

THE RELATIONSHIP AMONG ORGANIZATIONAL STRUCTURES, PATIENT  
SAFETY PRACTICES, AND PATIENT SAFETY EVENT REPORTING AMONG  
NURSES IN HOSPITALS IN THE UNITED STATES

By

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## ABSTRACT OF THE DISSERTATION

The Relationship Among Organizational Structures, Patient Safety Practices, and Patient  
Safety Event Reporting Among Nurses in Hospitals in the United States

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**Rationale:** This study was undertaken to address a gap in knowledge by examining the interrelationships among organizational structures (hospital and nurse characteristics); patient safety practice dimensions of patient safety culture; and patient safety event reporting among Registered Nurses (RNs) who work in U.S. hospitals. Little is known of the extent to which hospital and nurse characteristics interact with patient safety practices to influence the patient safety event reporting practices of RNs working in U.S. hospitals.

**Method:** Donabedian's Healthcare Quality Model and the Patient Safety Culture

Framework guided this research in exploring the interrelationships among hospital and nurse characteristics, patient safety practices, and patient safety event reporting practices of nurses working in U.S. hospitals. The study commenced following approval from the Institutional Review Board of Rutgers, The State University of New Jersey. Data used in this analysis were from the Agency for Healthcare Research and Quality (AHRQ) Hospital Survey on Patient Safety Culture Comparative Database. The database is funded by AHRQ and managed by Westat under contract # HHSA 290201300003C. Data from U.S. hospitals that voluntarily submitted their Hospital Survey on Patient Safety Culture (HSOPSC) data to the AHRQ collected during July 2011 through June 2013 was analyzed. **Results:** Hospital bed size, ownership status, and two geographic regions

were independent predictors of the frequency of event/near miss reporting and the number of event reports completed. The number of hours worked/week was a significant independent predictor of the frequency of event/near miss reporting. Amount of experience in the profession was a significant independent predictor of the number of event reports completed. Manager safety practices had the biggest effect on predicting event/near miss reporting. Mediation testing revealed a full or partial mediating role of all patient safety practices in the relationship between hospital or nurse characteristics and patient safety event reporting outcomes. **Conclusion:** All hospital characteristics and patient safety practices were significantly related to one or both event reporting outcomes. All nurse characteristics were significantly related to one of the two event reporting outcomes. Patient safety practices serve as a mediator between hospital and nurse characteristics and the frequency of event/near miss reporting.

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To all the Registered Nurses in U.S. hospitals, thank you for all you do.

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### **Dedication**

To Robert MacKay Wafer, my husband and soul mate. You inspire me.

To Alexandra Margaret Wafer, my precious, compassionate daughter who is just beginning her journey as a Registered Nurse.

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## **Chapter One**

### **Introduction: The Problem**

The phenomenon of patient safety event reporting is critical for organizational learning and safe patient care in health care worldwide (Christiaans-Dingelhoff et al., 2011; Kagan & Barnoy, 2013; Kim, An, Kim, & Yoon, 2007; Liu, Kalisch, Zhang, & Xu, 2009; Moumtzoglou, 2010; Stanhope, Crowley-Murphy, Vincent, O'Connor, & Taylor-Adams, 1999; Uribe, Schweikhart, Pathak, & Marsh, 2002). Patient safety event reporting is a process defined as the reporting of patient safety concerns by individuals in the health care setting who first discover, witness, or has familiarity with details of an incident, near miss event, or unsafe condition (Agency for Healthcare Research and Quality [AHRQ], 2013). According to Sorra, Famolaro, Dyer, Nelson, and Smith (2012), an event is defined as any type of mistake, error, accident, or deviation, regardless of whether it has caused harm to a patient or not. Incidents that reach the patient resulting in harm according to AHRQ are considered adverse events. Events not reaching a patient are considered near miss events; unsafe conditions represent situations that increase the likelihood of the occurrence of an incident (AHRQ, 2013).

Patient safety event reporting by employees is considered an essential outcome in health care organizations (AHRQ, 2012c; Hession-Laband & Mantell, 2011; Moody, Pesut, & Harrington, 2006). The nursing staff in hospitals represents an ongoing system of surveillance allowing for the early identification of patient safety events that include errors, adverse events, and complications (Aiken, Clarke, & Sloane, 2002; Aiken et al., 2012). Findings from research conducted by Thomas-Hawkins, Flynn, & Clarke (2008) in hemodialysis units in the U.S., including those hospital based, suggest that when

Registered Nurses (RNs) do not have enough time to complete the surveillance of patients or the processes of nursing care needed, the tasks-left-undone are associated with adverse patient safety events such as missed or shortened dialysis treatments, patient complaints, and dialysis hypotension. According to Thomas-Hawkins et al. (2008), the skills that RNs have in assessment are critically important for the early identification and prevention of complications to patients. In addition, Lucero, Lake, and Aiken (2010) reported findings similar to those reported by Thomas-Hawkins et al. (2008) in that a significant association was found with tasks-left-undone or nursing care needs unmet with adverse patient safety events such as medication errors occurring in acute care hospital settings. These findings emphasize the vital role that nurses have in the surveillance of patients during care. Nurses, as employees of hospitals are in a unique position to identify, mitigate (Lucero et al., 2010; Thomas-Hawkins et al., 2008), and report patient safety events.

The U.S. Department of Health and Human Services (DHHS), Office of Inspector General (OIG) (2010) has estimated that the incidence rate of adverse patient safety events for Medicare beneficiaries hospitalized is 13.5%. Based on this estimation, the DHHS, OIG (2010) projected that 1.5% of these patients or 15,000 in one month, had experienced an event that was contributory to their death. This study also found that in addition, 13.5% of Medicare beneficiaries hospitalized had experienced events that caused temporary harm during their hospitalization (DHHS, OIG, 2010). The hospital care cost that was associated with temporary harm and adverse patient safety events in October 2008 was estimated to be \$324 million dollars, annualized to equal \$4.4 billion dollars (DHHS, OIG, 2010). Specifically, health care organizations, via the identification

of their weaknesses through patient safety event reporting, typically experience improvement in care and safety practices and reductions in adverse events and near misses. In these instances, learning is accomplished. However, patient safety event reporting varies across health care organizations and consequently can be a significant problem in health care (Christiaans-Dingelhoff et al., 2011; Kagan & Barnoy, 2013; Kim et al., 2007; Liu et al., 2009; Moumtzoglou, 2010; Stanhope et al., 1999; Uribe et al., 2002). For example, in one study, Mardon, Khanna, Sorra, Dyer, and Famolaro (2010) reported that only 60% of participants indicated they reported events frequently. Moreover, event-reporting scores varied across 178 hospitals in this study and ranged from a minimum of 35% who reported events frequently to a maximum of 84% with frequent event reporting. In fact, according to the DHHS, OIG (2012) report, 86% of events that Medicare beneficiaries experienced that included temporary harm and adverse events were not reported by staff via hospital incident reporting systems. In this report, administrators indicated that staff did not report 62% of events because the event was not perceived as reportable (DHHS, OIG, 2012).

The underreporting of patient safety events inhibits organizational learning and improvements in patient care. Accordingly, a negative consequence of patient safety event underreporting is the potential for reoccurrence of those events since organizational learning will not take place, and the ability to reduce harm to patients is hindered (Brubacher, Hunte, Hamilton, & Taylor, 2011; Noble & Pronovost, 2010; Sorra et al., 2008). It is therefore paramount to examine patient safety event reporting in hospitals and potential antecedents to this process in these settings.

### **Antecedents to Patient Safety Event Reporting**

**Patient Safety Culture**

Culture has been described as shared traditions, customs, values, norms, meanings, mental models, formal rituals, and patterns of behaviors among group or organization members (Schein, 2004). Schein (1990, 2004) defines organizational culture as patterns of basic shared assumptions developed or discovered by group members that were learned from solving problems related to internal integration and external adaptation. New members of the organization are then trained the accepted way to feel, think, and perceive related to these problems when encountered since the basic assumptions are considered valid (Schein, 1990, 2004). Patient safety culture is an important aspect of organizational culture (Guldenmund, 2000; Smits et al., 2012). An organization's safety culture is defined as the outcome of group and individual perceptions, attitudes, competencies, behaviors, and values that establish the skill and method of, and dedication to an organization's management of safety and health (Advisory Committee on the Safety of Nuclear Installations [ACSNI], 1993). Positive safety culture in an organization is distinguished by collective perceptions of safety importance and confidence in the effectiveness of measures of prevention; communication is based on trust (ACSNI, 1993). Moreover, organizations with a Just Culture have been described as those who examine and identify their weaknesses; improvement and learning is therefore accomplished (Frankel, Leonard, & Denham, 2006). Just Culture can be characterized as a reporting culture in which staff feel safe when bringing up issues of patient safety; Just Culture resides within the overall safety culture of an organization (Barnsteiner & Disch, 2012; Frankel et al., 2006; Marx, 2001; von Thaden, Hoppes, Li, Johnson, & Schriver, 2006). Staff working in organizations that

embrace Just Culture principles judiciously self-report patient safety events because it is acknowledged that data reported is used to promote organizational learning and prevent recurrences; punishment and blame are not assigned when the system is faulty

(Barnsteiner & Disch, 2012; Frankel et al., 2006; Marx, 2001; von Thaden et al., 2006).

In fact, the literature indicates that, in organizations that promote and engage in Just Culture principles, staff are willing and encouraged to report events (Vogelsmeier, Scott-Cawiezell, Miller, & Griffith, 2010; von Thaden et al., 2006).

Patient safety culture in hospitals has been given considerable recent attention, and there is an emerging body of evidence that indicates that it is an important predictor of adverse patient events in health care settings. However, less is known of the extent to which patient safety culture in hospitals predicts patient safety event reporting by nurses, including their reports of mistakes or near misses that could harm a patient but does not. Importantly, research has shown that employee perceptions of patient safety culture in the hospital workplace, such as manager responses to employees' errors and near misses, varies widely across countries and health care organizations (Wagner, Smits, Sorra, & Huang, 2013). For example, in an exploratory examination of patient safety culture in 179 hospitals in the U.S. (Mardon et al., 2010), employee perceptions regarding aspects of safety culture in their hospitals varied broadly from only a 42% positive response for nonpunitive response to error to a 79% positive response for teamwork within their units. In addition, Wagner et al. (2013) reported agreement of 66%, 31%, and 44% of staff from the Netherlands, Taiwan, and the U.S. respectively that nonpunitive response to error in their hospitals promoted safety. This variation in employee perceptions of patient safety culture may be explained, in part, by organizational structures such as hospital

characteristics (e.g., bed size, teaching status) and employee characteristics (e.g., length of time employed in the hospital) (Smits et al., 2012). According to a recent Hospital Survey on Patient Safety Culture (HSOPSC) User Comparative Database Report (Sorra et al., 2012), hospital employees' perceptions of overall patient safety vary by hospital characteristics, such as bed size, and by employee characteristics, such as their work area or unit.

These data suggest important linkages among organizational structures, patient safety culture, and outcomes of patient safety culture in hospitals. Clearly, insight into the interrelationships among these phenomena can aid in understanding the operant mechanisms for the effects of organization structures, such as hospital and nurse characteristics, and patient safety culture on patient safety event reporting in hospitals. Evidence suggests that patient safety event reporting varies across health care organizations. The dimensions of patient safety culture that were examined in this study included four patient safety practices including nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement.

**Nonpunitive response to error.** The effectiveness of reporting systems in health care organizations relies heavily on staff willingness to report patient safety events (Marx, 2001). Nonpunitive response to error is a dimension of patient safety culture and is the degree in which staff perceive that their event reports and mistakes they make are not being held against them; it is the absence of worry that mistakes made are not filed in personnel records (Sorra et al., 2012). Nonpunitive response to error has been identified as a primary opportunity for improvement for most hospital settings, and it may be an

important antecedent to patient safety event reporting among nurses who work in hospitals (El-Jardali, Dimassi, Jamal, Jaafar, & Hemadeh, 2011).

**Manager safety practices.** Another dimension of patient safety culture is manager safety practices, defined as the degree that suggestions put forth by staff are given consideration by the supervisor or manager for improvement of patient safety (Sorra et al., 2012). Additionally, it is the extent that supervisors or managers praise staff for adherence to patient safety related procedures; problems of patient safety are not overlooked (Sorra et al., 2012). Notably, empirical evidence suggests that manager safety practices vary across health care organizations. In one study, Mardon et al. (2010) reported agreement among 74% of staff that supervisor / manager expectations and actions in their hospitals promoted safety and event reporting. However, agreement composite scores varied across 179 hospitals, ranging from a minimum of 47% agreement among staff to a maximum of 97% agreement (Mardon et al., 2010). Importantly, management safety practices that threaten patient safety in health care organizations represent a significant problem in nursing work environments that can potentially influence the patient safety event reporting practices of nurses (Aiken et al., 2001; Committee on the Work Environment for Nurses and Patient Safety, Board on Health Care Services, & Page, 2004). Thus, it is important to examine the extent to which manager safety practices in hospitals influence the extent to which nurses report patient safety events.

**Feedback and communication about error.** An additional dimension of patient safety culture is feedback and communication about error, defined as the extent that staff members receive information about errors that occur; feedback is provided about changes



made and ways that errors can be prevented are discussed (Sorra et al., 2012). Evidence from the empirical literature suggests that the extent of feedback and communication about error also varies across health care organizations. For example, Mardon et al. (2010) reported agreement of 62% of staff that feedback and communication about error in their hospitals promoted safety. Conversely, variability existed across 178 hospitals in the U.S., ranging from 43% agreement among staff to a maximum of 86% agreement (Mardon et al., 2010). Therefore, it is also crucial to examine the degree to which feedback and communication about error influences the extent to which nurses report patient safety events.

**Organizational learning-continuous improvement.** Finally, organizational learning-continuous improvement represents another dimension of patient safety culture that likely influences patient safety event reporting among nurses in hospitals, and it is defined as the extent of positive change actualized from mistakes (Sorra et al., 2012). In addition, the effectiveness of changes put in place is evaluated (Sorra et al., 2012). Empirical evidence suggests that organizational learning-continuous improvement varies across countries and health care organizations. For example, in one study, Wagner et al. (2013) reported agreement of 47%, 80%, and 71% of staff from the Netherlands, Taiwan, and the U.S. respectively that organizational learning-continuous improvement in their hospitals promoted safety. In addition, findings from the Mardon et al. (2010) study reveals that 69% of staff in U.S. hospitals reported agreement that organizational learning-continuous improvement supported safety in their hospitals. On the other hand, agreement composite scores for organizational learning-continuous improvement across 179 hospitals in this study ranged from a minimum of 39% to a maximum of 89%

(Mardon et al., 2010). The extent to which organizational learning-continuous improvement influences the patient safety event reporting behaviors of nurses in hospitals in the U.S. merits investigation.

### **Organizational Structures**

Theorists posit that organizational structures influence care processes, such as patient safety practices, which, in turn, affect organizational outcomes such as event reporting. Organizational structures include the organization or setting of care, adequacy of equipment and facilities, and human resources such as the qualifications and numbers of staff (Donabedian, 1966, 1988). For this study, organizational structures are represented as hospital and nurse characteristics.

**Hospital Characteristics.** Hospital bed size, teaching status, geographic region, and ownership status (Sorra et al., 2012) are hospital characteristics that may influence the nurses' perceptions of patient safety processes. For example, data from the HSOPSC User Comparative Database Report (Sorra et al., 2012) reveal that small hospitals (6 to 24 beds) had the highest percent positive averages among all patient safety composites, including those of interest in this study, and the largest hospitals (400 beds or more) had the lowest patient safety composite averages. Similarly, variations in patient safety dimensions were also found by hospital teaching status, geographic region, and ownership. Hospital characteristics may also influence safety outcomes, such as event reporting. For example, in one study, the frequency of patient safety event reporting in small hospitals (< 100 beds) was significantly higher (mean = 3.95, SD = 1.00) when compared to hospitals of medium size (100 to 199 beds) (mean = 3.87, SD = 1.03) and hospitals considered large ( $\geq$  200 beds) (mean = 3.81, SD = 1.08) (El-Jardali et al., 2011).

Little is known of the extent to which hospital size, teaching status, geographic region, and ownership status predict patient safety event reporting among nurses in hospitals. In one study, nurses in nonacademic (non-teaching) hospitals reported higher patient safety event reporting practices than in academic (teaching) hospitals (Rowin et al., 2008).

However, the researchers concluded that one possible explanation for this finding was the lower numbers of non-nurse staff who responded to the survey (Rowin et al., 2008). In multivariate analyses, the effects of hospital characteristics on outcomes of patient safety culture are typically controlled for in patient safety culture research (Hofmann & Mark, 2006; Mardon et al., 2010; Singer, Lin, Falwell, Gaba, & Baker, 2009), and the operant mechanisms for the interrelationships among hospital characteristics, patient safety culture, and patient safety event reporting among nurses in hospitals is not known.

**Nurse Characteristics.** Nurse characteristics are organizational structures that may also influence the extent to which nurses report patient safety events. Nurse characteristics of interest in this study include length of employment status in hospital; length of employment on existing unit or work area; number of hours worked per week in hospital; and amount of experience in the profession or present specialty (Sorra et al., 2012).

As in all hospitals, the characteristics of nurses who work in these institutions vary. For example, in one study, event reporting increased as years of hospital experience among employees, including nurses, increased (El-Jardali et al., 2011). In addition, Aiken, Clarke, Cheung, Sloane, and Silber (2003) examined the influence of nurse characteristics that included years of experience and educational level and the association with adverse patient events including failure to rescue and mortality of

surgical patients. Findings from this study suggest that surgical patients in hospitals employing greater proportions of baccalaureate or higher educational levels of nurses experience reduced rates of failure to rescue and mortality (Aiken et al., 2003). Conversely, years of experience as an RN was not found to be an independent predictor of failure to rescue or mortality (Aiken et al., 2003). These findings, taken together, suggest that nurse characteristics, such as length of experience in the hospital may influence nurses' perceptions of patient safety culture in their workplace and their event reporting behaviors. However, the nature, that is, the operant mechanisms, of the interrelationships of nurse characteristics, patient safety culture, and patient safety event reporting among nurses who work in hospitals is unknown.

### **Study Purpose**

The purpose of this study was to examine the interrelationships among hospital characteristics, nurse characteristics, patient safety culture (nonpunitive response to error, manager safety practices, feedback and communication about error, organizational learning-continuous improvement), and patient safety event reporting among nurses nationally who work in hospitals in the U.S.

