Sammer, Christine E., Culture of Safety in Hospitals: A Three-Part Analysis of Safety Culture, Evidence-Based Practice Guidelines, and Patient Outcomes. Doctor of Public Health (Health Management and Policy), December 2009, 101 pp., 10 tables, 1 figure, references, 115 titles.

This research is a three-part study of the culture of patient safety, evidence-based practice, and patient safety outcomes within the U.S. health care environment. Chapter 2 is a comprehensive review of the safety culture literature using qualitative meta-analysis methods from which a conceptual culture of safety framework and model, including subcultures and properties, was generated. The seven subcultures identified were: leadership, teamwork, evidence-based practice, communication, learning culture, just culture, and patient-centered culture. Chapter 3 further explores evidence-based practice and practice guidelines as components of safety culture. Physician and practice characteristics were examined to identify the effect practice guidelines have on physician practice. The data source was from the third round of the Community Tracking Study, Physician Survey, 2000-2001. An ordinal logistic regression model was estimated to capture the full range of responses. Recent medical school graduates (p<.01), women (p<.01), minorities (p<.001), ob-gyn specialists (p<.01), physicians who use computers for information in their practices (p<.001), and physicians in non-solo practice types (p<.01) were significantly more likely to state practice guidelines had an effect on their practice. Chapter 4 evaluates the effect of teamwork and safety culture

on the patient outcome of falls and falls with injury in 17 hospitals within a large healthcare system. A descriptive, correlational study was conducted with the unit of analysis the individual hospital. Multiple regression models were estimated to determine the role of teamwork and safety culture on falls and falls with injury, and year, facility, and licensed beds fixed-effects were used to control for temporality and unmeasured differences between hospitals. Teamwork climate in hospitals was a strong predictor for decreased falls (p<.001) and falls with injury (p<.05). Care providers knowing the proper channels to direct questions regarding patient safety indicated significant negative associations for falls (p<.01) and falls with injury (p<.001).

CULTURE OF SAFETY IN HOSPITALS: A THREE-PART ANALYSIS OF

SAFETY CULTURE, EVIDENCE-BASED PRACTICE

GUIDELINES, AND PATIENT OUTCOMES

Christine E. Sammer, M.P.H., B.S.N.

APPROVED:

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Major Professor

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Committee Member

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Committee Member

_____
Committee Member

_____
Department Chair

_____
Dean, School of Public Health

CULTURE OF SAFETY IN HOSPITALS: A THREE-PART ANALYSIS OF SAFETY CULTURE, EVIDENCE-BASED PRACTICE GUIDELINES, AND PATIENT OUTCOMES

DISSERTATION

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Christine E. Sammer, M.P.H., B.S.N.

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CHAPTER 1

INTRODUCTION

Research Rationale

The Institute of Medicine (IOM) is a nonprofit organization established in 1970 under the charter of the National Academy of Sciences. The IOM works outside the framework of government to provide independent, objective, evidence-based advice to policymakers, health professionals, the private sector, and the public. Its mission is to serve as adviser to the nation to improve health (Institute of Medicine, 2006).

In 1998, the National Academy of Sciences appointed the IOM Committee on the Quality of Health Care in America to identify strategies for achieving a substantial improvement in the quality of health care delivered to Americans. In response, in late 1999, the National Academies released the report, *To Err Is Human: Building a Safer Health System* (Kohn, Corrigan, & Donaldson, 2000). This report stated one of the leading causes of death and injury in the U.S. was medical errors. The report cited the findings of a major study that found medical errors kill approximately 44,000 people in U.S. hospitals each year and another study found the number to be 98,000. The report went on to say that using the lower estimate, more people died from medical errors each year than from highway accidents, breast cancer, or AIDS (Preventing death, 1999). Said another way, the number of deaths would be equivalent to the lives lost if a fully passengered B737 airplane crashed every day of the year killing all on board.

In response to these findings, and other studies related to patient safety, the IOM laid out a four-tiered approach to improve patient safety:

1. establish a national focus to create leadership, research, tools and protocols to enhance the knowledge base about safety;
2. identify and learn from errors through immediate and strong mandatory reporting efforts, as well as the encouragement of voluntary efforts, both with the aim of making sure the system continues to be made safer for patients;
3. raise standards and expectations for improvements in safety through the actions of oversight organizations, group purchasers, and professional groups; and
4. create safety systems inside health care organizations through the implementation of safe practices at the delivery level (Kohn et al., 2000).

Because creating safety systems was the ultimate target of all the recommendations (Kohn et al.), the IOM committee continued to emphasize that health care organizations must create an environment in which safety becomes a top priority. It defined a "culture of safety" as designing systems geared to preventing, detecting, and minimizing hazards and the likelihood of error and not attaching blame to individuals (Preventing death, 1999). The report stressed the need for executive and clinician leadership and for patient safety accountability by governing boards of trustees. It emphasized that safety principles of standardization and simplification of equipment, supplies, and processes should be adopted (Preventing death).

Two years later, the IOM Committee published a second report: *Crossing the Quality Chasm: A New Health System for the 21st Century* (Committee on Quality of Health Care in America, 2001). Whereas the first report, *To Err is Human*, focused on a single aspect of health care concern, patient safety, the purpose of the second report was to focus more broadly on the U.S. health care delivery system and the need for redesign of that system. The report identified six specific aims for the improvement of the health and functioning of the people of the U.S. The Committee (2001) reported health care should be:

1. Safe—avoiding injuries to patients from the care that is intended to help them.
2. Effective—providing services based on scientific knowledge to all who could benefit and refraining from providing services to those not likely to benefit (avoiding underuse and overuse).
3. Patient-centered—providing care that is respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.
4. Timely—reducing waits and sometimes harmful delays for both those who receive and those who give care.
5. Efficient—avoiding waste, in particular waste of equipment, supplies, ideas, and energy.

6. Equitable—providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location, and socioeconomic status.

It was thought that if health care systems could achieve the above goals, they would be better able to serve the needs of patients with safer and more reliable care. Thus, health care organizations began the process of improving the widespread deficits in patient safety (Leape, Berwick, & Bates, 2002). One strategy leaders used to create a safe environment, was to evaluate their organization's culture (Pronovost & Sexton, 2005). But first, culture needed to be defined. Culture of safety is one of those terms that is heard frequently whenever and wherever discussions on patient safety and quality take place. The term can be defined many ways, but for the purposes of this study, the Agency for Healthcare Research and Quality (AHRQ) definition, from the Health and Safety Commission of Great Britain is used:

> The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures (Organizing for Safety, 1993).

However, the challenge for health care organizations is not in defining culture, but in embracing the concepts; it is in embedding safety culture into the every day work of the organization so that care providers will say, “It is the way we do things around here.”

Statement of Purpose

Ten years after the IOM published its first report, however, health care organizations are still challenged by the goals set forth by the IOM. Leaders ask, “What can we do to assure our patients receive the highest quality and safest care?” “What does it look like to be a safe organization?” “What is a patient safety culture within health care?” and “How do we measure culture—how will we know we have succeeded?”

In an effort to provide leaders with answers to these and other safety culture questions, this study examines the literature around patient safety culture, evidence-based practice, and patient safety outcomes and offers insights that may guide health care leaders as they grapple with the “safety dilemma” within the U.S. health care environment today.

Chapter 2 is a comprehensive review of the culture of safety literature. There is no lack of discussion about culture and safety in the health care arena, however, little work has been published around the development of safety culture frameworks, the implementation of culture properties into practice, the measurement of culture and association with patient outcomes. This study revealed a vast array of cultural

properties that were categorized into subcultures and from which a typology of the literature was developed. The concepts were arranged as a conceptual model designed as an Ishikawa or fishbone diagram.

Within a short time of the *To Err Is Human* report, the U.S. Congress initiated hearings and President Bill Clinton ordered a government-wide feasibility study which lead to a directive to governmental agencies to implement the recommendations of the IOM (Leape et al., 2002). Up to this time, no thorough, evidence-based assessment of the medical literature had been made available to health care professionals, therefore, it fell to AHRQ to collect, organize, and disseminate "best practices" to clinicians (Leape et al.).

Evidence-based practice was identified, in this study's comprehensive literature review, as a subculture of patient safety. Even with the ongoing discussions around utilizing evidence as a safety measure, health care providers continue to show reluctance in accepting practice guidelines that are perceived to be "cookbook." Chapter 3 of this study brings forward an analysis exploring the characteristics that may contribute to the effect practice guidelines have on the practice of medicine.

Often, the perception by health care leaders is that the study of safety culture is a "soft" science. Health services research has been poorly funded and has been slow to recognize and report quantifiable patient safety outcomes associated with organizational safety culture. However, as the research has increased, adding to the body of knowledge, some interesting findings are coming forward.

Some studies have examined the associations between safety culture and central line associated blood stream infections, ventilator-acquired pneumonia, and medication errors, but the research is limited on culture of safety and falls in the hospital setting. Chapter 4 of this study examines the effect of the components of an organization's culture of safety on one clinical outcome, inpatient falls and falls with injury, and attempts to demonstrate the association between quantifiable patient outcomes and safety culture.

In an effort to make the results of this study immediately available to the health care community, Chapters 2, 3 and 4 were developed as independent journal articles with literature reviews and references. Chapter 2 entitled, "What is Patient Safety Culture? A Review of the Literature" is in press for *The Journal of Nursing Scholarship,* the official publication of Sigma Theta Tau International Honor Society of Nursing. Chapter 3, "Physician Characteristics and the Reported Effect of Evidence-Based Practice Guidelines" was published in the April 2008 volume of *Health Services Research.* The chapters were formatted to meet journal expectations and copyright was obtained for each chapter.

A plethora of abbreviations and acronyms are found throughout this study. For the convenience of the reader, a listing of these follows the introduction and can be found in Table 1. Study limitations are addressed in each chapter, as applicable.

