds.), *Patient safety: Achieving a new standard of care* (pp. 29-42). Retrieved from https://doi.org/10.17226/10863 April 24, 2017

Audi, R. (Ed.). (2001a). Aristotle. *The Cambridge dictionary of philosophy* (2nd ed., pp. 44-51). New York, NY: Cambridge University Press.

Audi, R. (Ed.). (2001b). Cicero, Marcus Tullius. *The Cambridge dictionary of philosophy* (2nd ed., pp. 143-144). New York, NY: Cambridge University Press.

Audi, R. (Ed.). (2001c). Ockham's razor. *The Cambridge dictionary of philosophy* (2nd ed., p. 629). New York, NY: Cambridge University Press.

Audi, R. (Ed.). (2001d). Plato. *The Cambridge dictionary of philosophy* (2nd ed., pp. 709-713). New York, NY: Cambridge University Press.

Audi, R. (Ed.). (2001e). Socrates. *The Cambridge dictionary of philosophy* (2nd ed., pp. 859-861). New York, NY: Cambridge University Press.

Baines, R. J., DeBruijne, M. C., Langelaan, M., & Wagner, C. (2013). What are the safety risks for patients undergoing treatment by multiple specialties: a retrospective patient record review study. *BioMed Central Health Services Research*, *13*, 497-506. Retrieved from http://dx.doi.org/10.1186/1472-6963-13-497

Barata, I. A., Benjamin, L. S., Mace, S. E., Herman, M. I., & Goldman, R. D. (2007, June). Pediatric patient safety in the prehospital/emergency department setting. *Pediatric Emergency Care*, *23*(6), 412-418.

Barlas, S. (2014, September). Hospitals struggle with ACA challenges: More regulatory changes are in the offing in 2015. *Pharmacy and Therapeutics*, *39*(9), 627-629, 645.

Beauchamp, T. L., & Childress, J. F. (2013). *Principles of biomedical ethics* (7th ed.). New York: Oxford University Press.

Benjamin, M., & Curtis, J. (2010). *Ethics in nursing: Cases, principles and reasoning* (4th ed.). New York: Oxford University Press.

Bleakley, A. (2010). Blunting Occam's razor: Aligning medical education with studies of complexity. *Journal of Evaluation in Clinical Practice*, *16*, 849-855.

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

Bodur, S., & Filiz, E. (2010). Validity and reliability of Turkish version of "hospital survey on patient safety culture" and perception of patient safety in public hospitals in Turkey. *BMC Health Services Research*, *10*(28), 1-9. Retrieved from http://tiny.cc/19jpmy

Brilli, R. J., Allen, S., & Allen, J. T. (2014, May). Revisiting the quality chasm. *Pediatrics*, *5*(5), 763-765. Retrieved from http://dx.doi.org/10.1016/j.jpeds.2010.05.046

Brilli, R. J., McClead, R. E., Davis, T., Stoverock, L., Rayburn, A., & Berry, J. C. (2010). The preventable harm index: An effective motivator to facilitate the drive to zero. *The Journal of Pediatrics*, 681-683. Retrieved from http://dx.doi.org/10.1016/j.peds.2010.05.046

Buck, D., Kurth, C. D., & Varughese, A. (2014, March). Perspectives on quality and safety in pediatric anesthesia. *Anesthesiology Clinics*, *32*(1), 281-294. Retrieved from http://dx.doi.org/10.1016/j.anclin.2013.11.001

Buck, M. L. (2008). Improving pediatric medication safety*,* part II*:* Evaluating strategies to prevent medication errors. *Pediatric Pharmacotherapy 14*(12), 2008.

Burkhart, L., Sohn, M., Jordan, N., Tarlov, E., Gampetro, P., & LaVella, S. L. (2016, April-June). Impact of patient-centered innovations on access to providers, ambulatory care utilization, and patient clinical indicators in the Veterans Health Administration. *Quality Management in Health Care*, *25*(2), 102-110.

Burkhart, L., Solari-Twadell, P. A., & Haas, S. (2008, January). Addressing spiritual leadership: An organizational model. *The Journal of Nursing Administration*, *38*(1), 33-39.

Burkhart, L., & Vlasses, F. R. (2017, September 14). Photovoice: Primary care redesign guided by nursing research. *Western Journal of Nursing Research*, *39*(10), 1372. Retrieved from http://dx.doi.org/10.1177/0193945917715261h

Burhans, L. M., & Alligood, M. R. (2010, March 19). Quality nursing care in the wordsof nurses. *Journal of Advanced Nursing*, *66*(8), 1689-1697. Retrieved from http://dx.doi.org/10.1111/j.1365-2648.2010.05344.x

Burr, M., Sorra, J., & Nieva, V. F. (2002). *Analysis of the Veteran Administration (VA) national center for patient safety (NCPS) FY 200 patient safety questionnaire*. Rockville, MD: Westat®.

Butler, G. A., & Hupp, D. S. (2016, April). Pediatric quality and safety: a nursing perspective. *Pediatric Clinics of North America*, *63*(2), 329-339. Retrieved from http://dx.doi.org/10.1016/j.pci.2015.11.005

Carter, S. (2016, June 2). *What's love got to do with it? Leadership in the new era of healthcare* [Video file]. Retrieved from https://www.youtube.com/watch?v=Ut0vgq3zbiY

Catchpole, K. (2013, March 26). Spreading human factors expertise in healthcare: untangling the knots in people and systems [Editorial]. *British Medical Journal of Quality and Safety*, *22*, 793-797. Retrieved from http://dx.doi.org/10.1136/bjmqs-2013-002036

Centre for the Advancement of Interprofessional Education. (2002). *Defining IPE*. Retrieved from http://caipe.org.uk/about-us/defining-ipe/

Chassin, M. R., & Loeb, J. M. (2013). High-reliability healthcare: Getting there from here. *The Milbank Quarterly*, *91*(3), 459-490.

Chedoe, I., Molendijk, H. A., Dittrich, S. T., Junsman, F. G., Harting, J. W., Brouwers, J. R., & Taxis, K. (2007). Incidence and nature of medication errors in neonatal intensive care with strategies to improve safety: A review of the current literature. *Drug Safety*, *30*, 503-513.

