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The Relationship Between Care Provider Perceptions of Safety Culture and Patient Perceptions of Care on Three Hospital Units

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The Relationship Between Care Provider Perceptions of Safety Culture and Patient Perceptions of Care on Three Hospital Units

by

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Dedication and Acknowledgments

It took a good deal more than a village and four years to produce this dissertation. Among the most important people, I would like to acknowledge Jean Ann Seago, RN, PhD, professor at the UCSF School of Nursing and my dissertation chair for her high standards and infinite patience. I was blessed with a committee of outstanding scholars, Mary Blegen, RN, PhD, of the UCSF School of Nursing and Brian Alldredge, PharmD, Associate Dean of UCSF School of Pharmacy. Without their friendship, guidance, and support, I would not have been able to see the end of this study. Many thanks to the Gordon and Betty Moore Foundation for the Triad for Optimal Patient Safety Project, so wonderfully envisioned by Robert Wachter, MD, Niraj Sehgal, MD and Dean Kathleen Dracup, of the UCSF School of Nursing. Laurie Drabble, PhD, MPH provided inspiration and guidance from early concepts through the final manuscript. Finally, I would like to acknowledge Bruce Cooper, PhD, psychologist and UCSF School of Nursing's senior statistician. His expertise in both specialties proved invaluable to me during the past few months.

This work is dedicated to my husband David Drabble, and to my father Richard Gearhart. Both became hospitalized at different times during this dissertation's research and writing, and in the case of my father, remains a continual reminder of the need to improve patient care quality and safety within our nation's hospitals.

ABSTRACT

In the hospital setting, the underlying causes of poor quality of patient care and the failures that jeopardize patient safety have resulted in catastrophic patient outcomes and dissatisfaction with safety systems among care providers. This quantitative study compared hospitalized patients' perceived experiences of care with the perceptions of patient safety culture among care providers. Two instruments in common use, the Consumers Assessment of Healthcare Providers and Systems-Hospital version (HCAHPS) and the Hospital Survey on Patient Safety Culture (HSOPSC) were statistically analyzed using a negative binomial regression model. Results demonstrated that several provider variables were significant predictors of patient outcomes on all six or five of six HCAHPS subscales including: Organizational learning and quality improvement, overall perceptions of safety, teamwork within the unit, staffing, supervisor and manager support for safety, and teamwork across units ($p < .001$). Research applications for this study include development of a model for comparing data from the two instruments and a framework for the examination of the forces that affect patient and provider perceptions of quality, care outcomes, and failures.

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CHAPTER 1

THE STUDY PROBLEM

Introduction to Problem and Subproblems

The Institute of Medicine (IOM) reported in *To Err is Human* that U.S. hospitals have caused up to 98,000 preventable deaths each year (Kohn, Corrigan, & Donaldson, 2000). This spurred a considerable number of organizational, financial, and regulatory responses from myriad private and public agencies in a rapid attempt to increase the safety of patient care (Altman, Clancy, & Blendon, 2004). Hospital administrators and educators joined forces in these improvement efforts through the introduction of updated procedures, policies, training, equipment, and electronic devices designed to protect patients from harm. During subsequent years, however, few measurable improvements were made to patient safety metrics or the science of hospital outcomes management (Amalberti, Auroy, Berwick, & Barach, 2005; Barach & Berwick, 2003; Wachter & Shojania, 2004). Although tangible progress is evident in building redundancy, checklists, and other simple safety tools into current hospital infrastructure, the underlying causes of many past failures that jeopardized the patient's safety and impacted their care have not been addressed (Pronovost, Miller, & Wachter, 2006). Studies have demonstrated that "dysfunctional" hospital environments and processes have led to both catastrophic patient outcomes and dissatisfaction among care providers (Becher & Chassin, 2001).

The IOM defined patient safety as "freedom from accidental injury; ensuring patient safety involves the establishment of operational systems and processes that minimize the likelihood of errors and maximizes the likelihood of intercepting them

when they occur" (as cited in Kohn, et al., p. 221). Therefore, patient safety is not a static state or endpoint, but rather several related multidimensional concepts that work together to form the complex matrix of a safe patient environment, or safety milieu, within the inpatient hospital care unit.

The IOM report is often cited as the beginning of the patient safety movement. In reality, the publication was a final push for recognition of a longstanding healthcare and hospital problem. Organized efforts to improve the quality of hospital care and reduce patient morbidity and mortality have been ongoing since the 1800s when Nightingale wrote *Notes on Hospitals* (Nightingale, 1863). Contemporary forms of quality and performance improvement activities have been actively pursued by hospitals since the 1960s (Zerwekh & Claborn, 2006).

A criticism of the patient safety literature is that various definitions of terms are used to describe hospital safety concepts and constructs. The following terms are defined for the purposes of the current study:

Table 1.1: *Definitions of Commonly Used Patient Safety Terms*

Term	Definition
Safety attitudes	Refers to the frontline workers' perceptions with regard to their unit safety and the quality of patient care, which are expressed as *safety climate*, *teamwork climate*, *stress recognition*, and *organizational climate* (Sexton et al., 2006).
Safety culture	Refers to the collective product of individual and group beliefs, attitudes, perceptions, competencies, and patterns of behavior which determine the type and level of organizational health and safety management (Nieva & Sorra, 2003).
Perception	The action of taking possession with the mind; reflect internal processes including learning, current and past experiences, and culture. Influenced by feedback from others (Pronin, 2007).
Belief	The mental model that varies among individuals that will influence perceptions and responses to those perceptions (Weick, 1995).
Safety climate	A comparatively easy aspect of safety culture to measure. Includes how groups of personnel perceive how their units manage mistakes, noncompliant employees, and safety concerns (Shteynberg & Sexton, 2005).
Care providers	Physicians, nurses, pharmacists, and other hospital personnel who may or may not work as a team to provide care for hospitalized patients, known as *team members*, *caregivers*, and *providers* (Sexton et al., 2006).
Quality	Measurable aspects of technical care as well as the knowledge, judgment and skill of those that provide it. Focus is on the care provider-patient relationship and also the patient's role in receiving and participating in care (Donabedian, 2003).
Outcome	Measurable desirable (positive) or undesirable (negative) changes in individuals or populations that can be attributed to health care. Outcomes can be classified as clinical, physical, social, psychological, perceptive, or learning (Donabedian, 2003).
Error	Failure of a planned action to be completed as intended or the use of an inappropriate or wrong plan to achieve an aim. Sometimes referred to as an *event* (Kohn et al., 2000).
Failure	Untoward, initially simple lapse or event within a system that has or could have severe consequences, especially if several occur at once (Weick & Sutcliffe, 2001).

Research conducted on safety culture and patient care experiences is a natural progression from the study of examining adverse error outcomes including patient deaths (Pronovost & Holzmueller, 2004; Shojania, Duncan, McDonald, & Wachter, 2002). IOM scientists and Congress informed the public that solutions would be found and implemented to render hospital care safer (Reinertsen & Clancy, 2006). Despite these efforts, the science of safety culture and patient care outcomes is poorly understood and underappreciated (Donabedian, 2003; Leape & Berwick, 2005). Rather than simply remaining unaddressed, the problem of patient safety, given the current healthcare environment of competition and scarcity, has worsened; many metrics and outcomes have likely become worse (Pronovost, Holzmueller et al., 2006).

The many issues related to how the organizational structures of U.S. health care affect patient care within hospitals are beyond the scope of the current study. However, understanding the experiences and conditions that affect care provider and patient relationships on the unit is pivotal to this research and requires a consideration of the basic forces that underlie problems with safety culture and negative patient outcomes in the U.S. The following four major forces contribute to patient outcomes in the United States: (a) the complex structure and nature of the U.S. healthcare and hospital system, (b) the roles and functions of healthcare safety regulatory bodies, (c) care provider characteristics, perceptions, and actions, and (d) patient characteristics, perceptions, and responses. A conceptual framework was developed to illustrate the patient safety milieu and the potential influence these forces have on the health outcomes of patients.

Complexity and Structure of the U.S. Healthcare System

The complex structures of acute care delivery systems are daunting. During 2005, 34.7 million inpatients were discharged from U.S. hospitals after undergoing 44.9 million procedures (NCHS, 2005). Hospitals may be fully private, owned by shareholders, not-for-profit, or government run (Singer et al., 2003). Funding is from a variety of sources, but comprised primarily of public and private monies, as well as third-party health insurance. Payers wield tremendous power over hospital functioning. For example, private insurance companies exert influence over hospital and provider practice through feedback on quality, cost, and effectiveness (Ramanujam & Rousseau, 2006). Threats to the survival of hospitals include loss of funding, competition, litigation, regulation, clinical issues, and organizational challenges.

According to researchers, barriers to change and improvement in safety are built into the organizational structure of acute care delivery as practiced by U.S. hospitals (Khatri, Baveja, Boren, & Mammo, 2006). An example of one barrier is referred to as *lack of transparency*, or the *cloud of secrecy,* that follows a nosocomial death. This secrecy masks the events that lead to an untoward patient outcome and results in an institutionalized reluctance to share safety information with other hospitals. The result may be repeated in the original hospital, as well as within others, resulting in similar outcomes (Barach, 2003). Although regulatory interventions have been instituted to mitigate the hazards from lack of transparency, national safety outcomes have not demonstrated significant increases in either safety or reliability (Barach & Berwick, 2003). This lack of transparency could be the result of a business-over-safety attitude that often pervades hospitals. Data concerning a poor patient outcome, especially one that

potentially leads to embarrassment, loss of business, or legal action, may be concealed from competing hospitals or the public, furthering a culture of secrecy and a loss of opportunity for organizational learning (Ramanujam & Rousseau, 2006). The current business environment of scarcity and competition also has a negative impact on hospitals (Devers, Brewster, & Casalino, 2003). Business decisions made for economic reasons rather than safety have initiated a subtle movement, or "drift" away from a culture of safety. As these decisions and actions continue, the drift continues toward conditions that foster failures, catastrophe, and disaster (Carthey, de Leval, & Reason, 2001; Dekker, 2005).

Healthcare Safety Regulatory Bodies

Lack of a national agenda to identify and regulate safety needs and related priorities contributes to faulty hospital systems. The disorganized "web" of agencies and organizations charged with regulating hospital care have evolved over time and produced regulations, laws, guidelines, and initiatives that may or may not be evidence based, achievable, measurable, or consistent with each other (Battles & Lilford, 2003). They are rarely interconnected or coordinated and occasionally conflict (Rivard, Rosen, & Carroll, 2006). For example, some states have passed legislation requiring error reporting; however such efforts are frequently regulated locally with no federal requirement for nationwide data sharing (Marchey, 2003).

A mix of private and public agencies with various missions and goals is charged with regulating hospitals. Federal public agencies with safety oversight responsibilities include Centers for Medicare and Medical Services and the Occupational and Safety Health Administration. The Joint Commission for the Accreditation of Healthcare

Organizations, a private company charged by the U.S. Congress with certifying that hospitals meet specific JCAHO-defined standards, enables the collection of federal monies (JCAHO), further confusing the regulation "landscape." Individual state and local agencies contribute additional rules and regulations. Insurers require that hospitals implement initiatives and meet specific benchmarks and "scorecards" to compete for market share, (i.e., patients) (Dixon & Shofer, 2006). Government and industry collaboration is providing hospital outcome comparison data for public consumption on online sites (Goldstein, Farquhar, Crofton, Darby, & Garfinkel, 2005).

Other safety net databases, such as the National Practitioner Databank, maintain national statistics on care providers, such as nurses and physicians, and by individual and group. However, the databanks track only malpractice payouts and license actions by individual practitioners (Services, 2008). Decisions against practitioners are not posted until actions are finalized, allowing questionable practitioners to move from state to state ahead of their professional licensing boards (Suhr, 2007).

Care provider Characteristics, Perceptions, and Actions

One result of the current patient safety movement is the effort to examine and understand care provider team functions within hospitals. Team functioning is associated with unit safety culture (Thomas, Sexton, & Helmreich, 2003). Such teams generally include physicians, pharmacists, nurses, and other care providers who work with hospitalized patients (Barach, 2003). Their characteristics tend to be institutionalized by gender and class—typically less common within other industries (Amalberti et al., 2005; Khatri et al., 2006). Professionals within the care provider disciplines come from various educational backgrounds, standards, and traditions all of which influence the patient's

safety (Garman, Leach, & Spector, 2006). Hierarchical labor and communication structures discourage the examination and understanding of problems related to quality and patient outcomes, particularly if committed by a member of the high-end status group (e.g. physicians; Edmondson, 2004). The archetype hierarchal relationship is the traditional physician-nurse dyad within which the nurse is considered subservient to the physician (Garman et al., 2006). Communication and other interaction between nurses and physicians are inhibited by their relative rank and status (Edmondson, 2004). Consequently nurses and other staff are frequently discouraged from questioning physicians (ISMP, 2004). The resulting communication failures are known to contribute to poor patient outcomes (Rivard et al., 2006).

Traditional provider-level management prevents changes in hospital safety culture. A pervasive “culture of blame,” the opposite of a positive safety culture, creates environments that not only discourages vocalization, but also where speaking up may be unwelcome or result in a negative job action (Leape & Berwick, 2005; Reason, 2000). Many hospitals continue a traditional model of management that entails “naming, blaming, and shaming” the individual who actually commits an error. This occurs in spite of the many systems and other individuals that may have contributed to the event (Reason, Carthey, & de Leval, 2001). This culture may vary within a given organization, evidenced more strongly within some units over others within the same hospital (Espin, Lingard, Baker, & Regehr, 2006; Thomas et al., 2003).

Another common manifestation of care provider perceptions and actions is the belief that an individual practitioner can attain a form of individual perfection that will prevent an error from ever occurring (Leonard, Graham, & Bonacum, 2004; Reason,

2000). This is a concept attributable to Descartes and other early 17th century thinkers (Taylor, 1985). The expectation of perfection in healthcare may be directly descended from this belief. Although there is no doubt that the advancement of modern science was a direct result of researchers refining their fields to be as error-free as possible, this artificial splitting of the technical and the human has been difficult to address in environments external to the laboratory (Dekker, 2002).

Several large studies have applied caregiver perceptions to define variables that measure quality of care on a hospital unit. For example, Aiken and colleagues (2001) used the self-reports of nurses to examine the quality of patient care as well as their perceptions of quality outcome trends (e.g., medication errors) to define related problems within five Western countries. A similar U.S. study also used nurse self-reports as a measure of the of quality patient care on hospital units (Aiken, Clarke, & Sloane, 2002). Neither study identified specific criteria for defining care quality nor triangulated findings with other data such as the care experience of patients.

Cultures and characteristics of the various healthcare professions also provide obstacles to safe care. The professions are often referred to as functioning within “silos” (i.e., working in isolation), although their efforts are focused within the same unit toward the same patient goals (Garman et al., 2006). Communication among these groups is frequently ineffective. Physicians within the organization are sanctioned to function as autonomous actors, perpetuating a system of individuality that is in direct opposition to the organizational teamwork model practiced by hospital nurses and other care providers (Amalberti et al., 2005).

Taken to the extreme, hierarchal power structures can produce catastrophic outcomes (IOM, 2000; IOM, 2004). A “culture of silence” is an organizational condition within which a practitioner is obviously performing poorly, but is not held accountable for poor practice. Such an environment has been credited with causing significant harm to patients, other care providers, and the culture of safety in general. This phenomenon is well documented in related literature; however by its very nature, it is poorly understood and therefore difficult to both measure and remedy (Hart & Hazelgrove, 2001; Henriksen & Dayton, 2006).

Patient Characteristics, Perceptions, and Responses

Researchers use care providers for subjects far more often than patients (Hoff, Jameson, Hannan, & Flink, 2004). Although a significant proportion of patient safety studies are not focused on the patients themselves, patient perspectives provide considerable insights into their experiences of care. An examination of the literature reveals commonalities among patients that were involved in a hospital event with a poor quality outcome. Their characteristics can serve as contributory factors (Vincent, Taylor-Adams, & Stanhope, 1998), specifically their socioeconomic status, spoken language, and current illness (Vincent et al., 1998). Past hospitalizations, knowledge of illness, age, family involvement, and experience with previous healthcare error may also increase susceptibility to a failure or other negative outcome (Schoen et al., 2005; Weingart et al., 2005b).

Minnick, Roberts, Young, Kleinpell, and Marcantonio (1997) focused on service quality measurements using a hospitalized patient population and found evidence of an ideal “single consumer” patient profile for which hospital unit resources are designed.

Patients with certain characteristics considered outside the “ideal” encountered shortfalls having their needs for physical care, pain management, and education. In this study a patient profile emerged in which age, number of admitting diagnoses, discharge status and marital status all contributed to significant findings of service problems that may lead to poor patient outcomes.

Researchers found that common traits may manifest among the characteristics of patients vulnerable to poor outcomes (Waterman, et al. 2006; AMA, 1997). In a 1997 public opinion poll of patient safety issues, respondents who reported they would not take precautions against errors and other quality problems (e.g., pose questions to care providers or research hospitals, providers, and treatments) also characterized themselves as “risk takers.” Risk takers were less likely to have a personal physician and more likely to be male (AMA, 1997). These data predate the IOM’s patient safety report; consequently the findings may not reflect the current balance of patient sentiments. However, as patient perspective research develops, additional evidence may emerge that supports a recognizable profile that identifies a patient’s susceptibility to negative quality outcomes.

The complexity and structure of U.S. healthcare, care safety regulatory bodies, the characteristics of care providers and their perceptions and actions, patient characteristics and their perceptions and responses contribute to the milieu of the hospital unit. Safety culture outcomes and patient perceptions of care are the result of actions and reactions within these dynamic and complex social, organizational, technical, and interpersonal forces.

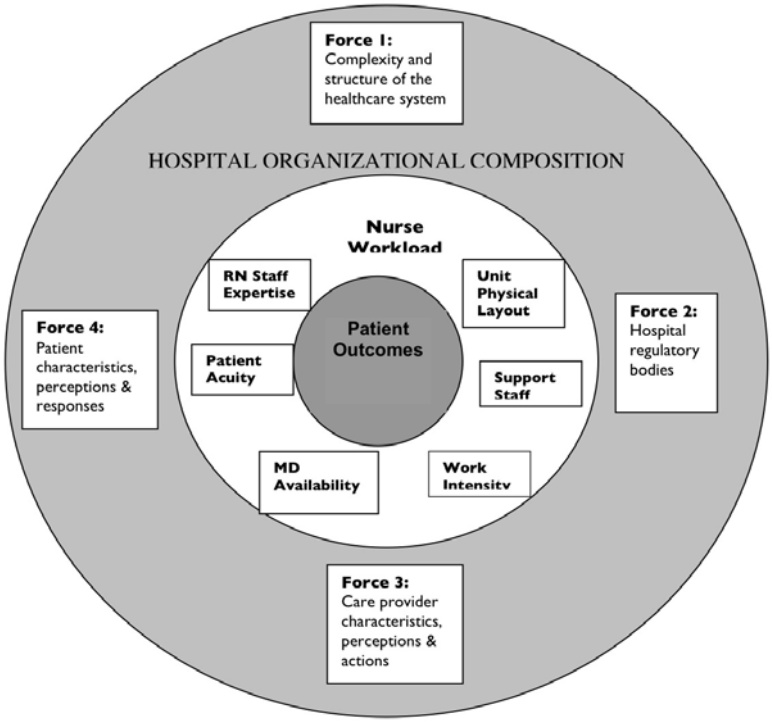

Figure 1-1 *"The California Experiment: Alternatives for Minimum Nurse-to-Patient Ratios," by J.A. Seago, 2002,* (Journal of Nursing Administration 32(1) p. 53 Adapted with permission.

The conceptual model pictured in Figure 1-1 was first developed by Seago in 2002 to show the nursing care workload on a hospital unit. The model has been adapted to represent the patient safety milieu within the hospital's organizational composition. The center or hub of the model contains patient outcomes. The next layer contains the conceptual elements of RN staff expertise that are thought to directly influence patient outcomes: Patient acuity, work intensity, unit layout, and resources (Seago, 2002). The outermost layer now holds the four forces that impact the occurrence of patient outcomes.

Research Problem, Purpose of the Study, and the Research Question

The Research Problem

It is known that care providers are subject to many, sometimes competing, influences that affect the unit's safety culture. What is not known is how the unit safety culture affects patient perceptions. The IOM, in their reports on keeping patients safe, has inspired the development of measures that reflect quality, safety culture, and patient perceptions of care (IOM, 200, 2001, 2004). Since 2003, there has been national attention given to developing and propagating these instruments (Darby, Hays, & Kletke, 2005; Sorra & Nieva, 2004a). There is no evidence, however, of whether these instruments can tell us anything about the relationships between the perceptions of the unit's patients and the providers who care for them. Additionally, there is a dearth of research exploring relationships between safety culture and patient experiences of care.

The following research question guided the study:

What is the relationship between care providers' perceptions of safety culture and the patients' experiences of care on the hospital unit?

An exploratory, quantitative study will be described that addresses the problem of the lack of knowledge about the relationships between care providers and patients perceptions within their milieu on the hospital unit. This study will attempt to determine if the relationships exist and if so, to what degree. Measures in common use in U.S. hospitals, the Hospital Survey on Patient Safety Culture-HSOPSC and Consumer Assessment of Healthcare Providers and Systems (Hospital version)-HCAHPS will provide data for the study (Darby et al., 2005; Sorra & Nieva, 2004a).

The purpose of the research is to develop a strategy and model for testing and analyzing data that measure perceptions of care provider safety culture and patient perceptions of experiences of care. This study is intended to support future research as well as policy and practice that promote patient safety within the hospital. The rationale and purpose for performing this study is that by determining if there are associations between patient and staff perceptions about safety and care, ways may be found to improve safety culture and/or quality of care in the acute care hospital.