### **Research Question**

What are the interrelationships among hospital characteristics, nurse characteristics, patient safety practices, and patient safety event reporting by RNs working in hospitals?

### **Sub Questions**

1. Are hospital characteristics significantly related to patient safety event reporting (frequency and number) practices of RNs working in hospitals?

2. Are nurse characteristics significantly related to patient safety event reporting (frequency and number) practices of RNs working in hospitals?
3. Are perceptions of patient safety practices significantly related to patient safety event reporting practices of RNs working in hospitals?
4. Does patient safety culture mediate the relationship between organizational structures (hospital and nurse characteristics) and patient safety event reporting practices among RNs working in hospitals?

### **Significance of the Study**

Patient safety event reporting systems are paramount to hospital risk management programs. Analysis of events reported by staff assist in the identification of patterns, problems, and trends, which facilitate organizational learning; the quality and safety of patient care will be affected if left uncorrected (Brubacher et al., 2011; Stanhope, et al., 1999). The phenomenon of patient safety event reporting is a significant problem in health care organizations. The underreporting of patient safety events threatens the safety of patients since organizational learning and improvements will not take place if events are not reported. Despite the empirical evidence that organizational structures and positive patient safety culture in hospitals are prerequisites for patient safety event reporting, little is known of the extent to which hospital characteristics and nurse characteristics interact with safety practice dimensions of patient safety culture to influence the patient safety event reporting behaviors of nurses who work in hospitals.

This study was intended to address the gap in knowledge by examining the operant mechanisms for the relationship that exists among organizational characteristics, nurse characteristics, patient safety culture, and patient safety event reporting by nurses

who work in hospitals. Specifically, this study intended to determine if patient safety practices (nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement) mediate the relationship between organizational structures and patient safety event reporting of RNs.

The knowledge gained from this study can aid in identifying patient safety culture as a key operant mechanism in the extent to which organizational structures affect the event reporting behaviors of nurses. In turn, patient safety culture can be the target of interventions in particular hospital types to support or increase the patient safety event reporting behaviors among nurses in these institutions and ultimately the safety and quality of patient care.

## **Chapter Two**

This chapter presents a discussion of the two theoretical frameworks that guided this study: Donabedian's Healthcare Quality Model and the Patient Safety Culture Framework. The theoretical discussion is followed by a synthesis and analysis of empirical literature as it relates to determinants (organizational structures, patient safety practices) of near miss and adverse event reporting in nurses who work in hospitals in the U.S. Finally, the theoretical rationale and the hypotheses formulated for this study will be discussed.

### **Theoretical Framework**

#### **Donabedian's Healthcare Quality Model**

Donabedian's Healthcare Quality Model provides a theoretical rationale to guide the research. As depicted in Figure 1, Donabedian's classic model (1980, 1988, 2003) is

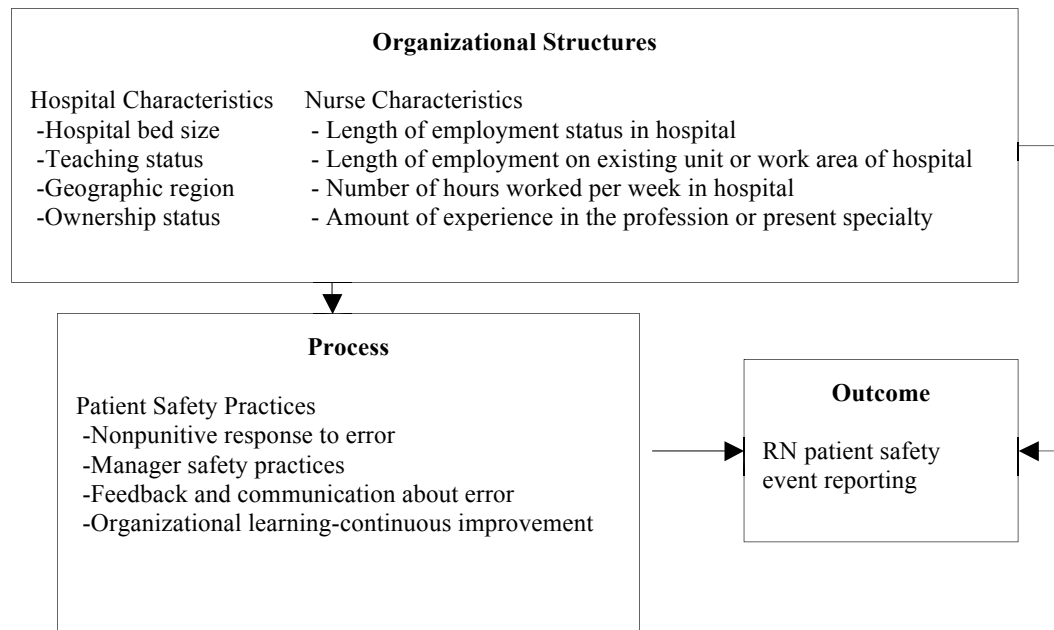
based on a 3-component approach: structure, process, and outcomes. Donabedian defines structure as the physical and organizational properties of health care settings, while process is the treatment or service provided to the patient, and outcomes are the results of care processes. A key proposition of the model is that organizational factors, or structure, including characteristics of the clinical workforce and the practice environment, influence nursing and physician care processes which, in turn, influence health outcomes. Thus, an implicit contingent proposition in Donabedian's model is that care processes serve as a mediator in the relationship between organizational structures and outcomes in health care organizations (Figure 1).

*Figure 1.* Donabedian's Healthcare Quality Model



As depicted in Figure 2, Donabedian's Healthcare Quality Model provides an appropriate theoretical framework for this study in examining the relationships among organizational structures (hospital characteristics and nurse characteristics), safe care processes, and patient safety event reporting among nurses who work in hospitals. In addition, the model guides an examination of the mediating role of patient safety practices in the relationship between hospital and nurse characteristics and patient safety event reporting.

*Figure 2.* Components of Donabedian's Healthcare Quality Model Tested in This Study



### Patient Safety Culture Framework

Organizational structures are theorized to influence the safety practices of employees who work in health care organizations. Safety practices are a dimension of a patient safety culture, a phenomenon that emerged following retrospective analyses of the nuclear disaster at Chernobyl in 1986 by an advisory team within the International Atomic Energy Agency (ACSNI, 1993; Feng, Bobay, & Weiss, 2008; Halligan & Zecevic, 2011; Pidgeon, 1991, 1998, 2010). Following the devastating Chernobyl accident, the concept of safety culture evolved within high-reliability organizations, characterized as high-risk but remarkably safe industries such as aviation (Feng et al., 2008; Halligan & Zecevic, 2011). In health care, patient safety was brought to the forefront in the seminal report entitled, *‘To err is human: Building a safer health system’*



by the Institute of Medicine (Kohn, Corrigan, & Donaldson, 1999). This report outlined the importance of the development of a safety culture by health care organizations and recommended that patient safety be explicitly identified as an organizational goal supported by all levels of leadership (Kohn et al., 1999).

Patient safety culture is an abstract, complex, multidimensional concept (Brown & Wolosin, 2013; Feng et al., 2008; Groves, Meisenbach, & Scott-Cawiezell, 2011; Guldenmund, 2000; Mardon et al., 2010; Sammer, Lykens, Singh, Mains, & Lackan, 2010). Patient safety culture is defined as an organization's commitment to safety at all levels of the organization in the face of inherently complex and potentially hazardous procedures (AHRQ, 2012b). The AHRQ (2012b) provides a framework for patient safety culture based on the maintenance of a commitment to safety from the executive level to staff at the frontline by high reliability organizations. According to AHRQ, the key features of patient safety culture in an organization are:

- Acknowledgement of the high risk nature of their activities;
- An environment that is blame-free where staff have the ability to report near miss events or errors without fear of being punished or reprimanded;
- Allocation of resources needed by the organization in addressing concerns of safety; and
- Encouraging the collaboration across disciplines and ranks in seeking correction of problems relating to patient safety.

Crucial among these is the premise that a *safe* organization is not error-free. It is inevitable that people will make mistakes. Safe organizations anticipate potential unsafe events and avoid blaming unsafe and adverse events on an individual failure. A Just

Culture has emerged as one that reconciles the need for no-blame and individual accountability in organizations (AHRQ, 2012b). Just Culture organizations focus on system issues that lead individuals to engage in unsafe behaviors while maintaining individual accountability by establishing zero tolerance for reckless employee behavior (Dekker, 2012). Since a no-blame approach may be appropriate for numerous errors, others may necessitate a punitive response, such as those due to reckless behavior of an individual (AHRQ, 2012b). Responses to near miss events and errors in a Just Culture, according to the AHRQ, are based on the type of behaviors exhibited by the individual with the event; it is not based on event severity.

Patient safety event reporting, including the frequency of mistakes reported and the number of event reports completed in a year are postulated to be positive outcomes of patient safety culture (Sorra & Nieva, 2004; Sorra et al., 2012) and considered paramount for the safety of patients (Kagan & Barnoy, 2013). Patient safety event reporting is defined as a process of reporting concerns of patient safety by individuals in hospitals who may discover, identify, witness, or have familiarity with the occurrence of an incident, unsafe condition, or near miss event that did not reach the patient (AHRQ, 2013). According to Kagan and Barnoy (2013), patient safety event reporting is thought of as a 'sine qua non' for the improvement of the safety of patients. Therefore, patient safety event reporting is an essential outcome of patient safety culture in health care organizations.

Nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement are patient safety practice dimensions of patient safety culture that are postulated to influence

patient safety event reporting. Nonpunitive response to error is defined as the degree to which hospital staff, such as nurses perceive that their patient safety event reports generated and mistakes they make are not being held against them and filed in personnel records (Sorra et al., 2012). Manager safety practices is defined as the degree in which supervisors or managers of nurses offer praise to staff for adherence to procedures of patient safety, do not disregard problems of patient safety, and consider suggestions offered by staff to improve patient safety (Sorra et al., 2012). Feedback and communication about error is defined as the extent that nurses perceive that they receive information about errors that occur, that feedback is provided about the implementation of changes, and that error prevention strategies are discussed (Sorra et al., 2012). Finally, organizational learning-continuous improvement is defined as the extent in which nurses perceive that positive change has resulted from mistakes and that an evaluation of the effectiveness of changes implemented is undertaken (Sorra et al., 2012).

In summary, Donabedian (1980, 1988, 2003) postulated that structure influences care processes and, in turn, care processes influence the outcome achieved. Patient safety practices as dimensions of patient safety culture are inherent within the Patient Safety Culture Framework. Based on Donabedian's Healthcare Quality Model and the Patient Safety Culture Framework, it is theorized that the organizational structures of hospital and nurse characteristics influence patient safety practices, which, in turn, influence patient safety event reporting by nurses who work in hospitals in the U.S.

### **Literature Review**

A critical analysis and synthesis of findings across studies from the empirical literature is presented in the literature review. For each section in the literature review,

the literature search strategy was delimited to research studies conducted from 2008 through 2013. The rationale for this time period is based upon the fact that instruments measuring patient safety culture have only emerged recently (Clancy, 2011a). For example, the AHRQ released the HSOPSC instrument in 2004 and the first HSOPSC Hospital Comparative Database Report in 2007 (AHRQ, 2014a). Consequently, research studies that have measured dimensions of patient safety culture have only begun to accumulate in the literature in the past five years. A final criterion for inclusion in the sample of literature reviewed for this study is that nurses were included as participants in the study sample. A total of 13 studies met the inclusion criteria. A summary, synthesis, and analysis of these studies are presented in this aspect of the chapter.

### **Hospital and Nurse Characteristics and Safety Outcomes**

#### **Hospital Characteristics**

Five studies were identified that examined the relationship between hospital characteristics and patient safety outcomes. Search terms used included ‘hospital characteristics’, ‘patient safety event reporting’, ‘incident reporting’, ‘patient safety culture’, ‘patient safety climate’, and ‘outcomes.’ Across the five studies, different hospital characteristics were examined including hospital size, teaching status, location or geographic region, and ownership status. A summary of each study is included in Table 1.

**Hospital bed size.** Four studies examined the relationship between hospital size and safety outcomes. The safety outcomes examined in the four studies varied and included the frequency that staff report mistakes (El-Jardali et al., 2011; Sorra et al., 2012); the number of event reports completed by the employee in the past year (El-Jardali

et al., 2011; Sorra et al., 2012); error occurrences by nurses (Hwang & Hwang, 2011); employees' overall perception of safety in their work area (El-Jardali et al., 2011); and patient safety indicators, defined as hospital level rates of in-hospital adverse events and complications (Mardon et al., 2010).

Findings across the studies revealed that safety outcomes differed by hospital size. In two studies (El-Jardali et al., 2011; Sorra et al., 2012), bivariate analyses revealed that employees from small hospitals (i.e., less than 100 beds) reported a significantly higher frequency of mistakes compared to employees from larger hospitals. On the other hand, findings from two different studies indicated that larger hospital size was associated with a significantly higher odds of error occurrences by nurses (Hwang & Hwang, 2011) and a higher number of in-hospital adverse events and complications (Mardon et al., 2010) compared to smaller hospitals. Additionally, in the study by El-Jardali and colleagues (2011), mean scores for employees' overall perceptions of safety in small hospitals (i.e. less than 100 beds) was higher compared to these scores in large hospitals (i.e., greater than 200 beds). Lastly, hospital size was not significantly associated with of the number of event reports completed by staff in a year in two studies (El-Jardali et al., 2011; Sorra et al., 2012).

**Teaching status.** Three studies examined relationships between hospital teaching status and safety outcomes, and bivariate analyses revealed inconsistent findings among the studies. Teaching hospitals were associated with a lower frequency of reported mistakes by hospital employees in one study (Sorra et al., 2012) but a higher number of in-hospital adverse events and complications in another study (Mardon et al., 2010). Additionally, Sorra et al. (2012) found no significant differences in the number of events

reported by staff in the past 12 months by teaching status. In a third study (Hwang & Hwang, 2011), hospital teaching status was not significantly associated with nurse reports of error occurrences.

**Geographic region.** Two studies examined relationships between hospital location or geographic region and safety outcomes. In one study, a higher percentage of nurse participants in hospitals located in small-to-medium urban locations reported error occurrences compared to the percentage of nurses who reported errors in hospitals located in large metropolitan cities and rural areas (Hwang & Hwang, 2011). Similarly, Sorra et al. (2012) found U.S. regional variations in frequencies of mistakes reported by hospital employees, including nurses.

**Ownership status.** Four studies examined relationships between hospital ownership status and safety outcomes. In two of the studies, bivariate analyses revealed a higher percentage of nurses who worked in a Regional Medical Centre, non-profit or private hospital reported error occurrences (Hwang & Hwang, 2011; Lin & Ma, 2009) or were more willing to report mistakes (Lin & Ma, 2009). In the Lin and Ma study, multivariate analysis indicated that private and non-profit hospital ownership status was independently associated with a higher likelihood of nurses' willingness to report mistakes compared to nurses who work in public hospitals. Similarly, Mardon and colleagues (2010) found that nongovernment owned hospitals were associated with higher numbers of in-hospital adverse events and complications. On the other hand, Sorra et al. (2012) found no difference in the frequency of mistakes reported by employees in government and nongovernment owned hospitals.

**Summary.** In summary, there is a paucity of published studies that focus on the examination of relationships between hospital characteristics and safety outcomes, and the few studies that could be found reveal inconsistent findings. However, the findings across the studies suggest that hospital characteristics have important associations with safety outcomes in these organizations, including patient safety event reporting by hospital employees, including nurses. Of the five studies reviewed, only two were conducted in the U.S. (Mardon et al., 2010; Sorra et al., 2012). In addition, only bivariate analyses were reported in three of the five studies (El-Jardali et al., 2011; Mardon et al., 2010; Sorra et al., 2012), including the two U.S. studies. Thus, little is known of the independent associations between hospital characteristics and safety outcomes, including event reporting in U.S. hospitals. In addition, no studies could be found that examined the operant mechanisms for *how* hospital characteristics influence safety outcomes. Further research in this area is needed.

### **Nurse Characteristics**

Six studies were identified that examined the relationship between nurse characteristics and patient safety outcomes. Search terms used included ‘nurse characteristics’, ‘patient safety event reporting’, ‘incident reporting’, ‘patient safety culture’, ‘patient safety climate’, and ‘outcomes.’ A summary of each study is included in Table 1.

**Length of employment in the hospital.** Two studies were found that examined the relationship between the length of employment in the hospital and safety outcomes, and the findings were mixed. In a sample of frontline hospital nurses in Taiwan, their length of employment in the hospital was not significantly related to medication error

reporting (Chiang, Lin, Hsu, & Ma, 2010). In contrast, in a sample of nurse and non-nurse participants in Lebanon, El-Jardali et al. (2011) found that the frequency of mistakes reported was highest among participants with a length of hospital employment that was 21 years or greater and lowest for participants with less than one year of employment at the hospital.

**Length of employment on hospital unit.** Only one study was found that examined the relationship between length of employment on a hospital unit and safety outcomes and the findings suggest that length of employment may be an important antecedent for safety outcomes in hospitals (Wilson, Redman, Talsma, & Aebersold, 2012). In bivariate analyses of length of employment on a unit in a charge nurse role, nurses who had no charge nurse experience had more positive overall perceptions of safety on their units, graded safety on their units more positively, and completed less event reports compared to nurses who had at least one year of charge nurse experience (Wilson et al., 2012).

**Experience in the profession or specialty.** Three studies were found that examined employee experience in the profession or specialty and patient safety event reporting. Findings differed across the studies. In two studies, no differences were found between years of experience in nursing and event reporting practices (Aboshaiqah & Baker, 2013) or their willingness to report mistakes (Lin & Ma, 2009). Conversely, Hwang and Hwang (2011) reported significant differences in error occurrence based on years of experience in nursing; that is, nurse participants who had less than three years of nursing experience were twice as likely to make an error compared to nurses with ten or more years of experience.



**Summary.** Findings suggest that the demographic characteristics of nurses who work in hospitals may be important antecedents to safety outcomes in these institutions. Five of the six studies reviewed were conducted using samples of nurses (Aboshaiqah & Baker, 2013; Chiang et al., 2010; Hwang & Hwang, 2011; Lin & Ma, 2009; Wilson et al., 2012). The search did not yield any studies that examined the relationship between the number of hours worked per week and patient safety outcomes. In most studies, only bivariate analyses were conducted (Aboshaiqah & Baker, 2013; El-Jardali et al., 2011; Wilson et al., 2012). Additionally, the operant mechanisms underlying the relationship between nurse characteristics and safety outcomes was not examined in these studies. Moreover, only one of the six studies reviewed was conducted in the U.S. (Wilson et al., 2012). These gaps in knowledge underscore the need for further research regarding nurse characteristics and safety outcomes in hospitals in the U.S.