Cimiotti, J. P., Barton, S. J., Gorman, K. E., Sloane, D. M., & Aiken, L. H. (2014). Nurse reports on resource adequacy in hospitals that care for acutely ill children. *Journal for Healthcare Quality*, *36*(2), 25-32. Retrieved from http://dx.doi.org/10.1111/j.1945-1474.2012.00212.x

Clancy, C. M., Margolis, P. A., & Miller, M. (2013, February 27). Collaborative networks for both improvement and research. *Pediatrics*, *131*(S4), S210-S214. Retrieved from http://dx.doi.org/10.1542/peds.2012-3786H

Clarke, S. P., Sloane, D. M., & Aiken, L. H. (2002). Effects of hospital staffing and organizational climate on needlestick injuries to nurses. *American Journal of Public Health*, *92*(7), 1115-1119.

Combs, J., Liu, Y., Hall, A., & Ketchen, D. (2006). How much do high performance work practices matter? A meta-analysis of their effects on organizational performance. *Personnel Psychology*, *59*, 501-528.

Comparative effectiveness research. (2017). Retrieved from https://tinyurl.com/yavaar5q

Cooper, D. M. (2000). Towards a model of safety culture. *Safety Science*, *36*, 111-136.

Cox, E. D., Carayon, P., Hansen, K. W., Rajamanickam, V. P., Brown, R. L., Rathouz, P. J., ... Buel, L. A. (2013, August). Parent perceptions of children's hospital safety culture. *British Medical Journal on Quality and Safety, 22*(8), 664-667.

Davis, K., Collins, S. R., Stremikis, K., Rustgi, S., & Nuzum, R. (2009). *Starting on the path to a high performance health system: Analysis of health system reform provisions of reform bills in the House of Representatives and Senate*. New York, NY: The Commonwealth Fund.

Davis, K., Stremikis, K., Squires, D., & Schoen, C. (2014). *Mirror, mirror on the wall: How the performance of the U.S. health care system compares internationally*. Retrieved from http://tiny.cc/qckpmy

Dekker, S. (2011). *Patient safety: A human factors approach*. Boca Raton, FL: Taylor & Francis Group.

Delaney, K. R., & Hardy, Lu. (2008). Challenges faced by inpatient child/adolescent psychiatric nurses. *Journal of Psychosocial Nursing*, *46*(2), 21-24.

Delery, J. E., & Shaw, J. D. (2001). The strategic management of people in work organizations: Review, synthesis, and extension: Vol. 20. In G. R. Ferris (Ed.), *Research in personnel and human resources management,* (pp. 165-197). Bingley, UK: Emerald Group Publishing Limited.

Denison, D. R. (1996). What is the difference between organizational culture and organizational climate? A native's point of view on a decade of paradigm wars. *Academy of Management Review*, *21*(3), 619-654.

DeVellis, R. F. (2012). *Scale development: Theory and applications* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Dickenson, C. J., Wagner, D. S., Shaw, B. E., Owens, T. A., Pasko, D., & Nieder, M. F. (2012, January-March). A systematic approach to improving medication safety in a pediatric intensive care unit. *Critical Care Nursing*, *35*(1), 15-26.

DiCuccio, M. H. (2015, September). The relationship between patient safety culture and patient outcomes: a systematic review. *Journal of Patient Safety*, *11*(3), 135-142.

Donnelly, L. F., Dickerson, J. M., Goodfriend, M. A., & Muething, S. E. (2009, July). Improving patient safety: Effects of a safety program on performance and culture in a department of radiology. *American Journal of Radiology*, *193*(1), 165-171. Retrieved from http://dx.doi.org/10.2214/AJR.08.2086

Edwards, P. T., Scott, T., & Richardson, P. (2008). Using staff perceptions of patient safety as a tool for improving safety culture in a pediatric hospital system. *Journal of Patient Safety*, *4*(2), 113-115.

Eiras, M., Escoval, A., Grillo, I. M., & Silva-Fortes, C. (2014). The hospital survey on patient safety culture in Portuguese hospitals: Instrument validity and reliability. *International Journal of Healthcare Quality Assurance*, *27*(2), 111-122. Retrieved from http://dx.doi.org/10.1108/IJHCQA-07-2012-0072

Etchegaray, J. M., & Thomas, E. J. (2012). Comparing two safety culture surveys: safety attitudes questionnaire and hospital survey on patient safety. *BMJ Quality and Safety*, *21*, 490-498.

Evans, W. R., & Davis, W. D. (2005). High-performance work systems and organizational performance: The mediating role of internal social structure. *Journal of Management*, *31*, 758-775.

Famolaro, T., Dyer-Yount, N., Burns, W., Flashner, E., Lu, H., & Sorra, J. (March 2016). *Hospital survey on patient safety culture: 2016 user comparative database report*. (Prepared by Westat, Rockville, MD, under Contract No. HHSA 290201300003C). Rockville, MD: Agency for Healthcare Research and Quality; March 2016. AHRQ Publication No. 16-0021-EF

Fewster-Thuente, L., & Velsor-Friedrich, B. (2008, January-March). Interdisciplinary collaboration for healthcare professionals. *Nursing Administration Quarterly, 32*(1), 40-48.

Field, A. (2011). *Discovering statistics using SPSS* (3rd ed.). Thousand Oaks, CA: Sage Publications.

Flin, R., Fletcher, G., McGeorge, P., Sutherland, A., & Patey, R. (2003). Anaesthetists' attitudes to teamwork and safety. *Anaesthesia*, *58*, 233-242.

Gans, D. N. (2004, July). Ockham's razor cuts confusion surrounding management. *Management Group Management Association Connexion*, *4*(6), 24-27.

Gawande, A. (2002). *Complications: A surgeon's notes on an imperfect science*. New York, NY: Picador.

Glisson, C., Ladsverk, J., Schoenwald, S., Kelleher, K., Hoagwood, K. E., Mayberg, S., & Green, P. (2008, March). Assessing the organizational social context of mental health services: Implications for research and practice. *Administration and Policy in Mental Health*, *35*(1-2), 90-113.

Glisson, C., Schoenwald, S. K., Kelleher, D., Landsverk, J., Hoagwood, K. E., Mayberg, S., Green, P. (2008). Therapist turnover and new program sustainability in mental health clinics as a function of organizational culture, climate, and service structure. *Administration and Policy in Mental Health Services Research, 35*(1-2), 124-133.