Significance of the Study

An important underlying assumption of this study is that perceptions influence care provider practice and patient experiences, which in turn influence outcomes. Related literature has demonstrated that when the relationships between perceptions and poor patient outcomes on a hospital unit are examined, several potential negative findings are evidenced. These include a loss of trust in hospitals, a lack of patient-centered care, and unmet patient expectations surrounding the disclosure and reporting of errors (Espin, Levinson, Regehr, Baker, & Lingard, 2006; Evans, Berry, Smith, & Esterman, 2006; Young, Minnick, & Marcantonio, 1996). Incongruent perceptions interfere with organizational learning and improvement as well as with positive culture change (Young et al., 1996). Care models may only meet the needs of a simple, single patient type, and the work environment of the hospital unit is prone to risks and failures (Minnick, Roberts, Young, Kleinpell, & Marcantonio, 1997; Stetler, Morsi, & Burns, 2000). It can be concluded from these studies that perceptual gaps at the point of service may form additional communication barriers between the hospitalized patient and care provider, further exacerbating patient vulnerability to a less than optimal outcome (Minnick et al.,

1997). The relationships identified offer several compelling reasons to study patient and care provider perceptions of hospital experiences.

The Influences of Care Provider Perceptions on Hospital Error

Studies of care providers have linked provider perceptions with actual or potential negative patient outcomes. When care providers perceive their work conditions to be complicated or otherwise difficult, there are associated system failures. Other authors have found that care providers may inadvertently or deliberately jeopardize patients through their work habits. Two studies explored the complex and sometimes chaotic conditions that contribute to hospital error by interrupting work and communication (Sutcliffe, Lewton, & Rosenthal, 2004). U.S. physicians-in-training were participants in a study that explored the outcomes of hospital error in a complex work environment. When a patient under a physician's care had a negative outcome, contributing factors included poor or faulty communication, wrong information, poor patient transitions, and difficult co-worker relationships (Sutcliffe et al., 2004). Tucker and Spear described a chaotic hospital environment and the nature of their work as contributors to "work system failures." Small failures and interruptions were so frequent during an average work shift that the nurses often experienced difficulty with completing even brief patient care tasks, exposing patients to safety threats with each shift (Tucker & Spear, 2006). The nurses underestimated their own failures by nearly 50%, perceiving an average of 4.3 operational failures per hour to the observed average of 8.2 operational failures per hour noted by the observers.

Ricci and colleagues (Ricci et al.) examined two methods of error reporting—an anonymous system and an official hospital system—available to physicians and nurses

working within pediatric critical care units in one British hospital. They concluded that significant variation existed between groups in the manner in which errors are perceived and reported. The researchers found evidence associating their findings with safety outcomes such as the prevention of organizational learning and diminished interdisciplinary communication. The care providers would periodically develop procedural "workarounds," personal methods of error management that circumvented routine hospital channels (Ricci et al., 2004). This form of error management is associated with poorly functioning organizations (Spear & Schmidhofer, 2005) and poor safety cultures (Espin, Lingard et al., 2006).

Nurse-reported perceptions of an inability to deliver safe care have also been reported in the literature. Rogers, Hwang, Scott, Aiken, and Dinges (2004) examined 5317 hospital work shifts and 393 registered nurses (RNs) recruited from a sample drawn from members of a U.S. nursing organization. The nurses reported frequently working longer hours than scheduled. The excess hours were associated with fatigue and lowered vigilance when caring for patients. These reports were positively correlated with both self-reported potential and actual errors (Rogers, Hwang, Scott, Aiken, & Dinges, 2004). Scott, Rogers, Hwang, and Zhang (2006) applied a similar methodology to determine if longer working hours were correlated with decreased reports of vigilance among nurses working within the intensive care unit (ICU). Their findings indicated that the majority of the 502 nurses sampled, who had collectively worked 6017 shifts, experienced difficulty staying awake during their shifts and many worked longer than scheduled. Of those reporting errors, 27% had made at least one error and 38% reported a near miss (Scott, Rogers, Hwang, & Zhang, 2006). Limitations of both studies included nonrandom

selection of participants, lack of definition for what constituted an error, and no confirmation of reported errors with any other data (Rogers et al., 2004; Scott et al., 2006).

Reeves, West, and Baron (2005) defined seven nursing care domains for a sample of 2,880 British nurses to self-rate their ability to regularly meet patient needs. Five of these domains were directly related to hospital errors involving the prevention of falls, coordination of care, discharge follow-up and teaching, transition and continuity of care, and information and communication. Depending upon the domain, the nurses responded that between 25%-79% of their time on their units they either sometimes had or did not have the time, tools, or education to provide error-preventing patient care (Reeves, West, & Barron, 2005).

The complexity of the work environment and insufficient resources are associated with numerous adverse patient outcomes. This includes nursing resources and the typical chaotic hospital unit environment (Rogers et al., 2004; Scott et al., 2006; Tucker & Edmondson, 2003). The underreporting of hospital error and events can be linked with other safety outcomes and behavior including communication and poor organizational learning (Reeves et al., 2005; Ricci et al., 2004). These problems are associated with shortfalls in patient safety culture within the hospital.

The Influence of Patient Perceptions on Outcomes

Minimal research has espoused a possible relationship between negative patient outcomes and patient perceptions, characteristics, and responses. Further research is needed to understand how patients experience a negative outcome. Patient self-report following an event has emerged in the literature as a credible method of identifying

patient harms. Studies have demonstrated that patients experience, or are concerned that they may experience, some type of failure of care during their hospitalization (Burroughs et al., 2007; Cleopas et al., 2006; Evans et al., 2006).

Patients report feeling vulnerable when hospitalized; however, they will typically not divulge their fears to their caregivers, possibly believing it will increase their vulnerability to a negative outcome. In one study, patients with care quality issues most frequently reported delays in care and communication difficulty with their care providers (Weingart et al., 2005a). In another study, patients stated they were "comfortable" advocating for their own safety while hospitalized (Waterman et al., 2006). However upon further questioning, they were reluctant to question care providers when they observed a mistake or an omitted safety practice, such as handwashing.

Evans, Berry, Smith, and Esterman, (2006) found that some patients and families reported a diminished sense of confidence in hospitals or healthcare providers following the experience of an adverse event. These researchers interviewed 2,884 family members of Australian households and discovered that 7% suffered an adverse event or error while hospitalized within the previous 5 years. Of those, 60% classified the error as "really serious," requiring an extended hospital stay. Patients and families who experienced such serious errors were twice as likely to report fear of a future hospitalization (Evans et al., 2006). One outcome of these negative perceptions is that a portion of the public may avoid future care for serious health problems.

Other researchers measured care provider and patient perceptions of poor care quality and negative outcomes. When care provider perceptions and patient perceptions are examined in the same study, a possible relationship between providers and patients is

evidenced. Espin, and colleagues (2006) applied qualitative methods and scenarios to determine that patients have expectations that healthcare providers will follow a robust error reporting and disclosure system. Physicians and nurses, however, when given the same scenarios, are not as likely to report or respond in a manner meeting patient expectations, including the manner in which the error is disclosed (Espin, Levinson et al., 2006). In actual situations, this mismatch of expectations may represent disappointment or alienation for the patient who perceives the hospital as accountable. Stetler, Morsi, and Burns (2000) used a novel approach to examine both positive and negative patient outcomes in a study of the physical and emotional safety of both patients and nurses. Patient findings were compared with nurse interview themes describing nursing activities that either prevented or allowed an adverse event to occur. Positive outcomes included instances within which a nurse caught a failure or mitigated its harm. Patient findings included a reported 318 negative outcomes and 873 positive outcomes based upon 1,000 patient days of hospitalization. Of the negative, 76% were considered “high severity events.” Nurses identified factors that enhanced positive outcomes including knowledge and skills (28%), familiarity with the patient and family (24%), and time to accomplish a task (18%). The two factors most identified by nurses as contributors to negative outcomes included (a) lack of time (32%) and (b) poor communication among nurses and physicians (27%) (Stetler et al., 2000).

Young, Minnick, and Marcantonio (1996) found substantial differences in the responses of nurses, hospitalized patients, and managers on a survey of quality of care values. These researchers presented this outcome as significant because knowledge of patient perspectives is required for the provision of patient-centered care. Improved

patient care, organizational learning, and culture change result from narrowing such gaps (Young et al., 1996). Other researchers compared the means of several safety related variables using RN and administrative data drawn from 117 hospital units that included post-discharge data from 2,051 patients (Minnick et al., 1997). As the patient profile, measured by the number of diagnoses and health problems, became more complex, so did his or her need for patient education, pain management and physical care. In turn, comparisons with nursing data indicated that higher profile patient needs went increasingly unmet. The authors concluded that their hospitals' care models and designs did not provide adequate resources for the needs of complex patients (Minnick et al., 1997).

Conclusion

A significant body of patient safety research has examined measurable provider practices surrounding outcomes such as event reporting (Kellogg & Havens, 2003). Few researchers have looked for evidence of relationships between the perceptions or actions of care providers and patient outcomes such as perceptions of care experiences. A study has been introduced that will examine two of the forces that contribute to patient outcomes: the characteristics, perceptions and responses of both care providers and patients. In order to understand these forces within their context, external factors, hospital factors, and unit factors will be explained and discussed.

CHAPTER 2

LITERATURE RELATED TO HOSPITALIZED PATIENTS AND CARE PROVIDERS

Overview of Relevant Research

Existing literature related to hospital patient safety often cites the landmark IOM (2000) publication *To Err is Human: Building a Safer Health Care System* as the beginning of the patient-safety movement. In reality, the report was a push for recognition of a longstanding healthcare and, more specifically, hospital problem. Members of the IOM, frustrated by public apathy toward previous reports, sought attention though statements such as "the goal of this report is to break this cycle of inaction. The status quo is not acceptable and cannot be tolerated any longer" (IOM, 2000, p. 3). Although one of the two studies used to determine mortality rates within the United States was published 15 years earlier, the data were presented in a manner that indeed caught renewed attention of the public, media, and regulators. The IOM report, along with several subsequent publications and the work of other organizations within the United States and across the globe, generated considerable pressure from regulators and the public to improve safety for hospitalized patients (Altman et al., 2004; Reinertsen & Clancy, 2006; Wachter & Shojania, 2004).

This chapter focuses on the empirical literature addressing care provider and patient perceptions as they relate to hospital cultures of safety, quality of care, care experiences and outcomes, as well as underlying theory. The findings will lead to a clearer understanding of the relationships between the perceptions of these two study populations.

Theoretical Framework

Of interest in this review of theory and literature are if and how the healthcare system, hospital structure, or the safety milieu of the care unit contribute to care provider and patient perceptions of the experiences of care and safety culture. Concepts of safety culture are grounded in systems theory and are drawn from human factors (Reason, 2000; Vincent et al., 1998) and normal accident theories (Perrow, 1999). Social cognitive theory is examined to provide an understanding of the phenomenon of perceptions (Bandura, 1989). An illustration of how these theories are associated with the respective groups under study is provided in Figure 2-1. Following the theory section, there will be a discussion of the related research literature based on the conceptual model from chapter 1. This conceptual model will then be revised to include the findings from this chapter.

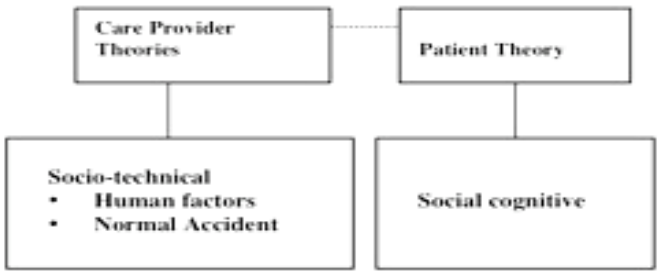

Figure 2-1. Theories and populations under study

Sociotechnical Theory

Complex systems have several important, innate qualities that must be considered before approaches to any patient quality, outcome, or safety culture problem can be proposed and tested (Perrow, 1999; M. B. Thomas & Houston, 2005). First, failures on the hospital unit are assumed to be complex and multicausal, requiring equally complex theoretical and conceptual models to understand how hospital care is taught, practiced,

and regulated (Leape & Berwick, 2005; Perrow, 1999). Second, failures and certain poor patient outcomes may be inevitable and sometimes unavoidable; consequently solutions aimed at “mistake proofing” systems and personnel are not only premature, but also impossible to achieve (Reason, 2002). Finally, in the majority of serious patient-care catastrophes studied, the causes or contributors are typically found to be an interplay between human and technological factors (Dekker, 2005; Perrow, 1999).

The first group of concepts examined in the current study can be categorized under sociotechnical theory. The term *sociotechnical* is described by Dekker (2005) as depicting the natural confluence of human and machine. Traditional quality management theory contends that the causes of failures and other problems can be categorized as either human or mechanical. Dekker posited that the differences are artificial; machines and technology are human made and human-operated, and all negative outcomes are human in origin. Therefore, an assumption of this current study is that safety culture and patient perceptions of experiences of care are the result of complex interactions among care providers, their environment, and their patients.

Human Factors Theory

In healthcare, the history of responses to errors, failures, and other negative outcomes was often to “name, blame, and retrain” the individual responsible (Reason, 2000). Searching for root causes and contributing organizational factors was uncommon within the industry (Barach, 2003). As a result, similar events recurred in similar situations within similar hospitals and often with the same deadly outcomes (Amalberti et al., 2005). The IOM has stated in various reports that the safety culture of the organization contributes to both positive and negative patient outcomes (IOM, 2000,

2001, 2004). Therefore, an examination of patient and care provider outcomes should include measurement of the organization's safety culture. Many aspects of safety culture are best understood by examining human factors theory.

The theoretical constructs of human factors were developed inductively by examining the system failures that contributed to accidents within the industries of aviation, nuclear power, oil exploration, and rail transport (Helmreich, 2000; Reason, 2000; Vincent et al., 1998). Studying a phenomenon such as failure exemplifies practice theory, which is useful for producing a positive activity or affecting an outcome (Walker & Avant, 2005). Practice theories may be attractive for systems or operations in need of improvement or change. An example of how human factors have changed hospital practice is the current trend toward understanding poor outcomes as an organized, rather than a random process. (Carthey et al., 2001; Hoff et al., 2004; Leonard et al., 2004).

The assumptions of human factors theory are focused on human and organizational factors, as well as the interaction between individuals, the organization, and the workplace (Vincent et al., 1998). The basic assumption is that humans are, by definition, imperfect and therefore susceptible to failures and other influences that affect patient outcomes (Reason, 2000). These outcomes can be measured as negative patient experiences, medication errors, medical errors, and patient mix-ups (Reason, 2005). The practitioner who actually commits an error is referred to by Reason (2000) as the "active failure" or being at the "sharp end." In discussion related to causes, he referred to "unsafe acts on the part of those in direct contact with the system " (Reason, 2004, p. 29). Within healthcare this is usually in reference to the provider caring for the patient (Reason, 2000).

The Reason (2004) Swiss cheese model of error causation illustrates how systems contribute to human fallibility and susceptibility to failure. Explained as a cross sectional slice of cheese, the model depicts the possible paths of an error. The Swiss cheese "holes" represent gaps in defenses - the active failures and latent conditions. Individual, organizational, and situational factors comprise these failures and conditions. As a potential failure moves through the holes in the Swiss cheese model, natural barriers usually block its passage. The Swiss cheese holes can behave dynamically, however, and depending upon latent conditions, move to allow the failure to pass unimpeded, resulting in an accident or patient harm (Reason, 2004).

A concept related to Swiss cheese theory that describes how an organization behaves and reacts to safety threats is known as the vulnerable system syndrome (VSS) (Reason et al., 2001). VSS is conceptualized as the organization, the individual, and the workplace interacting dynamically in ways that erode care quality and safety culture. The syndrome is comprised of three interactive elements—blaming the individual, denial of systemic problems, and pursuing a type of excellence not grounded in safety goals. One example of pursuing the wrong type of excellence is prioritizing profits over safety by understaffing nursing units as a way to limit hospital expenditures, despite evidence that adequate nurse staffing is associated with fewer medication errors and other desirable outcomes (Blegen, Goode, & Reed, 1998). Although present to some degree in all organizations, higher levels of VSS are associated with greater vulnerability to adverse events (Reason et al., 2001). The space can be viewed as an inclusive, dynamic, meta-organizational environment. Medical institutions that pursue profits over patient safety, for instance, move the organization toward the vulnerable (i.e. unhealthy) end of the

space. Organizations that demonstrate resilience to errors and failure have strong safety cultures. Simply put, organizational development and support for climates of safety determine safety health and the status of the organization within the safety space (Carthey et al., 2001).

What distinguishes human factors and VSS from other safety theories and concepts is the systematic approach that human factors takes in understanding failures, outcomes, and safety culture within organizations. However, human factors provides only partial understanding of error and safety on a patient care unit. For all of the latent and active failures that exist within a system, outcomes continue to be attributed to circumstance. The safest organizations with the best safety cultures can experience catastrophic failure while vulnerable organizations often come through near misses unscathed (Reason, 2000). Human factors theory was not developed for health care; hence, it is inadequate as a sole theoretical basis for the design and testing of measurement instruments for hospitals. Another shortcoming is that the theory does not address how organizations are held accountable for outcomes. Normal accident theory [NAT] (Perrow, 1999) will be applied in the current study to address these shortcomings.

The concepts and subconcepts from the human factors and VSS theories that are represented in the safety culture variables used the current study are (a) that active and latent workplace factors contribute to safety failures with active tending to apply more to frontline workers and latent with the organization; and (b) understanding how safety systems fail entails examining systematic causes and conditions. The subscales of the tools that will measure study variables relate to (a) overall perceptions of safety, (b) the frequency of reported events, (c) supervisor/manager expectations/actions promoting

safety, (d) organizational learning, (e) teamwork within units, (f) communication openness, (g) feedback and communication regarding error, (h) a nonpunitive response to error, (i) staffing, (j) management support for safety, (k) teamwork across units, and (l) "handoffs" and other transitions (Sorra, Nieva, Famolaro, & Dyner, 2007).

Normal Accident Theory

Theories that provide perspective to understanding complex systems and structures are essential to studying healthcare systems failures that lead to negative patient outcomes. Several authors have cited NAT in recent years to explain the complex interaction and risk experienced by patients on hospital units (Battles, Dixon, Borotkanics, Rabin-Fastmen, & Kaplan, 2006; Ramanujam & Rousseau, 2006; Tamuz & Thomas, 2006). NAT originated within the field of sociology and in the study of complex organizations (Perrow, 1999). The theory views trivial failures as serious when two or more small problems begin to accumulate and interact in unexpected ways, overcoming backup systems and eventually causing massive failure (Tamuz & Harrison, 2006). One of the assumptions of NAT is that nothing made by man is perfect and that failures in any system are normal events. Human factors plays a significant role in poor outcomes, but so do economic and organizational factors such as throughput, profit, efficiency, and cost cutting (Dekker, 2005; Perrow, 1999).

NAT contains three related concepts. *Coupling* refers to the level of dependency within and between the processes or procedures of a system. The more sequenced and scheduled the process, the more tightly coupled it is (Tamuz & Harrison, 2006). A process such as cardiac surgery is both strictly timed and resource dependent and therefore tightly coupled. Loose coupling, as the name implies, is a more flexible state as

resources fluctuate responding to environmental and other condition changes (Spear & Schmidhofer, 2005). An example of loose coupling in hospitals is the care provided to patients within an emergency department where resources are designed to quickly shift back and forth to areas of the greatest need. Another related NAT concept is complex interaction, which is useful for examining the structures and processes that allow quality problems and failures to occur within hospitals. During the complex interaction that is typical of many healthcare operations, an untoward event within a cluster of indirectly linked, asynchronous, and hidden processes may cause an untoward and unpredictable catastrophic event to occur elsewhere in the system (Hoff et al., 2004; Tamuz & Harrison, 2006). Any source may cause catastrophe at any time or place within a complex process (Perrow, 1999).

The operational definitions of NAT suggest that a positive relationship exists between the complexity of an interaction and the severity of the subsequent negative outcome. An example of a complex interaction is the problem-prone, multistep process of prescribing, transcribing, procuring, and administering patient medications within the hospital environment (Allard, Carthey, Cope, Pitt, & Woodward, 2002; Tamuz & Harrison, 2006). For example, there are several sources for statistics on medication errors, but most agree that hospital errors occur in unacceptable numbers such as 6.5 per hospital admission (Leape, Berwick, & Bates, 2002) and up to 20% of all medications administered by nurses (Barker, Flynn, Pepper, Bates, & Mikeal, 2002). Several functions common to medication administration contain elements with the potential for failure. These include changing patient conditions and locations, multiple types of programmable medication administration devices, inadequate medication dispensing

systems, potent medications with wide dosage ranges, inconsistent pharmacist oversight of all patient medications, shifting nurse and pharmacist workloads, and staff inexperience (Gladstone, 1995; Keohane & Bates, 2008).

Another NAT concept is that pursuit of organizational profit and power pursuits often overrides safety concerns, seriously eroding safety culture. According to Perrow (1999), organizations "impose…risks on the many for the benefit of the few" (p. 306). Within a profit driven organization, an implicit economic advantage exists for the organization to blame error on individuals. A trend in U.S. hospital care since the 1990s is the increasing external market pressures from economic scarcity that have resulted in marketplace competition and cost cutting to improve financial outcomes at the expense of safety (Reason et al., 2001). These include production quotas, throughput pressures, and downsizing to conserve funds—all to improve profit margins at the expense of safety culture and patient quality outcomes (Perrow, 1999; Tamuz & Harrison, 2006).