### **Patient Safety Practices and Safety Outcomes**

Only three studies were identified for review based on the search strategy that examined the relationship between patient safety practices and safety outcomes. Search terms used included ‘dimensions of patient safety culture’, ‘patient safety event reporting’, ‘incident reporting’, ‘patient safety culture’, ‘patient safety climate’, and ‘outcomes.’ A summary of each study is included in Table 1.

In two of the three studies (El-Jardali et al., 2011; Mardon et al., 2010), the patient safety practices examined were those that were assessed in this study; that is, nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement. In the El-Jardali et al. study, bivariate analyses revealed significant relationships between all of the safety practice dimensions

and the frequency of mistakes, and the magnitude of the relationships ranged from .116 to .378, suggesting small to moderate effects of patient safety practices on mistake reporting. However, in multivariate analysis, only one safety practice, feedback and communication about error, independently predicted an increased likelihood of the number of event reports completed by hospital employees. In the second study (Mardon et al., 2010), AHRQ patient safety indicators (PSIs) were the outcome variables measured, and statistically significant negative relationships were found for relationships between three patient safety practices, nonpunitive response to error, manager safety practices, organizational learning-continuous improvement, and the PSI composite score. Only one safety practice, organizational learning-continuous improvement, remained significantly associated with the PSI composite score in multivariate analysis.

In the third study (Kagan & Barnoy, 2008), patient safety practices were measured as organizational, departmental, and personal performances, and safety outcomes was operationalized as medication error self-reporting practices of nurses. Findings revealed that, in bivariate analysis, all dimensions of patient safety culture were significantly associated with medication error reporting. However, in multivariate analysis, only the overall patient safety culture score was independently associated with medication error reporting.

**Summary.** The number of studies that have examined the relationship between patient safety practices and patient safety outcomes is sparse. Additionally, the safety outcomes in each of the three studies differed, thus comparisons of associations across studies is difficult at best. Lastly, two of the three studies were conducted outside of the U.S. (El-Jardali et al., 2011; Kagan & Barnoy, 2008). These methodological limitations

underscore the need for more research that examines patient safety practices and safety outcomes in nurses who work in hospitals in the U.S.

### **Hospital and Nurse Characteristics and Patient Safety Practices**

#### **Hospital Characteristics**

A total of two studies were identified that examined the relationship between hospital characteristics and patient safety practices. Search terms used included ‘hospital characteristics’, ‘dimensions of patient safety culture’, ‘patient safety culture’, and ‘patient safety climate.’ A summary of each study is included in Table 1.

One study examined the hospital characteristics (bed size, teaching status, geographic region, ownership status) and patient safety practice dimensions that were assessed in this study. Sorra and colleagues (2012) found that employees’ positive endorsement of the four safety practices was lowest in hospitals with a larger bed size, were teaching, and were government owned. However, there was regional variation in the percent of employees who positively endorsed safety practices in their workplaces. For example, the percent of employees’ who positively endorsed nonpunitive response to error and manager safety practices was lowest in the New England region of the U.S. while the percent of employees’ who positively endorsed feedback and communication about error was lowest in the Mid-Atlantic region (Sorra et al., 2012). A second study examined the relationship between hospital location and teaching status and a safety outcome operationalized as error problem solving. In this study, safety participation through error problem solving was significantly higher in urban compared to rural hospital locations (Hughes, Chang, & Mark, 2009). However, teaching status was not related to patient safety practices.

**Summary.** In summary, the findings from the empirical literature, although scant, suggest that hospital characteristics are significantly associated with patient safety practices. These findings call attention to the need to further examine the relationship of hospital characteristics and nurses' reports of patient safety practices in hospitals in the U.S.

### **Nurse Characteristics**

Three studies were identified that examined the relationship between nurse characteristics and patient safety practices. Search terms used included 'nurse characteristics', 'dimensions of patient safety culture', 'patient safety culture', and 'patient safety climate.' A summary of each study is included in Table 1.

The studies revealed that two nurse characteristics were significantly associated with patient safety practices. The nurse characteristics examined across the studies were length of years in hospital and years of experience in the profession or the specialty. Across the studies, patient safety practices were operationalized differently.

In one study, patient safety practices was conceptualized as patient safety climate and measured as the extent to which nurses were engaged in unit safety practices and behaviors (Ausserhofer et al., 2012). Ausserhofer and colleagues (2012) examined the relationship between length of a nurse's employment in the hospital and patient safety climate and found a significant negative relationship between RN length of employment status in hospital and patient safety climate, indicating that less employment time in the hospital is associated with more engagement in unit safety practices and behaviors.

Three studies examined the amount of experience in the profession or present specialty and patient safety culture, and the findings were mixed. In one study,

Aboshaiqah and Baker (2013) found that increased years of nursing experience were directly related with positive overall perceptions of patient safety culture in their work setting. In another study, no significant relationships between professional experience and patient safety climate were found (Ausserhofer et al., 2012). Yet, in a third study, more years of nursing experience was significantly related to negative ratings of patient safety culture in bivariate and multivariate analysis (Feng, Acord, Cheng, Zeng, & Song, 2011).

**Summary.** Only two of four nurse characteristics were examined in the studies reviewed. The search did not yield any studies that examined the relationship between length of employment on hospital unit or work area or number of hours worked per week and safety practices. In addition, a lack of multivariate analysis in most of the studies limits the ability to draw conclusions about the independent effects of nursing characteristics on safety practices. Moreover, all three of the studies were conducted outside of the U.S. These limitations emphasize the need to gain a more in-depth understanding of these relationships in U.S. hospitals.

### **A Mediator Role of Patient Safety Practices**

Donabedian's Healthcare Quality Framework postulates that processes of care may mediate the relationship between organizational structures and quality outcomes. Therefore, the patient safety practices that were examined in this study may serve as mediators in the relationship between hospital and nurse characteristics and event reporting by nurses in hospitals. Only one study published was identified that examined the potential mediating role of patient safety practices. Search terms used included 'hospital characteristics', 'nurse characteristics', 'dimensions of patient safety culture',

‘mediation’, ‘mediator’, ‘patient safety culture’, and ‘patient safety climate.’ A summary of the study is included in Table 1.

In this study, Smits and colleagues (2012) examined the mediating effects of patient safety practices, including those practices that were examined in this study, on the relationship between a hospital characteristic (medical specialty) and hospital employees’ level of reporting of unintended events in hospitals in the Netherlands. The findings revealed that the nonpunitive response to errors safety practice partially mediated the relationship between medical specialty type and medication events. In addition, hospital management support partially mediated the relationship between medical specialty type and materials/equipment events (Smits et al., 2012). These findings suggest patient safety practices, such as the practices that were examined in this study, may mediate the relationship between hospital and nurse characteristics and safety outcomes. That is, patient safety practices may explain how these characteristics are related to safety outcomes, such as event reporting among nurses working in hospitals in the U.S.

### **Current State of Knowledge and Gaps**

The findings from the empirical literature suggest that organizational structures (hospital and nurse characteristics) and patient safety practices may be important predictors of patient safety event reporting among nurses who work in hospitals in the U.S. However, the literature in this area is sparse, and a majority of studies that have examined these relationships were conducted outside of the U.S. (Table 1). Since patient safety culture and related safety practices may vary internationally, there is a need to gain a more in-depth understanding of the relationships among organizational structures, patient safety practices, and patient safety event reporting in U.S. hospitals. Moreover,

no studies have examined the operant mechanisms for the relationship between hospital and nurse characteristics and patient safety event reporting. That is, no study has examined the theorized role of safety practices as a mediator in the relationship between organizational structures and patient safety outcomes.

This study addressed these gaps in knowledge. The purpose of this study was to examine the complex interrelationships among hospital characteristics, nurse characteristics, patient safety practice dimensions of patient safety culture, and patient safety event reporting among nurses nationally who work in hospitals in the U.S.

Table 1

*Summary of Studies*

<b>Author(s) / Year</b>	<b>Sample Participants</b>	<b>Relevant Findings</b>
Aboshaiqah & Baker (2013)	498 RNs who worked in a large tertiary care hospital in Saudi Arabia.	<b><u>Nurse Characteristics and Safety Outcomes</u></b> <ol style="list-style-type: none"> <li>1. No results were reported in the research report regarding any relationships found between years of nursing experience and patient safety event reporting practices.</li> <li>2. Increased years of nursing experience were found to be correlated with overall perceptions of patient safety culture that were more positive (correlation coefficient not reported; <math>P &lt; .05</math>).</li> </ol>
Ausserhofer et al. (2012)	1,564 RNs who worked on 132 medical-surgical, surgical, or medical units in 35 acute care hospitals in Switzerland.	<b><u>Hospital Characteristics and Patient Safety Practices</u></b> <ol style="list-style-type: none"> <li>1. RN participants from German-speaking language regions reported patient safety climate levels that were higher than participants from Italian and French-speaking language regions (<math>r = 0.434</math>, <math>p &lt; 0.001</math>; 95% CI -0.526 to -0.342).</li> <li>2. RN participants who worked in cantonal and university hospitals reported lower patient safety climate levels than RN participants from regional hospitals; statistical significance was borderline (<math>r = 0.093</math>, <math>p = 0.059</math>; 95% CI -0.004 to 0.189).</li> <li>3. In adjusted models, language region (German vs. French and Italian) (<math>r = -0.436</math>, <math>p &lt; 0.001</math>; 95% CI -0.529 to -0.343) and hospital type (<math>r = 0.091</math>, <math>p = 0.065</math>; 95% CI -0.006 to 0.187) remained significantly associated with patient safety climate.</li> </ol>

Author(s) / Year	Sample Participants	Relevant Findings
Chiang et al. (2010)	713 nurses who provided direct care and worked in five hospital settings in Taiwan.	<p><b><u>Nurse Characteristics and Event Reporting</u></b> No differences were found between educational background (<math>t = 3.60</math>) and tenure of work (<math>t = 8.44</math>) between the underreporting and reporting groups.</p>
El-Jardali et al. (2011)	6,807 hospital employees (that included nurses) in 68 hospitals in Lebanon.	<p><b><u>Hospital Characteristics and Event Reporting</u></b> 1. Hospitals of small size had higher means on the frequency of events reported (<math>M = 3.95</math>, <math>SD = 1.00</math>, <math>P = 0.001</math>) compared to hospitals of large (<math>M = 3.81</math>, <math>SD = 1.08</math>, <math>P = 0.001</math>) and medium (<math>M = 3.87</math>, <math>SD = 1.03</math>, <math>P = 0.001</math>) size.</p> <p><b><u>Employee Characteristics and Event Reporting</u></b> 1. Frequency of events reported was highest for participants with 21 years or more hospital employment (<math>M = 4.00</math>, <math>SD = 1.02</math>, <math>P = 0.001</math>) and lowest for those with one-year experience at the hospital (<math>M = 3.78</math>, <math>SD = 1.08</math>, <math>P = 0.001</math>). 2. Participants with less than one-year experience at the hospital were the largest participant group that reported no patient safety events in the past year (476 out of 693 or 68.7%; <math>p &lt; 0.001</math>).</p> <p><b><u>Patient Safety Practices and Safety Outcomes</u></b> 1. All patient safety culture dimensions, including safety practices of interest to this study, were significant at the 0.01 level (2-tailed). Feedback and communication about errors had the strongest correlation (<math>r = 0.378</math>) followed by organizational learning-continuous improvement (<math>r = 0.221</math>); manager safety practices (<math>r = 0.206</math>); and nonpunitive response to error (<math>r = 0.116</math>). 2. Feedback and communication about errors independently predicted odds of increased event reporting (<math>OR = 1.17</math>, 95% <math>CI = 1.03 - 1.32</math>; <math>P = 0.013</math>).</p>
Feng et al. (2011)	248 RNs from a university hospital in China who worked on intensive care units or medical-surgical units.	<p><b><u>Nurse Characteristics and Safety Practices</u></b> Years of experience in nursing was found to predict patient safety culture negatively (<math>Beta = -0.11</math>, <math>P &lt; 0.01</math>).</p>
Hughes et al. (2009)	3,689 RNs who provided direct patient care on 286 medical-surgical units and worked in 146 acute care hospitals in the U.S.	<p><b><u>Hospital Characteristics and Safety Practices</u></b> RN's working in urban hospitals reported greater participation in safety through solving error related problems (<math>t = 19.23</math>, <math>p &lt; 0.01</math>) than those participants working in rural locations (<math>t = 18.53</math>).</p>
Hwang & Hwang (2011)	1,923 RNs employed at 33 Regional Public Hospitals (RPHs) in Korea.	<p><b><u>Hospital Characteristics and Safety Outcomes</u></b> 1. Nurses had a greater likelihood of making an error if they worked in a rural location (<math>OR = 2.04</math>, 95% <math>CI = 1.14 - 3.66</math>) or at a Red Cross-owned hospital (<math>OR = 1.63</math>, 95% <math>CI = 1.05 - 2.53</math>) compared to nurses working in an urban location and at a hospital with the ownership status as a Regional Medical Centre (RMC).</p> <p><b><u>Nurse Characteristics and Safety Outcomes</u></b> 1. Differences were significant in relation to error</p>



Author(s) / Year	Sample Participants	Relevant Findings
		<p>occurrence based on nurses' years of experience in nursing (<math>\chi^2 = 19.69, p = 0.000</math>).</p> <p><b><u>Patient Safety Culture and Safety Outcomes</u></b></p> <ol style="list-style-type: none"> <li>1. Patient safety climate scores were significantly different between nurse participants with an occurrence of error and with those that did not have an occurrence of error (<math>t = 6.2, p &lt; 0.001</math>). Nurse participants with higher patient safety climate scores at the organization (OR = 0.69, 95% CI = 0.54 - 0.89) and workgroup (OR = 0.73, 95% CI = 0.55 - 0.96) levels were not as likely to make an error.</li> </ol>
Kagan & Barnoy (2008)	201 RNs working in Israel enrolled in a BA program or courses in advanced training.	<p><b><u>Patient Safety Practices and Event Reporting</u></b></p> <ol style="list-style-type: none"> <li>1. Significant relationships found to be positive between medication error self-reporting and the participants' perceptions on how the hospital and unit deals with errors made (<math>r = 0.43; P &lt; .01</math>).</li> </ol>
Lin & Ma (2009)	605 RNs and licensed practical nurses (LPNs) that worked in 14 hospitals in Taiwan. The majority of nurse participants were RNs (N = 435, 73%) and others included LPNs (N = 151, 25.3%) and Head Nurses (N = 10, 1.7%).	<p><b><u>Hospital Characteristics and Safety Outcomes</u></b></p> <ol style="list-style-type: none"> <li>1. Hospital type (nonprofit, private, or public) was a significant predictor of an increased likelihood in reporting Medication Administration Errors (MAEs) in nonprofit hospitals (OR = 3.28, CI = 1.73 to 6.21, <math>P = 0.00</math>) and private hospitals (OR = 2.66, CI = 1.09 to 6.49, <math>P = 0.032</math>) when comparison made to hospitals that were public.</li> <li>2. Nurse participants' willingness of reporting MAEs was found to differ by hospital funding (<math>\chi^2 = 18.30, p = 0</math>) and hospital type (<math>\chi^2 = 6.44, p = 0.040</math>). Higher nurse MAE reporting rates were found among those who worked in hospitals that were nonprofit (91.4%) and private hospitals (91.8%) when compared to nurses who worked in public hospital settings (77.4%).</li> </ol> <p><b><u>Nurse Characteristics and Safety Outcomes</u></b></p> <ol style="list-style-type: none"> <li>1. Nurse participants' willingness of reporting MAEs was found to differ by nursing grade (<math>\chi^2 = 9.56, p = 0.049</math>) and position (<math>\chi^2 = 8.11, p = 0.017</math>). The willingness to report MAEs was greater for RNs (90.6%) and Head Nurses (100%) when compared to LPNs (82.8%).</li> </ol>
Mardon et al. (2010)	2007 HSOPSC data submitted voluntarily from 179 U.S. hospitals.	<p><b><u>Patient Safety Practices and Safety Outcomes</u></b></p> <ol style="list-style-type: none"> <li>1. Hospitals with more positive patient safety culture scores were found to have lower PSI Composite rates when hospital characteristics were controlled (teaching status, hospital bed size, and ownership status).</li> <li>2. Nonpunitive response to error was negatively correlated with the PSI Composite (<math>r = -0.22, P &lt; 0.01</math>).</li> <li>3. Manager safety practices were negatively correlated with the PSI Composite (<math>r = -0.23, P</math></li> </ol>

Author(s) / Year	Sample Participants	Relevant Findings
		<p>&lt; 0.01).</p> <p>4. Organizational learning-continuous improvement was significantly correlated negatively with the PSI Composite (<math>r = -0.24</math>, <math>P &lt; 0.01</math>).</p> <p>5. Feedback and communication about error was not found to be significantly correlated with the PSI Composite.</p> <p><b><u>Hospital Characteristics and Safety Outcomes</u></b></p> <p>1. Bed size (<math>r = .36</math>, <math>p &lt; .001</math>), teaching status (<math>r = .30</math>, <math>p &lt; .001</math>), and ownership (<math>r = -.29</math>, <math>p &lt; .001</math>) were significantly related to the PSI composite.</p>
Smits et al. (2012)	The specialties of internal medicine, surgery, and emergency medicine in 20 hospitals on 28 units in the Netherlands. Participants included nurses (401 out of 542 or 74%) and other staff.	<p><b><u>Patient Safety Practices as a Mediator</u></b></p> <p>Results suggest that the patient safety practice of nonpunitive response to error partially mediated the relationship that exists between the work area or unit of Internal Medicine and medication related events (<math>Sobel = 2.201</math>; <math>p &lt; 0.05</math>).</p>
Sorra et al. (2012)	A total of 567,703 hospital staff participants (that included RNs) from 1,128 hospitals in the U.S.	<p><b><u>Hospital Characteristics and Safety Outcomes</u></b></p> <p>1. Number of events reported in the past 12 months.</p> <p>-Hospital bed size: No specific differences for the 6 response categories.</p> <p>-Teaching status: No specific differences for the 6 response categories.</p> <p>2. Reporting no events in the past 12 months / Overall % (highest and lowest):</p> <p>-Geographic region: West South Central 59%; West North Central and Pacific 51%.</p> <p>-Ownership status: Government owned 59%; nongovernment owned 54%.</p> <p>3. Frequency of Events Reported / Overall % Positive Response (lowest and highest):</p> <p>-Hospital bed size: 500+ beds 60%; 25-49 beds 66%.</p> <p>-Teaching status: Teaching 61%; Nonteaching 65%.</p> <p>-Geographic region: Mid-Atlantic, East and West North Central 61%; East and West South Central 67%.</p> <p>-Ownership status: No difference between government and nongovernment owned hospitals; 63%.</p> <p><b><u>Hospital Characteristics and Patient Safety Practices</u></b></p> <p><b><u>Hospital Bed Size / Overall % Positive Response (lowest and highest)</u></b></p> <p>-Nonpunitive response to error: 500+ beds 39%; 6-24 beds 50%.</p> <p>-Manager safety practices: 400-499, 500+ beds 72%; 6-24, 25-49 beds 78%.</p> <p>-Feedback and communication about error: 500+ beds 62%; 6-24, 25-49, 50-99 beds 66%.</p> <p>-Organizational learning-continuous improvement:</p>