Goldenhar, L. M., Brady, P. W., Sutcliffe, K. M., & Muething, S. E. (2013). Huddling for high reliability and situation awareness. *BMJ Quality and Safety*, *22*, 899-906.

Gonzales, K. (2010). Medication administration errors in the pediatric population: A systematic search of the literature. *Journal of Pediatric Nursing*, *25*, 555-565.

Grant, M. C., Donaldson, A. E., & Larsen, G. Y. (2006). The safety culture in a children's hospital. *Journal of Nursing Care Quality*, *21*(3), 223-229.

Halligan, M., & Zeceivic, A. (2011). Safety culture in healthcare: A review of concepts, dimensions, measures and progress. *BMJ Quality and Safety*, *20*, 338-343.

Handoffs and signouts. (2016). Retrieved from http://tiny.cc/6dkpmy

Hannah, K. L., Schade, C. P., Lomely, D. R., Ruddick, P., & Bellamy, G. R. (2008, August). Hospital administrative staff vs. nursing staff responses to the AHRQ hospital survey on patient safety culture. In K. Henriksen, J. B. Battles, & M. A. Keyes (Eds.), *Advances in patient safety: New directions and alternatives approaches (Volume 2. Culture and redesign)*. Rockville, MD: Agency for Healthcare Research and Quality.

Hansen, L., Williams, M., & Singer, S. (2011). Perceptions of hospital safety climate and incidence of readmission. *Health Services Research*, *46*(2), 596-616.

Haugen, A. S., Softeland, E., Eide, G. E., Nortvedt, M. W., Aase, K., & Harthug, S. (2010). Patient safety in surgical environments: Cross-countries comparison of psychometric properties and results of the Norwegian version of the hospital survey on patient safety. *BMC Health Services Research*, *10*(279), 1-10.

Hayes, L. W., Dobyns, E. L., DiGionvine, B., Brown, A. M., Jacobson, S., Randall, K. H., ... Markovitz, B. (2012, March). A multicenter collaborative approach to reducing pediatric codes outside the ICU. *Pediatrics*, *129*(3), e785-791.

Health and Safety Commission. (1993). *Third report: Organizing for safety. ACSNI study group on human factors* (HMSO). Washington, DC: Government Printing Office.

Health and Safety Executive. (2005). *A review of safety culture and safety climate literature for the development of the safety culture inspection toolkit* (367). Bristol: England: HSE Books.

Hedskold, M., Pukk-Harenstam, K., Berg, E., Lindh, M., Soop, M., Ovretveit, J., & Sachs, M. A. (2013). Psychometric properties of the hospital survey on patient safety culture, HSOPSC, applied on a large Swedish health care sample. *BMC Health Services Research*, *13*(332), 1-11. Retrieved from http://tiny.cc/gfkpmy

Hellings, J., Schrooten, W., Klazinga, N. S., & Vleugels, A. (2010, March 19). Improving patient safety culture. *International Journal of Health Care Quality Assurance*, *23*(5), 489-506. Retrieved from http://dx.doi.org/10.1108/09526861011050529

Henneman, E. A., Lee, J. L., & Cohen, J. I. (1995). Collaboration: A concept analysis. *Journal of Nursing Administration*, *21*(1), 103-109.

Henrickson, S. E., Wadhera, R. K., & Elbardissi, A. W. (2009). Development and pilot evaluation of a preoperative briefing protocol for cardiovascular surgery. *Journal of the American College of Surgeons, 208*, 1115-1123.

Hines, S., Luna, K., Lofthus, J., Marquardt, M., & Stelmokas, D. (April 2008). *Becoming a high reliability organization: Operational advice for hospital leaders*. (Prepared by the Lewin Group under Contract No. 290-04-0011.) AHRQ Publication No. 08-0022. Rockville, MD: Agency for Healthcare Research and Quality.

Hospitals. (2017). In *Merriam-Webster's Dictionary.* Retrieved from https://www.merriam-webster.com/dictionary/hospital

Hospital units. (2012). Retrieved from http://www.reference.md/files/D006/mD006757.html

Hughes, R. G. (Ed.). (2008). Nurses at the "sharp end" of patient care. *Patient safety and quality: An evidence-based handbook for nurses.* Rockville, MD: Agency for Healthcare Research and Quality.

Hulley, S. B., Cummings, S. R., Browner, W. S., Grady, D. G., & Newman, T. B. (2013). *Designing clinical research* (4th ed.). Philadelphia, PA: Lippincott Williams & Wilkins.

Huselid, M. A. (1995). The impact of human resource management practices on turnover productivity and corporate financial performance. *Academy of Management Journal*, *38*, 635-672.

Institute of Safe Medication Practices. (2003). *Survey on workplace intimidation [survey]*. Retrieved from https://ismp.org/Survey/surveyresults/Survey0311.asp

Institute of Medicine. (2003). *Keeping patients safe: Transforming the work environment of nurses*. Washington, DC: National Academy Press.

Ito, S., Seto, K., Kigawa, M., Fujita, S., Hasegawa, T., & Hasegawa, T. (2011). Development and applicability of hospital survey on patient safety culture (HSOPS) in Japan. *BMC Health Services Research*, *11*(28), 1-7. Retrieved from http://biomedcentral.com/1472-6963/11/28

James, J. T. (2013, September). A new, evidence-based estimate of patient harms associated with hospital care. *Journal of Patient Safety*, *9*(3), 122-128.

James, L. A., & James, L. R. (1989). Integrating work environment perceptions: Explorations into the measurement of meaning. *Journal of Applied Psychology*, *74*(4), 739-751.

Jamieson, S. (2004). Likert scales: How to (ab)use them. *Medical Education*, *38*, 1217-1218.

Jordan, N., Leon, S. C., Epstein, R. A., Durkin, E., Helgerson, J., & Lakin, B. L. (2009). Effect of organizational climate on youth outcomes in residential treatment. *Residential treatment for children and youth*, *26*, 1-15. Retrieved from http://dx.doi.org/10.1080/08865710903130277

Kaissi, A., Johnson, T., & Kirschbaum, M. S. (2003). Measuring teamwork and patient safety attitudes of high-risk areas. *Nursing Economics*, *21*, 211-218.