According to Perrow (1999), the more profit driven the organization, the more likely it is that safety will be in competition with other organizational objectives. Economic and power factors encourage organizations to prioritize profit and power over safety and discourage organizations from taking protective, often expensive actions to reduce failures therefore eroding or preventing a positive safety culture. In hospitals, staffing, nurse to patient ratios, and nurse hours devoted to patient care can be manipulated to produce safer patient outcomes (Kane, Shamliyan, Mueller, Duval, & Wilt, 2007). Although the conditions and nuances of nurse staffing in hospitals are complex, RN staff represent a high variable cost that is not directly reimbursable from third party payers (Zerwekh & Claborn, 2006). Therefore, a commonly held assumption

in business management is that organizations can limit variable costs to reduce expenditures (Cleary, 2003; Ramanujam & Rousseau, 2006). Hospital units with higher patient to nurse ratios, or fewer RN staff to care for patients, are thought to have higher rates of negative outcomes such as patient falls, decubitus ulcers, medication errors and/or lower perceived quality of care (Aiken et al., 2002; Kane et al., 2007; Rogers et al., 2004).

To summarize, there are aspects of NAT that are useful for understanding the patient's milieu on the hospital unit. This theory is illustrative of how safety culture and quality outcomes can be put at risk by organizational and external forces and includes (a) failures are normal and inevitable, (b) errors, failures, and poor outcomes occur within a dynamic environment of complex interaction and processes with multifactorial influences, (c) organizations may make unsafe decisions for financial and other reasons and (d) organizations may blame failure on those at the level where the problem occurred (Perrow, 1999). The safety culture subscales from the tools used to measure the variables in this study address (a) the level of supervisor and manager expectations and actions that promote patient safety, (b) the extent to which organizational learning and continuous quality improvement are promoted, (c) the nonpunitive management response to error, (d) the perception of staffing adequacy, and (e) the degree to which hospital management supports patient safety.

Social Cognitive Theory

Psychological theory contains operational definitions of individual and organizational learning, motivation, and performance (Bandura, 1989; Wood & Bandura, 1989). Specifically, social cognitive theory contains several elements that are useful for

understanding of how individuals react, learn, and respond within their environments (Wood & Bandura, 1989). This theory describes a dynamic process within which learned and personal attributes interact with behavior and environment to produce psychosocial functioning. Learning is accomplished by both trial and error and modeling. Each learner receives information and subsequently restructures that information through their personal-behavioral-environmental processes, transforming and integrating it into what is learned and known. Social cognitive theorists believe that the ability to perform complex tasks is based less on aptitude and skill and more on personal belief in terms of what can accomplished with encouragement and support (Wood & Bandura, 1989). This is known as the concept of self-efficacy, which is also defined as a person's belief in their ability to accomplish difficult tasks and manage their environment. For people with high self-efficacy, setbacks are considered challenges to be mastered. Lack of self-efficacy generally equates to an avoidance of tasks that may lead to defeat or failure (Bandura, 1991).

Wood and Bandura (1989) posited that a sense of self-efficacy guides individuals to choose situations that meet their coping abilities. Hospitalized patients, however, frequently encounter situations that exceed their abilities, resulting in dependencies and the inability to act as their own independent agents. Patient characteristics promoting self-efficacy include the ability to learn new information related to self-care and manage illness and disease processes. These abilities prevent errors at home that result in returns to the hospital and problems with medication (Goldstein et al., 2005). A growing body of evidence has demonstrated a relationship between patient self-efficacy, care outcomes, and perceptions of care. A recent study concluded that the personal characteristics of

patients, as well as their satisfaction with care, influenced treatment compliance and other outcomes (Rapkin et al., 2008). In studies conducted within emergency department settings, patients perceived that their experience was inadequate for their health needs if there was insufficient interaction with nurses and doctors (Muntlin, Gunningberg, & Carlsson, 2006). Contrary to care provider beliefs, the patients related nurse and physician encouragement with effective treatment and satisfaction outcomes (Baldursdottir & Jonsdottir, 2002).

A third concept of social cognitive theory is goal setting, which allows the achievement of a sense of self-accomplishment and self-worth (Bandura, 1989). For the hospitalized patient, goal setting and achievement are essential for benchmarking progress toward optimal functioning and healing. Care providers measure the progress of hospitalized patients toward preset goals through pain scores, educational objectives, or symptom relief (Zerwekh & Claborn, 2006). In terms of social cognitive theory, purpose and direction are derived from understanding clear goals and the activities that achieve those goals (Wood & Bandura, 1989). This concept can be applied to hospitalized patients (Blatt, Christianson, Sutcliffe, & Rosenthal, 2006). Patients may have a role in preventing errors through certain activities; for instance, questioning physicians and nurses on their handwashing while hospitalized (Waterman et al., 2006). Other goal achieving activities for patients include their participation in learning and teaching activities (Minnick et al., 1997).

Assumptions from social cognitive theory that are useful for understanding patient experiences of care and quality outcomes in this study include (a) hospitalized patients are in a dynamic system that includes the individual, his or her behaviors, and the

environment; (b) patient self efficacy will influence self-care ability and is directly affected by care provider support including direct patient care, relief of symptoms, and education; and (c) how effectively patients achieve goals will be reflected in their perceptions of the care extended to them. The items from the tool (Goldstein et al., 2005) used in this study to measure patient perceptions of their care asked (1) how would you rate your communication with nurses? (2) How would you rate your communication with doctors? (3) How would you rate staff responsiveness while you were in the hospital? (4) Were you told about your medications when you left the hospital?

The following assumptions were derived from the theories and concepts under study and are summarized in Figure 2-2. These theories provide the basis for the measurement surveys. Therefore, for this study, patient experiences of care and quality and care provider safety culture are not independent of each other; there is an assumed relationship between the two.

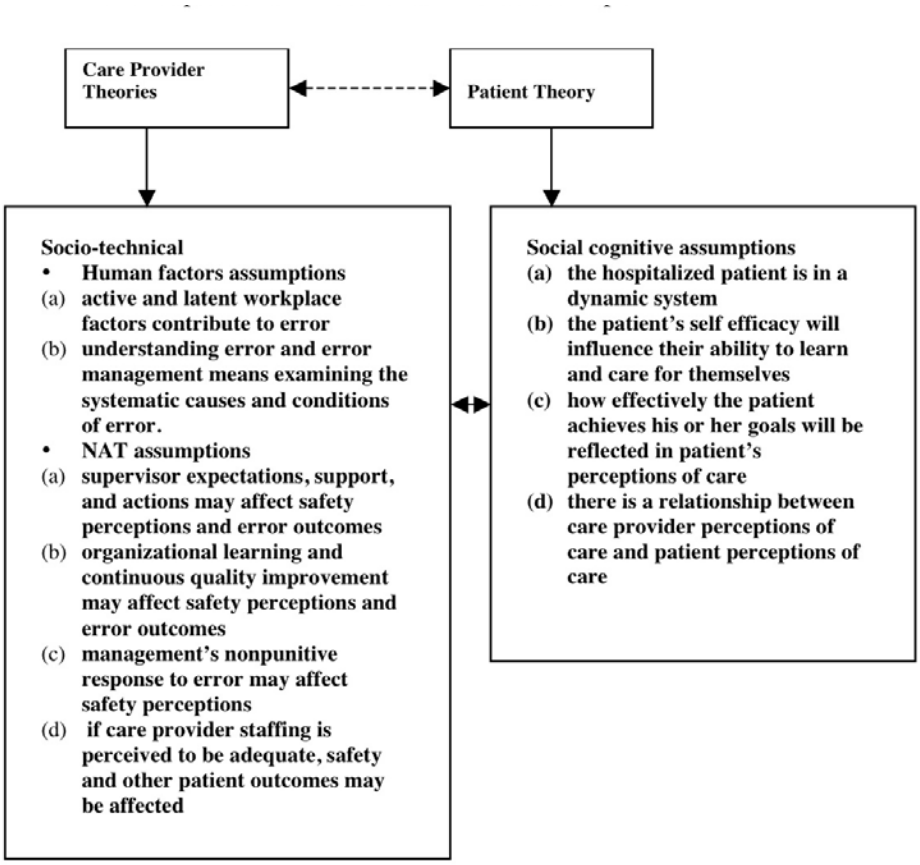

Figure 2-2. Theory-Based Assumptions Used in this Study

Database Search

A search of the databases known as Medline and Cumulative Index to Nursing and Allied Health Literature was conducted using the keywords *participation, medical error, adverse event, patient, staff, physician, nurse, safety culture, safety climate, patient-centered care,* and *patient outcomes.* The search covered 1995 through 2008 and yielded more than 400 papers that focused on care providers or patients, case studies, opinion pieces, or research studies. Few studies compared or tested correlations of perception data with any other variables. Nine met the criteria of the current study with variables measuring patient or care provider perceptions in settings with errors or error

related conditions or outcomes. Additional literature was found in searches through Google Scholar, PsychInfo, and Business Source Premier, which produced studies and theory papers on hospital management, hospital error theory, and organizational theory.

Complexity and Structure of the Healthcare System and Hospital Regulatory Bodies

The literature provides a diversity of opinions on how the complexity and structure of the healthcare system and regulatory bodies affect patient safety, safety culture, and experiences of care (Altman et al., 2004). Although a significantly high proportion of existing studies addressing hospital safety are devoted to error reporting, a few researchers have investigated how the complexity, structure, regulation, or oversight of the U.S. healthcare system relates to patient outcomes in acute care hospitals (Hoff et al., 2004; Kellogg & Havens, 2003). Although a complete investigation of the literature related to the complexity and structure of the healthcare system is beyond the scope of the current study, it is indisputable that these forces affect patients and care providers. Several studies illustrating their effects are described in this review.

Studies that measured safety management, attitudes, climate, or culture within hospitals have found evidence of what Reason referred to as “organizational pathologies” (Reason et al., 2001). Examples of these safety structures include (a) ineffective leadership (Thomas, Sexton, Neilands, Frankel, & Helmreich, 2005); (b) overemphasis on individual vigilance to prevent error (Tucker & Spear, 2006); and (c) fear of discipline from leadership for committing an error (Frankel, Leonard, & Denham, 2006). Rivard and colleagues (Rivard et al., 2006) believe that conditions promoting these structures fall into one of two categories: (a) insufficient commitment to institutional change or (b) lack of organizational learning compared with high reliability industries.

The largest regulatory body charged with protecting the hospitalized patient's safety is the Joint Commission for the Accreditation of Healthcare Organizations (JCAHO). A single study that examined JCAHO survey findings and standard U.S. hospital quality indicators of the (JCAHO) found no relationship between these two sets of statistics, indicating that an "excellent" score by this premier accreditation body does not correspond with any actual benchmarked quality statistics (Miller et al., 2005).

A body of evidence indicates that tolerance of variations in medical and nursing care provision between units and institutions adversely affects patient and care provider outcomes (Pronovost, Berenholtz et al., 2006; Tamuz & Harrison, 2006). The acceptance of this industry norm contrasts sharply with that of commercial aviation where practice variation has been virtually eliminated (Helmreich, 2000; Tamuz, Thomas, & Franchois, 2004). Long-term studies of aviation crashes demonstrated that over 70% involved human error. The introduction of industry-wide regulations and interventions to eradicate practice variation significantly diminished both the number of crashes and their human factor causes (Helmreich, 2000). Amalberti and colleagues (2005) argued that practice improvement will not manifest until the discretion of the individual practitioners is limited. This declaration may have some validity; however, it needs to be based on evidence. An example based on outcomes data is an intervention study set in 78 intensive care units within one U.S. state determined the effects of standardizing practice in central intravenous catheter line insertion and care techniques. Among several practice interventions, care providers also underwent training to improve teamwork and safety climate. Outcomes during a 2-year period demonstrated significant findings for several indicators including decreased catheter infections and associated patient morbidity and

mortality ($p < .005$); (Pronovost, Needham et al., 2006). No control group was used, and data for bloodstream infections were collected and calculated using national epidemiologic guidelines so the results could be compared to similar hospitals nationwide over the duration of the study. It is noteworthy that this study was strengthened by the use of more than one type of data and a 2-year measurement period. However, all of the interventions were performed concurrently and no specific action could be measured for any degree or significance of improvement. Although the program resulted in quality improvement for patients within the intensive care unit, the lack of rigor limits the contribution of the findings to the science of patient safety.

Theorists and opinion leaders have published extensively on organizational learning, but it has received minimal attention from field researchers (Carroll & Edmondson, 2002; Pronovost, Berenholtz et al., 2006; Senge, 1990). Evidence exists of a relationship between learning organizations, or organizations that promote ongoing education and feedback among their employees, and improvements in institutional error data involving infections, falls, or other indicators (Edmondson, 2004; Rivard et al., 2006). Researchers have speculated that many hospitals do not meet the criteria required of learning organizations (Pronovost, Holzmueller et al., 2006; Tamuz & Harrison, 2006; Tucker & Edmondson, 2003). The potential implication of this deficiency is that organizations will continue to devote attention and resources to nonsafety goals such as improving profits or community standing (Reason, 2004), rather than the learning and educational processes that lead to overall organizational improvement (Resar, 2006).

In summary, many tested and untested forces related to healthcare complexity and regulation may indirectly affect the milieu of hospitalized patients. A review of the

research, however, indicates that generalizations are possible. Complexity promotes practice variations associated with poor outcomes. For various reasons, hospitals engage in organizational practices that are known to be incongruent with positive safety culture and outcomes. Future studies that examine the influence and usefulness of current regulatory bodies and hospital practice may provide additional insight into the relationship between the healthcare system and patient outcomes.

Hospital Structure and Patient Outcomes

Within the conceptual framework pictured in Figure 1-1 is hospital organizational composition. Although hospital structure is beyond the scope of this study, it contributes to patient outcomes and patient experiences of care and will be briefly discussed (Baker et al., 2004; Thomas, Orav, & Brennan, 2000). Thomas and colleagues reviewed the medical records of 14,700 inpatients from 28 hospitals in two U.S. states during 1992. They sought criteria indicating that patients suffered specific, preventable negative outcomes. These researchers determined that for-profit hospitals were most closely associated with all types of adverse events studied. Teaching hospitals were deemed least likely to be associated with a preventable event. A third category—nonprofit hospitals—was associated with events from treatment delays and surgical procedures, but not as frequently as the for-profit institutions. Baker and colleagues (2004) conducted a study that necessitated a different hospital classification to reflect the single payer healthcare system of Canada. Their analyses found significant correlations between hospital structure and event outcomes. For the hospital categories, preventable adverse events were most likely to occur with patients in the teaching and community hospitals

compared with rural hospitals. These events resulted in preventable patient outcomes such as increased hospital stays.

Although existing literature is inconclusive with regard to the exact structures that affect patient outcomes within hospitals, particular conclusions were common to all studies. First, failures and quality problems are common in hospitals. Second, these problems may be sensitive to various organizational qualities and structure, and some have yet to be identified. Finally, there is evidence that payer type, teaching status, location, and hospital size affect patient outcomes and these outcomes are influenced by healthcare complexity, regulation, and hospital structure. Moreover, these external factors comprise a significant proportion of the framework introduced in this study. A discussion of research examining the hospital experiences of patients and care providers, their perceptions, and outcomes, will complete the framework.

Patient Characteristics and Care Provider Perceptions and Responses

Little is known about the association, if any, between patient and care provider perceptions. Researchers have sought to understand the experiences of patients and care providers as groups. Group perceptions have demonstrated specific traits in relationship to bias and human judgment (Pronin, 2007). Individuals will typically favor the group with which they are associated and will affiliate with the values of that group, regardless of any denial of bias in their preferences. Such bias in often perceived in others, but not personally recognized or acknowledged. As a result, self-perception may cloud the ability to perform the cognitive tasks of prediction, assessment, and estimation (Pronin, 2007). Therefore, measurements that rely upon self-perception or perceptions of a group, without other corroborating information, may contain significant bias (Burns & Grove,

2005). The studies reviewed all used triangulated data—the use of two or more sources to determine findings.

The manner in which a group processes feedback is another measure of group perceptions. Individual perceptions of feedback contribute to group perceptions, and both contribute to group and individual outcomes. Perceptions are influenced by the source, purpose, and clarity of feedback. These operations occur within, but not between, groups. Put simply, one group will have an individual process for its perceptions that is unrelated to other groups (London & Sessa, 2006).

Espin, Levinson, et al. (2006) applied grounded theory in a qualitative study investigating the differences between patient and care provider perceptions and expectations of hospital error. Physicians and nurses were given the opportunity to respond to hypothetical scenarios and report error according to their roles. The physician and nurse groups chose to use decision systems based upon personal and professional interest over patient needs or hospital policy and procedure. Participants of both study groups agreed on the definition of an error and incorporated error severity in related decision making. Patients, however, wanted physicians to respond quickly to error and to be advised of the error, regardless of whether harm resulted. Patients also expressed minimal tolerance for slow caregiver response to error disclosure, as well as a poor perception of staff who do not file error reports. Methodological limitations of the study included an operating room setting and sample, as well as the disadvantage of using simulated scenarios to prompt responses. Reactions to simulations may or may not run parallel to those following actual errors. Despite these shortcomings, this study advances the notion that patient expectations of their care vary from those of their care providers.

The findings also depart from traditional assumptions by concluding that care providers may act in accordance with their own professional interests, before that of their patients (Espin, Levinson et al., 2006).

Few researchers have examined relationships between the perceptions of related groups. These studies estimated whether the perceptions of one group affected those of another group. No between group relationships were found in studies with population samples of operating room personnel. Espin, Lingard, and colleagues found that physicians and nurses did not influence each other's problem solving (Espin, Lingard et al., 2006). McDonald and colleagues found that physicians and nurses did not influence their respective values or beliefs surrounding safety and safety culture (McDonald, Waring, Harrison, Walshe, & Boaden, 2005). While these findings are interesting and call for more study, there is insufficient evidence to conclude that any one group has commonly held perceptions that influence those of another group.

Patients rarely have the opportunity to formally report errors that involved them while hospitalized. The function of error reporting typically falls to care providers (E. J. Thomas & Petersen, 2003). In a unique study comparing errors reported by patients with traditional provider reported errors, most patient reported errors and quality outcomes were also not reported by their care providers (Weingart et al., 2005b). In a prospective cohort study of 228 hospital inpatients, 18% of those interviewed reported experiencing a significant quality problem or error during their hospitalization. Strengths of the study include the use of triangulated data collected in patient interviews during and after hospitalization, medical record review, and review of hospital error reports. The study design was limited by a lack of random selection, a small sample size, and a single study

site. However, the research provided valuable information on patient experiences using multiple time measurements and data sources.

Two studies using the same data set compared relationships among hospital staff nurses, nurse managers, and patients as well as a variety of variables including communication (e.g., RN-patient, and RN-RN), various types of decision-making skills, and team practice (Minnick et al., 1997; Young et al., 1996). Using the hospital unit as the unit of measure, the study found evidence that nurses and nurse managers had difficulty defining the perceived values of patients with regard to their quality of care, pain management, health education, and physical care. The researchers demonstrated that as patients' needs became more complex, resources including RN time decreased. Although an explanation was not offered, it may be inferred from the article that RN time is a relatively fixed commodity and that insufficient time is allotted for more complex patients or those with lower health status. The researchers interpreted their results as finding (a) an identifiable patient type predictive of patients likely to perceive unmet care needs, (b) a significant mismatch between RN, manager, and patient perceptions of care quality, and (c) unmet care needs for complex patients when the care system is inadequate. From the perspective of patients, "patient center care" is not a simple entity, but rather a set of domains based upon patient values (Minnick et al., 1997).

Edmondson (2004) also used the hospital unit as the unit of measure in a study exploring preventable medication errors. Schema theory was applied to posit that there is a perceptive error that leads to failure when a nurse sees what is expected to be seen such as a name or concentration on a medication label. Significant findings included medication error rates that were sensitive to differences in unit characteristics including

management involvement in unit operations. This finding varied unit by unit, suggesting that management is a factor in error mitigation and error and failure rates appear to be sensitive to differences in unit characteristics. One conclusion of the Edmondson study is that unit characteristics can be identified and manipulated to mitigate error-causing conditions (Edmondson, 2004).

A mixed method study based upon NAT and the concept of tight coupling examined conditions on the hospital unit by comparing observation with care provider perceptions (Tucker & Spear, 2006). The researchers reported a significant mismatch in the number of observed conditions, known as “operational failures,” and those perceived by nurses working on the same inpatient medical units. The nurses thought they had encountered failures that interfered with their ability to deliver care only half as often as noted by observers (Tucker & Spear, 2006). Although operational failure was defined for the nurses, those care professionals encountered such a high number of failures during their shifts, it was apparently difficult for them to identify the conditions as abnormal. The researchers concluded that a risky patient care environment could become so routine that conditions conducive to poor patient care quality and outcomes have become embedded in daily operations (Donabedian, 2003; Perrow, 1999).

Stetler and colleagues (2000) applied a prevention framework to examine the assumption that hospitalization presents an inherent risk of health complications and serves as a threat to patient safety. Correlating nurse memory of activities that successfully or unsuccessfully prevented adverse patient events with negative outcomes from patient data, the researchers noted 100 positive outcomes resulting from preventive activities including 12% reduced risk from medication error for 11 nurses delivering care

during 55,157 patient days. For the same time period, 33 negative outcomes related to a lack of preventive activities; 18% were associated with medication errors and 6% to10% with patient falls (Stetler et al., 2000). Similar to the Tucker and Spear (2006) study, nursing was identified as integral to care provider activities that promoted safe care.