Author(s) / Year	Sample Participants	Relevant Findings
		<p>200-299, 400-499, 500+ beds 71%; 6-24, 25-49 beds 74%.</p> <p><b><u>Teaching Status / Overall % Positive Response (lowest and highest)</u></b></p> <p>-Nonpunitive response to error: teaching 41%; nonteaching 45%.</p> <p>-Manager safety practices: teaching 73%; nonteaching 76%.</p> <p>-Feedback and communication about error: teaching 63%; nonteaching 66%.</p> <p>-Organizational learning-continuous improvement: teaching 71%; nonteaching 73%.</p> <p><b><u>Ownership / Overall % Positive Response (lowest and highest)</u></b></p> <p>-Nonpunitive response to error: government 42%; nongovernment 44%.</p> <p>-Manager safety practices: government 74%; nongovernment 75%.</p> <p>-Feedback and communication about error: government 64%; nongovernment 65%.</p> <p>-Organizational learning-continuous improvement: No difference; 72% for each.</p> <p><b><u>Geographic Region / Overall % Positive Response (lowest and highest)</u></b></p> <p>-Nonpunitive response to error: New England 39%; West North Central 47%.</p> <p>-Manager safety practices: New England 71%; East South Central 78%.</p> <p>-Feedback and communication about error: Mid-Atlantic 61%; South Atlantic, East South Central, &amp; West South Central 67%.</p> <p>-Organizational learning-continuous improvement: Mid-Atlantic &amp; Mountain 69%; South Atlantic 75%.</p>
Wilson et al. (2012)	A total number of 374 RNs participated who worked in a large Midwest academic hospital on 12 adult medical-surgical units. [Noncharge nurses N = 159; Charge nurses N = 215].	<p><b><u>Nurse Characteristics and Event Reporting</u></b></p> <ol style="list-style-type: none"> <li>1. Variation was identified among nurse participants with charge experience and the number of years in the charge role for the number of reported events [<math>F(3,362) = 3.49, P &lt; .05</math>].</li> <li>2. Variation was identified among nurse participants with charge experience and the number of years in the charge role for perceptions of overall safety [<math>F(3,365) = 4.20, P &lt; .05</math>]; teamwork within units [<math>F(3,365) = 3.52, P &lt; .01</math>]; number of patient safety events reported [<math>F(3,362) = 3.49, P &lt; .05</math>]; and safety grade assignment for their work unit [<math>F(3,360) = 2.61, P &lt; .05</math>].</li> </ol>

### Hypotheses

The following hypotheses were examined in this study in RNs working in hospitals in the U.S.:

1. Hospital characteristics are significantly related to patient safety event reporting (frequency and number) by nurses in hospitals. In hospitals:
  - a. Hospital bed size is significantly associated with patient safety event reporting (frequency and number) by nurses.
  - b. Hospital teaching status is significantly associated with patient safety event reporting (frequency and number) by nurses.
  - c. Hospital geographic region is significantly associated with patient safety event reporting (frequency and number) by nurses.
  - d. Hospital ownership status is significantly associated with patient safety event reporting (frequency and number) by nurses.
2. Nurse characteristics are significantly related to patient safety event reporting (frequency and number) by nurses in hospitals. In hospitals:
  - a. Length of employment status in hospital is associated with patient safety event reporting (frequency and number) by nurses.
  - b. Length of employment on existing unit or work area is associated with patient safety event reporting (frequency and number) by nurses.
  - c. Number of hours worked per week in hospital is associated with patient safety event reporting (frequency and number) by nurses.
  - d. Amount of experience in the profession or present specialty is associated with patient safety event reporting (frequency and number) by nurses.

3. Positive endorsement of patient safety practices are related to increased level of event reporting (frequency and number) by nurses in hospitals. In hospitals:
  - a. Positive endorsement of nonpunitive response to error is related to increased levels of event reporting (frequency and number) by nurses.
  - b. Positive endorsement of manager safety practices are related to increased levels of event reporting (frequency and number) by nurses.
  - c. Positive endorsement of feedback and communication about error is related to increased levels of event reporting (number and frequency) by nurses.
  - d. Positive endorsement of organizational learning-continuous improvement is related to increased levels of event reporting (frequency and number) by nurses.
4. When the effects of patient safety culture on event reporting are controlled for, the magnitude and significance of the relationships between hospital and nurse characteristics and patient safety event reporting will diminish.

### **Theoretical and Operational Definitions**

Organizational structures in this study included hospital characteristics and nurse characteristics. Patient safety practice dimensions of patient safety culture in this study included nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement.

**Hospital bed size** is defined as the number of open beds in a hospital. Hospital bed size is operationalized as the participant hospital's response to the 'bed size' item on

the registration information form submitted to the AHRQ Comparative Database (AHRQ, 2012a; Sorra et al., 2012).

**Teaching status** is defined as the hospital's teaching or nonteaching status. Teaching status is operationalized as the participant hospital's response to the 'teaching status' item on the registration information form submitted to the AHRQ Comparative Database (AHRQ, 2012a; Sorra et al., 2012).

**Geographic region** is defined as the hospital's location in the U.S. by states and territories. Geographic region is operationalized as the categorization by regions defined by the American Hospital Association (AHA) (Sorra et al., 2012) and assigned by Westat.

**Ownership status** is defined as a government-owned or non-government-owned hospital. Ownership status is operationalized as the participant hospital's response to the 'ownership and control' item on the registration information form submitted to the AHRQ Comparative Database (AHRQ, 2012a; Sorra et al., 2012).

**Length of employment status in hospital** is defined as the length of time the RN has worked in the hospital. Length of employment status in hospital is operationalized as the participant's response to the 'length of time worked in this hospital' item on the HSOPSC (Sorra et al., 2012).

**Length of employment on existing unit or work area of hospital** is defined as the length of time the RN has worked on their work area or unit in their current hospital. Length of employment on existing unit or work area of hospital is operationalized as the participant's response to the 'length of time worked on work unit or area in current hospital' item on the HSOPSC (Sorra et al., 2012).

**Number of hours worked per week in hospital** is defined as the number of hours the RN works per week in the hospital. Number of hours worked per week in hospital is operationalized as the participant's response to the 'hours per week worked' item on the HSOPSC (Sorra et al., 2012).

**Amount of experience in the profession or present specialty** is defined as the length of time the RN has worked in their current profession or specialty. Amount of experience in the profession or present specialty is operationalized as the participant's response to the 'current profession or specialty' item on the HSOPSC (Sorra et al., 2012).

**Nonpunitive response to error** is defined as the degree to which RNs perceive that their patient safety event reports and mistakes are not being held in opposition to them and personnel files do not include records of mistakes made (Sorra et al., 2012). Nonpunitive response to error is operationalized as the participant's score on the nonpunitive response to error dimension on the HSOPSC.

**Manager safety practices** is defined as the degree to which supervisors or managers of RNs do not disregard problems of patient safety, consider suggestions by staff to improve patient safety, and offer praise to staff for adhering to procedures of patient safety (Sorra et al., 2012). Manager safety practices are operationalized as the participant's score on the supervisor/manager expectations and actions promoting safety dimension on the HSOPSC.

**Feedback and communication about error** is defined as the degree to which RNs perceive that staff receive information about the occurrence of errors, that error prevention strategies are discussed, and that feedback is provided about the implementation of changes put in place (Sorra et al., 2012). Feedback and

communication about error is operationalized as the participant's score on the feedback and communication about error dimension on the HSOPSC.

**Organizational learning-continuous improvement** is defined as the extent in which RNs perceive that positive change has resulted from mistakes made and that an evaluation of the effectiveness of changes implemented is conducted (Sorra et al., 2012). Organizational learning-continuous improvement is operationalized as the participant's score on the organizational learning-continuous improvement dimension on the HSOPSC.

**Patient safety event reporting** is defined as a process of reporting patient safety concerns by RNs in hospitals who may discover, identify, witness, or have familiarity with the occurrence of an incident, unsafe condition, or near miss event that did not reach the patient (AHRQ, 2013). Patient safety event reporting is operationalized as the participant's score on the frequency of events reported dimension and the number of events reported in the past 12 months item on the HSOPSC.

**Staff position** is defined as the position in which the RN has within the hospital. Staff position is operationalized as the participant's response as 'RN' to the 'staff position' item on the HSOPSC (Sorra et al., 2012).

### **Chapter Three**

In this chapter, the research design, setting, sample, instrument, procedure for data collection, and the data analysis plan is discussed. A descriptive, cross-sectional, correlational research design was used for examining the interrelationships among 1) organizational structures that included four hospital characteristics (hospital bed size, teaching status, geographic region, and ownership status) and four nurse characteristics



(length of employment status in hospital, length of employment on existing unit or work area of hospital, number of hours worked per week in hospital, and amount of experience in the profession or present specialty); 2) four patient safety practice dimensions of patient safety culture (nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement); and 3) patient safety event reporting practices among nurses in hospitals. All study variables were aggregated to the hospital level prior to data analysis.

### **Research Setting**

U.S. hospitals that voluntarily submitted their employee HSOPSC data to the AHRQ served as the research settings. Participant hospitals had a teaching or non-teaching status and were either government or nongovernment owned. In addition, participant hospitals were located in each geographic region of the U.S. based on states and territories as specified by the AHA (Sorra et al., 2012).

### **Sample**

#### **Hospital Sample**

For purposes of this study of hospital-level variables, hospitals served as the unit of analysis. At least 600 de-identified U.S. hospitals that voluntarily submitted HSOPSC data collected during July 2011 through June 2013 to the AHRQ comprised the hospital sample population for this study. The hospital sample was further delimited to only those hospitals that had HSOPSC data from at least 10 RNs. A power analysis was performed based on results from a study that used the HSOPSC to examine relationships between the four patient safety practices that were examined in this study and event reporting (El-Jardali et al., 2011). In the study, standardized betas for these relationships ranged from

.02 to .37 with an average moderate effect across the safety practices on event reporting of .19. Thus, using an estimated moderate effect size for multiple regression analysis ( $R^2 = .13$ ) and a total of 12 predictors, a sample size of 170 hospitals would be needed for achievement of sufficient power (Cohen, 1988). It was anticipated, then, that a sample of 600 hospitals would yield more than sufficient power to detect significant relationships among study variables.

### **Nurse Sample**

HSOPSC data were collected from approximately 133,774 registered and licensed practical nurses in the hospital sample (Sorra et al., 2014) between July 2011 and June 2013. These de-identified and publicly available nurse-level HSOPSC data were provided to the Principal Investigator (PI) by the AHRQ. Only RN data was analyzed. Prior to data analysis, RN-level data was aggregated in each hospital to yield hospital-level HSOPSC nurse characteristics, patient safety practices scores, and event reporting scores.

## **Instruments and Measures**

### **Nurse Characteristics, Patient Safety Practices, and Event Reporting**

The HSOPSC data was used to examine nurse characteristics, patient safety practices, and patient safety event reporting. The HSOPSC measures hospital staffs' perceptions of patient safety culture and consists of eight unit-level patient safety culture dimensions, two hospital-level dimensions, and four outcome measures (Sorra et al., 2012).

For this study, nurse data from four unit-level HSOPSC scales were examined. The **nonpunitive response to error scale** consists of three reverse worded items relating

to the extent that participants disagree or agree that mistakes they make are being held in opposition to them and that mistakes made are filed in personnel records (Sorra et al., 2012). Participants respond to each item on a five-point Likert scale that ranges from 1 = strongly disagree to 5 = strongly agree.

**The supervisor/manager expectations and actions promoting safety (manager safety practices) scale** consists of two positively worded and two reverse worded items. These items relate to the extent that participants disagree or agree that their supervisors or managers consider suggestions made by staff for patient safety improvement and do not disregard problems of patient safety that occur (Sorra et al., 2012). Participants respond to each item on a five-point Likert scale that ranges from 1 = strongly disagree to 5 = strongly agree.

The **feedback and communication about error scale** consists of three positively worded items relating to the extent that participants perceive feedback is provided about changes implemented in response to patient safety events reported and that information regarding errors that occur on the unit is shared with staff (Sorra et al., 2012). Participants respond to each item on a five-point Likert scale that ranges from 1 = never to 5 = always.

The **organizational learning-continuous improvement scale** consists of three positively worded items relating to the extent that participants agree or disagree that positive change has resulted from mistakes and that an evaluation of the effectiveness of changes implemented is undertaken (Sorra et al., 2012). Participants respond to each item on a five-point Likert scale that ranges from 1 = strongly disagree to 5 = strongly agree.

In addition, nurse data from two HSOPSC outcome measures were examined in this study. The **frequency of event reporting scale** consists of three positively worded items relating to the extent that participants perceive patient safety events due to mistakes are reported (Sorra et al., 2012). These mistakes include patient safety events intercepted and corrected before the patient was affected, no harm events, and events that could but didn't cause patient harm (Sorra et al., 2012). Participants respond to each item on a five-point Likert scale that ranges from 1 = never to 5 = always. The **number of events reported** is a single-item measure on the HSOPSC in which participants select a response to the number of event reports that were filed and submitted in the past 12 months. A total of six response categories are possible and range from 'no event reports' to '21 event reports or more.'

For each of the multi-item HSOPSC scales, participants select responses from five-point Likert scales ranging from 1 = strongly disagree to 5 = strongly agree or from 1 = never to 5 = always. Scores for each of the multi-item scales of the HSOPSC are calculated by adding the number of participant responses to positively worded items that indicate agreement and the number of participant responses to negatively worded items that indicate disagreement (Sorra & Nieva, 2004). Composite scores for each multi-item scale are then computed by dividing the number of responses that are positive by the total number of positive, negative, and neutral responses to items in each dimension (Sorra & Nieva, 2004). For each dimension, higher scores are indicative of a more positive patient safety culture perception.

The HSOPSC also includes seven demographic questions including the four nurse characteristics that were analyzed in this study: length of employment in hospital; length

of employment on unit; number of hours worked/week; experience in specialty or profession. The HSOPSC is administered to hospital staff via Web, paper, or mixed approaches (Sorra & Nieva, 2004). However, hospitals submitting data to the AHRQ Hospital Comparative Database must submit their data in an electronic file conforming to specifications outlined by the AHRQ (AHRQ, 2012a).

Initial psychometric testing of the HSOPSC was conducted in a sample of 1,437 hospital staff participants that included nurses from 21 hospitals across six states in the U.S. (Sorra & Nieva, 2004). Confirmatory factor analysis yielded 12 multi-item patient safety culture scales. To further examine construct validity of the HSOPSC, correlations among the scales were examined by Sorra and Nieva (2004) and ranged from moderate ( $r = .23$ ) to high ( $r = .60$ ), indicating that each scale, while related, measures relatively distinct dimensions of patient safety culture. Sorra and Nieva (2004) also examined initial internal consistency reliabilities for each scale that ranged from .63 to .84. Additionally, in a sample of 50,513 hospital staff that included nurses from 331 hospitals in the U.S., Sorra and Dyer (2010) reported adequate to very good internal consistency reliabilities for 11 out of the 12 HSOPSC scales ranging from .71 to .85.

Predictive validity of the HSOPSC was established by Etchegaray and Thomas (2012) in a sample of 220 intensive care unit employees, including nurses, from 12 hospitals in the southern U.S. In this study, the HSOPSC was administered to participants along with items relating to safety climate and teamwork climate from the Safety Attitudes Questionnaire (SAQ). Findings revealed that three out of the four outcome measures of the HSOPSC were significantly correlated with the HSOPSC and SAQ patient safety culture dimensions, and correlation coefficients ranged from .22 to

.72 for the HSOPSC dimensions, and from .41 to .65 for the SAQ (Etchegaray & Thomas, 2012). Based on the aforementioned discussion, the HSOPSC instrument demonstrates adequate reliability and validity.

### **Hospital Characteristics**

Hospital characteristics (hospital bed size, teaching status, and ownership status) are provided to the AHRQ by hospitals that voluntarily submit their HSOPSC data. Geographic region for each hospital is based on regions defined by the AHA (Sorra et al., 2012).

### **Procedure for Obtaining Data**

An analysis of an Agency for Healthcare Quality national dataset of nurse responses to the HSOPSC was conducted. Data from U.S. hospitals that voluntarily submitted their HSOPSC data to the AHRQ collected during July 2011 through June 2013 was analyzed in this research study. To acquire the HSOPSC dataset, the 2014 De-Identified Data Request Form was submitted to Westat, an AHRQ process and evaluation contract agency, requesting access to the electronic file. Following review and approval of the 2014 De-Identified Data Request Form, Westat forwarded an email to the PI with a link to a secure website from which the dataset was downloaded. The dataset included RN responses to HSOPSC items and demographic characteristics of each nurse respondent. In addition, hospital characteristics for participating hospitals was provided.

### **Human Subjects Protection**

The publicly available, national HSOPSC dataset is de-identified. The study proposal was submitted to the Institutional Review Board (IRB) at Rutgers, The State University of New Jersey for exempt review. Following receipt of IRB approval, the

2014 De-Identified Data Request Form was then submitted to Westat for access to the HSOPSC de-identified data. Once electronic access to the HSOPSC data was obtained, it was downloaded into the Statistical Package for the Social Sciences (SPSS) and password protected. The dataset was backed up onto an external portable hard drive, which was secured by the PI in a locked cabinet when not in use. The PI will destroy data files on the computer and backup external portable drive three years following study completion.