Kapp, A. and Parboteeah, K. P. (2008, July). Ethical climate and safety performance: Design better programs, improve compliance and foster participation. *Professional Safety.* Retrieved from www.asse.org

Kaushal, R., Bates, D. W., Abramson, E. L., Soukup, J. R., & Goldman, D. A. (2008, July 1). Unit-based clinical pharmacists' prevention of serious medication errors in pediatric inpatient. *American Journal of Health Systems Pharmacy*, *65*, 1254-1260.

Kaushal, R., Bates, D. W., Landrigan, C., McKenna, K. J., Clapp, M. D., Federico, F., & Goldman, D. A. (2001, April 25). Medication errors and adverse drug events in pediatric inpatients. *Journal of the American Medical Association, 285*(16), 2114-2120.

Khan, A., Furtak, S. L., Melvin, P., Rogers, J. E., Schuster, M. A., & Landrigan, C. P. (2016, February 29). Parent-reported errors and adverse events in hospitalized children. *Journal of the American Medical Association: Pediatrics*. Retrieved from http://dx.doi.org/10.1001/jamapediatrics.2015.4608

Knapp, T. (1990). Treating ordinal scales as interval scales: An attempt to resolve the controversy. Nursing Research, *39*, 121-123.

Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.). (1999). *To err is human: Building a safer health system* (R729.8.T6.2000). Retrieved from National Academy Press: http://www.nap.edu/openbook.php?record_id=9728&page=R2

Korner, M., Wirtz, M., Bengel, J., & Goritz, A. (2015). Relationship of organizational culture, teamwork and job satisfaction in interprofessional teams. *BioMed Central Health Services Research*, *15*(243), 1-12.

Kourkouta, L. & Papathanasiou, J. V. (2014). Communication in nursing practice. *Mater Sociomed*, *26*(1), 65-67.

Kraus, W. A. (1980). *Collaboration in organizations: Alternatives to hierarchy*. Boston, MA: Human Sciences Press.

Landro, L. (2010, June, July, August). New focus on averting errors: Hospital culture. *The Alabama Nurse*, *37*(2), 18.

Lane, M. (2014). Ancient political philosophy. In E. N. Zalta, U. Nodelman, C. Allen, & R. L. Anderson (Eds.), *Stanford encyclopedia of philosophy*. Retrieved from http://tiny.cc/fikpmy

Langley, G. J., Moen, R. D., Nolan, K. M., Nolan, T. W., Norman, C. L., & Provost, L. P. (2009). *The improvement guide: A practical approach to enhancing organizational performance*. San Francisco, CA: Jossey-Bass.

Larrison, C. R., Xiang, X., Gustafson, M., Lardiere, M. R., & Jordan, N. (2017, April 24). Implementation of electronic health record among community mental health agencies. *Journal of Behavioral Health Services and Research*, 1-9. Retrieved from http://dx.doi.org/10.1007/s11414-017-9556-9

Leape, L. L. (2006). Problem doctors: Is there a system-level solution. *Annals of Internal Medicine*, *144*, 107-155.

Leape, L. L., Bates, D. W., & Cullen, D. J. (1995). Systems analysis of adverse drug events. *Journal of the American Medical Association*, *274*(1), 35-43.

Leape, L., Berwick, D., Clancy, C., Conway, J., Gluck, P., Guest, J., ... Isaac, T. (2009). Transforming healthcare: A safety imperative. *Quality and Safety in Health Care*, *18*, 424-428. Retrieved from http://dx.doi.org/10.1136/qshc.2009.036954

Lembitz, A., & Clarke, T. J. (2009). Clarifying "never events" and introducing "always events". *Patient Safety in Surgery*, *3*(26). Retrieved from http://dx.doi.org/10.1186/1754-9493-3-26

Leonard, M. S. (2010). Patient safety and quality improvement: Medical errors and adverse events. *Pediatrics in Review*, *31*, 151-158. Retrieved from https://tinyurl.com/yd5s6vkw

Leonard, J. C., Schariff, D. P., Koors, V., Lerner, E. B., Adelgais, K. M., Anders, J., ... Jaffe, D. M. (2012). A qualitative assessment of factors that influence emergency medical services partnerships in prehospital research. *Society for Academic Emergency Medicine*, 161-173. Retrieved from http://dx.doi.org/10.1111/j.1553-2712.2011.01283.x

Li, J., & Robertson, T. (2011). Physical space and information space: Studies of collaboration in distributed multi-disciplinary medical team meetings. *Behavior & Information Technology*, *30*(4), 433-454.

Makary, M. A., & Daniel, M. (2016, May 3). Medical error: The third leading cause of death in the U.S. *British Medical Journal*, 353:i2139. Retrieved from http://dx.doi.org/10.1136/bmj.i2139

Mardon, R. E., Khanna, K., Sorra, J., Dyer, N., & Famolaro, T. (2010). Exploring relationships between hospital patient safety culture and adverse events. *Journal of Patient Safety*, *6*(4), 226-232.

Marino, B. L., Reinhardt, K., & Eichelberger, W. J. (2004). Prevalence of errors in a pediatric hospital medication system: Implications for error proofing. *Outcomes Management for Nursing Practice, 4*(3), 129-135.

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

Martin, B. S., & Abore, M. (2016, April). Measurement standards and peer benchmarking: One Hospital's journey. *Pediatric Clinics of North America*, *63*(2), 239-249.

Mayer, C. M., Cluff, L., Wei-Ting, L., Schade Willis, T., Stafford, R. E., Williams, C., ... Amoozegar, J. B. (2011, August). Evaluating efforts to optimize TeamSTEPPS® implementation in surgical and pediatric intensive care units. *The Joint Commission on Quality and Patient Safety*, *37*(8), 365-374.

Medicare Payment Advisory Commission. (2008). *Report to Congress: Reforming the delivery system* [Report]. Washington, D.C.: MedPAC.

Milton, C. L. (2013). Ethical issues surrounding interprofessional collaboration. *Nursing Science Quarterly*, *24*(4), 316-318. Retrieved from http://dx.doi.org/10.1177/0894318413500314

Moghri, J., Arab, M., Saari, A. A., Nateqi, E., Forooshani, A. R., Ghiasvand, H., ... Goudarzi, R. (2012, April). The psychometric properties of the Farsi version of "hospital survey on patient safety culture" in Iran's hospitals. *Iranian Journal of Public Health*, *41*(4), 80-86.