A study exploring relationships between measures of care provider safety perceptions and patient outcomes tested the hypothesis that provider perceptions surrounding safety related to surgical patient morbidity and mortality (Davenport, Henderson, Mosca, Khuri, & Mentzer, 2007). Davenport and colleagues administered the Safety Attitudes Questionnaire (SAQ), an instrument commonly used to measure safety perceptions, to 5313 physicians, physicians in training, nurses, and other staff within 140 U.S. government hospitals. The researchers correlated the results with outcome data related to the surgical morbidity and mortality of 57,880 patients. Although the SAQ is considered sensitive to patient outcomes (Sexton & Thomas, 2003), this was the first large-scale test of the questionnaire with patient outcome data (Davenport et al., 2007). The findings indicated that none of the six subscales of the instrument that measure the components of safety climate demonstrated a significant relationship with any patient outcome. However, additional SAQ items that measured collaboration and communication showed that patients had lower risk-adjusted morbidity when their attending physicians and physicians in training reported higher than average scores on the questionnaire ($p < 0.10$). This implies some patient benefit from good communication among physicians. Limitations of the Davenport and colleagues study include the operating room setting and samples.

Gardner, Thomas-Hawkins, Fogg and Latham (2007) implemented several measures of culture and satisfaction, including a tool based upon the SAQ, within a sample of 151 dialysis nurses (J. K. Gardner, Thomas-Hawkins, Fogg, & Latham). Upon comparison with data collected from13,696 dialysis patients, the researchers found no significant relationship between the two study groups for perceptions of quality of care, patient satisfaction, or patient rehospitalization. Although this was a large, multisite study with triangulated data, the setting was a primarily outpatient area; consequently the outcomes may not be applicable to an inpatient hospital unit. Given the dearth of studies correlating both staff and patient perceptions with patient outcomes, however, this research provided insight into a complex issue.

Conclusion

Taken together, the results of the reviewed studies pertaining to the characteristics, perceptions, and responses of care providers and patients provide significant knowledge adding to the understanding of the hospital milieu, patient safety culture, and experiences of care. They provide evidence that care providers (i.e., specifically, physicians and nurses) do not represent a homogenous group, but rather, professionals within very different professions, thinking and acting similarly. How these groups function may, in turn, be associated with patient perceptions of care and other outcomes. If patients are examined as an additional group, their perceptions differ from those of their care provider. These perceptions are the basis for the research questions of the current study. Figure 2-3 illustrates the forces that influence error outcomes, while concurrently serving as the conceptual framework of the research. Hospital structure has

been added to the second ring of the model, and the inner circles contain the hospital unit with patient outcomes at the center of the forces.

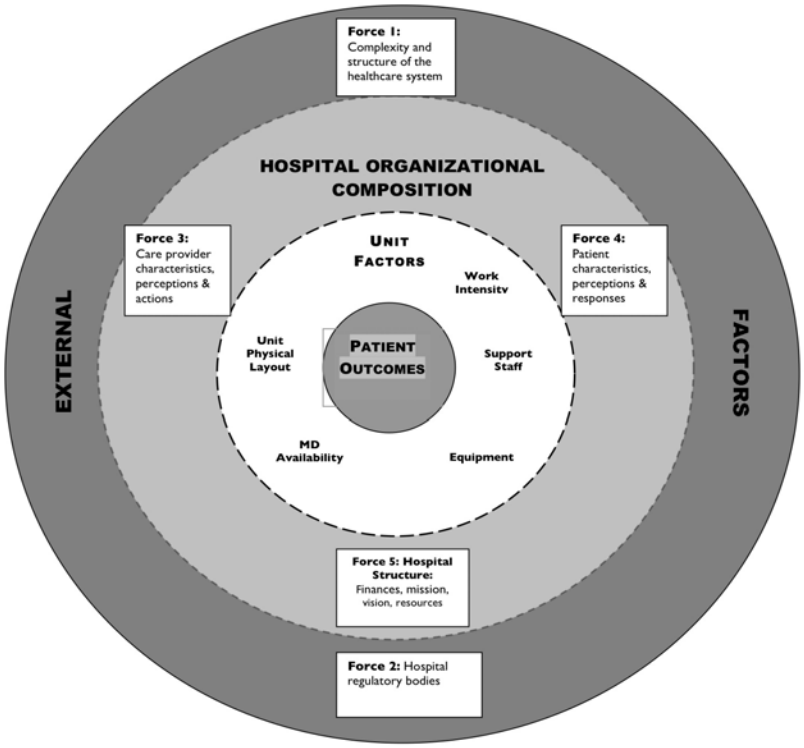

Figure 2-3. Revised Conceptual Framework with Force 5, Hospital Structure

The studies reviewed that addressed the external factors of hospital error found evidence of institutionalized practice variation, a mismatch between the regulatory agency and quality indicators, and tolerance of organizational pathologies. These findings are associated with poor safety culture and negative quality outcomes involving patients hospitalized within complex systems (Miller et al., 2005; Pronovost, Needham et al., 2006; Reason et al., 2001). The standard inpatient care model is designed for less acutely ill patients and does not meet the needs of patients requiring additional resources. When

applied to an acutely ill patient, it may negatively influence patient outcomes by overtaxing resources (Minnick et al., 1997; Stetler et al., 2000). Findings from the studies reviewed that relate to the effects of hospital structures, while inconsistent, demonstrate that aspects of structure are related to some patient findings (Edmondson, 2004). For example, hospital location and teaching status are two factors potentially associated with differences in adverse events or patient mortality rates (Baker et al., 2004; E. J. Thomas et al., 2000).

With regard to the relationship between patient outcomes and patient and care provider characteristics, perceptions, and actions, patients have reported significant problems with the processes related to their care (Minnick et al., 1997; Weingart et al., 2005b). The concepts of patient centered care and other patient values are poorly defined and understood by both patients and care providers (Young et al., 1996). Closer examination reveals that group behavior, especially between professions, influences quality and safety outcomes. A strong affiliation within professional groups appears to influence behavior associated with error reporting (Espin, Levinson et al., 2006), as do unit characteristics (Edmondson, 2004). There is evidence that, depending upon the circumstance, some care providers may act in the best interest of their group or organization, rather than that of the patient (Espin, Levinson et al., 2006). Other studies have indicated that nurses play a role in preventing some failures and other quality problems that affect patients (Stetler et al., 2000); however, if faced with too many problems and interruptions, they can become overwhelmed and lose their capacity to intercept the small failures that compound and lead to poor patient outcomes (Tucker & Spear, 2006).

Relationships of interest to the current study include the theoretical and empiric explanations of the safety perceptions held by care providers and patients on a hospital unit. Although studies have explored safety within hospitals, the concepts grounding hospital safety have had minimal organization, maturation, or development within the hospital environment (Amalberti et al., 2005; Resar, 2006). For example, researchers and theorists have assumed from concepts derived from within the aviation field that care provider safety behavior is uninfluenced by group affiliation (Helmreich, 1997, 2000; Sexton, Thomas, & Helmreich, 2000), and studies of specific healthcare groups, such as operating room teams, have demonstrated team behaviors similar to that observed within the aviation industry (Sexton et al., 2006). A closer inspection of these assumptions in other settings, however, has found that safety behavior of the care provider tends to be influenced by professional affiliation to the possible detriment of patient safety (Edmondson, 2004; Espin, Lingard et al., 2006). This is a phenomenon that does not manifest in aviation. Such behavior remains poorly understood, warranting further exploration. Whether it is also dependent upon the type of hospital setting requires additional examination.

To conclude, the research literature reviewed has demonstrated associations between perceptions and patient outcomes. Key safety theories and concepts, however, may or may not be evident in these studies. If present, they may not demonstrate in any systematic manner that their research questions apply to a conceptual model of the complex forces contributing to patient error. Gaps in the literature include a lack of information about how safety culture and care providers affect patient experiences and

other patient outcomes. There is ample justification for developing a study that captures the interaction of perceptions among patients, care providers, and the hospital unit.

CHAPTER 3

METHODOLOGY

Overview

In 19th century England, Nightingale (1863) observed that it was nearly impossible to perform accurate comparisons of hospital outcomes. She cited several reasons for this phenomenon, not the least of which were the methodological differences in statistical measurement between hospital facilities (Nightingale, 1863). The dearth of quality contemporary scientific research in this area of study demonstrates that a 19th century problem continues to plague examination into hospital patient safety outcomes as they relate to patients and care providers. Measuring the influence of care providers, hospitals, and patients on safety outcomes remains a challenge. Only recently have measures been introduced and commonly administered that are thought to be sensitive to these separate influential forces (Colla, Bracken, Kinney, & Weeks, 2005; Sofaer, Crofton, Goldstein, Hoy, & Crabb, 2005). Strategies for using instruments together to analyze the larger, complex factors that interact to influence patient outcomes have not been developed or tested.

The purpose of this chapter is to describe the methodology for studying the research question: What is the relationship between care providers' perceptions of safety culture and the patients' experiences of care on the hospital unit? If a relationship is found, what dimensions of patient experiences of care can we predict from care provider safety culture? It is expected that dimensions of the instruments administered to assess the patient experience and the staffs' perceptions of the safety culture will be related and that patient experiences will be predictable from the perspectives of the hospital unit's

safety culture held by care providers. It was hypothesized that higher, or more positive scores in the safety culture dimensions of the instrument administered will be positively correlated with higher, or more positive patient experience scores. This study was conceived to answer the questions of interest using data from a larger study. A description of the purpose and pertinent methodology of the larger project is provided, followed by a discussion of the specific instruments that the research implemented. The data analysis plan of the current research study is subsequently presented.

The larger study upon which the current research was based is known as the Triad for Optimal Patient Safety (TOPS) (Sehgal et al., in press). The TOPS project was conducted on three hospital medical units between February 2006 and May 2007. The current study's research question was not addressed in the original TOPS plan or protocols. The goal of the TOPS project was to improve the safety culture of the acute care hospital medical unit safety culture as well as patient outcomes, by enhancing collaboration among care providers and engaging patients to participate in their goals of care. The investigators provided three phased interventions to care providers and hospitalized patients over a 2-year period. The interventions were performed on hospital medical units within three northern California hospitals and were designed to improve teamwork, communication, interdisciplinary care coordination, and collaboration.

The first of the three phased interventions involved training for all participating staff on the unit to improve team collaboration and, ultimately, the safety culture. The second phase consisted of unit-based organization and training to reinforce the initial objectives. During the third phase, the team implemented the interventions designed to improve patient involvement with their own care and staff-patient communication.

Depending upon the unit of measure, data collection was conducted throughout the three phases.

Research Setting and Approval for Human Subjects

The study sites of the TOPS Project consisted of three participating hospitals that were members of a consortium of institutions involved in patient safety activities sponsored by the TOPS Project's funding organization. The TOPS project's primary investigators and funders first approached the project sites for permission to conduct the research. Once the administrators for each hospital agreed to participate, the hospital units were selected. Study criteria called for one medical unit within each hospital and physician staff who were hospitalists. Following enrollment, the project team developed and implemented protocols for obtaining and processing care provider and patient data.

Hospital A was a 540-bed tertiary care teaching hospital. The study unit had 36 beds and cared for general medical patients with an emphasis on geriatrics and palliative care. Hospital B was a 247-bed hospital operated by a health maintenance organization. The study unit was a 26-bed telemetry unit that cares for cardiac and general medical patients. Hospital C was a 411-bed community hospital awarded magnet status, a national recognition of nursing excellence. The study unit was a 26-bed unit caring for general medical and dialysis-dependent patients.

Permission to complete both the TOPS project and the current study was obtained from the University of California's Committee on Human Subjects Research (CHR). Additional approvals were obtained from the institutional review boards (IRBs) of the study sites. No benefit or remuneration of any kind was offered to participants and participation was strictly voluntary. Letters introduced the study to care providers and

explained the voluntary nature of participation. Participants were advised in writing that return of the completed survey indicated their consent to participate in the study. The participants were not identified by name and the completed instruments were held confidential according to the CHR and hospitals' IRB procedures.

Written consents to participate were obtained from patients using procedures outlined by the CHR and the IRBs. The patients were advised that they were free to withdraw at any time from the study. Patient privacy, confidentiality, and instrument security were maintained according to both CHR policy and individual IRB procedures. Additionally, the physicians and nurses caring for participating patients were advised of the patient arm of the study by letter prior to data collection. The TOPS project was a privately funded study. All permissions to access and use the data and findings from the larger TOPS project for the current study were received from the primary investigators, project codirectors, and the CHR (approval number H54283 27912-01).

All patient and care provider data were stored in a locked file cabinet inside a locked office within the University of California San Francisco, School of Nursing. All hard copies of instruments were marked "confidential" with contact information and instructions for return. Portable computers and other electronic devices were encrypted with passwords and other protections for confidentiality and privacy. Patient data were entered into a computerized database specially designed for the TOPS project.

Data collection

The TOPS project data collection plan was consisted of two separate sampling arms, one for care providers and one for patients. The patient plan called for the administration of a battery of survey tools, as well as chart abstraction and receipt of

administrative data from patient and hospital records. The care provider plan called for administration of surveys to staff working on the selected patient care units at two different time periods. Table 3-1 summarizes the data collection instruments used by the TOPS project. A discussion of the specific instruments that will contribute data for the proposed study will occur later in this chapter.

Table 3-1

TOPS Project Instrumentation

Instrument	Owner/Developer	Target population
Hospital Survey on Patient Safety Culture	Agency for Healthcare Quality and Research	Care providers and other staff on hospital units.
TOPS Patient interview tool: • Mini Mental State Exam (MMSE) • TOPS survey questions • Consumer Assessment of Health Providers and Systems (CAHPS) Hospital Survey	• MMSE: Holstein Folstein, and McHugh • TOPS project • Centers for Medicare and Medicaid, AHRQ, and other partners	All: TOPS Patients
• SF12v2	• QualityMetric Corporation	

Sample

Care providers. The care provider sample in the TOPS project was drawn from personnel on the study units of each study site and included licensed nurses, patient-care assistants, physicians and physicians in training, pharmacists and pharmacists in training, and licensed ancillary staff. Each care provider was invited to complete a survey, with the exception of those meeting exclusion criteria. Exclusion criteria included staff who worked on an “as needed” basis and staff not regularly assigned to the care area. No exclusions were made for gender, race, or ethnicity. For the TOPS project, care providers

at the three different sites were surveyed using a paper-and-pencil version of the Hospital Survey on Patient Safety Culture (HSOPSC) (Sorra & Nieva, 2004b).

The HSPOSC was administered twice, once in the spring of 2006 and again 12 months later. At the beginning of the first phase of the project—the initial measurement period—participating care providers completed a survey prior to a scheduled TOPS training class. Research assistants (RAs) and other study personnel distributed the HSOPSCs on clipboards to attendees of a team training class presented as part of the TOPS project. The clipboards contained a survey, a pencil, and a cover letter explaining the study. To assure confidentially, the survey did not include an area for participant name or other identifying information. The completed surveys were subsequently separated from their cover sheets and batched for data entry.

For the spring 2007 HSOPSC administration, a different procedure was used to survey the care provider staff. Because no TOPS training classes were held, RAs and project staff attended staff meetings and other venues asking care providers to complete the surveys. Copies of the survey were also placed in employee mailboxes with a letter requesting that each eligible care provider complete one survey. Envelopes were posted on the units to collect completed surveys and study personnel checked these envelopes daily. The surveys were anonymous; hence no additional confidentiality measures were taken. Participation in the second administration was open to all personnel, applying the same exclusion criteria described earlier. For both administrations, completion and return of the surveys was accepted as consent to participate. No further participation beyond completion and return of the instrument was requested or required. The TOPS sampling strategy resulted in a convenience sample of all staff who cared for patients on the

participating study units at the time of the two survey administrations. The total number of care provider participants was 850 subjects; 457 in the first survey administration and 393 at the second. As will be explained later in the paper, for the proposed study, only the time two sample will be used.

Patients. The data collection tool administered to patients participating in the TOPS project consisted of a battery of patient interview instruments. Some of the components of the battery are standardized instruments with published psychometrics and records of performance with groups of hospitalized patients (Lopez, Charter, Mostafavi, Nibut, & Smith, 2005; O'Malley et al., 2005). The data collection called for obtaining a sample drawn from patients hospitalized on each of the three units during the TOPS study. The time periods used in this study were two and three, July 1, 2006 to November 30, 2006 and December 1, 2006 to March 30, 2007. The rationale for this strategy was toward balanced sample sizes between the patient and care provider groups, thereby improving data quality. The strategy of obtaining samples from two adjacent time periods is known as consecutive sampling. Consecutive samples increase the validity of a study by enrolling all willing participants over a period of time, reducing the confounders of time, seasonality, and other erroneous fluctuations that may affect the findings (Hulley, 2001).

During data collection in the hospital, RAs visited one of the three assigned units on a rotating schedule to examine the daily census for potential study participants. Eligible adult patients (i.e., ages 18 years of age or older) were screened for inclusion and appropriate matches were approached for their consent to participate. Patient criteria included (a) admission to a medical service on a specific unit in the designated study site,

(b) not transferred from another hospital after a 72-hour stay, and (c) not transferred from another physician service. Exclusion criteria included: (a) patients who were non-English speakers or unable to speak, (b) transferred from another hospital or a surgical service, (c) previous participants in the study, or (d) assigned to the palliative care services. No exclusions were made for gender, race, or ethnicity. When RAs met with eligible patients at the bedside, they explained the study, thus beginning the consent process. Patients who agreed to participate completed the consent process and enrolled in the study. The RAs entered patients into a central tracking log to ensure against duplicate requests for participation. Patients who completed the hospital portion of the interview tool were then eligible for the telephone follow-up survey 2 to 4 weeks following their discharge.

Once the RA made initial patient contact at the bedside, consenting patients were screened for adequate cognitive functioning to complete the remainder of the interview using the Mini Mental State Exam (MMSE) (Folstein, Folstein, & McHugh, 1975). If patients scored over 17 on the MMSE, the RAs orally administered a survey containing questions related to the perceptions of the patients with regard to their hospitalization. When the follow-up telephone survey was completed, this concluded the interview portion of the patient data collection. The total time expected for patient completion the entire interview process was approximately 45 minutes. The goal of the TOPS project to enroll 690 patients was completed during March 2007. Final follow-up telephone calls were completed during April 2007. During the first quarter of the patient data collection period, the RAs completed the patient interviews on a paper-and-pencil form. A computer-based version of the instrument was subsequently used to facilitate data entry. To ensure consistency in data collection, the RAs interviewed hospitalized patients

following morning care and treatments. Interrater reliability between the RAs was assured by consistent orientation and training, written procedures for the patient interviews, supervised pilot interviews, and a comparison of interview tools performed by two raters simultaneously.

Data issues. Data collection issues for care providers included surveys returned with missing data and loss of potential participants prior to survey completion. For patient data collection, limitations included mortality and loss prior to follow up. Hospitalized medical patients may have found the anticipated 45 minutes of the initial patient interview too lengthy to tolerate, withdrawing from the study prior to completion. Successful strategies employed to mitigate these issues included approaching the patients at multiple times during their hospital stay, planning with nurses for the best times for individual patients, and avoiding times following painful or unpleasant procedures. It was not necessary to complete study interviews in one sitting; patients could request the RAs to return for completion at a later time.

Instrumentation

Hospital Survey on Patient Safety Culture. Several tools have been designed to measure the safety culture of hospitals (Colla et al., 2005). At the inception of the TOPS project, only two such tools—the SAQ and the HSOPSC—had published psychometrics (Colla et al., 2005). The HSOPSC was selected for the TOPS project because it is nonproprietary, simple to obtain, and data can be managed on site. This instrument was also chosen because it contains variables that reflect the concepts of human factors, NAT, and safety culture (Helmreich, 2000; Perrow, 1999; Reason, 1995). It includes empirical

indicators of the values, perceptions, and competencies of safety concepts and thus supports validity of the tool for both the TOPS and the current study (see appendix A)

The HSOPSC takes approximately 15 minutes to complete. Recommended methods for distributing surveys to hospital workers include mailings and staff meetings (Sorra & Nieva, 2004b). Computer programs are available that facilitate online completion of surveys; however the paper-and-pencil version has a greater reported response rate (62% versus 43%). Data are entered and scored using public-access software (AHRQ, 2008). Designers of the HSOPSC state that the instrument can be administered to all hospital personnel, selected units, or specific staffing categories.

Reliability. Sorra and Nieva (2004) applied the Cronbach's coefficient alpha to analyze internal consistency of the HSOPSC subscales. This analysis determined that these coefficient alphas ranged from .63 to .84. The factor of staffing, received a coefficient alpha of .63. Some authors state that, in most cases, reliabilities should not fall below .80, although others tolerate a coefficient α of .70 for a newer tool (Burns & Grove, 2005; Nunnally & Bernstein, 1994). Although the literature supports the concept of staffing and positive patient outcomes (Cox, Anderson, Teasley, Sexton, & Carroll, 2005; Rogers et al., 2004), the low reliability of the staffing subscale may be due to confusing or ambiguous phrasing within the items (Colton & Covert, 2007).

Validity. Initial methods used to develop the tool's content included a literature review of all published and unpublished safety culture tools within and outside of healthcare. Two healthcare-related tools were chosen to contribute items to the draft HSOPSC: the 120-item Veteran's Hospital Administration Patient Safety Questionnaire and the Medical Event Reporting System for Transfusion Medicine instrument. After

analyses of the tools and development of a new draft the researchers used focus groups of healthcare personnel to refine their instrument. To further develop the items, the researchers then used a type of cognitive testing, a process of listening to raters think aloud while reading and considering the items.