### **Data Analysis**

The de-identified national dataset was downloaded from a secure website into the IBM SPSS, Version 22. A delimited, analytic data file was created that 1) included only those hospitals with at least 10 RNs who completed the HSOPSC; and 2) no licensed practical nurse data. An inspection and screening of the analytic dataset was undertaken to identify any outliers, missing or inconsistent data. Distributions and residual plots of all variables were examined to assess for assumptions of statistical models, and skewness. Scatterplots were generated to assess for outliers. Frequencies, histograms, scatterplots, skewness and kurtosis statistics were examined to assess study variables for approximation of normal distribution. Descriptive statistics including means and standard deviations were used to describe hospital characteristics, nurse characteristics, patient safety practices, and patient safety event reporting. A code book which includes copies of the original analytic dataset and the cleaned dataset, copies of the basic descriptive, correlational and regression analyses, syntax and output, and notes to self were created to document the analytic file.

Correlational analysis of the study variables was conducted using both Pearson Product Moment Correlation and chi square for nominal level data. In line with a

conservative approach, a two-tailed test of significance set at .05 level was used, even if the hypothesized relationship was directional (Polit & Beck, 2012). The correlation matrix was reviewed to determine if hospital characteristics, nurse characteristics, and patient safety practice dimensions of patient safety culture were significantly related to patient safety event reporting as theorized.

For hospital characteristics, nurse characteristics, and patient safety practices that were significantly related to event reporting, multivariate linear regression analysis was used. This analysis allows the prediction of the score of a dependent variable from more than one independent variables or predictors (Polit & Beck, 2012).

To test hypothesis four, Baron and Kenny's (1986) 3-step regression analyses procedure for mediation testing was conducted. A mediating variable is a variable that accounts for the relationship between the predictor and outcome (Baron & Kenny, 1986). According to Baron and Kenny (1986), a variable operates as a mediator when variations in the independent variable account significantly for variations in the mediator (path a), variations in mediating variable account significantly for variations in the dependent or outcome variable (path b), and, when both paths a and b are controlled, a previous significant relationship between the independent and dependent variables becomes insignificant. In the first regression, the mediator variable (patient safety practices) was regressed on the independent variables (hospital and nurse characteristics). In the second regression, patient safety event reporting (the dependent variable) was regressed on hospital and nurse characteristics (the independent variables). In the third regression, patient safety event reporting (the dependent variable) was regressed on the mediator (patient safety practices) and the independent variables (hospital and nurse



characteristics). Conditions that must be met for mediation testing is that the independent variable must be related to the mediator and dependent variables, and the mediator must be related to the dependent variable (Baron & Kenny, 1986). In the event that these conditions were met for relationships among nurse and hospital characteristics, patient safety practices, and event reporting, a series of 3-step regressions were conducted to test the hypothesized mediation models.

## **Chapter Four**

### **Data Analysis**

The purpose of this study was to examine the complex interrelationships among four hospital characteristics (hospital bed size, teaching status, geographic region, ownership status); four nurse characteristics (length of employment status in hospital, length of employment on existing unit or work area of hospital, number of hours worked per week in hospital, amount of experience in the profession or present specialty); four patient safety practice dimensions of patient safety culture (nonpunitive response to error, manager safety practices, feedback and communication about error, organizational learning-continuous improvement); and patient safety event reporting among RNs nationally who work in hospitals in the U.S. Data used in this analysis were from the Agency for Healthcare Research and Quality (AHRQ) Hospital Survey on Patient Safety Culture Comparative Database. The database is funded by AHRQ and managed by Westat under contract # HHSA 290201300003C.

The publicly available, de-identified data collected during July 2011 through June 2013 from U.S. hospitals that voluntarily submitted their HSOPSC data to the AHRQ was analyzed in this research. Access to an electronic file via a link to a secure website

was obtained following receipt of approval from the Institutional Review Board (IRB) at Rutgers, The State University of New Jersey and then submission of the 2014 De-Identified Data Request Form to Westat, an AHRQ process and evaluation contract agency. The PI downloaded the de-identified national dataset into the IBM Statistical Package for the Social Sciences (SPSS) version 22. An inspection and screening of the analytic dataset was undertaken to identify any outliers, missing or inconsistent data.

For this study, data from the following HSOPSC scales were analyzed: 1) four nurse characteristics (length of employment status in hospital, length of employment on existing unit or work area of hospital, number of hours worked per week in hospital, amount of experience in the profession or present specialty); 2) four patient safety practice dimensions of patient safety culture unit-level scales (Nonpunitive Response to Error, Supervisor/Manager Expectations and Actions Promoting Patient Safety [Manager Safety Practices], Feedback and Communication about Error, Organizational Learning-Continuous Improvement); and 3) two outcomes of safety culture (the frequency of events and near misses reported by nurses; the number of event reports completed and submitted by nurses in the past year). Hospital characteristics (hospital bed size, teaching status, and ownership status) were provided by hospitals that voluntarily submitted their HSOPSC data to the AHRQ. Geographic region assignments for each hospital are based on regions defined by the AHA (Sorra et al., 2012).

Two analytic files were created for data analyses. The first file was an RN analytic file comprised of the subsample of RNs in the master HSOPSC file. The RN analytic file included 1) only participants that selected 'RN' to the staff position question on the HSOPSC; 2) only those hospitals that had 10 or more RN participants; and 3) only

RN participants who indicated that they had direct contact or interaction with patients. The data in this file included each RN's responses to HSOPSC items. This analytic file was used to 1) compute nurse-level HSOPSC scale mean and composite scores and 2) conduct descriptive analyses to describe the characteristics of the RN sample. A second hospital analytic file was created that included aggregated RN HSOPSC data for each hospital and hospital characteristics (bed size, ownership, teaching status, region). RN HSOPSC mean and composite scores in the RN analytic file for each hospital were aggregated in the hospital analytic file to yield, for each hospital, one aggregate RN score (mean and/or composite) for nurse characteristics, patient safety practices, event and near miss reporting, and number of event reports completed and submitted. In this chapter, data analyses are presented.

### **Demographics of the Study Sample**

#### **Characteristics of Nurse Sample**

A description of individual, nurse-level data for the RN sample is presented in Table 2. The final nurse sample size was 116,729 RNs who indicated they had direct contact or interaction with patients. The length of hospital employment among the nurses varied from less than one year to greater than 20 years (Table 2), and a little more than one-half of nurses (51.4%) were employed in their hospital for one to ten years. A majority of RNs reported that they worked from 20 to 39 hours per week. The number of years in their profession or specialty among the RNs in the sample varied from less than one year to greater than 20 years, and approximately one out of four RN participants had either one to five years or 21 or more years of experience in the profession or present specialty. Most RNs worked in teaching and non-government owned hospitals with 100

beds or more. Lastly, RNs worked in hospitals located in each geographic region in the U.S.

Table 2

*RN Sample Characteristics (n = 116,729\*)*

<b>Variable</b>		<b>Frequency</b>	<b>%</b>
Length of Employment Status in Hospital	Less than 1 year	11545	9.9
	1 to 5 years	36028	30.9
	6 to 10 years	23975	20.5
	11 to 15 years	14662	12.6
	16 to 20 years	8779	7.5
	21 years or more	18021	15.4
	Missing	3719	3.2
Length of Employment on Existing Unit or Work Area of Hospital	Less than 1 year	16037	13.7
	1 to 5 years	44247	37.9
	6 to 10 years	24202	20.7
	11 to 15 years	13079	11.2
	16 to 20 years	6350	5.4
	21 years or more	8572	7.3
	Missing	4242	3.6
Number of Hours Worked Per Week in Hospital	Less than 20 hours per week	4710	4
	20 to 39 hours per week	70379	60.3
	40 to 59 hours per week	30384	26
	60 to 79 hours per week	3981	3.4
	80 to 99 hours per week	961	.8
	100 hours per week or more	28	.0
	Missing	6286	5.4
Amount of Experience in the Profession or Present Specialty	Less than 1 year	7430	6.4
	1 to 5 years	31137	26.7
	6 to 10 years	21027	18
	11 to 15 years	14918	12.8
	16 to 20 years	12225	10.5
	21 years or more	28476	24.4
	Missing	1516	1.3
Hospital Bed Size	6-24 beds	546	.5
	25-49 beds	3422	2.9
	50-99 beds	7064	6.1
	100-199 beds	17598	15.1
	200-299 beds	21970	18.8
	300-399 beds	18861	16.2
	400-499 beds	13532	11.6

	500+ beds	33736	28.9
Teaching Status	Non-teaching	48980	42
	Teaching	67749	58
Geographic Region	New England/Mid Atlantic	22201	19
	South Atlantic	25555	21.9
	E. North Central	35638	30.5
	E. South Central	6731	5.8
	W. North Central	4560	3.9
	W. South Central	6431	5.5
	Mountain/Pacific	15613	13.4
Ownership Status	Non-government owned	101821	87.2
	Government owned	14908	12.8

\*sample size varies due to missing data

### **Description of the Hospital-Level Study Variables**

The hospital-level independent variables for this study were 1) hospital characteristics (bed size, ownership status, teaching status, geographic region); 2) nurse characteristics (length of hospital employment, length of unit employment, number of hours/week worked, length of professional or specialty experience); and 3) patient safety practices (manager safety practices, feedback and communication about error, nonpunitive response to error, organizational learning-continuous improvement). The two dependent variables for the study were 1) frequency of events or near misses reported by nurses in U.S. hospitals; and 2) the number of event reports completed by nurses in U.S. hospitals.

Hospital-level descriptive statistics for study variables are listed in Table 3. The final sample size was 555 hospitals. The mean number of RNs per hospital was 210 with a range of 10 to 2155. The majority of hospitals were non-teaching and non-government owned. Most hospitals had 100 or more beds, and all geographic regions in the U.S. were represented in the hospital sample.

Mean scores for nurse characteristics in Table 3 represent aggregated means of categorical nurse-level data. These hospital-level nurse characteristic data indicate that RN participants in each hospital, on average, were employed in each hospital between six to 15 years, and they worked on their current unit or work area, on average, from one to 10 years. RN participants in each hospital worked between 20 to 59 hours per week. In addition, RN participants in each hospital, on average, reported six to 15 years experience in the profession or present specialty.

Aggregated composite scores for the four patient safety practices and the frequency of event reporting by nurses represent the percent of RNs in the sample who positively endorsed, or agreed, that each dimension of patient safety culture was safe in their hospitals. As shown on Table 3, the overall composite scores indicate a majority of nurses in hospitals positively endorsed manager safety practices, feedback and communication about error, organizational learning-continuous improvement, and the frequency of events reported. On the other hand, only 44% of nurses in hospitals positively endorsed the safety practice of nonpunitive response to error in their hospitals.

Lastly, the overall mean aggregated score for the frequency of events reported was 3.82, indicating that nurses in each hospital, on average, reported mistakes or near misses at a frequency of “sometimes” to “most of the time.” Mean scores for the number of nurses who completed event reports in U.S. hospitals indicate that, on average, a majority of nurses in each hospital either did not complete an event report or completed one to five event reports in the past year compared to the number of nurses, on average, who completed six or more event reports in a year. Only one to eleven nurses per

hospital, on average, reported that they completed six or more event reports in the past year.

Table 3

*Descriptive Statistics of the Study Variables*

Hospital Characteristics (n=555)		%	
Hospital Bed Size	6-24 beds	3.6	
	25-49 beds	12.6	
	50-99 beds	16	
	100-199 beds	23.2	
	200-299 beds	16.4	
	300-399 beds	11.4	
	400-499 beds	6.1	
	500+ beds	10.6	
Teaching Status	Non-Teaching	63.8	
	Teaching	36.2	
Geographic Region	New England/Mid Atlantic	15.1	
	South Atlantic	20	
	E. North Central	28.8	
	E. South Central	8.3	
	W. North Central	5.2	
	W. South Central	9.7	
	Mountain/Pacific	12.8	
	Ownership Status	Non-Government	85.6
Government		14.4	
Nurse Characteristics			
	Mean	SD	Range
Length of Employment Status in Hospital	3.19	.507	1.33 - 4.96
Length of Employment on Existing Unit or Work Area of Hospital	2.76	.400	1.12 - 4.45
Number of Hours Worked Per Week in Hospital	2.35	.208	1.52 - 3.15
Amount of Experience in the Profession or Present Specialty	3.81	.424	1.89 - 5.76
Patient Safety Practice Dimensions of Patient Safety Culture			
	Composite Score % Positive		
Nonpunitive Response to Error	44.18		
Manager Safety Practices	74.18		
Feedback and Communication About Error	63.22		

Organizational Learning-Continuous Improvement	72.86		
Patient Safety Event Reporting			
	Composite Score % Positive		
Frequency of Events Reported	65.41		
	Mean	SD	Range
Frequency of Events Reported	3.82	.227	2.54 - 4.57
Number of Events Reported	# Of Nurses/Hospital (M)	SD	Range
• No Event Reports	65.28	85.61	0 - 819
• 1 to 2 Event Reports	85.56	109.19	0 - 882
• 3 to 5 Event Reports	40.75	58.14	0 - 798
• 6 to 10 Event Reports	11.51	14.61	0 - 124
• 11 to 20 Event Reports	3.80	5.64	0 - 53
• 21 Event Reports or More	1.13	1.81	0 - 11

### Instrument Reliability

As shown in Table 4, internal consistency reliability coefficients for the HSOPSC scales for this study were excellent and ranged from 0.76 to 0.87.

Table 4

*Alpha Coefficients for HSOPSC Scales*

<b>HSOPSC Scale</b>	<b>Cronbach's alpha coefficient</b>
Nonpunitive Response to Error	.824
Supervisor/Manager Expectations and Actions Promoting Patient Safety [Manager Safety Practices]	.809
Feedback and Communication About Error	.813
Organizational Learning-Continuous Improvement	.757
Frequency of Events Reported	.874

### Distribution of Hospital-Level Scores for Study Variables



As shown in Table 5, the distributions of scores for the aggregated study variables were examined to determine normality and skewness. Fisher's Skewness Z scores were calculated for each variable. As displayed on Table 5, only the frequency of events reported and the nurse characteristic of amount of experience in the profession or present specialty were normally distributed since the Fisher's Skewness Coefficient's (Z-scores) fell between +1.96 and -1.96. Most variables were only mildly skewed. Data transformation should be considered when nonnormality is evident; however this is not a universal recommendation since interpretation of variables transformed may be difficult (Tabachnick & Fidell, 2007). Due to the potential difficulty in interpretation, data transformation was not done.

Table 5

*Distribution of Scores for Study Variables*

	Skewness	S. E. Skewness	Kurtosis	S. E. Kurtosis	Fisher's Skewness Coefficient (Z – score)
<b>Patient Safety Culture Composite</b>					
Nonpunitive Response to Error	-.226	.104	.780	.207	-2.17
Manager Safety Practices	-.243	.104	1.194	.207	-2.34
Feedback and Communication About Error	-.304	.104	1.805	.207	-2.92
Organizational Learning-Continuous Improvement	-.408	.104	1.720	.207	-3.92
Frequency of Events Reported	-.190	.104	1.704	.207	-1.83
<b>Hospital Characteristics</b>					
Hospital Bed Size	.298	.104	-.699	.207	2.87
Teaching Status	.575	.104	-1.675	.207	5.53
Geographic Region	.497	.104	-.505	.207	4.78
Ownership Status	2.032	.104	2.136	.207	19.54

<b>Nurse Characteristics</b>					
Length of Employment Status in Hospital	-.428	.104	.961	.208	-4.12
Length of Employment on Existing Unit or Work Area of Hospital	-.241	.105	1.637	.210	-2.30
Number of Hours Worked Per Week in Hospital	.310	.106	1.549	.211	2.92
Amount of Experience in the Profession or Present Specialty	-.021	.104	1.654	.207	-0.202

### **Results of Hypothesis Testing**

As shown in Table 6, a correlation matrix of study variables is presented.

Computation of Pearson Product-Moment Correlations was completed to examine hypothesized relationships between hospital characteristics, nurse characteristics, patient safety practice dimensions of patient safety culture, and patient safety event reporting among RNs who work in hospitals in the U.S.

# PATIENT SAFETY EVENT REPORTING AMONG NURSES

Table 6

*Correlation Coefficients for Study Variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14
1 Geographic Region	1													
2 Ownership Status	.073	1												
3 Teaching Status	-.037	-.010	1											
4 Hospital Bed Size	-.130**	.066	.485**	1										
5 Length of Employment in Hospital	-.170**	.019	.181**	.238**	1									
6 Length of Employment on Unit	-.113**	.048	.167**	.173**	.914**	1								
7 Amount of Experience in Profession or Specialty	.001	.055	-.093*	-.122**	.487**	.532**	1							
8 Number of Hours Worked /Week in Hospital	.113**	.102*	.000	.087*	.062	.060	.122**	1						
9 Nonpunitive Response to Error	-.071	.088*	.125**	.265**	.135**	.177**	.083	.169**	1					
10 Feedback and Communication About Error	.046	.089*	-.115**	-.084*	-.154**	-.188**	-.102*	.013	-.466**	1				
11 Organizational Learning-Continuous Improvement	.045	.094*	-.115**	-.120**	-.155**	-.161**	-.165**	-.062	-.545**	.850**	1			
12 Manager Safety Practices	.076	-.035	-.157**	-.237**	-.253**	-.312**	-.187**	-.178**	-.703**	.737**	.773**	1		
13 Frequency of Events Reported	.004	.179**	-.213**	-.203**	-.113**	-.117**	-.022	.113**	-.221**	.694**	.649**	.461**	1	
14 Number of Events Reported	.124**	-.116**	-.028	-.182**	-.076	-.043	-.085*	.064	-.001	-.102*	-.002	.039	.064	1

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

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

### **Hypothesis Testing**

Prior to hypothesis testing, the categorical geographic region variable (1=New England/Mid Atlantic; 3=South Atlantic; 4=East North Central; 5=East South Central; 6=West North Central; and 7=West South Central) was dummy coded and the Mountain/Pacific region served as the comparison variable. The other hospital characteristics did not require dummy coding since ownership and teaching status were dichotomous with 0 and 1 response categories, and hospital bed size categories were ordinal from lower to higher bed sizes.