Table 1: Abbreviations and Acronyms

AAHP	American Association of Health Plans
ACOG	American College of Obstetrics and Gynecology
AHRQ	Agency for Healthcare Research and Quality
AHS	Adventist Health System
AMA	American Medical Association
AORN	Association of periOperative Room Nurses
CAP	Community-acquired Pneumonia
CDC	Centers for Disease Control and Prevention
CEO	Chief Executive Officer
CINAHL®	Cumulative Index to Nursing & Allied Health Literature®
CMS	Centers for Medicare and Medicaid Services
CPOE	Computerized Physician Order Entry
CTS	Community Tracking Study
DRA	Deficit Reduction Act
DRG	Diagnosis-related group
GDP	Gross Domestic Product
HAC	Hospital-acquired Condition
HMO	Health Management Organization
HSC	Center for Studying Health System Change
IHI	Institute for Healthcare Improvement
ICPSR	Inter-university Consortium for Political and Social Research
IOM	Institute of Medicine
IPPS	Inpatient Prospective Payment System
MEDai	Medical Artificial Intelligence, Inc.®
MEDLINE®	Medical Literature Analysis and Retrieval System Online®
NCG™	National Guideline Clearinghouse™
NPSF	National Patient Safety Foundation
NQF	National Quality Forum
POA	Present on Admission
PSO	Patient Safety Organization
SAQ®	Safety Attitudes Questionnaire®
SPE	Serious Preventable Event
TJC	The Joint Commission
WHO	World Health Organization
VBAC	Vaginal Delivery After Cesarean

CHAPTER 2

WHAT IS PATIENT SAFETY CULTURE? A REVIEW OF THE LITERATURE

Introduction

A review of the patient safety literature must necessarily begin with the seminal IOM report *To Err Is Human: Building a Safer Health System* that found medical errors kill between 44,000 and 98,000 people in U.S. hospitals each year. Using the lower estimate, more people die from medical errors in a year than from highway accidents, breast cancer, or AIDS (Preventing death, 1999). The IOM committee recommended that health care organizations create an environment in which culture of safety is an explicit organizational goal, becomes a top priority, and is driven by leadership (Kohn et al., 2000). In response to the recommendations of the IOM, health care organizations began the process of improving the widespread deficits in patient safety including a focus on organizational safety culture (Leape et al., 2002). This led health care leaders to ask, "how will we know?" when we have created a culture of safety within our hospitals (Pronovost et al., 2006). A first step is to define safety culture. We use the AHRQ definition from the Health and Safety Commission of Great Britain:

> The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management (*Organizing for Safety, 1993).*

While it is not difficult to express safety culture in words, actually knowing and understanding the characteristics that define a safety culture and its implications to health care organizations may be more elusive.

In this review, the authors critically examined the literature to identify studies which address the important beliefs, attitudes and behaviors that are integral to a culture of safety in hospitals. Many authors offered a theoretical framework for a safety culture, however, the review supported the concept that a more comprehensive framework could be designed incorporating a broader range of properties. The purpose of this review was to organize the properties of safety culture addressed by many studies and develop and define a conceptual culture of safety model that could be a valuable tool to support hospital leadership in creating or improving an organizational safety culture.

Methods

The research design was a comprehensive literature review utilizing meta-analysis to develop a typology of the patient safety culture literature and identify key concepts of patient safety culture. To strengthen reliability and validity, two authors agreed to the grouping of the concepts into categories from which we generated a conceptual culture of safety framework with subcultures and properties (Strauss & Corbin, 1990).

A literature search was conducted using Medical Literature Analysis and Retrieval System Online (MEDLINE®). MEDLINE® is the U.S. National Library of

Medicine's® premier bibliographic database that contains over 16 million references to journal articles in life sciences. The great majority of journals are selected for MEDLINE® based on the recommendations of the Literature Selection Technical Review Committee, a National Institutes of Health-chartered advisory committee of external experts (MEDLINE®, 2007). The Database CINAHL®, the authoritative source of information for the professional literature of nursing, allied health, biomedicine, and health care, was also used (CINAHL®, n.d.). Key search words were "hospital safety," "culture of safety," "safety culture," and "safety climate." Limitations were English language, humans, and the years 1999 through 2007. We found a preponderance of literature addressing hospital patient safety culture and reviewed over 200 scholarly journal articles that met the initial criteria. To further narrow the review, we limited criteria to include only U.S. publications and studies conducted in the U.S. We eliminated studies that were specific to disease, medical specialty, technologies, or hospital departments/units resulting in a review of 38 studies.

Findings

We identified a broad range of safety culture properties which we organized into seven subcultures and defined as:

1) Leadership: Leaders acknowledge the health care environment is a high risk environment and seek to align vision/mission, staff competency, fiscal and human resources from the boardroom to the frontline.

2) Teamwork: A spirit of collegiality, collaboration, and cooperation exists among executives, staff, and independent practitioners. Relationships are open, safe, respectful, and flexible.

3) Evidence-Based: Patient care practices are based on evidence. Standardization to reduce variation occurs at every opportunity. Processes are designed to achieve high reliability.

4) Communication: An environment exists where an individual staff member, no matter what his job description, has the right and the responsibility to speak up on behalf of a patient.

5) Learning: The hospital learns from its mistakes and seeks new opportunities for performance improvement. Learning is valued among all staff including the medical staff.

6) Just: A culture that recognizes errors as system failures rather than individual failures and at the same time, does not shrink from holding an individual accountable for his actions.

7) Patient-Centered: Patient care is centered around the patient and family. The patient is not only an active participant in his own care, but also acts as a liaison between the hospital and the community.

The subcultures are diagramed in a conceptual model shown in Figure 1. Table 2 is a typology of culture of safety identifying properties of each subculture which references the supporting literature.

Figure 1

Hospital Culture of Patient Safety

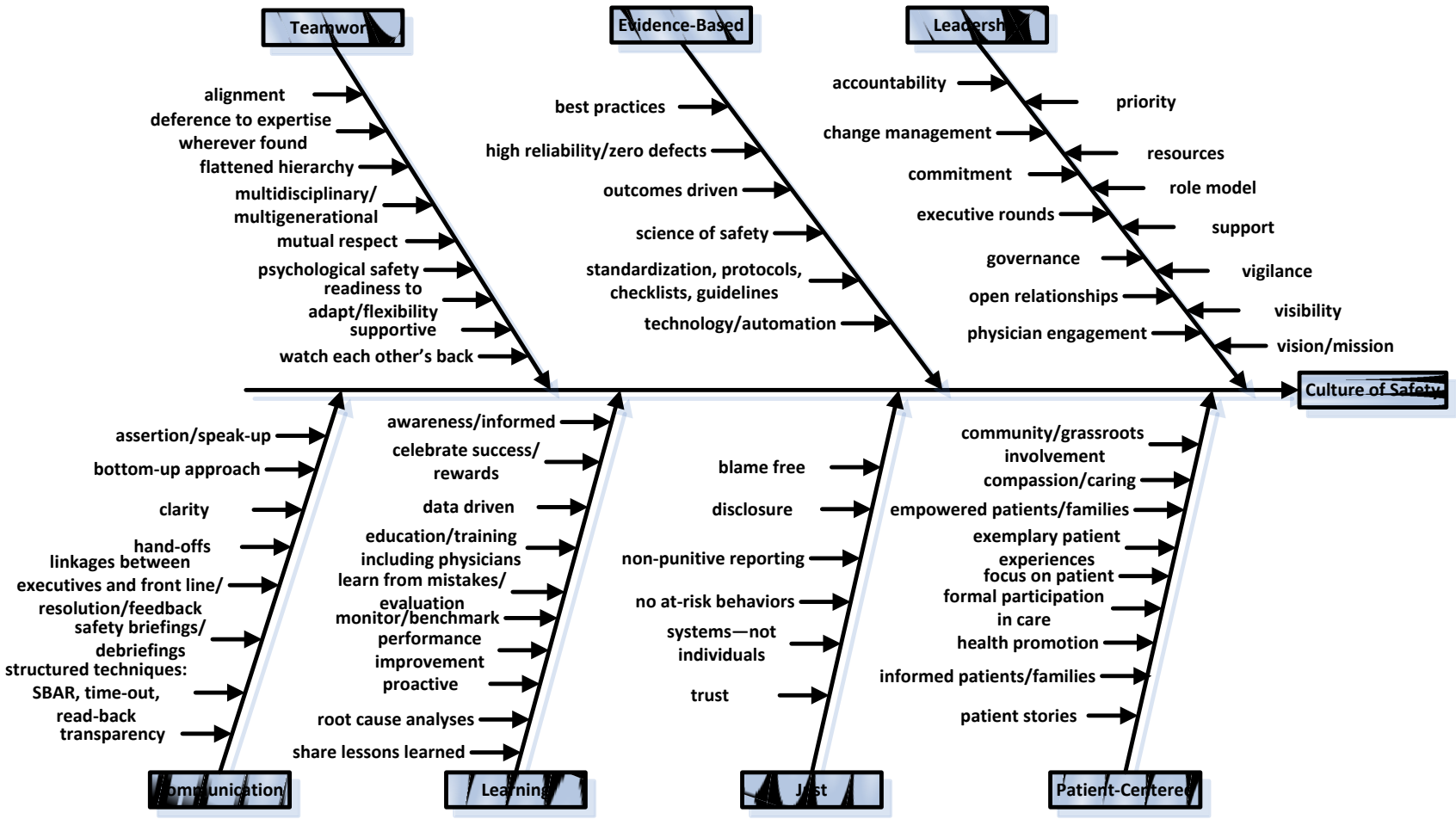

Table 2: Culture of Safety Typology

Subculture	Properties	Studies
Leadership	accountability	Frankel, Gandhi, & Bates (2003) Johnson & Maultsby (2007) Yates et al. (2005)
	change management	DiBella (2001)
	commitment	Cook et al. (2004) Ketring & White (2002) Singer et al. (2002)
	executive rounds	Frankel, Gandhi, & Bates (2003) Thomas et al. (2005) Wittington & Cohen (2004)
	governance	Clarke, Lerner, & Marella (2007) Connor, Ponte, & Conway (2002) Hader (2007)
	open relationships	AORN (2006) Cohen, Eustis, & Gribbins (2003) Morath & Leary (2004)
	physician engagement	Cohen, Eustis, & Gribbins (2003)
	priority	Yates et al. (2005)
	resources	Clarke, Lerner, & Marella (2007) Cook et al. (2004) Frankel, Gandhi, & Bates (2003) Singer et al. (2002) Yates et al. (2005)
	role model	Kaissi (2006)
	support	Ballard (2006) Blake et al. (2006) Odwazny et al. (2005)
	vigilance	Kaissi (2006) Lindblad, Chilcott, & Rolls (2004) McCarthy & Blumenthal (2006) Yates et al. (2005)
	visibility	Pronovost et al. (2003)
	vision/mission	Clarke, Lerner, & Marella (2007) Cook et al. (2004) Pronovost et al. (2003)

Subculture	Properties	Studies
Teamwork	alignment	Frankel, Gandhi, & Bates (2003)
	deference to expertise wherever found	Frankel & Haraden (2004)
	flattened hierarchy	Clarke, Lerner, & Marella (2007)
	multidisciplinary/mutigenerational	AORN (2006) Connor, Ponte, & Conway (2002) Gelinas & Loh (2004) Hansen et al. (2003)
	mutual respect	AORN (2006) Cohen, Eustis, & Gribbins (2003)
	psychological safety	Frankel, Gandhi, & Bates (2003) Morath & Leary (2004)
	readiness to adapt/flexibility	AORN (2006) McCarthy & Blumenthal (2006)
	supportive	AORN (2006)
	watch each other's back	Weinstock (2007)
Evidence-based	best practices	Apold, Daniels, & Sonneborn (2006) Ballard (2006) Clarke, Lerner, & Marella (2007) Frankel, Gandhi, & Bates (2003) Hansen et al. (2003) Ketring & White (2002)
	high reliability/zero defects	Clarke, Lerner, & Marella (2007) Ketring & White (2002) Pronovost et al. (2003)
	outcomes driven	Johnson & Maultsby (2007) Frankel, Gandhi, & Bates (2003) McCarthy & Blumenthal (2006)
	science of safety	Pronovost et al. (2003)
	standardization: protocols, checklists, guidelines	Frankel, Gandhi, & Bates (2003) Ketring & White (2002) McCarthy & Blumenthal (2006) Pronovost et al. (2006)
	technology/automation	Johnson & Maultsby (2007) Nadzam (2005)