Additional testing of the revised HSOPSC, included assessment of its face validity, which analyzes whether the tool measures what it appears to measure: worker attitudes and perceptions surrounding safety (Powers & Knapp, 1995). Face validity is important for any tool measuring sensitive issues. Errors, patient injury, stress, and poor relationships can be emotional, even threatening issues for healthcare providers. To be an effective instrument, it was critical that the content of all HSOPSC items was within areas healthcare workers are willing to disclose (Burns & Grove, 2005). The developers assessed face validity, readability, and other tool qualities by administering a draft of the revised questionnaire to 1,437 healthcare workers. The sample of respondents was comprised mainly of females, average age 43, and employed in direct care positions in a variety of hospital settings. (Sorra & Nieva, 2004b). One problem with this pilot population, however, was the skewing of the sample toward a single age group, sex, and job role. This constitutes a threat to validity that may confound the applicability of the tool to other age groups, variant healthcare assignments, or male respondents (Burns & Grove, 2005).

Strategies intended to confirm construct validity of the revised HSOPSC included exploratory and confirmatory factor analysis as well as fit testing to verify that 12 dimensions were optimal for measuring safety culture (Sorra & Nieva, 2004b). Intercorrelations were also performed on the subscores for evidence of construct validity;

the scores ranged from .23 to .66. This test demonstrated that the subscales work together to measure the constructs of interest without duplication (Burns & Grove, 2005). Correlations between subscale scores indicate support for criterion validity. In initial testing scenarios, the respondents who reported the greatest number of events had the most open communication environments and received the most feedback on their error reporting (Nieva & Sorra, 2003).

Mini Mental State Exam. The initial step in the TOPS data collection plan for participating patients was to assure that all participants possessed a level of cognitive functioning that allowed them to comprehend the interview tools and provide information about their hospital experience. The MMSE has been cited in nearly 5,000 scholarly papers and is widely used for cognitive screening and other purposes (Pangman, Sloan, & Guse, 2000). It is brief, can be administered by a nonprofessional, has been validated for a wide variety of populations and settings, and consistent reliabilities have been published in the relevant literature (Folstein et al., 1975). This tool was chosen by the TOPS team for is ease of use, brief administration time, and simple scoring method. Until 1975, available cognitive testing tools required up to 30 minutes to administer (Folstein et al., 1975). For populations requiring cognitive screening, this length of time was excessive. The goal for the MMSE developers was to design a tool that could be administered within the attention span of cognitively impaired respondents (Folstein & Folstein, 2001). The MMSE is a simple 30-point test that is typically completed in less than 10 minutes. The instrument is administered orally and scored on a paper tool by the researcher, clinician, or assistant. The results can also be entered directly into a computer program (Pangman et al., 2000).

The MMSE contains 11 cognition tasks divided into two sections. Scores of the complete instrument can range from 0 to 30, and scores of 24 or greater have been attributed to individuals who are cognitively intact (Folstein et al., 1975). The tool has been validated with lower literacy populations and scores of 17 or greater in this population indicates no cognitive impairment if a patient has less than a ninth grade education (Folstein & Folstein, 2001). The MMSE has been widely used since the mid-1970s, and several published papers have discussed its psychometrics with various populations and settings (Folstein et al., 1975; Molloy, Alemayehu, & Roberts, 1991; Pangman et al., 2000; Tombaugh, 2004). Frequently used for elderly populations, the tool has been implemented with other groups such as brain-injured patients (Folstein et al., 1975) and psychiatric patients (Tombaugh, 2004). Licensure or advanced degrees are not required to administer the instrument (Lopez et al., 2005).

Reliability. Initial published studies have reported test-retest reliability of the MMSE with scores of .89 or above (Folstein et al., 1975). In a summary of nine such test-retest studies, all but two indicated consistent results ranging from *good* to *excellent* (Folstein & Folstein, 2001). Interrater reliability has been reported at .82 or greater (Folstein et al., 1975). Subsequent testing with different populations has demonstrated reliabilities between .69 and .78 (Molloy et al., 1991).

Validity. Folstein and Folstein first published the psychometrics of the MMSE during 1975. In the original literature, content validity of the MMSE was limited to a description of how the tool was composed from items already in use within several other cognitive testing instruments (Folstein et al., 1975). Initial tool validity was established by repeated testing with various patient groups. Repeated correlations of the MMSE with

populations of patients with the ability to recover from their conditions (e.g., head injuries and metabolic disruption) and those with no chance of cognitive improvement demonstrated that the instrument was sensitive to both cognitive impairment and improvement (Folstein et al., 1975). Published data has also demonstrated concurrent validity for the MMSE via the Wechsler Adult Intelligence Scale and other intelligence tests. Correlations of -0.88 have been made with the MMSE and the Blessed Dementia Rating Scale and similar findings with other comparable instruments have also been published (Tombaugh, 2004).

The MMSE screening tool consisted of 22 items and a passing score was 17 or greater. The psychomotor tests that included drawing with a writing instrument and picking an object up off of the floor were eliminated to accommodate patients with physical disabilities such as arthritis or those who are bedridden. This treatment is consistent with the recommendations of Pangman and colleagues (2000) who advised eliminating the physical tests for particular populations. Folstein and Folstein (2001) reported that their tool has been widely used in revised forms and tolerates removal of these sections and score adjustment without significantly diminishing its ability to screen for cognitive impairment.

Consumer Assessment of Healthcare Providers and Systems Hospital Survey. Prior to 2006, no standardized method existed for measuring the experiences of hospitalized patients with their care providers and care processes. Hospital polling of patient experiences was typically confined to environmental and service satisfaction and often included items that had little to do with safety or health outcomes (San Keller et al., 2005). The TOPS project measured such patient experience using the HCAHPS. This

survey was developed at the behest of the AHRQ and the Centers for Medicare and Medicaid Systems (CMS). It belongs to a family of similar tools developed for different healthcare settings and populations and released for general use during 2005 (Darby et al., 2005). The HCAHPS was selected for implementation in both the TOPS and current study because of its good published psychometrics, nonproprietary status, ease of administration, and focus on the concepts of interest (see appendix B).

Development of the HCAHPS was first authorized by the Centers for Medicare and Medicaid Services through the AHRQ during 2002. The goal was to quantify national standards of patient quality and safety. The IOM reported on a nationwide need for the provision of safer more patient-centered health care. Several areas were identified for improvement within the overall healthcare system (IOM, 2001). A change model was proposed for “reinventing the system” to address what the report referred to as “system defects” that included preventing hospital error, meeting patient needs, and improving overall reliability and safety (IOM, 2001). Concepts from this document that were transformed into empirical indicators of the HCAHPS include cooperation between and among clinicians, anticipation of patient needs, safety as a system priority, good communication demonstrated by the sharing of knowledge and free flowing of information, physical comfort and emotional support, and education and information (San Keller et al., 2005).

The HCAHPS was originally developed for three hospital services—medicine, surgery, and obstetrics (O'Malley et al., 2005). The instrument is comprised of 27 items, 22 related to care and 5 to demographics. The items are divided into six scaled performance subscales for measurement of care, two “other” categories for the patient’s

assessment of the hospital, and one dichotomous item regarding discharge (San Keller et al., 2005). More specifically, the subscales reflect (a) three nurse communication items, (b) three doctor communication items, (c) two responsiveness of staff items (d) two physical environment items, (e) two pain control items, (f) two communication about medicines items, and (g) three non-scaled discharge information items. Two final items ask for an overall hospital rating using a graphic 1-10 scale and if the patient would recommend the hospital (Goldstein et al., 2005; San Keller et al., 2005). See Table 3- for a comparison of the HCAHPS and the HSOPSC.

A variety of measurement scales are incorporated into the HCAHPS with 16 items serving as filter questions with “yes” or “no” responses. Only respondents who have had a specific experience will answer “yes” to a filter question and progress to the “focal question.” Fourteen items use a 4-point Likert-type response rating scale of 1 = *never*, 2 = *sometimes*, 3 = *usually*, and 4 = *always* (San Keller et al., 2005).

Reliability. Internal consistency reliability testing of the HCAHPS indicated hospital level structure subscores from Cronbach’s alphas of .51 for physical environment and discharge information to .88 for communications with doctors (O'Malley et al., 2005). Although the alpha scores for three subscales were below .70, which is considered “acceptable” for a new tool (Burns & Grove, 2005), the developers addressed this issue by stating that the mean correlations for all subscales are above .70 and therefore acceptable. The HCAHPS subscales all include two or three items and alpha reliabilities tend to be lower with scales containing this number of items. San Keller and colleagues (2005) concluded that ongoing data collection from hospitals using the tool will continue the process of tool refinement and improvement.

Validity. The HCAHPS development team used what Burns and Grove (2005) referred to as the three elements of content-related validity. These are contribution and corroboration from a comprehensive review of the literature including (a) existing surveys, (b) extensive focus groups with patients and other public input, and (c) input from hospital industry experts. This process facilitated development of the instrument from a set of concepts based upon the IOM domains that totaled sixty-six items. Through extensive testing and refinement with a sample of 19,720 patients from 130 hospitals within three states, the tool was eventually reduced to the final 27 items (Goldstein et al., 2005). Face validity was a key concern for the HCAHPS researchers. Because patients were expected to use the tool it was important that the instrument to appear to measure sensitive and private issues discreetly and anonymously. The tool is simple to use and requires minimal identifying information beyond age, race, education, and language (Goldstein et al., 2005). Cognitive testing was performed on the final versions of the tool with patients who had undergone recent surgery, medicine, or obstetrical hospitalizations. This testing method ensures the instrument items are comprehensible to these patient populations, and that the tool measures what it is intended to measure (Levine, Fowler, & Brown, 2005).

Existing literature was assessed for two types of criterion validity for the HCAHPS, concurrent and predictive. Concurrent validity, also known as convergent validity, describes the ability of an instrument to be correlated with another measure within the same time period (Burns & Grove, 2005). No evidence of concurrent validity was found for the HCAHPS. Regarding the sensitivity of the survey, researchers found a significant variability between units within the same hospital and between hospitals. This

is consistent with surveys that measure safety climate by unit-staff perceptions. One unexpected relationship found by the developers was that the obstetric patients scored their physicians and nurses similarly, perhaps perceiving minimal difference between their roles. Similarly, medical patients correlated physician and nurse experiences similarly with items relating to pain, treatment, and comfort, holding both professional groups equally accountable for these domains (O'Malley et al., 2005).

Data Entry. Data collected via administration of the HSOPSC to the care providers were entered into the TOPS study's HSOPSC database program. Independent reviewers compared all data entered into the AHRQ HSPOSC tables with the original completed survey forms and checked the data for errors. Scales for the reverse-worded questions were recoded to reflect a positively worded question to allow for accurate data evaluation. The subscales were then calculated to produce the variables used for analysis (Burns & Grove, 2005). A codebook was developed in the database for all patient data, identifying each variable, item, and all possible answers. Following development of the codebook, data were directly entered into the database of he larger study by the RAs. The patient data were entered and checked for accuracy on an ongoing basis. As the patient data were examined during processing at later dates, outlying values and variables with nonsensical values were checked and corrected. Values that could not be corrected were entered as missing data.

Research Design

The current study uses a descriptive, cross-sectional, correlational design to explore the research question: What is the relationship between care providers' perceptions of safety culture and the patients' experiences of care on the hospital unit?

The research design in this study allows for comparison of the care providers' perceptions safety culture with perceptions of patient care experiences on the three participating hospital units. Cross-sectional studies are designed for single measurements with no repeated measures (Hulley, 2001). This type of design is well suited for study of a little known phenomenon such as safety and error perceptions. This study design should provide prevalence data about error perceptions, that is the number of people in a sample with certain findings at a given point in time. Although cross-sectional studies cannot rigorously test for causality, they do give information about relational links, or what factors may predict or be associated with other outcomes (Hulley, 2001). For the purpose of exploratory research, this study design is appropriate.

Sample

The study is a secondary analysis of data collected in the TOPS project via administration of the HSOPSC and the HCAHPS. The population sample included care providers and patients within three hospital units. Care provider data will be drawn from a second administration of the surveys during the spring of 2007. This dataset was selected for two reasons. First, it reflects the time period closest to the patient data collection time period and the most accurate comparisons in time. Second, the larger TOPS study contained pre and post intervention data; this study used post intervention data. The total number of care providers measured during the second administration of the survey during the TOPS project was 393. This study's sample will be further narrowed to the two groups of interest—nurses including assistants and physicians including physicians in training. These study groups were chosen because their roles involved direct patient care and were the most consistent across the three sites. The total

number of participants within the nurse and physician study groups is projected to be 287. Hospital A contributed 170 care providers, Hospital B number 52, and 65 participated from Hospital C.

Although the larger TOPS study enrolled 690 patients, some of these were enrolled for the hospital interviews and subsequently unavailable to complete the post discharge section of the HCAHPS. Therefore, the potential size of the sample for this study was 392. Reasons for this potential sample loss included patient death, discharge to intermediate care, changed health status, change of address, loss of interest in the study, homelessness, or a move out of the community. Other than RA attempts to contact the patients by phone, no other methods were used to locate the patients. The RAs enrolled and completed data collection for 165 patients from Hospital A, 59 patients from Hospital B, and 168 from Hospital C. The study data is from the second and third periods, July 1, 2006-March 31, 2007 because at these time periods data were being collected from all three sites and likely provided a more representative sample of the hospitals' patient populations. This narrowed the sample to a total of 216 participants. Table 3-2 contains a summary and comparison of the participants in the two samples.

Table 3-2

Participants and Time Periods Sampled

Hospital	Care Providers February 2007-March 30 2007	Patients July 2006-March 2007
A	170	84
B	52	44
C	65	88
TOTAL	287	216

Data Analyses

As noted earlier, the research question asks “What is the relationship between care providers’ perceptions of safety culture and the patients’ experiences of care on the hospital unit?” a special regression model will be used to test for relationships. Aggregated staff provider subscale means will represent hospital safety culture as the independent predictor variables. Six means representing patient experiences of care will serve as the dependent outcome variables. Both the care provider and patient data will be imported into the Statistical Package for the Social Science version 15 (SPSSv15) for the initial analyses. Certain statistical tests in this section will be performed with SPSS version 15. These include descriptive statistics, analyses of variance and factor analysis on the care provider data, and reliability calculations on all subscales. Because the type of regression analysis planned for this study cannot be conducted on non-integer data using SPSS version 15, a different statistical program is required. Stata version 10 has been chosen for performing the analyses in this study because it is able to use the selected model when the data are non-integer. The nature and types of data, however, present issues that must be resolved before the regression calculations can be performed. The data issues and the strategies for overcoming these issues will be explained in the following sections.

Hierarchical Data. Data with specific ranked relationships with other data within a structure are classified as hierarchal data (O'Connell & McCoach, 2004). For this study, the patients and care providers have a relationship with their own groups within their respective hospital units. These grouped, or *clustered* relationships allow for the creation of two levels of data linked by their respective hospitals (Flynn & Peters, 2004).

Differentiated data necessitate the use of a multilevel model for the regression analyses in the form of a generalized estimating equation, which is a population-averaged negative binomial regression model with adjusted standard errors (SEs). The negative binomial multilevel model with adjusted standard errors was selected for this study after testing several multilevel models.

Negative binomial and the related Poisson regression models are often used for count data (W. Gardner, Mulvey, & Shaw, 1995). In this study, the data "behave" similarly to count variables, meaning that the distributions are highly skewed and strongly overdispersed. Preliminary analysis of the patient data demonstrated extreme overdispersion. Overdispersion is defined as when the variance of the distribution is greater than mean (Hutchinson & Holtman, 2005). Although regression models such as Poisson regression are frequently used to analyze count data, it is not appropriate when the data are overdispersed. The negative binomial regression model allows for overdispersion (W. Gardner et al., 1995). Other advantages of this model are that it corrects for data non-independence and provides a way to link the patient and care provider scores (Hox, 2002). Figure 3-1 illustrates the issues and solutions that addressed the hierarchical data and non-normality.

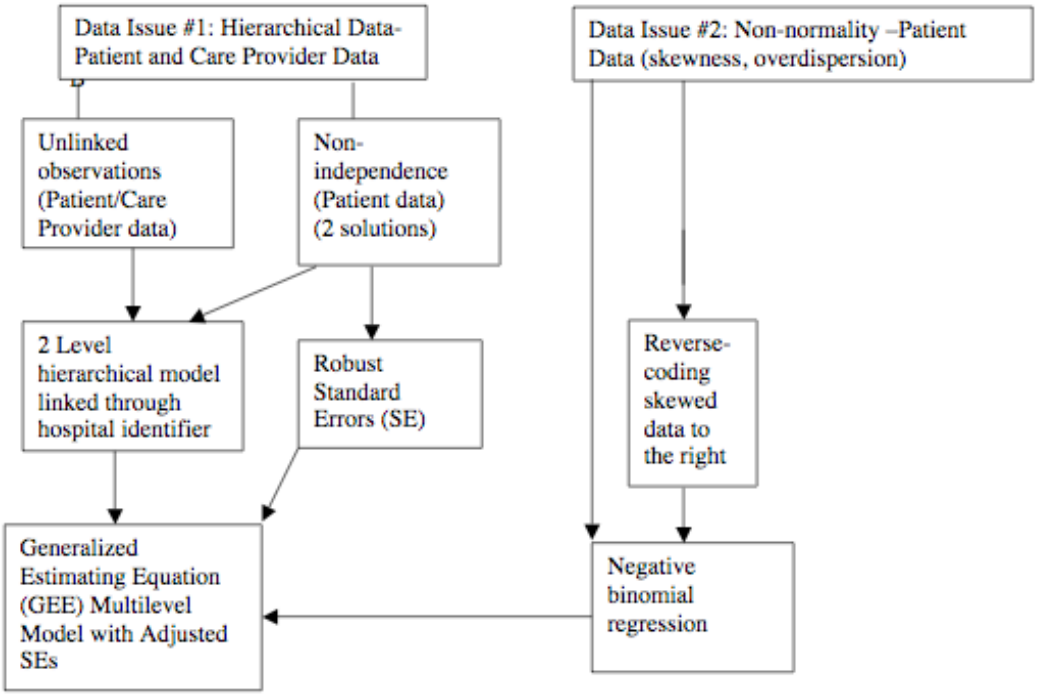

Figure 3-1. Issues and solutions that led to selecting the model

The literature review for the study proposal presented research that supported the notion of a relationship between care provider safety perceptions and related patient experiences. No standardized tool exists, however, for examining these two populations as a cohort. Different tools captured the primary data on the perceptions of staff providers and patients at different times, therefore the observations between the patients and care provider staff were not linked except by the hospital unit. To perform regression analyses and determine if relationships exist between the variables in the proposed study, a way to link the observations is necessary (Glantz & Slinker, 2001). This problem will be managed by linking the two levels of data in the hierarchical model using a hospital identifier.

To enable use of the care provider data as independent predictor variables, the subscales' means for the three hospitals will be aggregated into one set of HSOPSC

subscales, resulting in 12 predictor variables representing the dimensions of the care provider safety culture. The 12 new variables will reflect the group means by hospital while still retaining their original 1 through 5 scale. This will enable their use in the regression model with the dependent outcome variables to examine for possible associations and the extent of those associations. In the two-level model, the dependent predictor variables representing care providers will be considered second level and available to link with the patient variables at Level 1 with the hospital unit as the link. Following aggregation, the data will be exported into the Stata statistical computer software program for further analysis.

Each of the 12 care provider predictor variables will be entered into the model and regressed individually against each patient outcome variable. Therefore, a total of 72 regression analyses will be performed. This regression approach will be used to estimate the presence and degree of significant association for the six different patient subscales. Each of the six patient outcome (dependent) variables will have results for the 12 care provider predictor (independent) variables.

Power. A power analysis will be run for the proposed study using the sample sizes of 287 care providers and 216 patients. Nunnally and Bernstein (1994) recommended a minimum of 10 subjects for each variable of interest. Using that formula, the minimum sample size is 60 patients and 120 providers. Consequently, the planned sample sizes are expected to be adequate for this study.

A number of important limitations need to be noted regarding these data and methods. Table 3-3 contains the limitations and how they will be addressed.

Table 3-3

Addressing the Study's Data Problems

Data Problem	Description of Problem	Dataset Affected	How addressed
Extreme left skewness	Non-normal, asymmetrical distribution	Patient data	Use of a negative binomial regression model. Used for data conditions where ordinary linear regression is not appropriate. Asymmetrical data presentations require methods of analysis that take non-normality into account. Negative binomial regression is only for data distributions that are right-skewed (W. Gardner et al., 1995). This study's patient data are similar but left skewed. Before analysis the data will be reverse coded to mirror the skewing to appear on the right (Munro, 2005).
Dataset has cluster structure	Intra-hospital unit correlations embedded in the data. Results in inaccurate, underestimated standard errors	Patient data	Robust standard errors address the clustered data problem in the model (Flynn & Peters, 2004). Standard errors will be estimated to be large without adjustment for clustering. This problem results when individuals within groups have similar characteristics as a result of their association (Hox, 2002).
Type I error	Model, sample	Care provider and patient data	Chances of committing at least one type I error increases with this relatively large number of tests (72). Steps to lessen the chances of encountering at least one type I error include setting the significance level (p-value) at a low level (Munro, 2005).
Type II error	Model, sample	Care provider and patient data	Negative correlated to Type I error. As p value decreases, chance of type II error increases. Other means of decreasing the chances of type II error are to report the effect sizes as determinations of the correlations' significance. The effect size is the measurement of the dependent variable's influence on the independent variable. Greater effect sizes will indicate significance (Munro, 2005).

In summarizing this section, the data analysis plan has several objectives. First, it has been designed to associate information collected from the two groups of interest that has not been compared in existing research. Second, the plan includes measures for addressing and mitigating the lack of independent, linked observations and non-normality, including data skewing. Finally, procedures to manage potential Type I and II errors and work with clustered data have been presented.