### **Hypothesis One**

**Hypothesis 1** indicated that hospital characteristics (hospital bed size, teaching status, geographic region, ownership) were significantly related to patient safety event reporting (frequency and number of event reports completed) by nurses in hospitals. As shown in Table 6, the four hospital characteristics examined in this study were significantly related to the frequency that nurses reported events and near misses in their hospitals. Specifically, hospitals with a smaller bed size ( $r = -.203, p = .000$ ), non-teaching status ( $r = -.213, p = .000$ ), locations in the South Atlantic ( $r = .161, p = .000$ ) and East North Central ( $r = -.153, p = .000$ ) geographic regions, and those that were government owned ( $r = .179, p = .000$ ) were significantly associated with a higher frequency of event and near misses reported by nurses.

Three of the four hospital characteristics were significantly associated with the second dependent variable in this study, that is, number of event reports completed by nurses (see Table 6). Hospitals with a smaller bed size ( $r = -.182, p = .000$ ), locations in the geographic regions of East North Central ( $r = -.144, p = .001$ ), East South Central ( $r =$

.120,  $p = .005$ ), and West South Central ( $r = -.123$ ,  $p = .004$ ), and nongovernment-owned ( $r = -.116$ ,  $p = .006$ ) were significantly associated with a higher number of events reported by nurses in U.S. hospitals. Teaching status was not associated with event report completion by nurses in their hospitals ( $r = -.028$ ,  $p = .506$ ). Therefore, hypothesis one was partially supported.

### **Hypothesis Two**

**Hypothesis 2** indicated that nurse characteristics (length of hospital employment, length of unit employment, number of hours worked per week, experience in the profession) were significantly related to the two patient safety event reporting outcomes in this study. As shown in Table 6, three of the four nurse characteristics were significantly associated with the frequency that nurses reported events and near misses in their hospital. That is, a shorter length of hospital employment ( $r = -.113$ ,  $p = .008$ ), a shorter length of unit employment ( $r = -.117$ ,  $p = .007$ ), and a higher number of hours/week worked ( $r = .113$ ,  $p = .009$ ) were significantly associated with a higher frequency of event and near miss reporting by nurses. The length of time in the specialty was not associated with frequency of event/near miss reporting ( $r = -.022$ ,  $p = .604$ ).

On the other hand, only one nurse characteristic, shorter length of time in the specialty ( $r = -.085$ ,  $p = .045$ ), was significantly related to a higher number of event reports completed by nurses in hospitals (see Table 6). Length of hospital employment ( $r = -.076$ ,  $p = .076$ ), length of employment on unit ( $r = -.043$ ,  $p = .316$ ), and number of hours worked per week ( $r = .064$ ,  $p = .141$ ) were not significantly associated with this outcome. Therefore, hypothesis two was partially supported.

### **Hypothesis Three**

**Hypothesis 3** indicated that positive endorsement of four patient safety practices (nonpunitive response to error, manager safety practices, feedback and communication about error, organizational learning-continuous improvement) was significantly related to increased level of event reporting (frequency and number) by nurses in hospitals. As shown in Table 6, all four patient safety practices were significantly related to the frequency that nurses in U.S. hospitals reported events and near misses. Specifically, positive endorsements by nurses of nonpunitive response to error ( $r = -.221, p = .000$ ), manager safety practices ( $r = .461, p = .000$ ), feedback and communication about error ( $r = .694, p = .000$ ), and organizational learning-continuous improvement ( $r = .649, p = .000$ ) in their hospital was significantly associated with a higher frequency of the extent to which they reported events and near misses.

However, only one patient safety practice, positive endorsements of feedback and communication about error ( $r = -.102, p = .016$ ) was significantly associated with a lower number of event reports completed by nurses. Nonpunitive response to error ( $r = -.001, p = .977$ ), manager safety practices ( $r = .039, p = .357$ ), and organizational learning-continuous improvement ( $r = -.002, p = .958$ ) were not significantly associated with event report completion by nurses. Therefore, hypothesis three was partially supported.

### **Independent Effects of Hospital and Nurse Characteristics and Patient Safety Practices on Event Reporting**

Two multivariate linear regression analyses were undertaken to examine the independent effects of hospital characteristics, nurse characteristics, and patient safety practices on 1) event/near miss reporting and 2) number of event reports completed. For the first regression, the independent variables including four hospital characteristics, three

nurse characteristics, and four patient safety practices significantly related to the frequency of events and near misses reported by nurses (Table 7) were considered for simultaneous entry into the regression model. As shown in Table 6, the four patient safety practices were highly collinear. To avoid multicollinearity in the regression model, only one patient safety practice, manager safety practices, was entered in the regression model since this variable was correlated at a magnitude of  $-.70$  or higher with the three other patient safety practices. As displayed on Table 7, six of the nine variables entered in the regression model were independently associated with the frequency that nurses in hospitals reported events and near misses when the effects of the other variables in the model were controlled for. Notably, manager safety practices had the biggest effect on this outcome. Taken together, these variables accounted for 32% of the variance in the frequency of events/near misses reported by nurses in U.S. hospitals.

Table 7

*Independent Effects of Four Hospital Characteristics, Three Nurse Characteristics, and Manager Safety Practices on Frequency of Events Reported*

<b>Model 1</b>	<b>Standardized Beta</b>	<b>R<sup>2</sup></b> .323	<b>p-value</b>
Hospital Bed Size	-.098		.030
Teaching Status	-.082		.056
Ownership Status	.170		.000
Geographic Region:			
South Atlantic	.119		.003
East North Central	-.105		.008
Length of Hospital Employment	-.063		.510
Length of Unit Employment	.144		.128
# Of Hrs Worked/Week	.189		.000
Manager Safety Practices	.463		.000

For the second regression, the seven independent variables (three hospital characteristics, one nurse characteristic, one patient safety practice) significantly related to the second dependent variable, number of event reports completed were entered simultaneously into the regression model. As displayed on Table 8, six out of the seven variables were independently associated with the number of event reports completed by nurses when the effects of the other variables in the model were controlled for. Taken together, these variables accounted for 13% of the variance in the number of event reports completed.

Table 8

*Independent Effects of Three Hospital Characteristics, One Nurse Characteristic, and Feedback and Communication About Error on Number of Event Reports Completed*

<b>Model 1</b>	<b>Standardized Beta</b>	<b>R<sup>2</sup></b>	<b>p-value</b>
		.130	
Ownership Status	-.112		.006
Geographic Region:			
East North Central	-.200		.000
East South Central	.071		.088
West South Central	-.142		.001
Hospital Bed Size	-.211		.000
Amount of Experience in the Profession or Present Specialty	-.113		.006
Feedback and Communication About Error	-.133		.001

#### **Hypothesis Four**

**Hypothesis 4** indicated that, when the effects of patient safety practices on event reporting outcomes were controlled for, the magnitude and significance of the relationships between hospital and nurse characteristics and patient safety event reporting



will diminish. Mediation testing was conducted to determine if all or any of the four patient safety practices mediated the relationships between 1) hospital characteristics and the two event reporting outcomes and 2) nurse characteristics and two event reporting outcomes. According to Baron and Kenny (1986), three conditions must exist to test for mediation: 1) the independent variable must be related to the mediator; 2) the independent variable must be related to the dependent variable; and 3) the mediator must be related to the dependent variable. Full mediation occurs when the magnitude of the relationship between independent and dependent variable is reduced and no longer significant with the mediator in the model (Baron & Kenny, 1986). Partial mediation occurs when the magnitude of the relationship between the independent and dependent variable and level of significance is reduced with the mediator in the model (Baron & Kenny, 1986).

**Patient safety practices as mediator between *hospital characteristics* and *frequency of event/near miss reporting*.** Hypothesis 4a indicated that the four patient safety practices would mediate the relationship between the four hospital characteristics (hospital bed size, ownership status, teaching status, geographic region) and the first dependent variable, frequency of events/near misses reported by nurses. The conditions for mediation were met for three hospital characteristics (hospital bed size, ownership status, teaching status), and a series of three mediation tests were conducted; one for each hospital characteristic.

As noted in Table 6, interrelationships were noted among the following groups of variables: 1) hospital bed size, the four patient safety practices, and frequency of events/near misses reported; 2) ownership status, three of the four safety practices

(nonpunitive response to error, feedback and communication about error, organizational learning-continuous improvement) and the frequency of events/near misses reported; and 3) teaching status, the four patient safety practices, and the frequency of events/near misses reported.

As shown in Table 9, mediation testing revealed that all four patient safety practices (nonpunitive response to error, feedback and communication about error, organizational learning-continuous improvement, manager safety practices) partially mediated the relationship between *hospital bed size and the frequency of events/near misses reported* and between *teaching status and the frequency of events/near misses reported*. That is, the effects of hospital bed size and teaching status on nurses' frequency of events/near misses is direct and also indirect through their effects on patient safety practices. Moreover, two safety practices (feedback and communication about error, organizational learning-continuous improvement) partially mediated the relationship between *ownership status and frequency of events/near misses reported*, indicating that the effect these two hospital characteristics on nurses' frequency of event/near miss reporting is both direct and indirect.

**Patient safety practices as mediator between *nurse characteristics* and frequency of event/near miss reporting.** Hypothesis 4b indicated that the four patient safety practices would mediate the relationship between four nurse characteristics (length of hospital employment, length of unit employment, number of hours/week worked, amount of experience in the profession) and the first dependent variable, that is, frequency of events/near misses reported. Only three nurse characteristics met the conditions for mediation and results of mediation testing are described below.

As noted on Table 6, interrelationships were noted among the following groups of variables: 1) nurses' length of hospital employment, the four patient safety practices, and the frequency of events/near misses reported; 2) nurses' length of unit employment, the four patient safety practices, and the frequency of events/near misses reported; and 3) number of hours/week worked, two safety practices (nonpunitive response to error, manager safety practices), and the frequency of events/near misses reported.

After a series of mediation tests, three of four safety practices (feedback and communication about error, organizational learning-continuous improvement, manager safety practices) were found to fully mediate the relationships between *nurses' length of hospital employment and the frequency of events/near misses reported* and between *nurses' length of unit employment and the frequency of events/near misses reported* (Table 9). These findings indicate that the effects of nurses' length of hospital and unit employment on their frequency of event/near miss reporting is indirect through their effects on patient safety practices. Non-punitive response to error partially mediated these relationships (Table 9), indicating an additional and partial indirect effect of these nurse characteristics on event/near miss reporting through this mediator. Lastly, no safety practices served as partial or full mediators in the relationship between number of hours/week worked and events/near misses reported.

Table 9

*Patient Safety Practice Mediators of Relationship Between Hospital and Nurse*

*Characteristics and Frequency of Events/Near Miss Reporting*

		<b>Mediators</b>			
<b>Independent Variable</b>	Variables in model	Nonpunitive response to	Feedback and communication about	Organizational learning-continuous	Manager safety

		error $\beta$ (p-value)	error $\beta$ (p-value)	improvement $\beta$ (p-value)	practices $\beta$ (p-value)
<b>Hospital Characteristics</b>					
Bed size	Alone With mediator	-.203 (.000) -.156 (.000)*	-.203 (.000) -.146 (.000)*	-.203 (.000) -.127 (.000)*	-.203 (.000) -.100 (.010)*
Ownership status	Alone With mediator	.179 (.000) .200 (.000)	.179 (.000) .118 (.000)*	.179 (.000) .119 (.000)*	NA
Teaching status	Alone With mediator	-.213 (.000) -.189 (.000)*	-.213 (.000) -.135 (.000)*	-.213 (.000) -.140 (.000)*	-.213 (.000) -.144 (.000)*
<b>Nurse Characteristics</b>					
Length of hospital employment	Alone With mediator	-.113 (.008) -.085 (.043)*	-.113 (.008) -.007 (.834) †	-.113 (.008) -.013 (.694) †	-.113 (.008) .003 (.934) †
Length of unit employment	Alone With mediator	-.117 (.007) -.085 (.048)*	-.117 (.007) .013 (.685) †	-.117 (.007) -.015 (.666) †	-.117 (.007) .024 (.552) †
# hrs/week worked	Alone With mediator	.113 (.009) .155 (.000)	NA	NA	.113 (.009) .202 (.000)

\*partial mediation; †full mediation

**Patient safety practices as mediator between *hospital characteristics* and *number of event reports completed*.** Hypothesis 4c indicated that the four patient safety practices would mediate the relationship between hospital characteristics and the second event reporting outcome in this study, number of event reports completed. Only two of four hospital characteristics (ownership status and hospital bed size) met the conditions for mediation and results of mediation testing are described below.

As noted on Table 6, hospital ownership status, three of four patient safety practices, and the number of event reports completed were interrelated. As shown in Table 10, mediation testing revealed only one safety practice, feedback and communication about error, partially mediated the relationship between ownership status and the number of event reports completed by nurses in U.S. hospitals, indicating that the

effect of this hospital characteristic on the number of event reports completed by nurses was both direct and indirect. Similarly hospital bed size, the four patient safety practices, and the number of event reports completed were all interrelated (Table 6). Mediation testing revealed that none of the patient safety practices mediated the relationship between hospital bed size and the number of event reports completed by nurses (Table 10).

**Patient safety practices as mediator between *nurse characteristics* and *number of event reports completed*.** Hypothesis 4d indicated that the four patient safety practices would mediate the relationship between nurse characteristics and number of event reports completed. The amount of experience in the profession was the only nurse characteristic related to three patient safety practices (feedback and communication about error, organizational learning-continuous improvement, manager safety practices) and the number of event reports completed (Table 6). Results of mediation testing appear in Table 10. Manager safety practices was the only one of the three practices to fully mediate the relationship between amount of experience in the profession or present specialty and the number of event reports completed, indicating that the effect of the amount of nurses' experience in the hospital or specialty on their event report completion was indirect through its effect on patient safety practices. Feedback and communication about error and organizational learning-continuous improvement did not mediate this relationship.

Table 10

*Patient Safety Practice Mediators of Relationship Between Hospital and Nurse  
Characteristics and Number of Event Reports Completed*

		Mediators			
Independent Variable	Variables in model	Nonpunitive response to error β (p-value)	Feedback and communication about error β (p-value)	Organizational learning-continuous improvement β (p-value)	Manager safety practices β (p-value)
Hospital Characteristics					
Bed size	Alone With mediator	-.182 (.000) -.196 (.000)	-.182 (.000) -.192 (.000)	-.182 (.000) -.185 (.000)	-.182 (.000) -.183 (.000)
Ownership status	Alone With mediator	-.116 (.006) -.117 (.006)	-.116 (.006) -.108 (.011)*	-.116 (.006) -.117 (.006)	NA
Nurse Characteristic					
Amount of experience in profession	Alone With mediator	NA	-.085 (.045) -.097 (.023)	-.085 (.045) -.088 (.042)	-.085 (.045) -.081 (.063) †

\*partial mediation; †full mediation

### Summary of Hypothesis Testing

In summary, as noted on Table 11, of the four hypotheses tested, all were partially supported. For hypothesis one, all four hospital characteristics were significantly related to one or both patient safety event reporting outcomes. Hospital bed size and ownership status were significantly related to the frequency of events/near misses reported and to the number of events reported. Non-teaching hospital status was significantly and negatively related to the frequency of events/near misses reported. The geographic regions of South Atlantic and East North Central were significantly related to the frequency of events reported. In addition, the geographic regions of East North Central, East South Central, and West South Central were significantly related to the number of events reported.

For hypothesis two, all four nurse characteristics were significantly related to one of the two patient safety event reporting outcomes. Nurses' length of employment status

in hospital, length of employment on existing unit or work area, and number of hours worked per week in the hospital were significantly related to the frequency of events/near misses reported. The amount of experience in the profession, specifically, a short length of time in the profession or specialty, was significantly associated with a higher number of events reported.

For hypothesis three, all four patient safety practice dimensions of patient safety culture were significantly related to one or both patient safety event reporting outcomes. Nonpunitive response to error, manager safety practices, and organizational learning-continuous improvement were significantly related to the frequency of events/near misses reported. Feedback and communication about error was significantly related to both the frequency of events/near misses reported and to the number of events reported.

Multivariate analyses revealed that, when the nine independent variables significantly related to frequency of events/near misses reported were entered simultaneously in the regression model, six of the nine variables (hospital bed size, ownership status, number of hours worked per week, manager safety practices, and the South Atlantic and East North Central geographic regions) were independently related to frequency of events/near misses reported. The nine variables in the model accounted for 32% of the variance in frequency of events/near misses reported by nurses in U.S. hospitals. Similarly, when the seven variables significantly related to the number of events reported were entered simultaneously into the regression model, six of the seven (ownership status, geographic regions of East North Central and West South Central, hospital bed size, amount of time in the profession or present specialty, feedback and communication about error) remained independently related to the number of event

reports completed by nurses in U.S. hospitals and accounted for 13% of the variance in this outcome.

For hypothesis four, a series of mediation tests were conducted to determine which patient safety practice dimensions were mediators between hospital and nurse characteristics and both event reporting outcomes. Findings revealed a more significant role of patient safety practices as a mediator between hospital and nurse characteristics and the frequency that nurses reported events and near misses and a less significant role as a mediator in the relationship between hospital and nurse characteristics and the extent to which nurses completed event reports.

Table 11

*Summary of Hypothesis Testing*

Hypothesis 1	Hospital characteristics are associated with patient safety event reporting.	Partially supported.
Hypothesis 2	Nurse characteristics are associated with patient safety event reporting.	Partially supported.
Hypothesis 3	Patient safety practices are associated with patient safety event reporting.	Partially supported.
Hypothesis 4	Patient safety practices mediate the relationship between hospital and nurse characteristics and patient safety event reporting.	Partially supported.

## Chapter Five

### Discussion of the Findings

The purpose of this study was to investigate the complex interrelationships among hospital characteristics, nurse characteristics, patient safety practices, and patient safety event reporting among RNs nationally who work in U.S. hospitals. In this chapter, the research findings from this study are discussed within the context of Donabedian's (1980, 1988, 2003) Healthcare Quality Model and the Patient Safety Culture Framework (AHRQ, 2012b). The Healthcare Quality Model proposes that structure influences care



processes and, in turn, care processes influence the outcome achieved (Donabedian, 1980, 1988, 2003). Guided by this model, organizational structures in this study were represented by hospital and nurse characteristics. Care processes were represented by four patient safety practices, and outcomes were represented by 1) frequency of events/near misses reported by RNs in the study hospitals and 2) the number of event reports completed and submitted by RNs in the study hospitals. Additionally, the patient safety practices examined in this study were informed by the Patient Safety Culture Framework (AHRQ, 2012b) and represented as nonpunitive response to error, manager safety practices, feedback and communication about error, and organizational learning-continuous improvement. The findings from this study illuminated the interrelationships among organizational structures (hospital characteristics and nurse characteristics), patient safety practices, and patient safety event reporting behaviors of nurses in a sample of hospitals in the U.S.