Moore, J. D. (2014). I-PASS handoff system leads to decline in medical errors. Retrieved from http://www.medpagetoday.com/hospitalbasedmedicine/generalhospitalpractice/48817

Mueller, B. U. (2014, June). Quality and safety in pediatric hematology/oncology. *Pediatric Blood Cancer*, *61*(6), 966-969. Retrieved from http://dx.doi.org/10.1002/pbc.24946

Muething, S. E., Goodie, A., Schoettker, P. J., Donnelly, L. F., Goodfriend, M. A., Bracke, T. M., ... Kotagal, U. R. (2012, March 14). Quality improvement initiative to reduce serious safety events and improve patient safety culture. *Pediatrics*, *130*(2), e423-e431.

Murphy, D. R., Laxmisan, A., Reis, B. A., Thomas, E. J., Esquivel, A., Forjuoh, S. N., ... Singh, H. (2014). Electronic health record-based triggers to detect potential delays in cancer. *BMJ Quality and Safety*, *23*, 8-16.

Najjar, S., Hamdan, M., Baillien, E., Vleugels, A., Euwema, M., Sermeus, W., ... Vanhaecht, K. (2013). The Arabic version of the hospital survey on patient safety culture: A psychometric evaluation in a Palestinian sample. *BMC Health Services Research*, *13*(193), 1-8. Retrieved from http://www.biomedcentral.c0m/1472-6963/13/193

Nanji, K. C., Patel, A., Shaikh, S., Seger, D. L., & Bates, D. W. (2016, November 24). Evaluation of perioperative medication errors and adverse drug events. *Anesthesiology 124*(1), 25-34.

National Patient Safety Foundation. (2015). *Free from harm: Accelerating patient safety improvement fifteen years after To Err is Human*. Boston, MA: National Patient Safety Foundation.

National Quality Forum. (2011). *Serious reportable events in healthcare-2011: A consensus report*. Washington, D.C.

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. *Journal of Applied Psychology*, *91*(4), 946-953.

Nie, Y., Mao, X., Cui, H., He, S., Li, J., & Zhang, M. (2013). Hospital survey on patient safety culture in China. *BMC Health Services Research*, *13*(228), 1-11.

Nieva, V. F., & Sorra, J. (2003, December). Safety culture assessment: a tool for improving patient safety in healthcare organizations. *Quality and Safety in Heath Care*, *12* (suppl 2), ii17-ii23. Retrieved from http://dx.doi.org/10.1136/qhs.12.suppl_2.ii17

Nordin, A., Wilde-Larsson, B., Nordstrom, G., & Theander, K. (2013, December 4). Swedish hospital survey on patient safety culture: Psychometric properties and health care staff's perception. *Open Journal of Nursing*, *3*. Retrieved from http://dx.doi.org/10.4236/ojn.2013.38A006

Occelli, R., Quenon, J., Kret, M., Domecq, S., Delaperche, F., Claverie, O., ... Michel, P. (2013, May 27). Validation of the French version of the hospital survey on patient safety culture questionnaire. *International Journal for Quality in Health Care*, *25*(4), 459-468.

Olsen, E. (2008). Reliability and validity of the hospital survey on patient safety culture at a Norwegian hospital. In J. Ovretveit & P. Sousa (Eds.), *Quality and safety improvement research: Methods and researach practice from the international quality improvement research network* (pp. 173-186). Lisbon, Portugal: Escola Nacional de Saude Publica.

Pallant, J. (2010). Factor analysis. In *SPSS survival manual* (4th ed., pp. 181-212). New York: McGraw-Hill.

Parsell, G., & Bligh, J. (1999). The development of a questionnaire to assess the readiness of health care students for interprofessional learning (RIPLS). *Medical Education*, *33*(2), 95-100. Retrieved from http://dx.doi.org/10.1046/j.1365-2923.1999.00298.x

Perneger, T. V., Staines, A., & Kundig, F. (2014). Internal consistency, factor structure and construct validity of the French version of the hospital survey on patient safety culture. *BMJ Quality and Safety*, *23*, 389-397. Retrieved from http://dx.doi.org/10.1136/bmjqs-2013-002024

Peterson, T. H., Teman, S. F., & Connors, R. H. (2012, September). A safety culture transformation: Its effects at a children's hospital. *Journal of Patient Safety*, *8*(3), 125-130.

Pfeiffer, Y., & Manser, T. (2010). Development of the German version of the hospital survey on patient safety culture: Dimensionality and psychometric properties. *Safety Science*, *48*, 1452-1462. Retrieved from http://dx.doi.org/10.1016/j.ssci.2010.07.002

Porto, G., & Lauve, R. (2006). Disruptive clinical behavior: A persistent threat to patient safety. *Patient Safety and Quality Healthcare.* Retrieved from https://tinyurl.com/y8ckmtgk

Prenestini, A. Calciolari, S. Lega, F., & Grilli, R. (2015). The relationship between senior management team culture and clinical governance: Empirical investigation and managerial implications. *Health Care Management Review*, *40*(4), 313-323.

Press Ganey Associates, Inc. (2009). Press Ganey releases innovative report to assess culture of safety in U.S. hospitals. Retrieved from https://tinyurl.com/yd57ftus

Profit, J., Etchegaray, J., Petersen, L. A., Sexton, J. B., Hysong, S. J., Mei, M., & Thomas, E. J. (2012a, March). Neonatal intensive care unit safety culture varies widely. *Archives of Disease in Childhood: Fetal and Neonatal Edition*, *97*(2), F120-126.

Profit, J., Etchegaray, J., Petersen, L. A., Sexton, J. B., Hysong, S. J., Mei, M., & Thomas, E. J. (2012b, March). The safety attitudes questionnaire as a tool for benchmarking safety culture in the NICU. *Archives of Disease in Childhood: Fetal and Neonatal Edition*, *97*(2), F127-132.

Profit, J., Sharek, P., Amspoker, A., Kowalkowski, M., Nisbet, C., Thomas, E., ... Sexton, B. (2014). Burnout in the NICU setting and its relation to safety culture. *BMJ Quality and Safety*, *23*(10), 806-813.