Limitations of the Proposed Study.

The HSOPSC and the HCAHPS both suffer mono-operation bias, which is a threat to their construct validity (Burns & Grove, 2005). This form of bias implies that a single method was used to obtain the data; in the proposed study only perceptions will be measured. If the patient data were triangulated with other data, (e.g., falls or medication errors), relationships could be found that associate care provider perceptions with patient outcomes. Unfortunately, hospital error data, such as patient falls (Hitcho et al., 2004) are relatively rare occurrences. Consequently, few would be expected during the period of the proposed study. Medication errors and other hospital errors have low reporting rates; by some estimates, less than 20% of actual occurrences (Barker et al., 2002; Weingart et al., 2005b). They would therefore not be expected to provide meaningful information for this study.

The dearth of research focused on the safety experiences of patients may be due to methodology problems. Certain limitations in patient methodology deserve further examination. For example, participant samples in patient research are often limited to patients willing and capable of responding to questions or written surveys. This eliminates a significant population who are unable to pass the cognitive function tests,

unable to speak or understand English, or too ill to participate. An additional threat to the external validity of the proposed study is the open environment of the hospital unit. For example, the TOPS hospital sites implemented several patient safety initiatives during the project period. Those efforts were in response to national and local initiatives and included strategies to reduce medication errors, improve documentation and patient identification, measure the safety cultures of the hospitals, and assess patient fall risk (JCAHO, 2006).

Conclusion

Unique opportunities are presented by the proposed study. IOM safety concepts from the perspective of patients and care providers will be measured concurrently. The use of two different patient safety tools that measure similar concepts from different perspectives may demonstrate that staff and patient perceptions are either related or have no association. Regardless of the findings, the results will contribute to the knowledge base of patient safety science.

Nightingale (1863) discussed contrasting characteristics and qualities associated with improved hospital outcomes in 19th century France and England (Nightingale, 1863). As is evident in the following excerpt, a complex interplay of professions, patients, institutions, and other factors were perceived as making a difference in patient care:

> The publicity and the collision resulting from publicity are the best guardians of the interests of the sick. A patient is much better cared for in an institution where there is perpetual rub between doctors and nurses or nuns, between students, matrons, governors, treasurers, and casual visitors [and] between secular and spiritual authorities, than in a hospital under the best governed order in existence . . . where the chief of that order, be it male or female, is also the sole chief of the hospital. (p.187)

The proposed study will provide unique insight in the search for greater understanding of the patient experience with hospital care. Scientific testing of the interplay between care providers and patients will explore what Nightingale so aptly termed the “interests of the sick” and the “perpetual rub” within each of the study hospitals (p. 187). The findings of the proposed study will have implications for hospitals using the HSOPSC and the CAHPS instruments, and patients receiving care.

Table 3-4

Comparison of the Care Provider and Patient Survey Tools

Tool	Hospital Survey on Patient Safety Culture	Consumer Assessment of Health Providers and Systems
Source	AHRQ	AHRQ and CMS
Intended Population	Hospital care providers and administrators	Hospitalized patients
When administered?	Any time	One time, 2-4 weeks after discharge
Unit of measure	Hospital, hospital unit, individual	Hospital, hospital unit, individual
Items	42, includes 7 demographic items	27, includes 5 demographic items
Subscales	12 subscales: Overall perceptions of safety Frequency of errors reported Supervisor/manager expectations and actions Organizational learning-continuous quality improvement Teamwork within units Communication openness Error feedback and communication Nonpunitive response to error Staffing Management support for patient safety Teamwork across units Hospital handoffs and transitions	6 subscales: Communication with nurses Communication with doctors Responsiveness of hospital staff Physical environment Pain management Communication about medicines Discharge information (dichotomous data only)
Scales	Likert 1-5, A-F “grade” rating	Frequency: never, sometimes, usually, always; yes/no, 1-10 quality rating, 1-4 Likert

CHAPTER 4

RESULTS

This study presents an exploration of the forces that affect the hospitalized patient's safety milieu. In attempting to investigate influences that may account for hospital error, this study raises the question: What is the relationship between care providers' perceptions of safety culture and the patients' experiences of care on the hospital unit?

The quantitative measurement instruments used for the analyses in this study, the HSOPSC and HCAHPS, are both in common use in U.S. hospitals and designed for the capture and comparison of hospital unit data (Goldstein et al., 2005; Sorra et al., 2007). Data captured by these instruments describe care provider perceptions of the unit's safety culture (HSOPSC) as well as patients' experiences of care (HCAHPS). A basic assumption throughout this analysis is that the two instruments measure related concepts from the perspectives of two different populations.

As discussed in chapter 3, reaching the goal of comparing patient experiences and care provider safety culture required several steps. A two-level negative binomial regression model was employed with care provider data representing the independent predictor variables of hospital safety culture at level two. Patient data, which were nested within the hospital unit, are the outcome (dependent) variables at level one. Statistical techniques were used that rendered the data into comparable formats for imputation into the models. This chapter provides a description of the setting, sample, outcome and predictor variables, and the results of the analyses used to answer the research question.

Description of Research Setting

This study was set on three inpatient hospital medical units. The units were located in three separate hospitals. A detailed description of the settings is contained in table 4-1. To summarize, Hospital A is a 540-bed tertiary care teaching hospital. Hospital B is a 247-bed hospital operated by a large integrated health care delivery system. Hospital C is a 411-bed community hospital.

Table 4-1

Characteristics of the Three Hospitals' Units

Hospital Unit	Number of beds	Number of nursing staff	Nursing shifts	Nursing Skill Mix and Model at time of study	MD model	Pharmacist Model	Unit Specialties	Clinical Information System
Hospital A	34	60 RN 31 Assistant and other staff	RN: 12 hr Assistant: 8 hour	1 RN for 4-5 pts. 1 Assistant for 4 RNs 1 Nurse Manager 1 Assistant Manager; Team nursing model	Teaching service with physicians-in-training and attending physicians caring for all patients	Central pharmacy Service-based pharmacists, pharmacists-in-training on each team	Medicine; Palliative care	Electronic health record (EHR)
Hospital B	26	60 RN 20 Nursing assistant and other support staff 1 Nurse Manager	All nursing staff: 8 or 12-hour	1 RN for 4-5 pts 1 Assistant for 13 patients; Team nursing model	A mixed teaching and non-teaching service with physicians-in-training and attending physicians	Central pharmacy *Unit based pharmacist (2 PharmDs to cover 5 units, including study unit)	Medicine; Cardiac telemetry	Traditional paper documentation System
Hospital C	26	46 RN 6 LVN 8 Nursing assistant and other support staff 1 Nurse Manager	All nursing staff: 4, 8, or 12-hour	1 RN per 4-5 pts. 1Assistant per 13 patients; Team nursing model	Non-teaching facility	Central pharmacy *No unit based pharmacist at beginning (unit-based pharmacist introduced during study)	Medicine; Renal	EHR Computerized physician order entry (CPOE)

Description of Hospital Sample

The data from the HSOPSC's were initially entered into a spreadsheet program supplied by the AHRQ. For this analysis, data were imported into SPSS version 15 and the sample of care providers was noted to contain the following characteristics that are summarized in Table 4-2:

Table 4-2

Care Provider Characteristics

Care Provider Characteristics N=287	Hospital A % (n)	Hospital B % (n)	Hospital C % (n)	TOTAL % (n)
Care Provider Professions				
Registered nurse	31% (52)	46% (24)	62% (40)	40% (116)
Licensed Vocational Nurse	0	0	6% (4)	1% (4)
Unlicensed assistant	8% (14)	6% (3)	5% (3)	7% (20)
Physician (attending or staff)	11% (18)	23% (12)	26% (17)	16% (47)
Physician-in-training	50% (86)	25% (13)	1% (1)	35% (100)
TOTAL	100% (170)	100% (52)	100% (65)	100% (287)
Care provider tenure with hospital				
< 1 year	39% (66)	8% (4)	6% (4)	26% (74)
1-5 years	46% (79)	69% (36)	39% (25)	49% (140)
6-10 years	9% (16)	19% (10)	20% (13)	14% (39)
11-15 years	2% (3)	4% (2)	14% (9)	5% (14)
16-20 years	3% (5)	0	9% (6)	4% (11)
21 or > years	1 (<1%)	0	11% (7)	3% (8)
TOTAL	100% (170)	100% (52)	99% (64)	
Tenure in Profession				
< 1 year	36% (62)	6% (3)	3% (2)	23% (66)
1-5 years	40% (68)	56%(29)	29%(19)	40%(116)
6-10 years	11% (19)	21% (11)	26% (17)	16% (47)
11-15 years	6% (10)	15% (8)	11% (7)	9% (25)
16-20 years	4% (7)	2% (1)	14% (9)	6% (17)
21 or > years	2% (4)	(0)	17% (11)	5% (15)
TOTAL	100% (170)	100% (52)	100% (65)	

The care provider sample contains five jobs or professions (table 4-2). The hospitals' nursing and nursing support staff made up approximately 49% of the total sample; physicians

comprised 51% of the sample. On closer examination, each hospital had a different proportion of physicians and nurses. Hospital A's samples were composed primarily of physicians or physicians-in-training and registered nurses (62% and 31%). Hospital B was nearly half physicians and half registered nurses (48% and 46%). Hospital C contained a majority of registered nurses, 62%, with physicians making up 27% of the sample.

There are differences in how long the care providers have worked with their hospitals. A majority of the care providers in Hospital A and hospital B have worked five years or less in their hospital (85% and 77% respectively). By contrast, 55% of Hospital C's care providers have a greater tenure, five years or more in their hospital.

Description of Patient Sample

From the HCAHPS, the following patient characteristics were obtained and summarized (Table 4-3). Seventy-three percent of the sample had an education beyond high school, so the sample represents a well-educated patient population. A majority of the patients also rated their health as good to excellent (58% in Hospital A, 56% in Hospital B, and 75% in Hospital C).

Table 4-3

Patient Characteristics

	Hospital A % (n)	Hospital B % (n)	Hospital C % (n)	TOTAL (n)
Number of Patients	84	44	88	216
Sex				
Male	33	20	33	86
Female	49	24	49	122
Education Level				
High School Only	36% (28)	23% (10)	22% (19)	27% (57)
Post High School	64% (50)	77% (34)	78% (68)	73% (152)
TOTAL	100% (78)	100% (44)	100% (87)	100% (209) 7 data missing
Ethnicity/Race				
Latino	5% (4)	9% (4)	8% (7)	7% (15)
Black	23% (19)	23% (10)	9% (8)	17% (37)
White	61% (51)	57% (25)	75% (66)	66% (142)
Asian	3% (3)	9% (4)	8% (7)	6% (14)
Other race or not identified	8% (7)	1		4% (8)
TOTAL	100% (84)	100% (44)	100% (88)	100% (216)
Patient's Rating of Overall Health				
Excellent	1% (1)	7% (3)	1% (1)	3α% (5)
Very good	8% (6)	19% (8)	14% (12)	12% (26)
Good	49% (39)	30% (13)	61% (54)	50% (106)
Fair	34% (27)	35% (15)	24% (21)	30% (63)
Poor	8% (6)	9% (4)	0	5% (10)
TOTAL	100% (79)	100% (43)	100% (88)	100% (210) 6 data missing

Table 4-4 represents patient ratings of their hospital. Half of the sample rates their hospital as an "8" on a scale of 1-10. Of note, nearly all of the patients in the sample (with the exception of three patients in hospital B) stated that they would or probably would recommend their hospital to others.

Table 4-4

Patient Ratings of their Hospital

	Hospital A % (n)	Hospital B % (n)	Hospital C % (n)	TOTAL (n)
Patient's rating of their hospital 0=worst possible hospital, 10=best possible hospital				
0-3	0	0	0	0
4	0	2%(1)	0	1
5	0	9% (4)	0	2% (4)
6	2% (2)	16% 7	0	4% (9)
7	2% (2)	11% (5)	1	4% (8)
8	45% (38)	25% (11)	64% (56)	49% (105)
9	38% (32)	18% (8)	31% (27)	31% (67)
10	12% (10)	18% (8)	5% (4)	10% (22)
Patient recommends the hospital to others?				
Yes/Probably Yes	100% (83)	93% (41)	100% (88)	99% (212)
No/Probably No		7% (3)		1% (3)

Predictor and Outcome Variables

Care Provider Predictor Variables.

The initial analysis of the data included an examination of the care provider data from the HSOPSC including analysis of variance (ANOVA) testing. Once the means for all 12 subscales were calculated for the aggregated groups of physician and nursing care providers by hospital unit, the means were compared to determine trends and differences between the hospital units.

Post-hoc comparison testing was performed to determine where differences between the hospital units occurred. Using a significance level of .05 or less, all of the subscales were subjected to Bonferoni post hoc t tests. Eight subscales were noted to have significant between group differences. These differences are noted in Table 4-5:

Table 4-5

Care Provider Subscales and Findings

Subscale	Hospital Unit A Mean (SD))	Hospital Unit B Mean (SD)	Hospital Unit C Mean (SD)
Overall Perceptions**[2]	3.17 (.59)	2.94 (.60)	3.29 (.63)
Frequency of Events Reported ***[1, 3]	2.99 (.81)	3.48 (.83)	3.55 (.90)
Supervisor Actions	3.82 (.56)	3.72 (.53)	3.63 (.86)
Organizational Learning- QI	3.79 (.52)	3.72 (.56)	3.82 (.60)
Teamwork Within Units ***[1, 2]	3.95 (.49)	3.60 (.64)	4.05 (.49)
Communication Openness **[1]	3.70 (.52)	3.39 (.60)	3.58 (.66)
Error Feedback Communication	3.34 (.80)	3.34 (.65)	3.60 (.87)
Nonpunitive Response	3.16 (.72)	2.98 (.77)	3.11 (.81)
Staffing *** [2,3]	3.18 (.57)	2.97 (.57)	3.41 (.69)
Management Support ***[1, 2]	3.67 (.62)	3.16 (.77)	3.72 (.74)
Teamwork Across Units ***[1,2,3]	3.45 (.62)	3.17 (.57)	3.66 (.58)
Hospital Handoffs *[1, 2]	2.82 (.82)	2.72 (.67)	3.11 (.85)

means by hospital (scale 1-5)
*p< .05 **p<.01 ***p<.001
[1] difference between A and B significant
[2] difference between B and C significant
[3] difference between A and C significant

Bonferroni testing identifies differences between hospitals, but cannot describe the nature of how the hospitals vary; therefore it is difficult to draw conclusions from these data. However the data do tell us there are significant differences between the hospitals on several of the subscales. For example, care providers perceive teamwork across their hospital units differently. Teamwork within units demonstrated significant differences between hospitals A and B as well as B and C but Teamwork across units showed significant differences among hospitals A and B, B and C, and A and B. Of the subscales with significant differences, Hospital B's care providers' perceptions had the lowest scores and are the most different from the other two facilities. Hospitals B and C demonstrated significant between group differences on the greatest number of subscales (six), followed by hospitals A and C (five), then hospitals A and B (four).

Reliability. Table 4-6 contains the reliability analysis performed on the items in each HSOPSC subscale based on the full sample of care providers. Cronbach's alpha coefficient was used as the test of internal consistency reliability. Six of the twelve subscales scored above .7, generally considered acceptable internal consistency reliability for an established tool (Nunnally & Bernstein, 1994). Three subscales scored between .6 and .7; no Cronbach's coefficient alpha was below .547.

Table 4-6

Aggregated Care Provider Subscale Scores

Subscale*	Mean (SD)	Median (min., max.)	Cronbach's alpha
Overall Perceptions	3.16 (.6109)	3.25 (1.5, 5)	.547
Frequency of Events Reported	3.20 (.8695)	3.00 (1, 5)	.816
Supervisor Actions	3.76 (.6279)	3.75 (1, 5)	.638
Organizational Learning- QI	3.79 (.5475)	4.00 (1, 5)	.651
Teamwork Within Units	3.91 (.5394)	4.0 (2, 5)	.749
Communication Openness	3.61 (.5811)	3.67 (2, 5)	.557
Error Feedback Communication	3.40 (.7972)	3.42 (1.33, 5)	.796
Nonpunitive Response	3.11 (.7505)	3.0 (1, 5)	.716
Staffing	3.19 (.6134)	3.25 (1.5, 4.75)	.536
Management Support	3.59 (.7034)	3.67 (1.33, 5)	.662
Teamwork Across Units	3.44 (.6170)	3.5 (1.5, 5)	.729
Hospital Handoffs	2.87 (.8135)	2.75 (1, 5)	.838

* Means calculated based on 1-5 scale

Validity. Exploratory factor analysis was performed on the care provider data using principal components extraction with Equamax rotation. This method has been shown to effectively compare results with those found by the instrument's creators (Sorra & Nieva, 2004a) and has been used with the larger TOPS care provider dataset (Blegen, Gearhart, O'Brien, Sehgal, & Alldredge, in press). Based on this factor analysis, this sample behaves differently than the developers' sample (see Table 4-7). Ten components with Eigenvalues greater than one were extracted. Results demonstrated loading on 9 distinct factors, with three factors containing two subscales. These included organizational learning and staffing, hospital handoffs, teamwork

between units, communication openness and error feedback, frequency of events reported, and management support for safety and teamwork across units. A limitation of these results may be the sample size (n=287). Nunnally and Bernstein suggest a large number of subjects for every variable in the analysis, however they do not specify an exact number (Nunnally & Bernstein, 1994).

Table 4-7

Factor Analysis, Rotated Component Matrix. Bold Coefficients Indicate Primary Factor Loading.

Subscale Name	Survey Item	1	2	3	4	5	6	7	8	9	10
Frequency of events reported	D1 Mistake caught but corrected	.280	.117	-.054	.145	**.810**	.102	.014	.135	-.080	.010
	D2 Mistake made but no harm	.135	.009	.053	.112	**.722**	.103	.072	.045	-.004	.009
	D3 Mistake made could harm	.002	.104	.054	.119	**.861**	-.041	.003	.050	.134	.035
Hospital handoffs	F5r Important info lost during shift changes	.162	**.758**	.124	.088	.167	-.007	.050	.095	.101	.082
	F11r Shift changes are problematic	.051	**.668**	.048	.055	.047	-.005	.049	.282	.151	-.125
	F3r Transfers fall between cracks	.162	**.689**	.007	.048	.056	.097	.097	.032	-.026	.032
	F7r Problems occur in info exchange	.049	**.769**	.076	.087	.134	.034	.034	.077	.070	.101
Communication openness	C2 Staff speak up	.128	.104	.275	**.624**	.132	.108	.058	.179	.080	.034
	C4 Staff question authority	-.002	.061	.167	**.709**	.034	.157	.199	.142	.088	-.087
	C6r Staff are afraid to ask questions	-.065	.125	.194	**.241**	.073	.062	.318	.165	.451	-.075
Supervisor expectations	B1 Supervisor says good word	.539	.028	.076	.424	.111	.181	.130	-.032	.128	.060
	B2 Supervisor considers suggestions	.489	.027	.122	.425	-.088	.171	.195	.009	**.217**	.002
	B3r Supervisor wants faster work	.199	.130	-.059	.140	.027	.143	.168	.106	**.496**	.233
	B4r Supervisor overlooks safety	.108	.022	.096	.089	-.041	-.095	.074	.022	**.755**	.117
Teamwork within units	A1 People support one another	.156	.041	**.771**	.138	.059	.068	.140	.016	.079	-.057
	A3 When work needs done- do together	.145	.024	**.759**	.149	-.047	.103	.032	.081	.115	.142
	A11 When one area busy, others help	.248	.115	**.634**	.147	.001	.126	.082	.068	.005	.105
	A4 People treat each other with respect	.100	.105	**.750**	.047	.058	.064	.162	.052	.057	-.048
Org learning-QI	A9 Mistakes led to positive change	**.694**	-.003	.188	.056	.043	.045	.058	-.079	.136	-.008
	A13 After change we evaluate	**.686**	.164	.056	.044	.185	.102	.039	.160	-.058	.004
	A6 We actively improve safety	**.586**	.174	.277	.040	.094	-.156	.020	.088	.116	.027
Mgt support for safety	F1 Hospital management promotes safety	.270	-.027	.103	.082	.076	**.499**	.057	.449	.291	-.112
	F8 Mgt actions show safety is a priority	.316	.016	.102	.146	.086	**.456**	-.027	.381	.312	-.197
	F9r Mgt only interested in safety after event	.213	.182	.090	.047	.081	**.244**	.080	.239	.550	.116
	F6r Other units staff unpleasant to work with	.029	.398	.135	-.051	.084	.272	.274	-.079	.062	.126
Non-punitive response	A12r Person, not event, written up	.202	.073	.095	.030	.121	.070	**.772**	.005	.096	.157
	A8r Staff mistakes held against them	.062	.051	.171	.121	.030	.072	**.798**	.108	.124	.088
	A16r Staff worry mistakes in file	-.008	.081	.122	.122	-.089	-.120	**.698**	.229	.122	.033
Teamwork across units	F4 Good cooperation among hospital units	.091	.248	.080	.167	.073	**.711**	.001	-.022	.062	-.014
	F10 Hospital units work well together	.058	.335	.139	.163	.115	**.593**	-.033	.016	.048	-.029
	F2r Hospital units don't coordinate	.082	.580	.064	.087	.013	**.475**	.040	.099	.035	.117
Error feedback	C1 We are given feedback about changes	.435	.125	.160	**.471**	.332	.042	.049	.049	.027	.082
	C3 We are informed about errors	.290	.332	-.025	**.607**	.400	.040	-.032	.015	.053	.162
	C5 People support one another	.495	.400	.149	**.542**	.229	.111	-.005	.071	.185	.030
Overall perceptions	A15 Safety not sacrificed for more work	.285	.161	.027	.120	.155	.071	.046	**.482**	-.075	-.038
	A18 Our procedures are good	.493	.174	.493	.112	.064	.219	.057	**.243**	.087	.008
	A17r We have safety problems	-.022	.261	.053	.127	.046	.008	.163	**.668**	.107	.045
	A10r It's by chance mistakes don't happen	.012	.043	.052	.037	.082	.024	.104	**.563**	.215	.299
Staffing	A2 We have enough staff	**.346**	-.297	.140	.229	.006	-.475	-.185	-.155	.243	-.132
	A5 Staff work longer hours than is best	**-.214**	.148	-.268	-.338	-.034	.280	.076	.411	-.090	.290
	A7r Use more temps than is best	**.359**	-.020	.261	.318	.222	.084	-.134	-.159	.007	-.365
	A14r Work in "crisis mode"	**.468**	-.281	.307	.000	.130	-.234	-.184	-.202	.069	-.026

Patient Outcome Variables

Reliability. Table 4-8 displays estimations of internal consistency reliability of the items in the HCAHPS patient subscales that were performed using Cronbach's coefficient alpha. Four of the six coefficient alpha scores were above .7.