### **Patient Safety Event Reporting**

Developing and maintaining a positive culture of patient safety in healthcare organizations, including hospitals, is a recommendation made by the Institute of Medicine to improve patient safety (Kohn et al., 1999). Event reporting, including the willingness of staff to report events and the number of event reports completed and submitted, is an essential component and outcome of a just and learning safety culture in hospitals (AHRQ, 2012b, 2013). In this study, patient safety event reporting, the dependent variable, was measured in two ways. First, the frequency of events reported focused on how often events and near misses are reported by nurses. Secondly, the number of events reported focused on the number of event reports that nurses' reported

they completed and submitted in the past 12 months. There were striking differences between the two event reporting outcomes among nurses in the study hospitals, and these findings suggest that nurses in U.S. hospitals may report events and near misses at a higher rate than their completion and submission of event reports. The frequency that nurses reported near misses or events in the study hospitals was fairly high, and the mean score for this event reporting outcome ( $M = 3.82$ ) indicated that nurses reported events or near misses in the study hospitals most of the time. On the other hand, the completion and submission of event reports by nurses in the study was low. A majority of nurses in the study hospital sample (72%) reported that they filled out and submitted either no event reports (31%) or only one to two event reports (41%) in the past year.

One possible reason for these disparate event reporting findings may be that an incident or patient safety event report, if required by the hospital to document an unexpected event occurring to a patient during the processes of care, may not be completed and submitted. In fact, findings in other studies suggest that nurses tend to use informal event reporting alternatives that replace formal methods, such as completion of event reports, that include 1) documenting the event in the nurses notes or progress notes, 2) reporting the event verbally to a nurse manager or supervisor, and 3) communicating what happened to a colleague (Espin, Wickson-Griffiths, Wilson, & Lingard, 2010; Lederman, Dreyfus, Matchan, Knott, & Milton, 2013). In addition, some nurse participants may perceive that there is no need to report an error if it has been corrected, if education had been provided to rectify a problem, or if no patient harm occurred (Espin et al., 2010; Lederman et al., 2013). On the other hand, nurses may fail to complete event reports for errors because of humiliation, fear, and the presence of punitive response to

error (VanGeest & Cummins, 2003). The event reporting behaviors of nurses in this study underscore a need for future research to more fully understand what patient safety event reporting means to nurses. Qualitative inquiry could assist in clarifying how nurses interpret 1) event/near miss reporting and completion of event report behaviors and requirements; and 2) the importance (or not) of event reporting for themselves, patients, and the hospital.

### **Hospital and Nurse Characteristics**

The characteristics of U.S. hospitals and the nurses who work within these institutions were postulated to be directly associated with nurses' event reporting behaviors. In this study, 555 U.S. hospitals that had HSOPSC data from at least 10 nurse respondents who had contact with patients were included in the analysis. The majority of these hospitals were non-teaching (64%) and non-government owned (86%) and are proportionately similar to the percentage of all non-government owned hospitals in the U.S. (AHA, 2015) and non-teaching hospitals represented in the HSOPSC 2014 User Comparative Database Report (Sorra et al., 2014). A small majority of hospitals in the study sample (55%) had less than 200 beds and were slightly underrepresented compared to the percentage of all hospitals in the U.S. with less than 200 beds (73%) (AHA, 2014). In addition, the geographic regions of hospitals in this study reveal some consistency when compared to U.S. AHA registered Community Hospitals in 2012 (AHA, 2014).

Approximately 41% of nurses in the sample worked in their hospitals for five years or less, and the remainder worked for six up to 21 years or more. The length of employment for RNs was slightly greater in teaching hospitals compared to non-teaching hospitals in the sample. There were no differences in employment tenure of nurses in

nongovernment and government owned hospitals. In addition, approximately 33% of nurses in the sample indicated they were less seasoned, having five years or less experience in their profession or specialty; 48% were more seasoned, that is, they had 11 to 21 years or more experience. The findings of nurses in the sample in relation to hospital employment tenure and length of time in profession are consistent with those reported for all hospital staff participants in the HSOPSC 2014 User Comparative Database Report (Sorra et al., 2014).

### **Hospital Characteristics and Patient Safety Event Reporting**

The first hypothesis in this study specified an examination of the relationship between hospital characteristics and the patient safety event reporting behaviors of nurses in the study hospitals. In bivariate analyses, four hospital characteristics (smaller bed size, government owned, non-teaching status, two geographic regions) were significantly associated with a higher frequency of event/near miss reporting by nurses in these hospitals. In addition, three hospital characteristics (smaller bed size, three geographic regions, and non-government owned) were significantly associated with a higher number of event reports completed by nurses, the second event reporting outcome in this study.

There is a paucity of published studies that have examined the relationship between hospital characteristics and hospital employee event reporting outcomes. One study was found that demonstrated a similar relationship between small hospital size and increased event reporting behaviors by hospital employees (El-Jardali et al., 2011). The relationship between small hospitals and higher levels of event reporting behaviors in this study may reflect a more homogenous culture in smaller hospitals where employees have similar values compared to the bureaucracy of larger hospitals where it may be more

difficult to sustain quality work (El-Jardali, Jamal, Dimassi, Ammar, & Tchaghchaghian, 2008).

Interestingly, the findings from this study revealed some differences in particular hospital characteristics associated with the two event reporting outcomes by nurses in the study hospitals. Nongovernment hospital ownership was significantly associated with the number of event reports completed by nurses in these types of hospitals. On the other hand, only government ownership status was significantly associated with a higher frequency of event and near miss reporting by nurses in this type of hospital. It is plausible that the findings in this study reflect hospital event reporting policies and cultures that differ by hospital type. These findings also suggest that particular hospital types and regions of the country, such as larger hospitals and those designated as teaching hospitals, could be targeted to increase event reporting practices by nurse employees. Clearly more studies that examine these associations are needed to confirm, refute, or clarify these findings. The findings between hospital characteristics and RN event reporting behaviors in this study also support the theorized relationships, according to Donabedian's Healthcare Quality Model, between organizational hospital structures and outcomes in U.S. hospitals.

The magnitude of the associations between hospital characteristics and event reporting behaviors was small in that the absolute correlation coefficients ranged from 0.12 to 0.21. Importantly, in multivariate analysis, all but one hospital characteristic (i.e., teaching status) remained independently associated with the frequency of events/near misses reported by nurses. Similarly, all but one hospital characteristic (i.e., East South Central region) remained independently associated with the number of event reports

completed by nurses. These findings indicate that, while the effects of each individual hospital characteristic on event reporting by nurses in these hospitals is small, the cumulative effect of the hospital characteristics on event reporting behaviors by nurse employees may be more important; the four hospital characteristics taken together accounted for 12% of variance in event/near miss reporting and 9% of variance in number of events reports completed by nurses in the study hospitals.

### **Nurse Characteristics and Patient Safety Event Reporting**

The second hypothesis in this study indicated that nurse characteristics were significantly related to patient safety event reporting by nurses in hospitals. In bivariate analyses, three nurse characteristics (shorter length of hospital employment, shorter length of unit employment, higher number of hours worked per week) were significantly associated with a higher frequency of event/near miss reporting by nurses. On the other hand, only one nurse characteristic, a shorter length of time in the profession/specialty, that is, experience as a nurse, was significantly associated with a higher number of event reports completed and submitted by nurses in the study hospitals. The findings in this study suggest that RNs with less experience may identify more events and/or follow hospital policies for filling out and submitting event reports to a greater extent than more experienced or seasoned RNs. On the other hand, the findings may also suggest that more experienced nurses feel that procedures in hospitals serve as barriers to problem and error occurrences, and they may simply not engage in event reporting per hospital policies. Unfortunately, there are a paucity of studies that have examined the relationship between hospital employee characteristics and their event reporting behaviors to help elucidate the findings regarding nurse characteristics and their event reporting behaviors

in this study. Only two studies were found. In one of these studies (El-Jardali et al., 2011), participants with the most experience in the hospital (i.e., at least 21 years) had a higher frequency of events reported, a finding in contrast to the finding in this study. In a second study, findings were consistent with this study in that there was a lack of association between years of nurse experience (in profession/specialty) and frequency of event/near miss reporting (Kagan & Barnoy, 2013).

Importantly, the associations between individual nurse characteristics and event reporting behaviors by nurses, while significant, were quite small in this study (absolute correlation coefficient range = 0.08 to 0.11) and contributed little variance in nurses' event frequency reporting (2%) and number of event reports completed (6%) behaviors. These findings suggest that, compared to the associations between hospital characteristics and event reporting behaviors of nurses, the effects of the nurse characteristics examined in this study on their event reporting behaviors may be less important. Notably, research findings have revealed other important nursing structures not examined in this study, such as nurse staffing, to be significantly associated with error occurrence in hospitals such as patient falls (Lake, Shang, Klaus, & Dunton, 2010) and medication errors (Chang & Mark, 2011). Future research should explore the effects of nursing structures known to be significantly related to nurse, patient, and organizational outcomes, such as nurse staffing, workload, and skill mix, on the event reporting behaviors of nurses in U.S. hospitals.

### **Patient Safety Practices and Patient Safety Event Reporting**

Hypothesis three stipulated a positive relationship between the four patient safety practices examined in this study and event reporting behaviors by nurses in the study

hospitals. The safety practices examined in this study included nonpunitive response to error, manager safety practices, organizational learning-continuous improvement, and feedback and communication about error. Study findings revealed that a majority of nurses (i.e., at least 63% of nurses) reported that manager safety practices, organizational learning-continuous improvement, and feedback and communication about error in their hospitals was positive. On the other hand, only 44% of nurses positively endorsed nonpunitive response to error in their hospitals. This finding is important since encouraging health professionals, particularly nurses, to report events and complete event reports in a nonpunitive environment is crucial for patient safety, and it points to a patient safety component in U.S. hospitals that may require continued attention and improvement. Interestingly, the four safety practices were highly correlated with each other in this study, with the magnitude of intercorrelations ranging between 0.70 to 0.85. This suggests that the four safety practices are not relatively distinct from one another (Tabachnick & Fidell, 2007), and improvements in one of the safety practices in hospitals is likely to lead to improvements in other practices as well. It is also important to note that the extent to which nurses in this study endorsed the safety practices in their hospitals are consistent with the findings in the 2014 HSOPSC User Comparative Database Report (Sorra et al., 2014) that notes similar levels of endorsements of safety practices by a diverse group of employees in U.S. hospitals.

In bivariate analyses, all four patient safety practices were significantly related to the frequency of events and near misses reported, and the relationship was in the theoretically expected direction. That is, nurses' positive endorsements of the four patient safety practices was associated with a higher frequency of their reports of events



and near misses. These findings are consistent with previous research that examined these relationships in hospital employees and found positive relationships between the four patient safety practices and the employees' event reporting behaviors (El-Jardali et al, 2011). The findings also underscore the premise that the safety culture in hospitals is important for positive employee outcomes such as event reporting (AHRQ, 2012b, 2012c). When strong hospital leaders and managers create a culture and commitment to solve underlying system causes of medical errors and harm to patients, the whole organization will follow and thus disclosing real or potential adverse events and finding their root causes will become an organizational process (Clancy, 2011b). The positive associations between safety practices and reporting of events/near misses by nurses in this study support that theoretical premise.

Only one patient safety practice, feedback and communication about error, was significantly related to the number of event reports completed by nurses in the study hospitals. That is, there was a significant association between positive endorsements of feedback and communication about error and a lower number of event reports completed and submitted by these nurses. Theoretically, the opposite was expected. It is possible that feedback and communication about error by managers and leaders in hospitals may have led to correction of problems that, in turn, resulted in fewer error events and completion of event reports. Clearly, effective communication about error within and across healthcare teams is essential to removing any threats to the safety of patients and improving the safety behaviors of employees within healthcare organizations.

Importantly, the magnitude of the associations in bivariate analyses between the four safety practices and the first event reporting outcome examined in this study,

frequency of event/near miss reporting, were moderate to large with correlation coefficients ranging from 0.22 to 0.69. In multivariate analyses, manager safety practices was the only safety practice entered into the regression model to avoid multicollinearity between the safety practices, and individually this safety practice contributed 21% of the variance in frequency of events/near misses reported which is two times the amount of variance in this outcome contributed by hospital characteristics and ten times the variance contributed by nurse characteristics. In addition, manager safety practices had the biggest effect on event/near miss reporting by nurses in multivariate analyses (Beta = 0.46,  $p = .000$ ) when in the regression model with all other hospital and nurse characteristics. Thus, patient safety practices in hospitals, particularly manager safety practices, can be considered an important predictor of event/near miss reporting behaviors by nurses. These findings also highlight the importance that patient safety practices have in fostering a *reporting culture* in which nurses report events and near misses that they discover during the processes of patient care delivery in hospitals. The findings also suggest that these practices should be targeted for improvement if the goal is to increase the event/near miss reporting behaviors by nurses.

On the other hand, the magnitude of the association between the one safety practice (i.e., feedback and communication about error) significantly associated with the second event reporting outcome in this study (i.e., the number of event reports completed by nurses) was small ( $r = 0.10$ ,  $p = .016$ ) and contributed only 1% of variance in this outcome. The lack of association between most safety practices examined in this study and event report completion by nurses in this study may be due to the lack of variability across the range of possible scores on this outcome. Most scores were on the low end of

the event report completion range. The extent to which the low number of events reports completed by nurses in this study indicate a failure by nurses to report actual events, an underreporting of the behavior on questionnaires, or the possibility that less events are actually occurring in U.S. hospitals merits further research.

### **The Mediating Role of Patient Safety Practices**

Donabedian's Healthcare Quality Model proposes that processes, represented as patient safety practices, serve as an operant mechanism, or mediators, by which organizational structures influence outcomes of care. Consistent with this theoretical premise, hypothesis four stipulated mediation testing to determine the extent to which the four safety practices served as mechanisms or pathways through which hospital and nurse characteristics influenced event reporting behaviors of nurses.

Findings from this study revealed that the four safety practices served as either full or partial mediators in particular relationships between hospital or nurse characteristics and patient safety event reporting. Most notably, three safety practices fully mediated two relationships: 1) the length of a nurses' hospital employment and frequency of events/near miss reporting; and 2) the length of a nurses' unit employment and frequency of events/near miss reporting. These safety practices are feedback and communication about error, organizational learning-continuous improvement, and nurse manager safety practices. These findings indicate that the association between a nurses' length of hospital and unit employment on event/near miss reporting is indirect and through the effects of these characteristics on the three patient safety practices. In addition, manager safety practices fully mediated the relationship between nurses' length of time in the profession and the second event reporting outcome in this study, that is,

nurses' completion and submission of event reports. Interestingly, there was an inverse relationship between 1) nurses' length of hospital/unit employment and event/near miss reporting behaviors and 2) nurses' length of professional experience and completion of event reports in this study, suggesting that more experienced nurses report events, either verbally or written, at lower rates. The finding that patient safety practices mediates the inverse relationship between these nurse characteristics and event reporting behaviors is important and suggests that it is the extent to which experienced nurses' perceive the safety practices and culture within hospitals that affect their event reporting behaviors, not their employment tenure, per se. Fortunately, patient safety practices are modifiable and can be enhanced through administrative policy initiatives such as manager training to enrich their safety practices, implementation of unit and organizational-level error feedback and communication protocols, and the creation and maintenance of learning, reporting and just cultures within hospitals, particularly those hospitals that have a higher level of experienced nurses and low levels of nurse event reporting outcomes.

Patient safety practices served only a partial role as mediators between relationships between several hospital characteristics and event reporting behaviors, indicating that the relationships between hospital characteristics and event reporting behaviors are not completely accounted for by patient safety practices (Baron & Kenny, 1986). This finding points to a need in future research to investigate other operant mechanisms for the relationship between hospital characteristics and patient safety event reporting behaviors of nurses in hospitals such as work environment support for professional nursing practice.

### **Utility of Theoretical Frameworks for Explaining RN Patient Safety Event Reporting in U.S. Hospitals**

The findings of this study provide support for the empirical adequacy of Donabedian's Healthcare Quality Model and the Patient Safety Culture Framework for the theorized relationships among organizational structures (hospital characteristics and nurse characteristics), patient safety practices, and event reporting outcomes among RNs who work in U.S. hospitals. Donabedian's (1980, 1988, 2003) Healthcare Quality Model provides linkages from structures to processes and outcomes, and the Patient Safety Culture Framework provides both a conceptualization of patient safety practices and linkages of these practices to event report outcomes. All independent variables that represented organizational structures (hospital characteristics and nurse characteristics), and patient safety practice dimensions of patient safety culture (processes) were significantly related to one or both of the patient safety event reporting outcomes. Taken together, the hospital and nurse characteristics significantly related to frequency of event/near miss reporting by nurses accounted for 32% of the variance in this event reporting outcome. In addition, the combined effect of hospital and nurse characteristics on the completion and submission of event reports by nurses accounted for 13% of the variance in this outcome. Moreover, patient safety practices either fully or partially mediated the relationships between hospital or nurse characteristics and event reporting behaviors of nurses. Therefore, Donabedian's Healthcare Quality Model and the Patient Safety Culture Framework were quite useful in guiding the study and for explaining and understanding the complex interrelationships that were examined.

### **Chapter Six**

## **Summary, Conclusions, Implications, and Recommendations**

### **Summary**

Donabedian's (1980, 1988, 2003) Healthcare Quality Model and the Patient Safety Culture Framework (AHRQ, 2012b) guided this research study that examined the interrelationships among organizational structures (hospital characteristics and nurse characteristics), patient safety practice dimensions of patient safety culture, and patient safety event reporting. An examination of the following hypotheses was undertaken in a sample of RNs working in hospitals in the U.S.:

1. Hospital characteristics (bed size, teaching status, geographic region, ownership status) are significantly related to patient safety event reporting (frequency and number) by nurses in hospitals.
2. Nurse characteristics (length of employment in hospital, length of employment on unit or work area, number of hours worked per week, amount of experience in profession or specialty) are significantly related to patient safety event reporting (frequency and number) by nurses in hospitals.
3. Positive endorsements of patient safety practices (nonpunitive response to error, manager safety practices, feedback and communication about error, organizational learning-continuous improvement) are related to increased level of event reporting (frequency and number) by nurses in hospitals.
4. When the effects of patient safety culture on event reporting are controlled for, the magnitude and significance of the relationships between hospital and nurse characteristics and patient safety event reporting will diminish.