Subculture	Properties	Studies
Communication	assertion/speak-up	Clarke, Lerner, & Marella (2007) Weinstock (2007)
	bottom-up approach	Farrell & Davies (2006) McCarthy & Blumenthal (2006)
	clarity	Weinstock (2007)
	hand-offs	Blake et al. (2006) Weinstock (2007)
	linkages between executives and front line/resolution/feedback	Blake et al. (2006) Morath & Leary (2004) Singer et al. (2002) Wittington & Cohen (2004)
	safety briefings/debriefings	Frankel, Gandhi, & Bates (2003) Leonard, Graham, & Bonacum (2004) Wittington & Cohen (2004)
	structured techniques: SBAR, time-out, read-back	Joint Commission Weinstock (2007)
	transparency	DiBella (2001) Frankel, Gandhi, & Bates (2003)
Learning	awareness/informed	Blake et al. (2006) McCarthy & Blumenthal (2006)
	celebrate success/rewards	Kaissi (2006) Yates et al. (2005)
	data driven	Ballard (2006) Frankel, Gandhi, & Bates (2003) Johnson & Maultsby (2007) McCarthy & Blumenthal (2006) Paine et al. (2004)
	education/training including physicians	Blake et al. (2006) Cook et al. (2004) Frankel, Gandhi, & Bates (2003) Johnson & Maultsby (2007) Pronovost et al. (2003) Weinstock (2007)
	learn from mistakes/evaluation	Blake et al. (2006) Farrell & Davies (2006)
	monitor/benchmark	Chavanu (2005) Clarke, Lerner, & Marella (2007) Johnson & Maultsby (2007)

Subculture	Properties	Studies
Learning	performance improvement	Clarke, Lerner, & Marella (2007) Reiling (2004) Wittington & Cohen (2004) Yates et al. (2005)
	proactive	Kaissi (2006) Reiling (2004) Wittington & Cohen (2004)
	root-cause analyses	Apold, Daniels, & Sonneborn (2006) Connor, Ponte, & Conway (2002) Farrell & Davies (2006) Nadzam et al. (2005) Yates et al. (2005)
	share lessons learned	Apold, Daniels, & Sonneborn (2006) DiBella (2001) Pronovost et al. (2003)
Just	blame-free	Blake et al. (2006) DiBella (2001) Reiling (2004)
	disclosure	Clarke, Lerner, & Marella (2007) Connor, Ponte, & Conway (2002) Johnson & Maultsby (2007) Pronovost et al. (2003)
	non-punitive reporting	Blake et al. (2006) Johnson & Maultsby (2007) Nadzam et al. (2005) Pronovost et al. (2003) Reiling (2004) Wittington & Cohen (2004)
	no at-risk behaviors	Clarke, Lerner, & Marella (2007)
	systems—not individuals	Apold, Daniels, & Sonneborn (2006) Kaissi (2006) Wittington & Cohen (2004)
	trust	AORN (2006) Morath & Leary (2004)

Subculture	Properties	Studies
Patient-Centered	community/grassroots involvement	Apold, Daniels, & Sonneborn (2006) Ketring & White (2002)
	compassion/caring	Morath & Leary (2004) Rose et al. (2006)
	empowered patients/families	Reiling (2004)
	exemplary patient experiences	Gelinas & Loh (2004)
	focus on patient	Connor, Ponte, & Conway (2002) Hansen et al. (2003) McCarthy & Blumenthal (2006)
	formal participation in care	Connor, Ponte, & Conway (2002)
	health promotion	Hansen et al. (2003)
	informed patients/families	Clarke, Lerner, & Marella (2007) Pronovost et al. (2003) Reiling (2004)
	patient stories	Morath & Leary (2004)

Culture of Safety Begins with Leadership

It is a difficult task to identify the precise components of what makes a health care organization a safe organization. A common theme running through the literature suggests the role of senior leadership is a key element to designing, fostering, and nurturing a culture of safety. Therefore, we identified leadership as an important subculture. This was particularly exemplified when the National Quality Forum (NQF) adopted "Improving Patient Safety by Creating a Culture of Safety" with a focus on leadership structures and systems (National Quality Forum [NQF], 2006).

Engaged senior leaders are critical to an organization's successful development of a culture of safety. Engaged leaders drive the culture by designing strategy and building structure that guides safety processes and outcomes (Yates et al., 2005). Blake,

Kohler, Rask, Davis, & Naylor (2006) identified administrative leadership as one of the most significant facilitators for establishing and promoting a culture of safety. Dickey (2005), in an editorial on "Creating a Culture of Safety," suggests a culture of safety must begin with the Chief Executive Officer (CEO), but it must also permeate throughout every level of the health care system.

Likewise, lack of leadership has been attributed as a barrier to safety culture. In 2002 Dennis O'Leary, then President of The Joint Commission (TJC), stated hospital CEOs see no business case for patient safety (DeWolf, Hatlie, Pugliese, & Wilson, 2003). In 2004 in an interview with Lucian Leape, the acknowledged father of patient safety, Buerhaus (2004) reported lack of hospital level leadership as a barrier to patient safety. "Most hospital presidents and CEOs are not in the vanguard of safety," Leape stated. As he travels and lectures on patient safety, he sees few CEOs in the audience.

However, we found several examples of hospital leaders that took steps to integrate a safety culture within their organizations. In 2005, top executives of Mercy Health System, St. Louis met to discuss the moral and theological imperatives for creating a culture of safety. They identified improved leadership as a key element to enhance patient safety (Ballard, 2006). Children's National Medical Center in Washington, DC reported a significant improvement in clinical outcomes, but stated improvement would not have occurred without a hospital-wide culture change emphasized by the CEO and Vice President of Patient Services (Chavanu, 2005). Cohen, Eustis, & Gribbins (2003) described how leadership in one community hospital improved

the quality of care by changing the safety culture. Patient safety, with improved outcomes through an approach of targeted process and system improvements, was a strategic focus at Sentara Healthcare, an integrated health care system in Virginia involving the board of directors, senior administrators, and medical staff leaders (Yates et al., 2005).

Whereas strong leadership is often cited as critical to an organization's culture of safety, there are no easy answers as to how leadership can develop or be developed to assure a culture of safety. Five articles cited leadership education as key to an organization's move toward a safety culture. Leaders require basic insight into safety problems and need rationales for focusing on patient safety. They need to be educated on the science of safety and the power of data (Blake et al., 2006; Chavanu, 2005; DeWolf et al., 2003; Johnson & Maultsby, 2007; Ketring & White, 2002).

Teamwork

Teamwork is the second critical subculture we identified. Health care organizations are treating patients with increasingly complex disease processes and with increasingly complex treatments and technologies requiring stronger efforts toward applications of teamwork and collaboration among caregivers to achieve a system-wide culture of patient safety (NQF, 2006).

Frankel & Haraden (2004) describe the original National Aeronautics and Space Administration model for organizational safety as including, "deference to expertise wherever found." This property of teamwork describes a multidisciplinary and

multigenerational approach crossing all ranks, layers, and individuals across an organization (Association of periOperative Room Nurses [AORN], 2006; Cook, Hoas, Guttmannova, & Joyner, 2004; Gelinas & Loh 2004; Hansen et al., 2003).

Evidence-Based

Evidence-based health care is the third subculture we identified. Health care organizations that demonstrate evidence-based best practices, including standardized processes, protocols, checklists, and guidelines, are considered to exhibit a culture of safety (Apold, Daniels, & Sonneborn, 2006; Ballard, 2006; Clarke, Lerner, & Marella, 2007; Frankel, Gandhi, & Bates, 2003; Hansen et al., 2003; Ketring & White, 2002; Odwazny, Hasler, Abrams, & McNutt, 2005; Pronovost et al., 2006; Reiling, 2004).

Health care leaders refer to the aviation industry as a model for safety. Pilots use a standardized checklist before every flight to assure the aircraft, systems, and flight crew are ready and working as designed (Frankel & Haraden, 2004). Interestingly, the World Health Organization (WHO) recently introduced a standardized checklist recommended for use by the operative team before surgical procedures.

Because the medical model of physician autonomy and the "art" of medicine are still prevalent, incorporating best practices and standardization may be leadership's greatest challenge to developing a culture of safety. However, as new generations of physicians are trained, the use of standardized guidelines may become more widely accepted (Sammer, Lykens, & Singh, 2008).

Communication

We identified communication, a fourth subculture, as an integral component of safety culture (Blake et al., 2006; Farrell & Davies, 2006; Hansen et al., 2003; NQF, 2006; Rapala & Kerfoot, 2005). Assertive language such as "I need clarity" (Weinstock, 2007) and structured language are communication techniques critical to a culture of safety. "Read backs" are an example of structured communication that clarifies and provides accuracy of verbal orders. "Time-outs" are another example of structured communication between team members, before an invasive procedure, to verify that the correct procedure, at the correct body site, is being performed on the correct patient (The Joint Commission (a) [TJC], 2009). Hand-off communication is a structured communication method between care providers to assure information is transferred as a cohesive plan between shifts, departments, and units (Blake et al., 2006; Weinstock, 2007).

Frankel et al. (2003) and Leonard, Graham, & Bonacum (2004) suggest implementing forms of communication such as briefings. Briefings are very short discussions at the beginning of procedures to assure all parties are introduced and that equipment, medications, and supporting documents are in place. A debriefing occurs again at the end of a procedure to allow for a review.

Finally, front line staff want to know that communications with managers are heard and acknowledged. Providing feedback or closing the loop builds trust and openness; important properties of a culture of safety (AORN, 2006; Frankel et al., 2003; McCarthy & Blumenthal, 2006; Wittington & Cohen, 2004).

Learning

A culture of learning exists within a hospital when the organizational culture seeks to learn from mistakes and integrates performance improvement processes into the care delivery system (Blake et al., 2006; Farrell & Davies, 2006; Rapala & Kerfoot, 2005; Reiling, 2004; Smith, 2002; Wittington & Cohen, 2004). We found a learning culture to be a fifth subculture.