Table 4-8

Patient Subscales

	Number of Items	Mean (SD)	Median (min., max.)	Skewness	Cronbach's alpha
Nurse communication	3	3.88 (.35)	4.00 (2, 4)	-3.30	.894
MD Communication	3	3.86 (.39)	4.00 (1 ,4)	-4.22	.894
Responsiveness (nursing services)	2	3.54 (.68)	4.00 (1 ,4)	-1.22	.533
Physical environment	2	3.69 (.50)	4.00 (1.5, 4)	-1.63	.831
Pain control	2	3.80 (.50)	4.00 (1, 4)	-3.68	.783
Communication about meds	2	3.73 (.58)	4.00 (1, 4)	-2.80	.516

Validity. Attempts to establish validity through exploratory factor analysis were unsuccessful. On further investigation, it was found that factor analysis is not possible on highly skewed data (Table 4-8). Factor analysis assumes multivariate normality. Standard methods and statistical programs are incapable of countering the problem (Cooper, personal communication, November 14, 2008). An alternative method of establishing the tool's content validity includes consideration of the relatively high levels of internal consistency reliability, which contribute to instrument validity (Nunnally & Bernstein, 1994).

Findings

The research question "what is the relationship between care providers' perceptions of safety culture and the patients' experiences of care on the hospital unit?" was explored through regression models that tested for relationships between the 12 independent predictor variables representing hospital unit characteristics, and the six dependent outcome variables representing patients' experiences of care. Analyses using the multilevel negative binomial regression model were performed as described in Chapter 3. The 12 independent predictor variables were individually used in regression models with each of the six dependent outcome variables resulting in 72 separate regression analyses. The analyses generated incidence rate ratios, semi-robust standard errors, confidence intervals, *p*-values, and effect sizes (see Tables 4-9 through 4-14). One measure of the significance of the relationships is demonstrated through the *p*-value using a significance level of <=.001. The other methods for explaining the significance of the relationships are the IRR and effect sizes.

Incident rate ratio (IRR) is defined as the relationship between incidence rates, or the rates of occurrence of a particular event, in this case the relationships between predictor (care provider perception) and outcome (patient perception) variables (Bonomi et al., 2008). The IRR is used to interpret the coefficients, similar to logistic regression. This is a somewhat unusual way of reporting results with non-count, non-epidemiological data and by themselves IRRs are difficult to interpret. They are used in these analyses to calculate the effect size, a more easily understood result that can be interpreted on its original scale (personal communication, Cooper, November 23, 2008).

The effect size can be defined as the amount of influence the independent variable has on the dependent variable, or the strength of the relationship between two variables (Munro, 2005). These are noted within the “predicted effect” column. Negative scores on the “predicted effect” column reflect the reverse scoring of the patient subscales. Negative patient scores were created during data preparation to compensate for the effects of left skewing. For interpretation, the negative scores have been positively coded and positive scores are negatively coded. To interpret the finding on the first table, nurses communication, the tabled “overall perceptions of safety” score can be seen as a predicted effect size change of .64. The “units” are points on the original instruments’ 1-5 and 1-4 Likert scales (HSOPSC and HCAHPS respectively). Therefore, for every one-unit improvement of overall perceptions of safety on the HSOPSC’s original 1-5 Likert scale, the patient experience of nurse communication, the dependent outcome variable, improves .64 on the HCAHPS original 1-4 Likert scale.

To determine the percentage of change for a dependent outcome variable for a one-unit change within the independent predictor variable, the following calculation is employed: Percent change within outcome variable = (1-IRR) x 100. For the Overall perceptions of safety predictor variable and Nurses communication dependent outcome variable, the calculation is: (1-.43) x 100 = .57. For every one-unit increase in Overall perceptions of safety, there is a .64 unit corresponding increase in patient perceived nurse communication. Using the percentage calculation, it can be expected that for every one unit increase in overall perceptions of safety, there is a 57% corresponding increase within the dependent outcome variable, nurse communication.

The following tables 4-9 through 4-14 contain the results for the negative binomial regression analyses on 12 separate care provider scores, aggregated by hospital. The IRRs, *p*-values, and significant predicted effects are noted.

Table 4-9

Results of Regression Analyses for Nurse Communication (reversed)

Predictor	IRR[1] (SE[2])	*p*-value	Predicted effect [3] (% change)
Overall Perceptions of Safety	.43 (.095)	.000*	.64 (57)
Frequency of Events Reported	1.19 (.253)	ns	ns
Supervisor Actions Promoting Safety	.93 (.574)	ns	ns
Organizational Learning-QI	.03 (.0174)	.000*	1.08 (97)
Teamwork Within Units	.50 (.049)	.000*	.58 (50)
Communication Openness	.36 (.092)	.000*	.69 (64)
Error Feedback and Communication	.67 (.322)	ns	ns
Nonpunitive Response to Error	.16 (.038)	.000*	.91 (84)
Staffing	.56 (.153)	ns	ns
Management Support for Patient Safety	.57 (.019)	.000*	.48 (43)
Teamwork Across Units	.56 (.115)	ns	ns
Hospital Handoffs and Transitions	.63 (.224)	ns	ns

Predictors are centered at the total sample mean
[1]IRR is Incidence Rate Ratio
[2]SE is semi-robust standard errors
[3]Predicted change in nurse communication for a 1-unit increase in the predictor (translated from negative to positive for interpretation)
*indicates Significant finding p<.001

Six of the twelve predictor variables had a significant relationship with the nurse communication patient outcome variable. The most significant predictor was

organizational learning-quality improvement. For every one-point increase in the provider predictor variable of perceived organizational learning, there was a 1.08 or 97% increase in patient perceived nurse communication. Second largest provider predictor variable was nonpunitive response to error, which, for every 1 point increase, predicted a .91-point, or 84% corresponding increase in patient perceived nurse communication.

Table 4-10

Results of Regression Analyses for Doctor Communication (reversed)

Predictor[1]	IRR[2] (SE)	*p*-value	Predicted effect [3] (% change)
Overall Perceptions of Safety	.78 (.022)	.000	.25 (22)
Frequency of Events Reported	.96 (.054)	ns	ns
Supervisor Actions Promoting Safety	1.27 (.163)	ns	ns
Organizational Learning-QI	.39 (.064)	.000*	.69 (61)
Teamwork Within Units	.83 (.028)	.000*	.19 (17)
Communication Openness	.88 (.133)	ns	ns
Error Feedback and Communication	.79 (.051)	.000*	.24 (21)
Nonpunitive Response to Error	.75 (.151)	ns	ns
Staffing	.82 (.001)	.000*	.21 (18)
Management Support for Patient Safety	.88 (.029)	.000*	.14 (12)
Teamwork Across Units	.83 (.009)	.000*	.19 (17)
Hospital Handoffs and Transitions	.82 (.024)	.000*	.21 (18)

Predictors are centered at the total sample mean
[1]IRR is Incidence Rate Ratio
[2]SE is semi-robust standard errors
[3]Predicted change in nurse communication for a 1-unit increase in the predictor (translated from negative to positive for interpretation)
*indicates Significant finding p<.001

The doctor communication outcome variable was positive for eight of the independent variable predictors. The largest predictor was provider perceived organizational learning; for every one point increase in organizational learning there was a .69 point, or a 61% change in patient perceived MD communication. This was followed by a 22% positive change in patient perceived MD communication when provider perceived non-punitive response to error increased by one point. Other subscales predicted smaller changes in the outcome variables.

Table 4-11

Results of Regression Analyses for Staff Responsiveness (reversed)

Predictor[1]	IRR (SE) [2]	*p*-value	Predicted effect [3] (% change)
Overall Perceptions of Safety	.42 (.068)	.000*	.85 (58)
Frequency of Events Reported	.82 (.145)	ns	ns
Supervisor Actions Promoting Safety	2.59 (.933)	ns	ns
Organizational Learning-QI	.04 (.034)	.000*	1.4 (96)
Teamwork Within Units	.54 (.085)	.000*	.67 (46)
Communication Openness	.76(.446)	ns	ns
Error Feedback and Communication	.43 (.071)	.000*	.85 (57)
Nonpunitive Response to Error	.47 (.369)	ns	ns
Staffing	.50 (.022)	.000*	.74 (50)
Management Support for Patient Safety	.65 (.090)	ns	ns
Teamwork Across Units	.53 (.044)	.000*	.70 (47)
Hospital Handoffs and Transitions	.50 (.027)	.000*	.75 (50)

Predictors are centered at the total sample mean
[1]IRR is Incidence Rate Ratio
[2]SE is semi-robust standard errors
[3]Predicted change in nurse communication for a 1-unit increase in the predictor (translated from negative to positive for interpretation)
*indicates Significant finding p<.001

For staff responsiveness, effect sizes greater than .65 were noted in seven significant predictor variables. Patient perceived staff responsiveness was predicted to increase by 1.4 units or 96% for every one-point improvement in provider perceived organizational learning. Providers' overall perceptions of safety predicted an increase in patient perceived responsiveness of .85 points or 58%.

Table 4-12

Results of Regression Analyses for Physical Environment (reversed)

Predictor[1]	IRR (SE) [2]	*p*-value	Predicted effect [3] (% change)
Overall Perceptions of Safety	.33 (.035)	.000*	.88 (67)
Frequency of Events Reported	1.05 (.284)	ns	ns
Supervisor Actions Promoting Safety	1.51(1.070)	ns	ns
Organizational Learning-QI	.01 (.001)	.000*	1.28 (99)
Teamwork Within Units	.42 (.002)	.000*	.75 (58)
Communication Openness	.37 (.178)	ns	ns
Error Feedback and Communication	.47 (.223)	ns	ns
Nonpunitive Response to Error	.15 (.085)	.001*	1.08 (85)
Staffing	.45 (.089)	.000*	.74 (55)
Management Support for Patient Safety	.51 (.022)	.000*	.63 (49)
Teamwork Across Units	.46 (.059)	.000*	.71 (54)
Hospital Handoffs and Transitions	.48 (.152)	ns	ns

Predictors are centered at the total sample mean
[1]IRR is Incidence Rate Ratio
[2]SE is semi-robust standard errors
[3]Predicted change in nurse communication for a 1-unit increase in the predictor (translated from negative to positive for interpretation)
*indicates Significant finding p<.001

Seven independent predictor variables demonstrated significant positive relationships with the outcome variable physical environment. Organizational learning and nonpunitive response to error had the greatest effect sizes on perceptions of the physical environment: 1.28 point (99%) and 1.08 point (85%) increases, respectively.

Table 4-13

Results of Regression Analyses for Pain Control (reversed)

Predictor[1]	IRR (SE) [2]	*p*-value	Predicted effect [3] (% change)
Overall Perceptions of Safety	.55 (.064)	.000*	.55 (45)
Frequency of Events Reported	.86 (.087)	ns	ns
Supervisor Actions Promoting Safety	1.87 (.368)	.001*	-1.09 (-87)
Organizational Learning-QI	.11 (.062)	.000*	1.08 (89)
Teamwork Within Units	.65 (.075)	.000*	.43 (35)
Communication Openness	.89 (.399)	ns	ns
Error Feedback and Communication	.58 (.059)	.000*	.52 (42)
Nonpunitive Response to Error	.63 (.389)	ns	ns
Staffing	.62 (.017)	.000*	.46 (38)
Management Support for Patient Safety	.74 (.069)	.001*	.31 (26)
Teamwork Across Units	.64 (.037)	.000*	.44 (36)
Hospital Handoffs and Transitions	.63 (.025)	.000*	.46 (37)

Predictors are centered at the total sample mean
[1]IRR is Incidence Rate Ratio
[2]SE is semi-robust standard errors
[3]Predicted change in nurse communication for a 1-unit increase in the predictor (translated from negative to positive for interpretation)
*indicates Significant finding p<.001

Nine significant predictor variables are associated with patient pain control. Oddly, Supervisor actions promoting safety was negatively correlated with patient perceptions of pain control. For every one-unit increase in provider perceived supervisor actions that promote safety, there was an 87% decrease in the patient perceived pain control. Other relationships were in a positive direction.

Table 4-14.

Results of Regression Analyses for Communication about Medications (reversed)

Predictor[1]	IRR (SE) [2]	*p*-value	Predicted effect [3] (% change)
Overall Perceptions of Safety	.27 (.041)	.000*	.93 (73)
Frequency of Events Reported	1.06 (.317)	ns	ns
Supervisor Actions Promoting Safety	1.60 (1.243)	ns	ns
Organizational Learning-QI	.01 (.001)	.000*	1.26 (99)
Teamwork Within Units	.36 (.007)	.000*	.82 (64)
Communication Openness	.31 (.184)	ns	ns
Error Feedback and Communication	.43 (.244)	ns	ns
Nonpunitive Response to Error	.10 (.070)	.001*	1.10 (90)
Staffing	.39 (.103)	.000*	.79 (61)
Management Support for Patient Safety	.45 (.018)	.000*	.69 (55)
Teamwork Across Units	.40 (.070)	.000*	.77 (60)
Hospital Handoffs and Transitions	.44 (.172)	.000*	.74 (56)

Predictors are centered at the total sample mean
[1]IRR is Incidence Rate Ratio
[2]SE is semi-robust standard errors
[3]Predicted change in nurse communication for a 1-unit increase in the predictor (translated from negative to positive for interpretation)
*indicates Significant finding p<.001

Eight of 12 predictor variables had significant relationships with the outcome variable communication about medications. For each one-unit increase in provider perceived non-punitive response to error, patient perceived communication about medication increased by 1.26 points (99%) and organizational learning increased by 1.10

points (90%). Other provider predictor variables that were significantly correlated with pain control include teamwork within units (.82) and teamwork across units (.77).

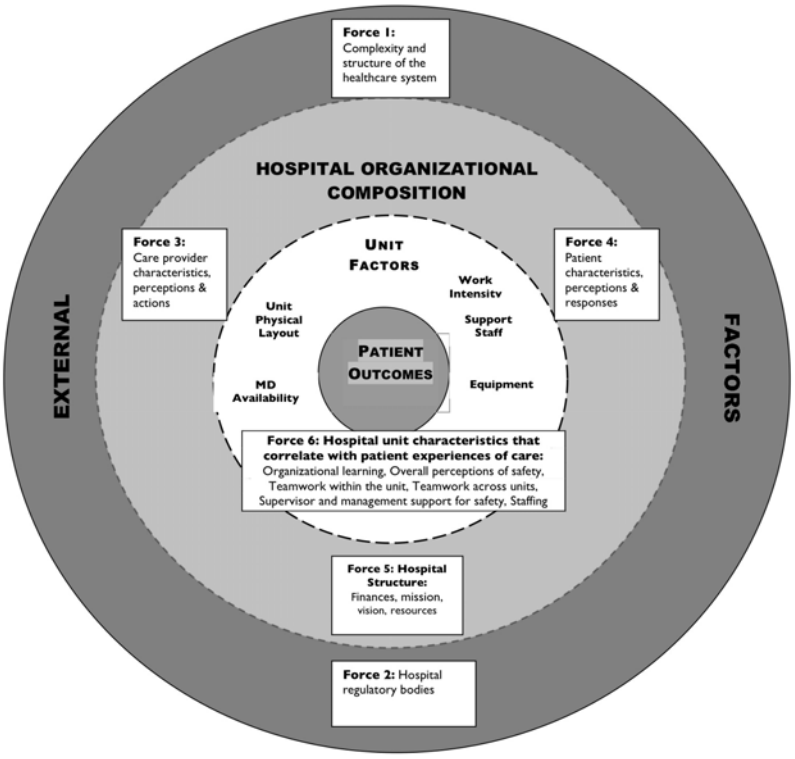

Figure 4-1. Conceptual framework with six forces

Conclusion

Findings reveal that certain care provider predictors have significant effect sizes with all patient subscale scores, organizational learning and quality improvement, overall perceptions of safety, and teamwork within the unit. Provider predictor variables with significant results for five of the six patient outcome variables include: Staffing, supervisor and manager support for safety, and teamwork across units. Figure 4-1 illustrates the conceptual model from chapter 3 that now includes a coherent “sixth force”

at the unit and hospital levels that reflects these findings. The framework is now more complete and derives its current form and characteristics from the results of this study.

CHAPTER 5

DISCUSSION

The goal of this study was to explore the relationships between patient perceptions of their experiences of care and care provider perceptions of safety culture on the hospital unit. This chapter provides a discussion of the results of the study and is organized around four subsections. The first subsection is a summary of the findings from the analyses in chapter 4. Next will be a review of the significance of the findings followed by the study's limitations. The study's implications for practice and policy are discussed. Finally, thoughts about future research related to this study are presented.

Summary and Significance of the Findings

The specific study question was "what is the relationship between care provider perceptions of the hospital unit's safety culture and the patients' perceptions of their care experiences on the hospital unit?" This required exploring relationships between patient and care provider groups using two instruments, the HCAHPS and the HSOPSC, that measure the concepts of safety culture and patient experiences of care. The investigation included analyses on data from both provider and patient groups who fulfilled inclusion criteria for this study. The final sample consisted of 287 care providers and 216 patients. The patients had been hospitalized during a time period from July 1, 2006-March 30, 2007 on one of three medical units within one of three San Francisco bay area hospitals. Seventy-two single order logistic regression analyses were performed on the data in order to determine the significance and magnitude of relationships, if any, between the care provider predictor (independent) variables and the patient outcome (dependent) variables.

In 45 of the 72 regression models, provider predictor variables were significantly related to the patient outcome variables. Six of the 12 predictor subscales of provider perceptions of safety were significantly related to all or a majority of the patient outcome variables. Furthermore, the magnitude of the relationships between the variables suggested that these specific provider variables were strongly predictive of higher scores of patient perceptions of experiences in the hospital as measured by six subscales: nurse communication, MD communication, responsiveness of the hospital staff, communication about medications, pain control, and physical environment. The hospital unit characteristics that were significantly and consistently associated with patient experiences of their care included the following: Overall perceptions of safety, organizational learning/continuous improvement, teamwork within the unit, staffing, management support for patient safety, and teamwork across units.

The findings from this study both affirm and extend earlier research exploring what influences patient safety. The findings underscore the importance of key organizational factors that are imbedded in, but are distinct from, previously identified factors, such as hospital structure. The results appear to reflect the influence of the overall milieu of the unit, such as the degree to which the organization embraced learning, quality improvement, collaboration, and effective communication.

Forces that Impact Patient Outcomes

The study's conceptual framework's "forces," described in the literature and theory in chapter two, suggested that patient outcomes related to quality and patient safety are complex, multi-causal and difficult to measure. The forces included (a) the complex structure and nature of the U.S. healthcare and hospital system, (b) the roles and

functions of healthcare safety regulatory bodies, (c) care provider characteristics, perceptions, and actions, (d) patient characteristics, perceptions, and responses and (e) hospital structures such as financing and mission. However, this study was not designed to measure all of these forces. The findings from this study suggest that additional characteristics could be part of the framework and these characteristics reflect both the individual and environmental factors that impact patient safety outcomes. The new or potential sixth force, the correlates of care, could become useful patient safety indicators within the context of the unit, the hospital, and the external environment. Force six offers an additional research-based conceptualization of patient, care provider, and hospital elements that contribute to outcomes on the unit. The characteristics that describe Force 6 include its location in the intersection between the larger external environment, the hospital, and the unit. This location characterizes Force 6 as containing broader as well as local influences that converge to affect the patient.

It was hypothesized that relationships would be found between several of the patient and provider variables. It was anticipated, for example, that the results would be congruent with research that supports “organizational learning and quality improvement” as a powerful aspect of safety culture that is perceived by both patients and care providers. Organizational learning, universally agreed upon to be beneficial for the patient and the care provider, has several definitions. These include improving skills and knowledge to work better together, (Carroll & Edmondson, 2002), creating reliable systems (Resar, 2006), and creating performance measures (Rivard et al., 2006). This study demonstrated that the provider predictor variable, organizational learning and quality improvement, was strongly and positively predictive in all patient outcome

variables. This finding is consistent with prior studies. For example, Tucker and Edmondson (2003) linked a lack of organizational learning to poor nursing and patient outcomes. Tucker and Spear (2006) studied nurse work and found that organizational and quality improvements impact nurse and patient outcomes for the better. In the perinatal setting, Draycott et al. (2006) associated organized training practices among physicians and nurses with improved infant outcomes.