The study consisted of 555 de-identified hospitals in the U.S. that voluntarily submitted their HSOPSC data collected during July 2011 through June 2013 to the AHRQ. Hospitals that had 10 or more RN participants met the inclusion criteria. The majority of hospitals were nonteaching (64%), non-government owned (86%), had 100 or more beds (68%), and were located in the New England/Mid Atlantic, South Atlantic, and East North Central (64%) geographic regions in the U.S.

Additionally, the sample consisted of de-identified data from 116,729 RN participants meeting the inclusion criteria of 1) selection of 'RN' to the staff position question on the HSOPSC; and 2) only RN participants who indicated that they had direct contact or interaction with patients. Approximately 41% of participants in the RN sample worked in their hospital five years or less. Over one-half (52%) had worked on their unit five years or less. In addition, 48% of RN participants were more seasoned, indicating they had 11 to 21 years or more experience. Most RN participants worked in hospitals that were teaching, non-government owned, with 100 or more beds, and located in the New England/Mid Atlantic, South Atlantic, or East North Central geographic regions. The frequency of event reporting by RNs in this study was fairly high ( $M = 3.82$ ) suggesting that events and near misses were reported "sometimes" to "most of the time." On the other hand, event report completion was low. No event reports were completed by 31% of RN participants and 41% indicated completing and submitting one to two event reports in the past year.

De-identified and publicly available HSOPSC data collected using the HSOPSC instrument (see Appendix) was analyzed in this research study (AHRQ, 2015). The dataset included 1) demographic questions for the four nurse characteristics (length of

employment in hospital, length of employment on unit or work area, number of hours worked per week, amount of experience in profession or specialty); 2) four unit-level HSOPSC scales (nonpunitive response to error, supervisor/manager expectations and actions promoting safety [manager safety practices], feedback and communication about error, organizational learning-continuous improvement); and 3) two outcome measures that include the frequency of event reporting scale and the number of events reported, single-item measure (Sorra et al., 2012). In addition, hospital characteristics (bed size, teaching status, geographic region, ownership status) were included in the HSOPSC dataset.

In this study, variables were measured to examine hypothesized relationships between organizational structures (hospital characteristics and nurse characteristics), patient safety practice dimensions of patient safety culture, and patient safety event reporting among RNs working in U.S. hospitals. Pearson Product-Moment Correlation Coefficients were computed to test hypotheses one through three. Mediation testing was conducted to test hypothesis four.

For hypothesis one, findings from inferential statistics suggest significant relationships between four hospital characteristics (smaller bed size, government ownership, non-teaching status, two geographic regions) and higher event/near miss reporting by nurses. In addition, three hospital characteristics (smaller bed size, three geographic regions, non-government ownership) were significantly related to a higher number of event reports completed by nurses. Findings from multivariate analyses revealed a significant and independent effect of three hospital characteristics (hospital bed size, ownership status, two geographic regions) on both the frequency of event/near



miss reporting and the number of event reports completed by nurses, when the effects of the other variables were controlled for.

For hypothesis two, findings from inferential statistics suggest significant relationships between three nurse characteristics (shorter length of hospital employment, shorter length of unit employment, higher number of hours worked per week) and a higher frequency of event/near miss reporting by nurses. In addition, one nurse characteristic (shorter length of time in profession or specialty) was significantly related to a higher number of event reports completed by nurses. Findings from multivariate analyses revealed a significant and independent effect of 1) only one nurse characteristic (number of hours worked/week) with the frequency of event/near miss reporting by nurses in hospitals; and 2) one nurse characteristic (amount of experience in profession or specialty) with the number of event reports completed by nurses, when the effects of other variables were controlled for.

For hypothesis three, findings from inferential statistics suggest significant relationships between positive endorsements by nurses of all four patient safety practices and a higher frequency of event/near miss reporting. Findings also suggest that positive endorsements of only one patient safety practice, feedback and communication about error, was significantly related to a lower number of event reports completed by nurses, however, the magnitude of the association was small contributing only 1% of variance. Findings from multivariate analyses revealed that the only safety practice entered, manager safety practices, had the biggest effect on event/near miss reporting behaviors of RNs and can be considered as an important predictor of this outcome. In addition, one patient safety practice, feedback and communication about error, had a significant and

independent effect on the number of event reports completed by nurses, when the effects of the other variables were controlled.

For hypothesis four, mediation testing was conducted. Findings revealed that all four patient safety practices had a full or partial mediating role in relationships between hospital or nurse characteristics and patient safety event reporting outcomes.

In summary, several hospital characteristics, nurse characteristics, and patient safety practice dimensions of patient safety culture are significantly related to patient safety event reporting practices of RNs in U.S. hospitals. In addition, patient safety practices serve as partial or full mediators for the relationship between hospital and nurse characteristics and patient safety event reporting.

### **Limitations**

Limitations to this research study include the descriptive, cross-sectional, correlational research design. Even though there may be a relationship found to exist between an independent and dependent variable, causality attribution is extremely difficult to infer in correlational, nonexperimental research (Polit & Beck, 2012; Tabachnick & Fidell, 2007). Another limitation of this research study relates to the analysis of an existing dataset. Namely, the researcher does not have control over what and how data was collected (Grady & Hearst, 2007). Selection bias limits the generalizability of the RN sample in this study to other populations. Nurse participants in U.S. hospitals who completed the HSOPSC may not be representative of other populations that 1) report events/near misses; and 2) complete and submit event reports. The study is also limited in relation to participants' self-reported responses to the HSOPSC questions. Reliability of recollection of responses by participants may be

limited due to recall bias (Hulley, Martin, & Cummings, 2007). A final limitation to this study is that all hospital types within the U.S. or associated territories, such as acute care, psychiatric, and rehabilitation are eligible to submit their HSOPSC data to be included in the Comparative Database (AHRQ, 2012a).

### **Conclusions**

The findings from this study partially support the theorized relationship between the organizational structures of hospital characteristics and the two patient safety event reporting outcome measures. All four hospital characteristics (smaller bed size, government ownership, non-teaching status, two geographic regions) were significantly related to higher event/near miss reporting by RNs in U.S. hospitals. Only three hospital characteristics (smaller bed size, three geographic regions, non-government ownership) were significantly related to a higher number of event reports completed and submitted by nurses. On the other hand, hospital teaching status was not related to the number of event reports completed. Hospital bed size, ownership status, and two geographic regions were independent predictors of the frequency of event/near miss reporting and the number of event reports completed. Even though the effects of each hospital characteristic on event reporting is small, the four hospital characteristics together contributed 12% of variance in event/near miss reporting and 9% of variance in number of events reported by RNs in the study hospitals.

The relationship theorized between the organizational structures of nurse characteristics and the two patient safety event reporting outcomes was also partially supported. Three nurse characteristics (shorter length of hospital employment, shorter length of unit employment, higher number of hours worked/week) were significantly

related to a higher frequency that events/near misses were reported by nurses. The length of time in the profession or specialty was not related to the frequency of events/near miss reporting. On the other hand, this was the only nurse characteristic, that is, a shorter length of time in the profession or specialty that was significantly related to a higher number of event reports completed. Only one nurse characteristic, the number of hours worked/week was a significant independent predictor of the frequency of event/near miss reporting. Additionally, the nurse characteristic of amount of experience in the profession or specialty was a significant independent predictor of the number of event reports completed. The effect of nurse characteristics on event reporting was quite small, contributing only 2% of the variance in event frequency reporting and 6% variance in number of event reports completed.

The theorized relationship between positive endorsements by nurses of all four patient safety practices were significantly related to a higher frequency of event/near miss reporting. However, only positive endorsement of feedback and communication about error was significantly related to a lower number of event reports completed and submitted. From a theoretical perspective, this finding was not expected. It is plausible that feedback and communication about error was evident in sample hospitals and therefore resulted in fewer occurrences of patient safety events. Notably, the magnitude of the associations of safety practices with event reporting was moderate to large. Manager safety practices had the biggest effect on event/near miss reporting contributing 21% of variance and can be considered as an important predictor for this outcome.

Lastly, the findings in this study partially support the theorized relationships between all four patient safety practices mediating the relationships between 1) hospital

characteristics and two event reporting outcomes, and 2) nurse characteristics and two event reporting outcomes. Findings from mediation testing revealed a full or partial mediating role of all four patient safety practices in relationships between hospital or nurse characteristics and patient safety event reporting outcomes.

### **Implications for Nursing**

The Healthcare Quality Model and the Patient Safety Culture Framework posit that interrelationships among hospital characteristics, nurse characteristics, patient safety practices, and patient safety event reporting are complex. The findings in this study provide support for the theoretical propositions that organizational structures (hospital characteristics and nurse characteristics), and the processes of patient safety practice dimensions of patient safety culture (nonpunitive response to error, manager safety practices, feedback and communication about error, organizational learning-continuous improvement) influence the outcome of patient safety event reporting practices of RNs working in U.S. hospitals. In addition, the findings from this study have implications for nurse leaders in hospitals to advance the development of nurse managers and their safety practices when patient safety event reporting behaviors of nurses is targeted for improvement. Study findings also underscore the important need for leaders and executives within U.S. hospitals to create and maintain cultures of patient safety that focus particularly on just, learning, and reporting cultures for nurses and other employees of these institutions. An organization's safety culture has a significant influence on efforts to identify policies, practices, omissions, and assumptions that could lead to medical errors (Clancy, 2011b). The AHRQ (2009, 2014b) recommends annual assessments of safety culture as one of its ten top safety tips for hospitals in order to

increase staff awareness about patient safety culture, assess the current state of patient safety culture, identify strengths and areas for improvement, examine trends over time in safety culture, and evaluate the impact of safety culture interventions and initiatives on outcomes, including nurses' event reporting behaviors.

### **Recommendations for Future Research**

Recommendations for future research based on the findings from this study include:

1. Qualitative inquiry of RN patient safety event reporting practices. An exploration of how nurses interpret a) event/near miss reporting and the completion of event report behaviors and requirements; and b) the importance (or not) of patient safety event reporting for themselves, patients, and the hospital.
2. Study replication with additional nurse and hospital characteristics. A replication of this research across U.S. hospitals with the addition of the a) nurse demographic characteristics (i.e., age, gender, level of education, and ethnicity); and b) hospital characteristics (i.e., Magnet/Non-Magnet status, acute care/psychiatric/rehabilitation).
3. An examination of relationships among nursing structures (i.e., nurse staffing, workload, and skill mix), supportive nurse practice environment, patient safety practices, and RN event reporting behaviors.
4. Study replication with the use of hospital incident reporting data. Utilization of hospital incident reporting data will assist in quantifying the frequency that nurses report events/near misses as well as the number of event reports completed and submitted.

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## Appendix

## Hospital Survey on Patient Safety Culture

# 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.

- |  |  |  |
|--|--|--|
| <input type="checkbox"/> a. Many different hospital units/No specific unit | <input type="checkbox"/> h. Psychiatry/mental health | <input type="checkbox"/> n. Other, please specify:                       |
| <input type="checkbox"/> b. Medicine (non-surgical)                        | <input type="checkbox"/> i. Rehabilitation           | <div style="border: 1px solid black; height: 20px; width: 150px;"></div> |
| <input type="checkbox"/> c. Surgery  | <input type="checkbox"/> j. Pharmacy                 |  |
| <input type="checkbox"/> d. Obstetrics                                     | <input type="checkbox"/> k. Laboratory               |  |
| <input type="checkbox"/> e. Pediatrics                                     | <input type="checkbox"/> l. Radiology                |  |
| <input type="checkbox"/> f. Emergency department                           | <input type="checkbox"/> m. Anesthesiology           |  |
| <input type="checkbox"/> g. Intensive care unit (any type)                 |  |  |

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

	Strongly				Strongly
	Disagree	Disagree	Neither	Agree	Agree
	▼	▼	▼	▼	▼

Think about your hospital work area/unit...

- |  |                                       |                                       |                                       |                                       |                                       |
|--|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|
| 1. People support one another in this unit.....  | <input type="checkbox"/> <sub>1</sub> | <input type="checkbox"/> <sub>2</sub> | <input type="checkbox"/> <sub>3</sub> | <input type="checkbox"/> <sub>4</sub> | <input type="checkbox"/> <sub>5</sub> |
| 2. We have enough staff to handle the workload .....   | <input type="checkbox"/> <sub>1</sub> | <input type="checkbox"/> <sub>2</sub> | <input type="checkbox"/> <sub>3</sub> | <input type="checkbox"/> <sub>4</sub> | <input type="checkbox"/> <sub>5</sub> |
| 3. When a lot of work needs to be done quickly, we<br>work together as a team to get the work done ..... | <input type="checkbox"/> <sub>1</sub> | <input type="checkbox"/> <sub>2</sub> | <input type="checkbox"/> <sub>3</sub> | <input type="checkbox"/> <sub>4</sub> | <input type="checkbox"/> <sub>5</sub> |
| 4. In this unit, people treat each other with respect.....   | <input type="checkbox"/> <sub>1</sub> | <input type="checkbox"/> <sub>2</sub> | <input type="checkbox"/> <sub>3</sub> | <input type="checkbox"/> <sub>4</sub> | <input type="checkbox"/> <sub>5</sub> |
| 5. Staff in this unit work longer hours than is best for<br>patient care.....                            | <input type="checkbox"/> <sub>1</sub> | <input type="checkbox"/> <sub>2</sub> | <input type="checkbox"/> <sub>3</sub> | <input type="checkbox"/> <sub>4</sub> | <input type="checkbox"/> <sub>5</sub> |

**SECTION A: Your Work Area/Unit (continued)**

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

**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 .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
2. My supervisor/manager seriously considers staff suggestions for improving patient safety .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
3. Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
4. My supervisor/manager overlooks patient safety problems that happen over and over.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

**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 .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
2. Staff will freely speak up if they see something that may negatively affect patient care.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
3. We are informed about errors that happen in this unit.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
4. Staff feel free to question the decisions or actions of those with more authority .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
5. In this unit, we discuss ways to prevent errors from happening again.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
6. Staff are afraid to ask questions when something does not seem right.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

**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 <i>caught and corrected before affecting the patient</i> , how often is this reported? .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

2. When a mistake is made, but has no potential to harm the patient, how often is this reported? ..... ☐<sub>1</sub>   ☐<sub>2</sub>   ☐<sub>3</sub>   ☐<sub>4</sub>   ☐<sub>5</sub>
3. When a mistake is made that could harm the patient, but does not, how often is this reported? ..... ☐<sub>1</sub>   ☐<sub>2</sub>   ☐<sub>3</sub>   ☐<sub>4</sub>   ☐<sub>5</sub>

**SECTION E: Patient Safety Grade**

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

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>
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 .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
2. Hospital units do not coordinate well with each other .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
3. Things "fall between the cracks" when transferring patients from one unit to another .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
4. There is good cooperation among hospital units that need to work together.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

**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 .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
6. It is often unpleasant to work with staff from other hospital units .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
7. Problems often occur in the exchange of information across hospital units .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
8. The actions of hospital management show that patient safety is a top priority.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
9. Hospital management seems interested in patient safety only after an adverse event happens.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
10. Hospital units work well together to provide the best care for patients.....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>
11. Shift changes are problematic for patients in this hospital .....	<input type="checkbox"/> <sub>1</sub>	<input type="checkbox"/> <sub>2</sub>	<input type="checkbox"/> <sub>3</sub>	<input type="checkbox"/> <sub>4</sub>	<input type="checkbox"/> <sub>5</sub>

**SECTION G: Number of Events Reported****In the past 12 months, how many event reports have you filled out and submitted?**

- |  |  |
|--|--|
| <input type="checkbox"/> a. No event reports     | <input type="checkbox"/> d. 6 to 10 event reports    |
| <input type="checkbox"/> b. 1 to 2 event reports | <input type="checkbox"/> e. 11 to 20 event reports   |
| <input type="checkbox"/> c. 3 to 5 event reports | <input type="checkbox"/> 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?**

- |  |  |
|--|--|
| <input type="checkbox"/> a. Less than 1 year | <input type="checkbox"/> d. 11 to 15 years   |
| <input type="checkbox"/> b. 1 to 5 years     | <input type="checkbox"/> e. 16 to 20 years   |
| <input type="checkbox"/> c. 6 to 10 years    | <input type="checkbox"/> f. 21 years or more |

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

- |  |  |
|--|--|
| <input type="checkbox"/> a. Less than 1 year | <input type="checkbox"/> d. 11 to 15 years   |
| <input type="checkbox"/> b. 1 to 5 years     | <input type="checkbox"/> e. 16 to 20 years   |
| <input type="checkbox"/> c. 6 to 10 years    | <input type="checkbox"/> f. 21 years or more |

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

- |   |  |
|---|--|
| <input type="checkbox"/> a. Less than 20 hours per week | <input type="checkbox"/> d. 60 to 79 hours per week    |
| <input type="checkbox"/> b. 20 to 39 hours per week     | <input type="checkbox"/> e. 80 to 99 hours per week    |
| <input type="checkbox"/> c. 40 to 59 hours per week     | <input type="checkbox"/> 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.**

- |  |   |
|--|---|
| <input type="checkbox"/> a. Registered Nurse                             | <input type="checkbox"/> j. Respiratory Therapist                       |
| <input type="checkbox"/> b. Physician Assistant/Nurse Practitioner       | <input type="checkbox"/> k. Physical, Occupational, or Speech Therapist |
| <input type="checkbox"/> c. LVN/LPN                                      | <input type="checkbox"/> l. Technician (e.g., EKG, Lab, Radiology)      |
| <input type="checkbox"/> d. Patient Care Asst/Hospital Aide/Care Partner | <input type="checkbox"/> m. Administration/Management                   |
| <input type="checkbox"/> e. Attending/Staff Physician                    | <input type="checkbox"/> n. Other, please specify:                      |
| <input type="checkbox"/> f. Resident Physician/Physician in Training     | <div style="border: 1px solid black; height: 20px; width: 100%;"></div> |
| <input type="checkbox"/> g. Pharmacist                                   |   |

☐ h. Dietician

☐ i. Unit Assistant/Clerk/Secretary

**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

☐ d. 11 to 15 years

☐ b. 1 to 5 years

☐ e. 16 to 20 years

☐ c. 6 to 10 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.***