Learning can begin when leaders demonstrate a willingness to learn, not only from internal sources, but from sources outside health care that have developed and exhibited successful safety cultures (Wittington & Cohen, 2004). A learning culture creates a safety awareness among employees and medical staff and promotes an environment of learning through educational opportunities (Blake et al., 2006; McCarthy & Blumenthal, 2006; Reiling, 2004). Education and training should include, at least , a basic understanding of: 1) the science of safety, 2) what it means to be a high-reliability organization, 3) the value of a safety culture assessment, and 4) the performance improvement process including rapid cycle testing of change (Johnson & Maultsby, 2007; Pronovost et al., 2006; Yates et al., 2005).

A hospital that is "data driven" has opportunity to learn not only from failures but from successes (Blake et al., 2006; Johnson & Maultsby, 2007; McCarthy & Blumenthal, 2006). A hospital should be transparent in reporting identified key safety indicators and results should be posted and updated in a timely manner.

Learning cultures use root-cause analyses to investigate medical errors and near misses (Apold et al., 2006; Connor, Ponte, & Conway, 2002; Farrell & Davies, 2006; Nadzam, Atkins, Waggoner, & Shonk, 2005; Yates et al., 2005). However, as a hospital safety culture matures, learning cultures will become more proactive in identifying and improving potentially unsafe processes to prevent errors. Evaluation of the learning process encourages opportunities to share lessons learned, and considers the education process to be continuous and evolving (Apold et al., 2006; Blake et al., 2006; DiBella, 2001; Farrell & Davies, 2006). A learning culture celebrates and rewards success (Kaissi, 2006 & Yates et al., 2005).

Just

We identified a just culture as a sixth subculture. One way to define just culture is to think of a two-sided scale of justice. One side of the scale is individual accountability and the other side is system failure (Kaissi, 2006). Marx (2008) describes a method useful to health care organizations to determine whether errors are individual failure or system failure by asking four questions: 1) Was the care provider's behavior malicious? 2) Was the care provider under the influence of alcohol or drugs? 3) Was

the care provider aware he was making a mistake? 4) Would two or three of her peers make the same mistake?

Just culture is characterized by trust (AORN, 2006; Morath & Leary, 2004; Singer et al., 2003). It is non-punitive and includes a blame-free error-reporting atmosphere (Blake et al., 2006; Johnson & Maultsby, 2007; Nadzam et al, 2005; Pronovost et al., 2003; Reiling, 2004; Wittington & Cohen, 2004).

Patient-Centered

Patient-centered culture is the seventh subculture we identified. A patient-centered culture embraces the patient and family as the sole reason for the hospital's existence (Connor et al., 2002; Hansen et al., 2003; McCarthy & Blumenthal, 2006). It promises to value the patient by providing a healing environment during the hospitalization and also to promote health and well-being as a continuum of care (Hansen et al.).

It is the responsibility of leadership to commit to patient-centeredness as a core value. Leaders should challenge the medical staff and all employees to make every effort toward focusing on the patient and offering the patient an exemplary experience marked by caring and compassion (Gelinas & Loh, 2004; Morath & Leary, 2004; Rose, Thomas, Tersigni, Sexton, & Pryor, 2006). The patient-centered hospital allows and empowers patients to be participatory in their care decisions (Reiling, 2004). Leaders that share their patient-centered vision with their community allow the community to

feel a sense of pride and ownership of their hospital (Apold et al., 2006; Ketring & White, 2002).

Patient stories can be used to put a "face" on system failures leading to potentially serious adverse events. Stories enhance the richness of description and create an atmosphere where discussion can lead to safety action (Morath & Leary, 2004).

Discussion

Health care, like other organizations, exhibits an organizational culture characterized by commonly defined attributes such as beliefs, attitudes, behaviors, and values (Schein, 1997). Similarly, cultures vary across organizations from department to department, unit to unit, and individual to individual. Recognizing these organizational commonalities and the potential impact culture has on organizational structure, creating a culture of safety in health care may be imperative to any type of safety improvement program (McCarthy & Blumenthal, 2006).

One way to aid health care leaders in an understanding of safety culture, to evaluate the relationship with patient safety indicators, and to maximize the potential of patient safety is to administer a survey (Colla, Bracken, Kinney, & Weeks, 2005; Does your organization, 2006; Johnson & Maultsby, 2007; Nieva & Sorra, 2003; Pronovost & Sexton, 2005; Singer et al., 2003; Weingart, Farbstein, Davis, & Phillips, 2004). However despite the efforts of the National Patient Safety Foundation (NPSF), NQF, AHRQ, TJC, and others, in the early 2000s, few hospital executives had invested resources in a

measurement of their organization's patient safety status or culture of safety (Pronovost et al., 2003).

Policy and Practice Implications

Safety culture is a complex phenomenon. Health care systems and individual hospitals have defined safety culture, surveyed staff including medical staff, developed performance improvement measures surrounding safety outcomes, and designed models and tools to guide and aid in the process. Yet, questions remain unanswered for both the hospital and its community: "Does this hospital provide a safe environment for its patients?" "What will it take to assure the community we are a safe hospital?" "How will we know that our safety improvements have made a difference?"

There are many directions policy makers could take toward improving a culture of safety within U.S. hospitals. McCarthy & Blumenthal (2006) state "policymakers could help stimulate a culture of safety by linking regulatory goals to safety culture expectations, sponsoring collaborations, rewarding safety improvements, better using publicly reported data, encouraging consumer involvement, and supporting research and education."

Hansen et al. (2003) offers suggestions for policy makers: review patient/provider ratio standards and define roles and responsibilities of providers, especially care "extenders" such as physician assistants and nurse practitioners. Leaders must view linkages between organizational culture, a rapidly changing workforce, and financial and quality success (Gelinas & Loh, 2004). Finally, we suggest medical, nursing, and ancillary academicians incorporate safety culture principles into educational curriculums.

The question for policy makers is self-evident. Can a governmental response to patient safety, in the form of regulation and financial incentives/disincentives, provide sufficient impetus to hospital organizations to embrace a culture of patient safety with the ultimate goal of preventing patient harm?

CHAPTER 3

PHYSICIAN CHARACTERISTICS AND THE REPORTED EFFECT OF EVIDENCE-BASED PRACTICE GUIDELINES

Introduction

In 2002, health spending in the U.S. had climbed to 14.9 percent of the gross domestic product (GDP), advancing much faster than the rest of the U.S. economy and is projected to rise to $3-4 trillion or 18.4 percent in 2013 (Centers for Medicare & Medicaid Services (a) [CMS], 2004; Levit, Smith, Cowan, Sensenig, & Catlin, 2004). Concerns about the rapid growth in health expenditures are coupled with disturbing reports, such as those published by the IOM, that attribute up to 98,000 unnecessary inpatient deaths per year due to medical error (Kohn et al., 2000) and suggest Americans are not receiving care that is based on the best scientific knowledge (Committee, 2001). Although the IOM reports contributed significantly to increasing safety and quality awareness issues among healthcare providers, leaders are calling for a national commitment toward improving patient safety and quality of care (Leape & Berwick, 2005).

A promising tool for reducing medical error, improving quality of care, and lowering health care cost is the development and use of evidence-based clinical practice guidelines (Cydulka , Rowe, Clark, Emerman, & Carnargo, 2003; Maue, Segal, Kimberlin, & Lipowski, 2004; Timmermans & Mauck, 2005). Hauck, Adler, and Mulla (2004) found that patients with community-acquired pneumonia (CAP) who were placed on a CAP

clinical practice guideline had a decreased length of stay, lower odds of hospital mortality, and decreased total patient charges. Similarly, researchers found that patients with unstable angina pectoris and non-ST-segment elevation myocardial infarction who received care concordant with evidence-based practice guidelines had substantially improved long-term survival rates (Allen, O'Donnell, Giugliano, Camargo, & Lloyd-Jones, 2004).

In 1999 the American College of Obstetricians and Gynecologists (ACOG) issued a practice guideline on vaginal birth after cesarean section (VBAC) and trial of labor (TOL). The guideline recommended that a physician be immediately available during TOL in the rare case of complications. Since the 1999 update of this clinical practice guideline, obstetrical providers in Utah have decreased use of TOL and more repeat cesarean sections are performed (Gochnour, Ratcliffe, & Stone, 2005). Evidence-based clinical guidelines for acute respiratory tract infections, acute otitis media, and acute sinusitis have been associated with improving quality of care by assisting physicians to accurately diagnose these conditions, provide treatment rationales, and reduce the costs associated with inappropriate antibiotic prescriptions (McCracken, 2001).

While the above examples illustrate compelling evidence for the use of clinical practice guidelines, the preponderance of literature examines reasons for poor implementation and adherence to practice guidelines. There is, additionally, limited research examining the characteristics of the physicians who use practice guidelines.

The purpose of this paper is to identify and explore physician and practice characteristics that contribute to the effect physicians report practice guidelines have on their practice of medicine.

Literature Review

Between 1992 and 1996, the Agency for Health Care Policy and Research (AHCPR), now AHRQ, began publishing clinical practice guidelines for many different health diagnoses and problems (Agency for Healthcare Research and Quality [AHRQ]a, n.d.). AHCPR ended its clinical guidelines program in 1996 and a year later launched its initiative to promote evidence-based practice by establishing 12 Evidence-based Practice Centers (AHRQ b, n.d.). To disseminate the evidence, AHCPR then partnered with the American Medical Association (AMA) and the American Association of Health Plans (AAHP) Foundation to sponsor the development of the National Guideline Clearinghouse™ (NGC™): a world wide web-based database of evidence-based clinical practice guidelines (NGC™, 2005).

The literature supports many barriers to both the implementation of practice guidelines and compliance of use (Cabana, Rand, Powe, Wu, & Wilson, 1999; Halm et al., 2000; Katz, 1999; Pathman, Konrad, Freed, Freeman, & Koch, 1996; Ward et al., 2002). Barriers to adherence were generally focused on physician knowledge about how to access clinical practice guidelines (Liu, Shilkret, & Finelli, 1998), attitudes about guidelines such as loss of autonomy or “cookbook” medicine, and organizational factors

including formats and accessibility (Harris, Mueller, Low, Peplowski, & Koziol-McLain, 2000). A relatively low adherence to guidelines usage was found among students, residents, and medical school faculty (Kogan, Reynolds, & Shea, 2001). One study suggests barriers centered on concern over professional autonomy (Maue et al., 2004).

Methods

Participants

The data for this analysis were obtained from the third round of the Community Tracking Study Physician Survey, 2000-2001 (CTS). The CTS is a longitudinal study conducted by the Center for Studying Health System Change (HSC) and funded by the Robert Wood Johnson Foundation to document changes and track the effects of the evolving U.S. healthcare system over time. The Physician Survey is a component of the CTS. Every two years since 1996, the Gallup Organization has conducted a telephone survey of more than 12,000 physicians from 60 communities that were selected using stratified sampling, with a probability proportional to population size, in order to provide a representative profile of the nation as a whole. The physicians must have spent at least 20 hours per week in direct patient care. Within each site, physicians were randomly selected from sampling frames stratified by primary care physician status. To increase the precision of national estimates, a supplemental sample, selected with stratified probability sampling, was included in the survey. Additionally, primary care physicians were over sampled in the site sample (Health and Medical Care Archive, 2004).