Since the largest effect sizes on all patient outcome variables occurred with organizational learning, it may be useful to note the three items that make up the subscale. They are: (a) we are actively doing things to improve patient safety, (b) mistakes have led to positive changes here, and (c) after we make changes to improve patient safety, we evaluate their effectiveness (Sorra & Nieva, 2004a). These items are derived from high reliability organizational theory (HRO) (Weick & Sutcliffe, 2001). The literature has discussed HRO and its application to hospitals, and opinions vary as to whether any hospital could meet the stringent practice requirements for an HRO, even in the foreseeable future (Dixon & Shofer, 2006; Pronovost, Berenholtz et al., 2006; Resar, 2006). Nonetheless, these findings call for relooking at concepts from HRO, either those that may be employed or are currently employed, that may improve both safety culture and patient perceptions of care on the unit

Another provider predictor variable, management and supervisor support for patient safety was predictive in five of six patient outcome variables. These findings are also consistent with previous studies. It has been argued in the literature that care quality problems and safety culture deficiencies are not just a care provider problem, but also a leadership problem (Khatri et al., 2006). In high-performing organizations, leaders model

the safety behaviors that are expected of care provider staff (Rivard et al., 2006). Management and leaders who support staff and assist with problem solving on an organizational level find that their hospitals are less vulnerable to inefficiencies and poor quality outcomes (Reason et al., 2001; Tucker & Edmondson, 2003).

Perceptions of teamwork both within the unit and between units were strongly predictive of patient outcome variables in this study. This is consistent with the literature; high proportions of studies in the field of patient safety are concerned with teamwork, team communication, and more recently, patient outcomes. Teamwork concepts include teamwork in groups (E. J. Thomas, Sexton, & Helmreich, 2004) and team communication failures (Sutcliffe et al., 2004). More contemporary studies are examining teamwork and patient outcomes including mortality (Davenport et al., 2007), unsafe practices (Espin, Lingard et al., 2006), and complexity and medical error (Varpio, Hall, Lingard, & Schryer, 2008). This finding may validate hospitals' efforts and programs that support teamwork, particularly between provider groups.

Although unit staffing levels were not measured in this study, the staffing provider predictor variable was significant with five of six patient perception outcome variables. This result was surprising and should be treated with caution. Staffing was associated with all but one of the six patient outcome variables; the association between staffing and nurse communication was not significant. Reliability analysis of the HSOPSC revealed possible weaknesses in the subscale for the variable. In published psychometrics, the staffing subscale had the weakest internal consistency reliability, .63 (Sorra & Nieva, 2004b); the internal consistency reliability was .54 in this study. A second provider predictor variable, supervisor/manager expectations and actions

promoting safety, did not load on a single factor in the factor analysis. Internal consistency reliabilities for supervisor/manager expectations were .75 (Sorra) and .66 in this study. This subscale was not significant with any patient outcome variables except for a strong negative relationship with physical environment, a predicted change of -87% for every 1 point increase in the predictor variable. These differences, in light of the remainder of the findings, may reflect weaknesses in the items and construction of the scales related to staffing and supervisor/management expectations.

Limitations of the Study

The results of this study should be interpreted after consideration of its limitations. The first methodological problem to consider is the possibility of social desirability bias related to the study's design. The highly skewed patient data may be a result of this bias, defined as a tendency for people to answer survey questions in a manner that they believe the questioner wants to hear, and therefore appear "more acceptable" (Pronin, 2007). This may explain, in part, why the patient data were skewed to the high end of the scale, since high scores would be more socially desirable. A tendency to report higher scores during interviews was discussed in the HCAHPS literature (Goldstein et al., 2005). Strategies to lessen social desirability bias when completing the HCAHPS include using less personal questionnaire methods such as mail or on-line instead of telephone surveys (Goldstein et al., 2005). These were not done during the TOPS survey because patient surveys were completed by interview. Interviews increase response rates, which may mediate non-response bias; however, social desirability remains a possible issue. Although the scores were generally high, it is worth noting that the standard deviations from the subscale means demonstrated variability.

Variability in the patient subscale scores is also evidenced by the variation of the correlations with the provider predictor variables.

Data analysis issues, first reported in chapter 3, presented potential problems worth noting. The skewed and overdispersed patient data required the use of statistical techniques that controlled for the non-normal data. Patient and provider data were not linked. This issue necessitated the use of a hierarchal model that connected the data by hospital unit. Chance of type I error increased with the large number of regression analyses, therefore actual significance test results were displayed in the results section. Another possible limitation of the study was the effect of the TOPS study's interventions that may have influenced both provider and/or patient perception (Segal, et al. 2008, in press). In this study, it was not possible to account for the effects of the TOPS study's interventions' on the samples because control units were not used.

Finally, multivariable analyses were not possible with this study's data. Multivariate models were attempted, but the data were extremely collinear, and the significant results could not be trusted to be accurate. Predictive influences may be shared among the variables and relationships may be found that do not exist. Additionally, chances of having replicable results are increased by using simpler models in exploratory studies (Babyak, 2004). This being said, future studies with additional sites and/or linked observations between patients and providers may produce data that could be used in multivariate analysis (Cooper, personal communication, December 19, 2008).

Implications for Practice and Policy

Despite these limitations, the study found evidence that there are measurable relationships between how the patients perceive their experiences of care and the safety

culture on the hospital unit and this evidence may prove useful to nursing practice and policy. The strengths of the relationships between key provider predictors and patient experiences of care point to the possibility that the subscales represented by the provider predictor variables might be particularly useful targets for change. Health care systems seeking to improve patient experiences and outcomes may identify and measure changes in specific practices and policies that appear to have a strong impact on patients.

Better practices result in better outcomes, but the complexity of hospital care delivery may make the job of identifying areas for change difficult. The findings from this study underscore the utility of using HCAHPS data as a tool for examining factors that may impact patient safety. The use of this type of measure may complement other measures of the concept of safety, which are important but have limitations. Specific barriers to measuring safety outcomes in the hospital may include the following problems: Safety events in hospitals tend to be infrequent occurrences; care providers report a small fraction of the actual number of events that occur, including near misses; and individual hospitals tend to manage their operations and outcomes data differently, leading to problems benchmarking many of the safety findings (Rivard et al., 2006).

There is good evidence that patient perceptions are correlated with quality of care (Evans et al., 2006; Weingart et al., 2005a). Therefore, the results of this study may be considered to be useful for practice. More than 4000 U.S. hospitals regularly collect and report HCAHPS data and more than 500 hospitals are benchmarking HSOPSC with the AHRQ (AHRQ, 2008). Many other hospitals administer their culture surveys internally. Until this study, data from these instruments have been used and reported separately and were not used in a relational way. One goal of this study was to establish a method for

comparing these measurements so that hospitals and researchers might use existing hospital data to improve patient safety. Comparison of these two data sets is novel and unique and should be of interest to any hospital with patient safety and organizational improvement programs. Use of both tools together may help provide focus and direction for hospitals needing to make informed choices to use their safety resources. For example, hospitals can replicate analyses correlating care provider predictors and patient outcomes in their own settings and then target improvement efforts toward the provider variables that have the greatest impact on patient outcomes.

Although this study did not include direct measures of patient or hospital error outcomes, other researchers have documented how the experiences of care have directly affected patient safety. Patient falls (Hitcho et al., 2004), poor medication adherence (McDonald et al., 2005), and other patient health and safety outcomes (Schoen et al., 2005) are directly tied to the concepts measured by the HCAHPS. There are several significant relationships found in this study that that hospitals may use to impact patients' experiences, even for hospitals using only a single instrument. In the context of limited resources, the findings from this study may show hospitals how to leverage the most information out of existing tools and data for evaluation and planning. For example, the finding that subscales related to teamwork and communication were consistently positively correlated with patient outcomes might suggest that hospitals seeking to improve patient scores develop a plan to improve practice in these areas. Subsequent patient data might be used to measure the impact of these interventions.

Implications for Future Research

The next step for this research would be to look at larger data sets from more hospital units. Repeating this study in other areas or units may or may not have more normal data distributions and may or may not provide confirmation of the study's findings. A second type of research that could naturally grow out of this work would be to look for associations with other data sources such as relationships between staffing measures, the HSOPSC, and the HCAHPS. Another area for scrutiny may be to examine the provider variables that were strong predictors of patient experience in further depth.

A second area of research that needs to be looked at is if these findings replicate with other patient groups. Over 70% of this study's sample had at least some college education, and may represent the hospitals' locations or patients' willingness to enroll in the study, but do not reflect vulnerable groups including non-English speakers, low socio-economic levels, and non-verbal patients. As the HCAHPS evolves, information may be gained about groups outside of the study's sample such as non-English speaking patients. One area discussed in the literature is the expansion of the HCAHPS to measure language barriers and translation services (Rothman, Park, Hays, Edwards, & Dudley, 2008).

A final area for possible research and study is to use the model to explore the forces that affect patient outcomes. One example is Force 4: patient characteristics, actions, and responses that impact unit factors and patient outcomes. Different researchers have identified specific patient traits, pathologies, attitudes, and other characteristics that seem to predispose them to errors and other quality outcome problems (AMA, 1997; Schoen, et al. 2005). Could a patient profile instrument be developed, similar to those commonly used to identify patients at risk for falls and skin breakdowns,

that would tell care providers a patient has a higher than average chances of quality problems and failures? Would such a tool be beneficial to patients?

Conclusion

This study contributes to a growing body of literature that seeks to identify and remedy factors associated with patient perceptions of their care and patient safety culture. Practical applications of the findings include ways to look at the relationships between patient and provider perceptions that may impact how hospitals manage resources or set goals. Future research may focus on a deeper understanding of patient and provider perceptions and how they are impacted by changes in a hospital's safety culture. Improved knowledge will come from refining methods for evaluating the linkages between patient safety interventions at the systems, hospital and unit levels with patient perceptions of their experiences of care.

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APPENDIX A

HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

APPENDIX A: HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

HOSPITAL SURVEY ON PATIENT SAFETY CULTURE

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.

- *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.

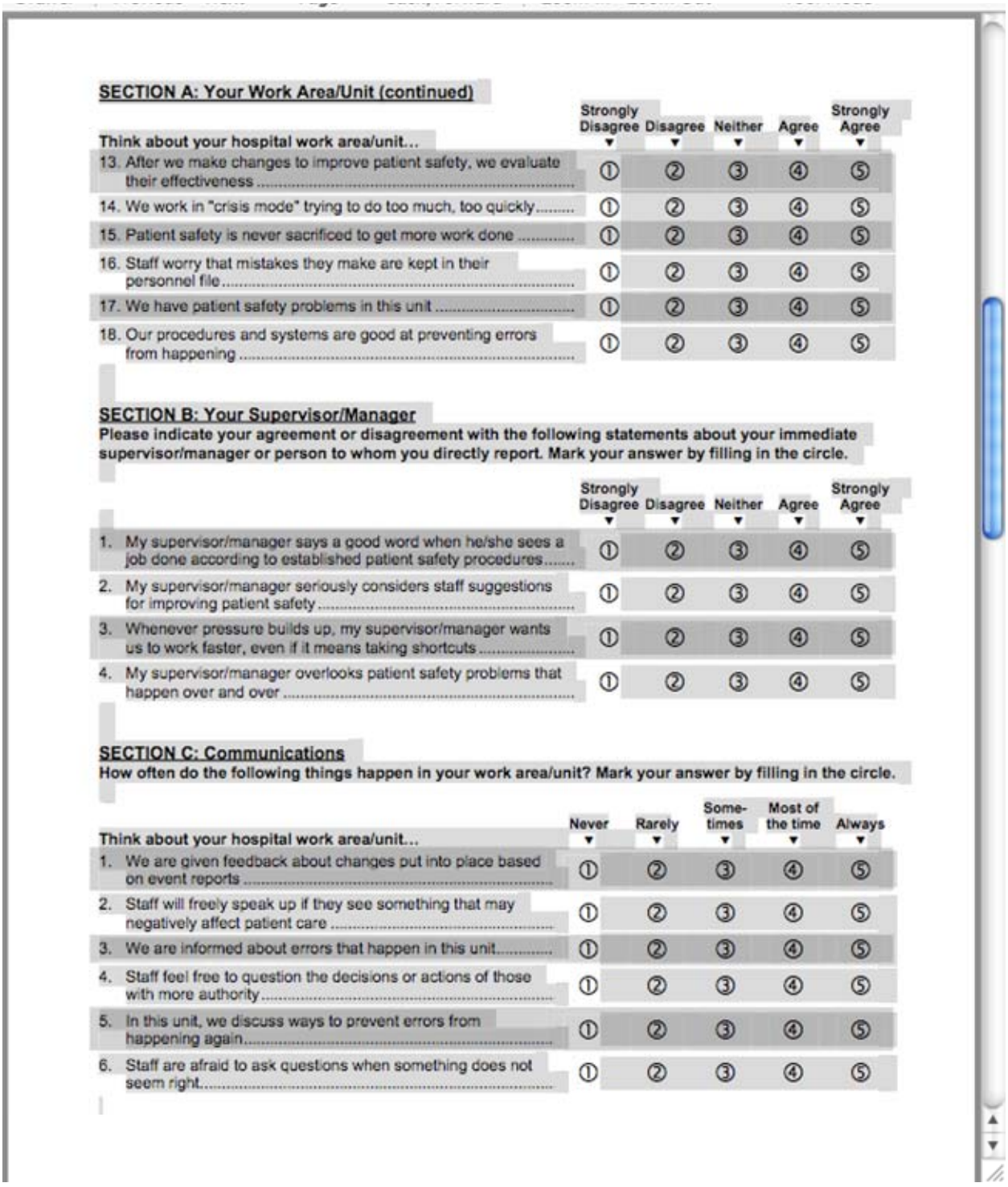
What is your primary work area or unit in this hospital? Mark ONE answer by filling in the circle.

○ a. Many different hospital units/No specific unit

○ b. Medicine (non-surgical)
○ c. Surgery
○ d. Obstetrics
○ e. Pediatrics
○ f. Emergency department
○ g. Intensive care unit (any type)
○ h. Psychiatry/mental health
○ i. Rehabilitation
○ j. Pharmacy
○ k. Laboratory
○ l. Radiology
○ m. Anesthesiology
○ n. Other, please specify: _____

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

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



SECTION A: Your Work Area/Unit (continued)

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

SECTION B: Your Supervisor/Manager

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

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

SECTION C: Communications

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

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

SECTION D: Frequency of Events Reported

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

SECTION H: Background Information

This information will help in the analysis of the survey results. Mark ONE answer by filling in the circle.

1. How long have you worked in this hospital?
   - ○ a. Less than 1 year
   - ○ b. 1 to 5 years
   - ○ c. 6 to 10 years
   - ○ d. 11 to 15 years
   - ○ e. 16 to 20 years
   - ○ f. 21 years or more

2. How long have you worked in your current hospital work area/unit?
   - ○ a. Less than 1 year
   - ○ b. 1 to 5 years
   - ○ c. 6 to 10 years
   - ○ d. 11 to 15 years
   - ○ e. 16 to 20 years
   - ○ f. 21 years or more

3. Typically, how many hours per week do you work in this hospital?
   - ○ a. Less than 20 hours per week
   - ○ b. 20 to 39 hours per week
   - ○ c. 40 to 59 hours per week
   - ○ d. 60 to 79 hours per week
   - ○ e. 80 to 99 hours per week
   - ○ f. 100 hours per week or more

4. What is your staff position in this hospital? Mark ONE answer that best describes your staff position.
   - ○ a. Registered Nurse
   - ○ b. Physician Assistant/Nurse Practitioner
   - ○ c. LVN/LPN
   - ○ d. Patient Care Assistant/Hospital Aide/Care Partner
   - ○ e. Attending/Staff Physician
   - ○ f. Resident Physician/Physician in Training
   - ○ g. Pharmacist
   - ○ h. Dietician
   - ○ i. Unit Assistant/Clerk/Secretary
   - ○ j. Respiratory Therapist
   - ○ k. Physical, Occupational, or Speech Therapist
   - ○ l. Technician (e.g., EKG, Lab, Radiology)
   - ○ m. Administration/Management
   - ○ n. Other, please specify:

5. In your staff position, do you typically have direct interaction or contact with patients?
   - ○ a. YES, I typically have direct interaction or contact with patients.
   - ○ b. NO, I typically do NOT have direct interaction or contact with patients.

6. How long have you worked in your current specialty or profession?
   - ○ a. Less than 1 year
   - ○ b. 1 to 5 years
   - ○ c. 6 to 10 years
   - ○ d. 11 to 15 years
   - ○ e. 16 to 20 years
   - ○ f. 21 years or more

SECTION I: Your Comments

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

APPENDIX B

CONSUMER ASSESSMENT OF HEALTHCARE PROVIDERS AND SYSTEMS

HOSPITAL VERSION

APPENDIX B: HCAHPS

CAHPS® Hospital Survey

SURVEY INSTRUCTIONS

- You should only fill out this survey if you were the patient during the hospital stay named in the cover letter. Do not fill out this survey if you were not the patient.
- Answer all the questions by checking the box to the left of your answer.
- You are sometimes told to skip over some questions in this survey. When this happens you will see an arrow with a note that tells you what question to answer next, like this:

☐ Yes
☑ No → ***If No, Go to Question 1 on Page 1***

You may notice a number on the cover of this survey. This number is ONLY used to let us know if you returned your survey so we don't have to send you reminders.
Please note: Questions 1-22 in this survey are part of a national initiative to measure the quality of care in hospitals.

Please answer the questions in this survey about your stay at the hospital named on the cover. Do not include any other hospital stay in your answers.

YOUR CARE FROM NURSES

1. During this hospital stay, how often did nurses treat you with courtesy and respect?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

2. During this hospital stay, how often did nurses listen carefully to you?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

3. During this hospital stay, how often did nurses explain things in a way you could understand?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

4. During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always
9 ☐ I never pressed the call button

YOUR CARE FROM DOCTORS

5. During this hospital stay, how often did doctors treat you with courtesy and respect?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

6. During this hospital stay, how often did doctors listen carefully to you?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

7. During this hospital stay, how often did doctors explain things in a way you could understand?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

THE HOSPITAL ENVIRONMENT

8. During this hospital stay, how often were your room and bathroom kept clean?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

9. During this hospital stay, how often was the area around your room quiet at night?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

YOUR EXPERIENCES IN THIS HOSPITAL

10. During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan?

1 ☐ Yes
2 ☐ No → **If No, Go to Question 12**

11. How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

12. During this hospital stay, did you need medicine for pain?

1 ☐ Yes
2 ☐ No → **If No, Go to Question 15**

13. During this hospital stay, how often was your pain well controlled?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

14. During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?

1 ☐ Never
2 ☐ Sometimes
3 ☐ Usually
4 ☐ Always

15. **During this hospital stay, were you given any medicine that you had not taken before?**

[1] ☐ Yes
[2] ☐ No ➔ **If No, Go to Question 18**

16. **Before giving you any new medicine, how often did hospital staff tell you what the medicine was for?**

[1] ☐ Never
[2] ☐ Sometimes
[3] ☐ Usually
[4] ☐ Always

17. **Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand?**

[1] ☐ Never
[2] ☐ Sometimes
[3] ☐ Usually
[4] ☐ Always

WHEN YOU LEFT THE HOSPITAL

18. **After you left the hospital, did you go directly to your own home, to someone else's home, or to another health facility?**

[1] ☐ Own home
[2] ☐ Someone else's home
[3] ☐ Another health facility ➔ **If Another, Go to Question 21**

19. **During this hospital stay, did doctors, nurses or other hospital staff talk with you about whether you would have the help you needed when you left the hospital?**

[1] ☐ Yes
[2] ☐ No

20. **During this hospital stay, did you get information in writing about what symptoms or health problems to look out for after you left the hospital?**

[1] ☐ Yes
[2] ☐ No

OVERALL RATING OF HOSPITAL

Please answer the following questions about your stay at the hospital named on the cover. Do not include any other hospital stays in your answer.

21. **Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?**

[0] ☐ 0 Worst hospital possible
[1] ☐ 1
[2] ☐ 2
[3] ☐ 3
[4] ☐ 4
[5] ☐ 5
[6] ☐ 6
[7] ☐ 7
[8] ☐ 8
[9] ☐ 9
[10] ☐ 10 Best hospital possible

22. Would you recommend this hospital to your friends and family?

- [1] ☐ Definitely no
- [2] ☐ Probably no
- [3] ☐ Probably yes
- [4] ☐ Definitely yes

ABOUT YOU

There are only a few remaining items left.

23. In general, how would you rate your overall health?

- [1] ☐ Excellent
- [2] ☐ Very good
- [3] ☐ Good
- [4] ☐ Fair
- [5] ☐ Poor

24. What is the highest grade or level of school that you have completed?

- [1] ☐ 8th grade or less
- [2] ☐ Some high school, but did not graduate
- [3] ☐ High school graduate or GED
- [4] ☐ Some college or 2-year degree
- [5] ☐ 4-year college graduate
- [6] ☐ More than 4-year college degree

25. Are you of Spanish, Hispanic or Latino origin or descent?

- [1] ☐ No, not Spanish/Hispanic/Latino
- [2] ☐ Yes, Puerto Rican
- [3] ☐ Yes, Mexican, Mexican American, Chicano
- [4] ☐ Yes, Cuban
- [5] ☐ Yes, other Spanish/Hispanic/Latino

26. What is your race? Please choose one or more.

- [1] ☐ White
- [2] ☐ Black or African American
- [3] ☐ Asian
- [4] ☐ Native Hawaiian or other Pacific Islander
- [5] ☐ American Indian or Alaska Native

27. What language do you mainly speak at home?

- [1] ☐ English
- [2] ☐ Spanish
- [8] ☐ Some other language (please print): _____

THANK YOU

Please return the completed survey in the postage-paid envelope.

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1/8/09
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