Pronovost, P. J., Needham, D. M., Berenholtz, S., Sinopoli, D., Chu H., Cosgrove, S.,… Goeschel, C. (2006). An intervention to decrease catheter-related bloodstream infections in the ICU. *New England of Medicine*, 355.

Pronovost, P. J., Ravitz, A. D., Stoll, R. A., & Kennedy, S. B. (2015). *Transforming patient safety: A sector wide systems approach*. Retrieved from https://tinyurl.com/ycp4plua

Reason, J. (1990). The contribution of latent human failures to the breakdown of complex systems. *Philosophical Transactions of the Royal Society of London B: Biological Sciences*, *327*(1241), 475-484.

Reason, J. (1997). *Managing the risks of organizational accidents*. United Kingdom: Ashgate.

Reason, J. (1998). Achieving a safe culture: theory and practice. *Work and Stress: An International Journal of Work, Health and Organizations*, *12*(3), 293-306. Retrieved from http://dx.doi.org/10.1080/02678379808256868

Reason, J. (2000, March 18). Human error: Models and management. *British Medical Journal, 320*(7237), 768-770.

Reason, J., & Hobbs, A. (2003). *Managing maintenance error: A practical guide.* Burlington, VT: Ashgate.

Reed, T., Horsley, T. L., Muccino, K., Quinones, D., Siddall, V., McCarthy, J., & Adams, W. (2017, May-June). Simulation using TeamSTEPPS® to promote interprofessional education and collaborative practice. *Nurse Educator*, E1-E5. Retrieved from http://dx.doi.org/10.1097/NNE.0000000000000350

Reilly, J. M., Aranda, M. P., Segal-Gidan, F., Halle, A., Han, P. P., Harris, P., ... Cousineau, M. R. (2014). *33*(4), 177-193. Retrieved from http://dx.doi.org/10.1080/01621424.2014.968502

Robida, A. (2013, June 4). Hospital survey on patient safety culture in Slovenia: A psychometric evaluation. *International Journal for Quality in Health Care*, *25*(4), 469-475.

Rosenstein, A. H. (2011). The Quality and Economic Impact of Disruptive Behaviors on Clinical Outcomes of Patient Care. *American Journal of Medical Quality*, *26*(5), 372-379. Retrieved from http://dx.doi.org/10.1177/1062860611400592

Rosenstein, A. H., & O'Daniel, M. (2005). Disruptive behavior and clinical outcomes: Perceptions of nurses and physicians. *American Journal of Nursing, 105*(1), 54-64.

Runy, L. A. (2007, September). How one hospital is cutting serious safety events. *Hospitals and Health Networks*, *81*(9), 27.

Sabin, J. E. (2012, May). Individualism, solidarity and U.S. health care. *Virtual Mentor*, *14*(5), 415-418.

Salas, E., Diaz Granados, D., Klein, C., Stagl, K. C., Goodwin, G. F., & Halpin, S. M. (2008, December). Does team training improve team performance? *Human Factors*, *50*(6), 903-033. Retrieved from http://dx.doi.org/10.1518/001872008X375009

Sarac, C., Flin, R., Mearns, K., & Jackson, J. (2011, April 1). Hospital survey on patient safety culture: Psychometric analysis on a Scottish sample. *BMJ Quality and Safety*, *20*, 842- Retrieved from http/:dx.doi.org.10.1136:bmjqs.2010.047720

Schmidt, L. A. (2010, November to December). Making sure: Registered nurses watching over their patients. *Nursing Research*, *59*(6), 400-406.

Schneider, E. C., Sarnak, D. O., Squires, D., Shah, A., & Doty, M. M. (2017). Mirror, mirror 2017: International comparison reflects flaws and opportunities for better U.S. health care. Retrieved from http://www.commonwealthfund.org/interactives/2017/july/mirror-mirror/assets/Schneider_mirror_mirror_2017.pdf

Schwoebel, A., & Creely, J. (2010, January to March). Improving the safety culture of neonatal care through the development and implementation of a staff-focused delta team. *Journal of Perinatal Neonatal Nursing*, *24*(1), 81-87.

Sedman, A., Harris, J. M., Schultz, K., Schwalenstoker, E., Remus, D., Scanlon, M., & Bahl, V. (2005, January 1). Relevance of the Agency for Health Care Research and quality patient safety indicators for children's hospitals. *Pediatrics*, *115*(1), 135-145. Retrieved from http://dx.doi.org/10.1542/peds.2004-1083

Sexton, J. B., Helmreich, R. L., Neilands, T. B., Rowan, K., Vella, K., Boyden, J., ... Thomas, E. J. (2006, April 3). The safety attitudes questionnaire: psychometric properties, benchmarking data and emerging research. *BMC Health Services Research*, *6*(44), 10. Retrieved from http://dx.doi.org/10.1186/1472-6963-6-44

Shapiro, J., Whittemore, A., Lawrence, C., & Tsen, M. D. (2014, April). Instituting a culture of professionalism: The establishment of a center for professionalism and peer support. *The Joint Commission Journal on Quality and Patient Safety*, *40*(4), 168-177.

Sheehan, M., McCarthy, P., Barker, M., & Henderson, M. (2001, June). *A model for assessing the impacts and costs of workplace bullying.* Paper presented at the Standing Conference on Organizational Symbolism (SCOS), Dublin, Ireland.

Sheth, S., McCarthy, E., Kipps, A. K., Woods, M., Roth, S. J., Sharek, P. J., & Shin, A. Y. (2016, February). Change in efficiency and safety culture after integration of an I-PASS-supported handoff process. *Pediatrics*, *137*(2). Retrieved from http://dx.doi.org/10.1542/peds.2015-0166

Shiner, B., Ronconi, J. M., McKnight, S., Young-Xu, Y., Mills, P. D., & Watts, B. V. (20016, May 25). Test-retest reliability of the VA national center for patient safety culture questionnaire. *Journal of Evaluation in Clinical Practice*, *22*, 989-993. Retrieved from http://dx.doi.org/10.1111/jep.12589

Siarkowski-Amer, K. (2013). *Quality and safety for transformational nursing*. Upper Saddle River, NJ: Pearson Education.