Dependent and Key Independent Variables

The survey question most pertinent to this study and defined as the dependent variable was, "How large an effect does your use of formal, written practice guidelines such as those generated by physician organizations, insurance companies or HMOs, or government agencies have on your practice of medicine?" The key independent variables for this analysis were selected based upon prior research and the literature review. The first of these was the number of years since graduation from medical school. The thinking was that more recent graduates may have had greater exposure during medical school to the use of clinical practice guidelines as a method of practicing evidence-based medicine and additionally, may have had more exposure to information technology as methodologies for learning (Lee et al., 2004; Choudhry, Fletcher, & Soumarai, 2005; Wolfe, Sharp, & Wang, 2004).

Other independent variables were selected based on physician and practice characteristics that may contribute to the development of a clinical practice guideline user profile. Survey questions relevant to this analysis include: practice specialty type such as internal medicine, surgery, or obstetrics (Freed, Pathman, Konrad, Freeman, & Clark, 1998; Waldrop, Prejean, & Singleton 1998; Lee et al., 2004); board certification (Waldrop et al., 1998; Maue et al., 2004); the type of practice such as solo or two-man (Freed et al., 1998; Wolfe et al., 2004); the use of computers to obtain information about treatment alternatives or recommended guidelines; and internet accessibility (Wolfe et al.).

Statistical Analysis

Preliminary analysis was conducted using the public-use data file. Once significant *p*-values were identified, the restricted data-use file was obtained through Inter-university Consortium for Political and Social Research (ICPSR), University of Michigan. The restricted-use version preserves physician anonymity while it contains more variables and is less extensively edited than the public-use files. It contains the sample design variables which allowed calculation of the corrected standard error estimates. The software used for the analyses was Intercooled Stata 8.1™ (STATA™, 2003).

The method of maximum likelihood was used in estimating the ordinal logit coefficients:

$$\text{Ologit (Y)} = \beta_0 + \beta_1\text{Gen} + \beta_2\text{Race} + \beta_3\text{YrGrad} + \beta_4\text{Spec} + \beta_5\text{BdCert} + \beta_6\text{PracType} + B_7\text{Computer} + \beta_8\text{Internet}$$

where:

Y: Probability of the effect of practice guidelines on a physician's practice

Gen: Gender as Female; Male

Race: White/Caucasian; Asian/Pacific Islander; African American/Black; Native American/Alaska Native/Other

Yr Grad: Year of graduation from medical school

Spec: Practice specialty

Bd Cert: Board certification

Prac Type: Type of practice

Computer: Use of computer to obtain information on treatment

Internet: Internet access at place where providing patient care

The dependent variable, the effect of practice guidelines on practice, was measured using a Likert Scale and was ranked as 0 = no effect to 5 = a very large effect. Reference categories for the six categorical independent variables were: white/Caucasian; graduation from medical school before 1961; internal medicine as a medical specialty; and solo or group practice type of no more than 2 physicians.

Findings

Descriptive Statistics

The distributions of the dependent and independent variables are shown in Table 3 along with the proportion estimates and standard errors. Physicians reporting that the use of guidelines had a moderate effect on their practice were the most prevalent response at 33 percent. Slightly more than half (56 percent) of responding physicians stated that practice guidelines had a moderate to very large effect on their practice. The median for medical school graduation years was 1981-1985 at 19.6 percent. About 39 percent of the respondents were practicing in primary care: internal medicine, family practice, and pediatrics. The largest group of respondents was physicians practicing in medical specialties such as cardiology, oncology, or pulmonology. Physicians practicing obstetrics and gynecology were the smallest

population at about 6.3 percent. About 65 percent of the population practiced in a solo or group practice as opposed to practicing within an HMO or as a hospital employee.

Table 3: Descriptive Statistics for Effect of Practice Guidelines on Practice and Independent Variables

	Observations	Est. Prop. (%)	Std. Err.
Practice Guidelines--Ordinal			
No effect	1047	9.35	0.0040
Very small effect	1396	11.37	0.0056
Small effect	2898	23.07	0.0055
Moderate effect	4238	33.43	0.0063
Large effect	2215	17.94	0.0056
Very large effect	576	4.81	0.0029
Gender			
Female	3275	23.55	0.0063
Male	9131	76.44	0.0063
Race			
White/Caucasian	9774	80.23	0.0122
Asian/Pacific Islander	1541	12.33	0.0100
African American/Black	497	3.62	0.0027
Native American/Alaska Native/Other	465	3.80	0.0049
Graduation Year			
1960 or earlier	644	4.24	0.0028
1961-1965	657	5.34	0.0035
1966-1970	853	7.61	0.0033
1971-1975	1349	12.11	0.0048
1976-1980	1989	16.65	0.0051
1981-1985	2338	19.63	0.0054
1986-1990	2230	18.47	0.0061
1991-1995	2037	14.32	0.0054
1996-1998	309	1.58	0.0010

	Observations	Est. Prop. (%)	Std. Err.
Practice Specialty			
Internal Medicine	2542	14.28	0.0058
Family/General Practice	3273	16.98	0.0070
Pediatrics	1802	7.82	0.0025
Medical Specialties	2402	29.35	0.0087
Surgical Specialties	1407	18.83	0.0072
Psychiatry	534	6.46	0.0035
Ob-Gyn	446	6.25	0.0036
Board Certification			
Board Eligible Only/Neither	1526	11.30	0.0063
Board Certified	10838	88.69	0.0063
Practice Type			
Solo/2 physician	4292	35.20	0.0116
Group ≥ 3 physicians	3593	30.22	0.0102
HMO	551	3.78	0.0037
Medical school	970	8.43	0.0063
Hospital-based	1660	11.99	0.0073
Other	1340	10.35	0.0053
Computer Used for Treatment Alternatives			
No	5922	47.08	0.0085
Yes	6469	52.91	0.0085
Internet Access in Office			
No	3049	22.87	0.0079
Yes	9323	77.12	0.0079

Ordinal Logistic Regression

The binary logistic regression methods are applied when there is a categorical response of the simplest possible form—dichotomous. These methods require collapsing data when there are more than two possible values, thus, causing loss in information. A variety of methods have been developed for determining categorical responses that have more than two possible values. The best known and most highly

developed are methods for ordinal response variables, called ordinary logistic regression methods. In this project, initially, binary logistic regression models were estimated to identify factors correlated to the effect of practice guidelines. Then an ordinal logistic regression model was estimated where the full range of the response categories was included. The ordinal model was found to be a better fit to the data and is included in the paper. The fitted model assumes proportional odds for the independent variables for each of the effects variable categories.

Table 4 shows the results of this model. The F statistic of 27 (p<0.001) indicates that the predictive value of this model is significant. Females are significantly more likely to indicate perceived effects of practice guidelines than males (β = -.222, p<0.01). Asians and physicians from the Pacific Islands indicated a strong effect of practice guideline (β = .624, p<0.001) and African American physicians indicated a significant effect of practice guidelines (β = .421, p<0.01). Physicians graduating in 1996 or after are correlated with a strong effect of practice guidelines (β = .513, p<0.01). Three practice specialty categories showed significant findings. Ob-Gyn physicians showed a strong effect of practice guidelines (β =.426, p<0.01) while medical and surgical specialists were less likely to show an effect of guidelines in this ordinal model. All practice types had significant positive logit coefficients when compared with the reference group of solo or two physician practice groups. Physicians who use a

Table 4: Survey Ordinal Logistic Regression Analysis for Effect of Practice Guidelines on Practice

Number of Observations	12,159
F (34, 2685)	27
p-value	<0.0001

Practice Guideline	Coefficient Estimate†	Std. Err.
Gender		
Male	-.222 **	.065
Race		
Asian/Pacific Islander	.624 ***	.071
African American/Black	.421 **	.122
Native American/ Alaskan/Other	.199	.154
Graduation Year		
1961-65	.009	.191
1966-70	.090	.175
1971-75	.050	.153
1976-80	.075	.142
1981-85	.047	.137
1986-90	.178	.142
1991-95	.286	.146
1996--	.513 **	.175
Practice Specialty		
Fam/Gen Pract	-.050	.068
Pediatrics	.045	.074
Medical Spec	-.168 **	.064
Surgical Spec	-.357 ***	.099
Psychiatry	-.056	.112
Ob-Gyn	.426 **	.133
Board Certification	-.121	.069
Practice Type		
Group ≥ 3	.223 **	.068
HMO	.614 ***	.145
Medical School	.275 *	.107
Hospital Based	.156 *	.071
Other	.291 ***	.081
Computer Use	.411 ***	.050
Internet Access	-.039	.058

† The coefficients represent the change in the effect of practice guidelines on the practice of medicine.

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

computer to obtain information about alternative treatments or recommended guidelines showed a significant effect of practice guidelines (β = .411, p<.001).

Threshold coefficients for each of the categories of effect of practice guidelines are shown in Table 5. All of these, except the "moderate effect" category, were significantly different from the "no effect" reference category with the coefficients of small to very small having negative logit coefficients (lower probabilities) and the categories of large to very large effect having positive (higher probabilities) than the "no effect" category.

Table 5: Thresholds for the Effect of Practice Guidelines on Practice as Compared to No Effect

Practice Guideline Effect	Coefficient Estimate	Std. Err.	Wald t-test
Threshold 1 1: Very small effect	-2.167	.155	-13.96*
Threshold 2 2: Small effect	-1.205	.150	-8.01*
Threshold 3 3. Moderate effect	-.065	.146	-0.44†
Threshold 4 4. Large effect	1.469	.149	9.80*
Threshold 5 5. Very large effect	3.272	.157	20.76*

*p < 0.001, †p > 0.05

Discussion

No graduation year from before 1960 to 1995 was significant for effect of guidelines. This may be explained by the fact that practice guideline development and implementation did not begin until the early 1990s. Our results suggest, as the proportion of practicing physicians graduating after 1996 increases, so will the effect of practice guidelines. Because more women have been graduating from medical school in recent years and our results showed that practice guidelines had a greater effect on their practice than on their male colleagues, our findings imply this will also have a positive effect on the use of practice guidelines.

Compared with white/Caucasian physicians, Asian and African American physicians showed significant associations with increased effect of practice guidelines. We do not know why this finding was significant. Perhaps one reason may be that their minority status encourages them to be more attentive to using established medical practices.

A surprising finding was that access to the Internet did not contribute significantly to the model. This may be because prior to 1998, agencies such as the NGC™ did not post their practice guidelines on the Internet. However, computer use to obtain information about treatment and recommended guidelines did contribute significantly to the model. This may be because of increasing third party payer and federal and state requirements for electronic communication of administrative data and

patient health information. Thus, the accessibility of computers in the work environment may lead to increased use of computers for the information gathering.