Siedlecki, S., & Hixson, E. D. (2015, September). Relationships between nurses and physicians matter. *Online Journal of Issues in Nursing*, *20*(3), 1. Retrieved from http://dx.doi:10.3912/OJIN.Vol20No 03PPT03

Silo. (2018). In *Oxford Living Dictionaries*. Retrieved from https://tinyurl.com/yc2tfsdk

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

Singh, H., Giardina, T. D., Forjuoh, S. N., Reis, M. D., Kosmach, S., Khan, M. M., & Thomas, E. J. (2012). Electronic health record-based surveillance of diagnostic errors in primary care. *BMJ Quality and Safety, 21*, 91-100.

Singh, H. M., & Thomas, E. J. (2014, September). The frequency of diagnostic errors in outpatient care: Estimations from three large observational studies involving U.S. adult population. *BMJ Quality and Safety*, *23*, 727-731. Retrieved from https://tinyurl.com/yczpd2oy

Singla, A. K., Kitch, B. T., Weissman, J. S., & Campbell, E. G. (2006, September). Assessing patient safety culture: A review of synthesis of the measurement tools. *Journal of Patient Safety*, *2*(3), 105-115.

Smits, M., Christians-Dingelhoff, I., Wagner, C., Van der Wal, G., & Groenewegen, P. P. (2008, November 7). The psychometric properties of the Hospital Survey on Patient Safety Culture in Dutch hospitals. *BMC Health Services Research*, *8*(230). Retrieved from http://dx.doi.org/10.1186/1472-6963-8-230

Solidarity. (2016). In *Merriam Webster's Dictionary*. Retrieved from https://www.merriam-webster.com/dictionary/solidarity

Sorra, J., & Dyer, N. (2010). Multilevel psychometric properties of the AHRQ hospital survey on patient safety culture. *BMC Health Services Research*, *10*(199). Retrieved from http://www.biomedcentral.com/1472-6963/10/199

Sorra, J., Gray, L., Streagle, S., Famolaro, T., Yount, N., & Behm, J. (2016). *AHRQ hospital survey on patient safety culture: User's guide* (AHRQ Publication No. 15-0049-EF). Washington, DC: Government Printing Office.

Sorra, J., Khanna, K., Dyer, N., Mardon, R., & Famolaro, T. (2012). Exploring relationships between patient safety culture and patient's assessments of hospital care. *Journal of Patient Safety*, *8*(3), 131-139.

Sorra, J., Khanna, K., Dyer, N., Mardon, R., & Famolaro, T. (2012). Exploring relationships between patient safety culture and patient's assessments of hospital care. *Journal of Patient Safety*, *8*(3), 131-139.

Sorra, J., & Nieva, V. F. (2002). *Psychometric analysis of the MERS-TM hospital transfusion service safety culture survey*. Rockville, MD: Westat®

Sorra, J. S., Nieva, V. F. (2004). Development of the Hospital Survey on Patient Safety Culture. (Prepared by Westat®, under Contract No. 290-96-0004). Rockville, MD: Agency for Healthcare Research and Quality.

Spade, P. V., & Panaccio, C. (Winter 2016). William of Ockham. In E. N. Zalta (Ed.), *Stanford encyclopedia of philosophy: Philosophy*. Retrieved from http://plato.stanford.edu/entries/ockham/

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

Spence-Laschinger, H. K., Wong, C. A., Cummings, G. G., & Grau, A. L. (2014, January/February). Resonant leadership and workplace empowerment: The value of positive organizational cultures in reducing workplace incivility. Nursing Economics, *32*(1), 5-16.

Suresh, G. K., & Edwards, W. H. (2012, January 29). Central line-associated bloodstream infections in neonatal intensive care: changing the mental model from inevitability to preventability. *American Journal of Perinatology*, *1*, 57-64. Retrieved from http://dx.doi.org/10.1055/s-0031-1286182

Sutcliffe, K. M., Paine, L., & Pronovost, P. J. (2016). Re-examining high reliability: actively organising for safety. *BMJ Quality and Safety, 26,* 248-251. Retrieved from http://dx.doi.org/10.1136/bmjqs-2015-004698

Takata, G. S., Mason, W., Taketomo, C., Logsdon, T., & Sharek, P. J. (2008). Development, testing, and findings of a pediatric-focused trigger tool to identify medication-related harm in U.S. children's hospitals. *Pediatrics*, *121*, e927-e935. Retrieved from http://dx.doi.org/10.1542/peds.2007-1779

Tarini, B. A., Lorano, P., & Christakis, D. A. (2009, November). Afraid in the hospital: Parental concern for errors during a child's hospitalization. *Journal of Hospital Medicine*, *4*(9). Retrieved from http://dx.doi.org/10.1002/jhm.508

The Evidence Center. (2011, November). Research scan: Does improving safety culture affect patient outcomes?. *The Health Foundation*, 1-25. Retrieved from www.health.org.uk

The Joint Commission. (n.d.). *The ambulatory care program: The who, what, where, when and why's of credentialing and privileging*. [pamphlet]. Oakbrook, IL: The Joint Commission Accreditation.

The Joint Commission. (2017). *The essential role of leadership in developing a safety culture* [Sentinel event alert, Issue 57]. Retrieved from https://tinyurl.com/y752m496

The Joint Commission. (2012). *Hospital accreditation program* (Standard LD.03.01.01). Retrieved from http://www.jointcommission.org

The Joint Commission. (2008a). *Preventing pediatric medication errors* [Sentinel event alert, Issue 39]. Retrieved from http://www.jointcommission.org/assets/1/18/SEA_39.pdf

The Joint Commission. (2008b). *Behaviors that undermine a culture of safety* [Sentinel event alert, *Issue 40*]. Retrieved from https://tinyurl.com/zr8fmp8

The Joint Commission. (2016). *Sentinel event policy and procedures*. Retrieved from https://tinyurl.com/y6v4vwrs

The Joint Commission. (2012, June). *Transitions of care: The need for a more effective approach to continuing patient care. The Joint Commission Hot Topics in Health Care*. Retrieved from https://tinyurl.com/ycz29qgc

Thomas, L., & Galla, C. (2013). Building a culture of safety through team training and engagement. *BMJ Quality and Safety*, *22*, 425-434. Retrieved from http://dx.doi.org/10.1136/bmjqs-2012-001011

Tiessen, B. (2008). On the journey to a culture of patient safety. *Healthcare Quarterly*, *11*(4), 58-63.