Several factors, however, were found to have no significant associations on the effect of practice guidelines. In fact, physicians practicing in a medical or surgical specialty were less likely to indicate that practice guidelines had an effect on their practice. This is despite the fact that the literature supports that many medical specialty groups have developed and published practice guidelines specific to their specialty. Medical specialty groups may benefit from further educational efforts to their membership regarding practice guidelines.

No specialty practice area except Ob-Gyn contributed to the likelihood of the effect of guidelines. This specialty is often closely scrutinized in our litigious environment, which may lead to attentiveness to published guidelines.

We found it interesting that board certified physicians are less likely to state practice guidelines had an effect on their practice than non-board certified physicians. This finding may suggest board certified physicians are more secure in their knowledge base and therefore, would be less influenced by guidelines to assist them in their decisions about appropriate health care for specific clinical circumstances.

The findings suggest further research to identify other factors affecting the effect of practice guidelines. More research related to behavior, attitudes, and perceptions related to loss of autonomy would be a valuable addition to the body of knowledge. In addition, we believe the succeeding rounds of the CTS Physician Survey will support our

findings because many of the characteristics correlated to effects of practice guidelines have a temporal aspect.

This study does have limitations. The sample of physicians selected for the survey was not a simple random sample of the population of all physicians. The sampling frame was physicians practicing in designated cities, ranging from very large to small. Therefore, the findings should not be generalized to all physicians, particularly not to those in rural practice. Interpretation of the findings should consider that physicians were asked for perceptions of the impact of practice guidelines on their own practice. No direct measures of this impact were available.

Policy and Practice Implications

Because studies have shown positive correlations between the use of practice guidelines and improved quality and patient safety and decreased costs (Hauck et al., 2004; Gochnour et al., 2005; McCracken, 2001), our findings suggest that there will be positive results on health care as recent graduates, women, and minorities continue to enter the physician workforce. Additionally, as computer usage becomes more prevalent in clinical practice, the influence of guidelines on physician practice will have a positive effect on health care in the U.S.

Policy initiatives such as the promotion or requirement for information technology in health care should reinforce the tendencies found in this study. Furthermore, the introduction and requirements for medical students to learn and use computer technologies from the outset of their clinical training should also increase the effects of guidelines on practice. Additionally, the inclusion of women and minorities in the medical profession reinforces these policy and practice developments.

CHAPTER 4

THE EFFECT OF SAFETY CULTURE ON PATIENT FALLS WITHIN THE ACUTE CARE SETTING

Introduction

Falls among older adults in the home, community, as well as in health care settings are an important public health safety concern. In the U.S. each year, falls occur in more than one third of adults age 65 and older (Hausdorf, Rios, & Edelber, 2001). Englander, Hodson, & Terrengrossa (1996) predict that by 2020, the annual direct and indirect cost of fall injuries is expected to reach $54.9 billion (in 2007 dollars).

In the hospital setting, no one single ICD-9-CM code clearly identifies patients that have suffered a fall of any type; therefore, less is known about falls for hospitalized patients. In FY 2006, the CMS found 2,591 reported cases of hospitalized Medicare patients who fell out of bed accruing an average charge of $24,962 for their hospital stay (Federal Register, 2007).

Health care regulatory and standards agencies have directed their attention toward falls and falls prevention. Preventing falls is one of TJC's National Patient Safety Goals. The Joint Commission also tracks sentinel events which it defines as: an unexpected occurrence involving death or serious physical or psychological injury occurring in a health care setting. Patient falls are the sixth most commonly reported

sentinel event in TJC's Sentinel Event Database occurring at a rate of 6.3 percent (TJC (b), 2009). The NQF has endorsed falls prevention as a safe practice that should be universally utilized in health care settings to reduce the risk of harm to patients (NQF, 2009).

On February 8, 2006 President George W. Bush signed the Deficit Reduction Act (DRA) of 2005. DRA Section 5001 (c) modified Medicare payments for selected health care associated conditions or complications that were deemed as preventable during a patient's hospital stay. Medicare's acute care hospital inpatient prospective payment system (IPPS) encourages hospitals to treat patients efficiently and avoid complications, when possible (CMS (b), 2006). In the FY 2008 IPPS proposed rule, the CMS worked with public health and infectious disease experts from the Centers for Disease Control and Prevention (CDC) to identify a list of hospital-acquired conditions, as required by the DRA, that would meet the following criteria: 1) high cost/high volume or both, 2) result in a diagnosis-related group (DRG) that has a higher payment when present as a secondary diagnosis, and 3) could reasonably have been prevented through the application of evidence-based guidelines. The CMS announced, on August 22, 2007, its selection of eight hospital-acquired conditions. One of these conditions was falls with resulting injuries such as fractures, dislocations, intracranial and crushing injury (Federal Register, 2008). More than ever before, it has become financially imperative that hospital organizations not only monitor quality outcomes such as falls, but that they reduce the number of inpatient falls and falls with injuries.

In 2006, in an effort to focus on and foster safety thinking, 17 Adventist Health System (AHS) hospitals participated in a safety culture assessment. The objective of this study was to evaluate the effect of a hospital's safety culture, specifically on improving patient outcomes, as evidenced by fewer reported falls and falls with injury within the acute care setting. The research question was, "What is the association between a hospital's culture of safety and falls and falls with injuries of inpatients?"

Literature Review

Most research on hospital related falls has focused on falls risk and prevention. It is evident from the literature that hospitals spend a great deal of human and financial resources to prevent patient falls through screening patients at risk and developing, implementing, and evaluating falls prevention programs (Effken et al., 2005; St Pierre, 2006; Sulla & McMyler, 2007). O'Connell and Nyers (2001) and vanderHelm, Goossens, and Bossuyt (2006) even report failed attempts to reduce falls within their organizations.

A review of falls risk factors within the hospital setting found impaired mental status, special toileting needs, impaired mobility, and a history of falling were factors that increased the risk for falling (Evans, Hodgkinson, Lambert, & Wood, 2001). Interestingly, Hitcho, et al. (2004) reported falls risk was not limited to older patients, but also included younger patients, especially when elimination-related activities were involved. Shaw, Drever, Hughes, Osborn, and Williams (2005) found the risk of falls increases with age for patients 70 years of age and older. Fischer et al. (2005) reported

advanced age as a significant predictor of serious injury related to falls in the hospitalized patient and Nurmi, Luthje, and Kataja (2004) found falls account for substantial morbidity and mortality among the elderly in hospitals and long-term care facilities and found no difference in the survival rate between falls with or without injuries. As the population ages, falls will continue to present a threat to patient safety (Poe, Cvach, Gartrell, Radzik, & Joy, 2005).

The role of nursing leadership, both at the administrative and unit level, and patient outcomes is limited. Houser (2003) found teamwork and staff expertise had significant effects on patient outcomes such as falls and medication errors and Boyle (2004) showed nursing units with characteristics of autonomy and collaboration experienced lower rates for falls and pressure ulcers. Others have studied the effect of nurse staffing models on adverse patient outcomes, including falls, and quality of care (McGillis Hall, Doran, & Pink, 2004; Sochalski, 2004).

Two studies examined the relationship between safety culture and the adverse outcome of falls. Sentara Healthcare, an integrated health care system in Virginia recognized that a strong culture of safety, that embedded behavior accountability, was critical to meet organizational expectations for dramatic and sustained improvements. They were able to reduce the rate of falls with injury by 39.8 percent (Yates et al., 2005).

Vogus and Sutcliffe (2007) surveyed the safety culture of registered nurses in 125 nursing units across 13 states. They found high levels of safety organizing behaviors showed a significant negative association to reported patient falls.

Methods

Population and Design

The data were obtained from AHS, the largest not-for-profit, Protestant health care organization in the U.S. consisting of 38 acute care and critical access hospitals in ten states, totaling over 6,600 beds (Adventist Health System, n.d.). Two hundred forty-two clinical areas in seventeen of the 38 hospitals are included in this study. The hospitals are community hospitals located in eight states, two in rural locations. Fifty-nine percent of the hospitals ranged in bed size from 100 to 299 beds. Medicare and managed Medicare, which was used as a proxy for age, was the primary payer in over 70 percent of the admissions. During the study period, changes in senior leadership occurred in 76 percent of the hospitals.

A descriptive, correlational study was conducted, covering the years 2005 through 2008, with the unit of analysis the individual hospital. The study was approved by the institutional review board of the University of North Texas Health Science Center and was considered exempt from review.

Dependent and Independent Variables

The two dependent variables were: 1) falls, measured as a mean of falls per patient days, and 2) falls with injury, measured as a mean of falls with injury per total falls. AHS defines falls as "an incident where a patient is on the ground secondary to an unplanned event." Included in the numerator and the denominator are acute care inpatients, psychiatric, rehabilitation, and skilled nursing facility patients. Outpatients,

visitors, and newborns are excluded from the numerator and denominator. Falls are calculated as the total number of documented falls times 100, divided by total patient days. Falls with injury are calculated as falls with injury, divided by total falls. The falls and falls with injury data for this analysis were made available from Medical Artificial Intelligence, Inc.® (MEDai®), a health information company with a contractual relationship with AHS.

The two key independent variables were domains from a cultural assessment instrument, the Safety Attitudes Questionnaire® (SAQ®): teamwork climate and safety climate. Other independent variables were six cultural assessment questions that rolled up to an aggregate teamwork climate score and seven questions that rolled up to an aggregate safety climate score (Table 6). Three hospital characteristics were considered as possible confounders: hospital size, primary payer, and changes in senior leadership.

Dummy variables were created for the categorical independent variables: year the falls data were collected, the 17 hospitals, licensed beds, Medicare as a primary payer, and senior leadership changes. Additionally, the individual health care worker responses to the cultural assessment instrument were aggregated to the hospital unit level and remained constant over the study period. This created a panel of sampling units allowing a fixed-effects model.

Table 6: SAQ® Teamwork and Safety Climate Items

Abbreviations	Items
Teamwork Climate	Perceived quality of collaboration between personnel
Nurse input	Nurse input is well received in this clinical area.
Difficult to speak up	In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
Disagreements are resolved	Disagreements in this clinical area are resolved appropriately (i.e., not who is right, but what is best for the patient).
Support I need	I have the support I need from other personnel to care for patients.
Easy to ask questions	It is easy for personnel here to ask questions when there is something that they do not understand.
Physicians and nurses work together well	The physicians and nurses here work together as a well-coordinated team.
Safety Climate	Perceptions of a strong and proactive organizational commitment to safety.
Feel safe treated as a patient	I would feel safe being treated here as a patient.
Medical errors are handled appropriately	Medical errors are handled appropriately in this clinical area.
I know proper channels to direct questions	I know the proper channels to direct questions regarding patient safety in this clinical area.
I receive feedback	I receive appropriate feedback about my performance.
It is difficult to discuss errors	In this clinical area, it is difficult to discuss errors.
I am encouraged to report patient safety concerns	I am encouraged by my colleagues to report any patient safety concerns I may have.
Easy to learn from others	The culture in this clinical area makes it easy to learn from the errors of others.

Cultural Assessment Instrument

The instrument used was the SAQ®, a safety culture assessment of the frontline caregiver (Appendix). It is a 39 item questionnaire using a five-point Likert scale: disagree strongly; disagree slightly; neutral; agree slightly; and agree strongly. The

responses to individual SAQ® questions are reported at the unit of analysis as the percent positive score. The SAQ® author has made adjustments for negatively worded assessment questions to match the positively worded items (Sexton et al., 2006).

The SAQ® is the most widely used and formally validated cultural assessment instrument in healthcare. The results are reliable, responsive to interventions, and predictive of clinical and operational outcomes (Sexton et al., 2006). The SAQ® has been used to examine safety culture in hospital intensive care units, operating rooms, and labor and delivery units and it demonstrates linkages to clinical and operational outcomes such as bloodstream infections, ventilator associated pneumonia, post-op sepsis, pressure ulcers, RN turnover, and burnout (Sexton et al.). The SAQ® is the intellectual property of Pascal HealthBench™, Version 1.7 (Pascal Metrics™, 2009) and the cultural assessment data from the SAQ®, referenced in this study, is the property of AHS and is available to this research with permission by the AHS Office of Clinical Effectiveness.

Data Management

Data management was accomplished using STATA™, Version 10.1 (STATA™, 2008). Seventeen data sets for falls, year, hospitals and hospital characteristics, and culture assessment were combined using the append command. The 17 sets contained the same variables, however, the data differed. The data was re-structured by changing observations to variables and variables to observations using the xpose command.

Statistical Analysis

A series of regression models was estimated to determine the combined effects of the independent variables, including the key independent variables of culture, on falls, percent of fall, falls with injury, and percent falls with injury. Year, hospital, and licensed beds fixed-effects were used to control for temporality and unmeasured differences between hospitals. The method of maximum likelihood was used in estimating the coefficients:

$$Y_{jt} = \beta_0 + \beta_1 X_{1t} + \beta_2 X_{2j} + \beta_3 X_{3j} + \beta_4 X_{4jt} + \beta_5 X_{5j} + \beta_6 X_{6j} + \beta_7 X_{7j} + e_{jt}$$

where:

Y_{jt}: Probability of effect of teamwork climate and safety climate on percent of falls and percent of falls with injury in the jth hospital at time t,

X_{1t}: Year at time t,

X_{2j}: jth hospital,

X_{3j}: Number of licensed beds in the jth hospital,

X_{4jt}: Percent of Medicare and managed Medicare as primary payer in the jth hospital at time t,

X_{5j}: Turnover—Changes in senior leadership during study years in the jth hospital,

X_{6j}: Teamwork Climate—Six cultural assessment questions in the jth hospital,

X_{7j}: Safety Climate—Seven cultural assessment questions in the jth hospital,

$e_{jt:}$ Error Term in the jth hospital at time t.

Five of the independent variables were categorical. The reference categories were: the year 2005; hospital 1; licensed beds <100; percent Medicare/managed Medicare <30; and no senior leadership turnover. Statistical significance was examined with *p* values less than 0.05 considered significant and 95 percent confidence intervals.

Findings

Descriptive Statistics

Table 7 shows the distributions of the dependent variables with the mean and standard deviations. The distributions and characteristics of the independent variables are shown with the proportion estimates and the standard errors. The falls mean did not improve over time. In fact, the average number of falls by quarter increased over the four study years from 33 to 35 with the mean of percent of falls staying constant. Falls with injury decreased by two percent. Slightly more than half (59 percent) of the hospitals have between 100 and 299 licensed beds. Medicare was the primary payer for 71 percent of the hospital admissions. There was a change in senior leadership in three out of four of the hospitals over the four year study period. The mean positive responses for teamwork climate and safety climate were 67 percent and 70 percent respectively. The mean positive response for the item, "I would feel safe being treated here as a patient" was 75 percent.

Table 7: Descriptive Statistics for the Dependent Variables of Falls and Falls with Injury per Quarter by Year and Independent Variables

Falls	Mean	Std. Dev.
2005	33.3529	2.4913
2006	33.75	2.4023
2007	33.7059	2.7086
2008	35.4412	2.8612
Percent Falls		
2005	0.0059	0.0019
2006	0.0045	0.0004
2007	0.0043	0.0003
2008	0.0053	0.0008
Falls with Injury		
2005	7.25	0.8716
2006	6.8529	0.8803
2007	6.6618	0.8566
2008	6.9118	0.8068
Percent Falls with Injury		
2005	0.1955	0.0186
2006	0.1768	0.0164
2007	0.1832	0.0142
2008	0.1793	0.0157
Hospital Characteristics	Est. Proportion (%)	Std. Err.
Licensed Beds		
<100	29.1	0.0277
100-199	35.29	0.0290
200-299	23.53	0.0258
≥300	11.76	0.0196
Percent Medicare		
<30	11.76	0.0196
30-40	17.65	0.0232
50-69	47.06	0.0303
≥70	23.53	0.0258
Sr. Leadership Turnover		
No	23.53	0.0258
Yes	76.47	0.0258

Cultural Assessment Items	Mean of % Positive Responses	Std. Dev.
Teamwork Climate	66.8647	7.7633
Nurse input	73.2294	6.2474
Difficult to speak up	17.1941	3.0947
Disagreements are resolved	72.5589	6.3172
Support I need	81.8647	5.3970
Easy to ask questions	87.0412	3.4182
Physicians and nurses work together well	70.6059	8.8609
Safety Climate	69.5765	8.9950
Feel safe treated as a patient	74.6824	11.4740
Medical errors are handled appropriately	81.7941	6.3168
I know proper channels to direct questions	92.1706	3.0041
I receive feedback	77.7353	5.3615
It is difficult to discuss errors	21.4882	4.7316
I am encouraged to report patient safety concerns	81.8647	3.6562
Easy to learn from others	69.1882	6.1045

Multiple Regression

Correlation testing among variables was used to assess the presence and strength of their relationships. A very high correlation between hospitals and safety culture questions was found, likely due to the fact that all the hospitals administered the same cultural assessment and the front line staff answered the same questions. Therefore, the hospital category was dropped out of the models that included the cultural assessment questions because it contributed no significant additional information.

Three regression models were estimated where the full range of the response categories was included. No association was found between hospitals and falls (regression results are not reported but are available from the author). Table 8 demonstrated the effect of hospital characteristics on falls with injury. Two hospitals showed strong negative associations (β = -.1654, p<.001; β = -.2378, p<.001) for falls with injury. The model with the cultural assessment variables was found to be the model with the best fit for the effect of teamwork climate and safety climate on both percent of falls and percent of falls with injury. Table 9 shows the results of culture on percent of falls. The adjusted R-square is not strong, but the F statistic of 2.73 (p<.001) is significant. Teamwork climate (β = -.0043, p<.001) is strongly negatively associated with percent of falls. Two specific items from the cultural assessment also indicate significant negative associations with percent of falls: knowing the proper channels to direct patient safety questions (β = -.0033, p<.01) and receiving appropriate performance feedback (β = -.0021, p<.05).

Table 8: Effect of Hospital Characteristics on Percent of Falls with Injuries

Number of Observations	272
F (19, 252)	7.45
p-value	<0.0000
Adj. R-squared	0.3113

Percent of Falls with Injury	Coefficient Estimate†	Std. Err.
Year		
2006	-0.0186	0.0190
2007	-0.0122	0.0190
2008	-0.0162	0.0190
Hospital		
2	-0.1654 **	0.0480
3	0.0099	0.0392
4	0.1639 **	0.0554
5	-0.0704	0.0392
6	dropped	
7	dropped	
8	-0.0752	0.0679
9	dropped	
10	-0.0790	0.0554
11	dropped	
12	dropped	
13	0.0533	0.0392
14	dropped	
15	0.0690	0.0392
16	-0.2378 ***	0.0554
17	dropped	
Licensed Beds		
100-199	0.1737 ***	0.0392
200-299	0.2080 ***	0.0554
≥300	0.1367 ***	0.0277
Percent Medicare		
30-49	-0.1002 *	0.0392
50-69	-0.1012 **	0.0392
≥70	-0.2543 ***	0.0554
Sr. Leadership Turnover	0.0183	0.0277

† The coefficients represent the change in the effect of hospitals on percent of falls with injury
***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Table 9: Effect of Teamwork Climate and Safety Climate on Percent of Falls

Number of Observations	272
F (18, 253)	2.73
p-value	<0.0003
Adj. R-squared	0.1030

Percent of Falls	Coefficient Estimate†		Std. Err.
Year			
2006	-0.0014		0.0014
2007	-0.0016		0.0014
2008	-0.0007		0.0014
Cultural Assessment			
Teamwork Climate	-0.0043	***	0.0010
Nurse input	0.0009	*	0.0004
Difficult to speak up	-0.0007		0.0005
Disagreements are resolved	0.0009		0.0004
Support I need	-0.0002		0.0004
Easy to ask questions	0.0056	**	0.0016
Physicians and nurses work together well	0.0005		0.0003
Safety Climate	0.0016	*	0.0006
Feel safe treated as a patient	0.0004	*	0.0002
Medical errors are handled appropriately	0.0002		0.0004
I know proper channels to direct questions	-0.0033	**	0.0010
I receive feedback	-0.0021	*	0.0009
It is difficult to discuss errors	-0.0001		0.0003
I am encouraged to report patient safety concerns	0.0014	**	0.0005
Easy to learn from others	-0.0002		0.0004

† The coefficients represent the change in the effect of teamwork climate and safety climate on percent of falls

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Table 10, the effect of culture on percent of falls with injury, shows a stronger model with an *F* statistic of 7.83 ($p<.001$) and an adjusted R-square of 0.31. Teamwork climate ($\beta = -.034$, $p<.05$) and front line workers knowing the proper channels to direct questions regarding patient safety ($\beta = -.0730$, $p<.001$) both indicate significant negative associations for falls with injury.

Discussion

The SAQ® has been shown to be highly reliable in demonstrating the relationship between safety culture and patient outcomes (Colla et al., 2005). This research is the only known study using the SAQ® to examine the effect of safety culture on the patient safety outcome of falls and falls with injury.

AHS hospitals repeated the SAQ® in 2008. Because no significant changes in teamwork or safety climate were observed, those variables were removed from the models. Likewise, no significant changes in falls or falls with injury trends were observed over time.