Tillett, J. (2013, April). Collaboration and communication for optimal patient care. *The Journal of Perinatal & Neonatal Nursing*, *27*(2), 105-107.

Townsend, D. (2007). *Up the organization: How to stop the corporation from stifling people and strangling profits.* San Francisco, CA: Jossey-Bass.

Trochim, W. M., & Donnelly, J. P. (2008). *The research methods knowledge base* (3rd ed.). Mason, OH: Cengage Learning.

Trzesniewski, K. H., Donnellan, M. B., & Lucas, R. E. (2011). *Secondary data analysis*. Washington, DC: American Psychological Association.

Tsai, Y. (2011). Relationship between organizational culture, leadership behavior and job satisfaction. *BMC Health Services Research*, *11*(98). Retrieved from https://bmchealthservres.biomedcentral.com/articles/10.1186/1472-6963-11-98

Vandergoot, S., Sarris, A., Kirby, N., & Ward, H. (2017, September 20). Exploring undergraduate students' attitudes towards interprofessional learning, motivation-to-learn, and perceived impact of learning conflict resolution skills. *Journal of Interprofessional Care*, 1-8. Retrieved from http://dx.doi.org/10.1080/13561820.2017.1383975

Victor, B., & Cullen, J. B. (1987). A theory and measure of ethical climate in organizations. *Administrative Science Quarterly*, *33*(1), 101-125.

Vlayen, A., Hellings, J., Claes, N., Abdou, A., & Schrooten, W. (2015, March). Measuring safety culture in Belgian psychiatric hospitals: Validation of the Dutch and French translations of the hospital survey on patient safety culture. *Journal of Psychiatric Practice*, *21*(2), 124-138.

Waltz, C. F., Strickland, O. L., & Lenz, E. R. (2010). *Measurement in nursing and health research* (4th ed.). New York: Springer Publishing.

Waterson, P., Griffiths, P., Stride, C., Murphy, J., & Hignett, S. (2010, March 8). Psychometric properties of the hospital survey on patient safety culture: Findings from the U.K. *Quality and Safety in Health Care*, *19*(e2), 1-5. Retrieved from http://dx.doi.org/10.1136/qshc.2008.031625

Weick, K. E., & Sutcliffe, K. M. (2015). *Managing the unexpected: Sustained performance in a complex world* (3rd ed.). San Francisco, CA: Wiley, Jossey-Bass.

Weick, K. E., Sutcliffe, K. M., & Obstfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness. *Research in Organizational Behavior*, *21*, 81-123.

Weingart, S. N., Farbstein, K., David, R. B., & Phillips, R. S. (2004, March 4). Using a multihospital survey to examine the safety culture. *Joint Commission on Quality and Safety*, *30*, 125-132.

Weingart, C., Herstich, T., Baker, P., Garrett, M. L., Bird, M., Billock, J., Schwartz, H. P., & Bigham, M. T. (2013). Making good better: Implementing a standardized handoff in pediatric transport. *Air Medical Journal*, *32*(1), 40-46.

Wells, N. D., Johnson, R., & Salyer, S. Interdisciplinary collaboration. (1998). *Clinical Nurse Specialist, 12*(4), 161-168.

Westat®. Homepage. (2017). Retrieved from http://www.westat.com/

Woods, D. M., Holl, J. L., Angst, D., Echiverri, S. C., Johnson, D., Soglin, D. F., ... Weiss, K. B. (2008). Improving clinical communication and patient safety: clinician-recommended solutions. *NCBI Bookshelf*, *3*. Retrieved from https://tinyurl.com/yazurlun

Woods, D., Thomas, E., Holl, J., Altman, S., & Brennan, T. (2005, January 1). Adverse events and preventable adverse events in children. *Pediatrics*, *115*(1), 155-160. Retrieved from http://dx.doi.org/10.1542/peds.2004-0410

World Health Organization: Health workforce. (2010). *Framework for action on interprofessional education and collaborative practice* (WHO/HRH/HPN/10.3). Retrieved from http://www.who.int/hrh/resources/framework_action/en/

Xuanyue, M., Yanli, N., Hao, C., Pengli, J., & Mingming, Z. (2013, January 5). Literature review regarding patient safety culture. *Journal of Evidence Based Medicine*, 43-49. Retrieved from http://dx.doi.org/10.1111/jebm.12020

Zeidel, M. L. (2011, July). Systematic quality improvement in medicine: Everyone can do it. *Rambam Maimonides Medical Journal*, *2*(3). Retrieved from http://dx.doi.org/10.5041/RMMJ.10055

VITA

Pamela Gampetro is a native of Illinois and was raised just outside of Chicago. She first attended St. Francis School of Nursing in Evanston, IL, and in 1995 went on to earn a Bachelor of Science in Nursing from Barat College, Lake Forest, IL. After years of working as an RN, Dr. Gampetro went on and earned a Master of Science in 2001 from DePaul University, Chicago, IL, and became certified by the American Nurses Credentialing Center as an Advanced Practice Nurse. She has worked in the specialty of pediatrics for over two decades specializing in both inpatient and outpatient settings, in the clinical role and within management.

Dr. Gampetro has published articles in two peer-reviewed journals, focusing on evaluating and improving the quality of patient care. As primary investigator, her first publication was a qualitative study examining the perceptions of adolescents and their mental health care needs in an outpatient clinic setting. For her second publication, Dr. Gampetro earned co-authorship on an interdisciplinary team of health service researchers at the Veteran's Health Administration where patient-centered care initiatives at select healthcare centers across the country were evaluated. Her participation in this quantitative study of secondary data influenced her most recent research, the *Perceptions of Pediatric Hospital Safety Culture in the U.S.: A Secondary Data Analysis of the 2016 Hospital Survey on Patient Safety Culture*. In this study, Dr. Gampetro evaluated the 2016 Agency for Healthcare Research and Quality's Hospital Survey on Patient Safety Culture Database, examining the organizational safety culture within

U.S. pediatric hospitals and specialty units. This research was funded by the Versant Center for the Advancement of Nursing (VCAN) at East Carolina University's College of Nursing.

Dr. Gampetro is currently teaching pediatrics at the University of Illinois and will pursue further research surrounding the care of infants and children throughout her professional career. Contact Dr. Gampetro at gampetro@uic.edu with comments or questions regarding this study.