Medicare was used as a proxy for age with the thinking that a high percentage of Medicare patients would represent an elderly population, and thus, an increased incidence for falls. A surprising negative significant finding was that as Medicare as primary payer increased to 70 percent or greater, falls with injury decreased ($\beta = -.2543$, $p<.001$). This could suggest that hospitals with high proportions of elderly patients may exhibit a high culture of safety.

Table 10: Effect of Teamwork Climate and Safety Climate on Percent of Falls with Injury

Number of Observations	272
F (18, 252)	7.83
p-value	<0.0000
Adj. R-squared	0.3122

Percent of Falls with Injury	Coefficient Estimate†		Std. Err.
Year			
2006	-0.0186		0.0190
2007	-0.0123		0.0190
2008	-0.0162		0.0190
Cultural Assessment			
Teamwork Climate	-0.034	*	0.0143
Nurse input	-0.0079		0.0056
Difficult to speak up	-0.0042		0.0064
Disagreements are resolved	-0.0025		0.0061
Support I need	0.0052		0.0058
Easy to ask questions	0.0679	**	0.0225
Physicians and nurses work together well	0.0038		0.0041
Safety Climate	0.0176	*	0.0086
Feel safe treated as a patient	0.0081	**	0.0025
Medical errors are handled appropriately	0.0038		0.0061
I know proper channels to direct questions	-0.0730	***	0.0144
I receive feedback	-0.0086		0.0130
It is difficult to discuss errors	-0.0003		0.0046
I am encouraged to report patient safety concerns	0.018	**	0.0065
Easy to learn from others	-0.0033		0.0059

† The coefficients represent the change in the effect of teamwork climate and safety climate on percent of falls with injury

***$p < 0.001$, **$p < 0.01$, *$p < 0.05$

Interestingly, falls were strongly positively associated (p<.001) with hospitals greater than 100 beds. This suggests there may be fewer falls in small hospitals as patients may be in closer proximity to the nursing station allowing for faster response time to calls or increased ability for staff to hear patients if they call out for help. Hospital administrators often like the item, "I would feel safe being treated here as a patient" (Pascal Metrics™, 2009). Four out of five front line workers from the units of analysis agreed with this item.

Study findings suggest strong associations between the effect of safety culture, specifically teamwork, on reducing falls and falls with injury within the acute care setting. This result is not surprising as demonstrated teamwork has been found to be integral to a hospital's safety culture (Sammer, Lykens, Singh, Mains, & Lackan, in press). Further research is needed to help understand the extent hospital size, geographic location, senior leader turnover, and Medicare as a proxy for age could have on falls with injury.

There are several limitations to this research. AHS hospitals use standardized definitions for reporting falls, but it is important to recognize the limitations of self-reported data since the actual rate of falls is not independently verified. The SAQ® captures data at the hospital unit level. Since AHS hospitals report falls data at the hospital level, unit level falls data were not available. To determine the full extent of safety culture on patient outcomes, future studies would benefit from data collection and analysis at the unit level. The study was also limited by AHS hospitals having the

choice of participation in the cultural assessment. Even though the hospitals are geographically diverse and of varying size, the findings may not be generalizable to all hospitals within the system or to all U.S. hospitals.

Policy and Practice Implications

The CMS currently categorizes falls with resulting injuries as medical errors or hospital-acquired conditions under which hospitals do not qualify for additional reimbursement surrounding the extra treatment and care caused by the injury. An awareness of unintended consequences is important as health care payers increasingly implement pay-for-performance initiatives. In an effort to eliminate or reduce falls in hospital settings, health care providers may be tempted to increase the use of physical or chemical restraints. Such actions may achieve fewer falls, but could lead to other, unrecognized adverse events.

The Joint Commission and NQF have recommended health care organizations periodically measure their safety culture. Policymakers within an individual hospital or healthcare systems are encouraged to assess and analyze their own safety culture, using cultural assessment instruments such as the SAQ®, and additionally, analyze the correlations between safety culture and patient outcomes.

CHAPTER 5

CONCLUSIONS AND POLICY IMPLICATIONS

Ten years have elapsed following publication of the historic *To Err Is Human: Building a Safer Health System* that suggested medical errors in hospitals are responsible for up to 98,000 unanticipated deaths each year. Forward thinking health care leaders, individually and collectively, began the journey toward improving the widespread deficits in patient safety (Leape et al., 2002) and evaluation of the safety culture within the organization became increasingly recognized as important to achieving safety goals (Pronovost & Sexton, 2005). Leaders administered safety surveys among staff and physicians, developed performance improvement measures surrounding safety outcomes, and designed models and tools in an effort to guide them toward a safer culture. But as reports of egregious medical errors continued to be widely reported in the print, television, and internet media, the public continued to ask, "Are we, or our loved ones, safe from medical error while hospitalized?" And hospital leaders asked, "What will it take to assure the community we are a safe hospital?"

This three-part study addressed safety culture in health care organizations. Safety culture appears to be a nebulous phenomenon and because the literature revealed a need for defining a safety culture structure, Chapter 2 examined the properties of safety culture from which a conceptual framework was developed. Safety culture was categorized into seven subcultures: leadership, evidence-based practice,

teamwork, communication, learning culture, just culture, and patient-centered culture. Leadership was found to be the most important subculture containing properties of: accountability, change management, commitment, governance, open relationships, physician engagement, safety as a priority, sufficient resources, role modeling, support, vigilance, visibility, and safety embedded into the organization's vision/mission.

Evidence-based practice was another important subculture found. A key property of evidence-based practice is standardization of processes in an effort to reduce variation. Protocols, checklists, and guidelines are examples of this type of standardization. Despite the efforts to reduce variation, thus improving quality of care and safety to patients, barriers exist to standardization. Chapter 3 examined standardization in the form of evidence-based practice guidelines. This study suggests standardized practice guidelines have a greater effect in the practice of medicine on physicians who are recent graduates, women, and minorities and as these populations continue to enter the medical profession, there will be positive results in health care.

Further research is needed to identify other factors contributing to the effect of practice guidelines. This study suggests the succeeding rounds of the CTS Physician Survey will support these findings because many of the characteristics correlated to effects of practice guidelines have a temporal aspect.

In Chapter 4, teamwork, another subculture of safety identified in this study, was found to be integral to a hospital's safety culture. The findings suggest strong associations between teamwork and reduction in percent of falls and falls with injury

within the acute care setting. This result is not surprising as the survey instrument used has been shown to be highly reliable in demonstrating the relationship between safety culture and patient outcomes (Colla et al., 2005). Safety culture varies throughout a hospital from unit to unit. Future studies would benefit from data collection and analysis at the unit level to determine the full extent of safety culture on patient outcomes.

There are many directions policy makers could take toward improving a culture of safety within U.S. hospitals. Learnings from this study have generated suggestions that may be helpful to leaders of health care organizations as they continue to make efforts toward creating safer environments for patients. McCarthy & Blumenthal (2006) state "policymakers could help stimulate a culture of safety by linking regulatory goals to safety culture expectations." Currently, TJC requires that hospitals regularly measure the culture of safety within the organization using valid and reliable instruments, track changes over time, and evaluate the impact of patient safety interventions (TJC, 2009). The NQF takes a stronger position requiring hospital leaders to assess their organization's safety culture annually, provide feedback to leaders and staff, and implement interventions focused on target units and domains of safety culture (NQF, 2009).

Federal legislation has driven impetus for patient safety in health care. On October 1, 2008, the CMS enacted new payment provisions for eight selected hospital-acquired conditions (HAC). One of the HACs for which Medicare will not reimburse

hospitals is for injuries sustained during a fall that would be assigned to a higher-paying DRG. More than ever before, it has become financially imperative that hospital organizations decrease the number of inpatient falls and falls with injuries.

Federal incentives for performance improvement occurred in late 2003 with the signing of the Medicare Prescription Drug, Improvement, and Modernization Act (MMA). Hospitals were financially incentivized to report designated quality measures in order to receive a higher annual update to their payment rates. In FY 2007, nearly 95 percent of U.S. hospitals successfully participated in the program.

Similarly, the Patient Safety and Quality Improvement Act of 2005 (Patient Safety Act), which authorized the creation of Patient Safety Organizations (PSO), was designed to encourage health care organizations to voluntarily report and share data on patient safety events without fear of legal discovery. It remains to be seen how hospitals will respond to these federal or state pressures for full disclosures of patient safety initiatives and/or adverse events.

Federal, state, and third party payer requirements around information systems technology is increasing. Policy initiatives, such as the promotion or requirement for information technology in healthcare, should reinforce the tendencies found in this study. Computerized physician order entry (CPOE) has the potential to impact standardization of care through evidence-based, pre-selected order sets and electronic prompts when prescribing choices are not supported by evidence. Aarts and Koppel

(2009) found the advantages of CPOE to be compelling even though implementation is slower and more problematic than anticipated with adoption rates of 20 percent or less.

Academic institutions could provide opportunities for research and learning around the science of safety. Since health care providers, in the practice environment, are being held to principles of safety culture such as evidence-based practice, standardization, and disclosure of adverse events, it is suggested that accrediting organizations require academic institutions to incorporate safety principles education and training into the core curricula. Similarly, health care organizations, themselves, should design new employee orientations to include safety principles. All physicians, whether house staff, contracted, or independent practitioners, should receive training on the safety culture including leadership, teamwork, and communication skills.

This study suggests patient-centered efforts may add robustness to an organization's safety culture. Hospital policymakers should consider engaging patients and families, as consumers of health care, in hospital activities. Patients could contribute to performance improvement teams, quality committees, and focus groups. Patients could serve in official capacities as liaisons between the hospital and the community. Patients could "tell the stories," putting a "face" onto data, thus contributing to safety awareness and culture change.

Finally, collaborative efforts across hospitals and systems should be encouraged. Organizations such as the Institute for Healthcare Improvement (IHI), AHRQ, NQF, TJC, NPSF, and others are leading the way toward a safer health care system. Ten years after the IOM report, it is imperative that health care leaders answer the question, "Is health care safer today?" with a resounding, "Yes!"

REFERENCES

Aarts, J. & Koppel, R. (2009). Implications of computerized physician order entry in seven countries. *Health Affairs (Millwood), 28*(4), 1231-1232.

Adventist Health System about us. (n.d.). Retrieved November 9, 2009, from http://www.adventisthealthsystem.com/AboutUs.aspx

Agency for Healthcare Research and Quality (a). (n.d.). *Clinical practice guidelines online.* Retrieved on October 26, 2004, from http://www.ahrq.gov/clinic/cpgonline.htm

Agency for Healthcare Research and Quality (b). (n.d.). *Evidence-based practice centers.* Retrieved on May 23, 2005, from http://www.ahrq.gov/clinic/epc

Allen, L. A., O'Donnell, C. J., Giugliano, R. P., Camargo, C. A., Jr, & Lloyd-Jones, D. M. (2004). Care concordant with guidelines predicts decreased long-term mortality in patients with unstable angina pectoris and non-ST-elevation myocardial infarction. *American Journal of Cardiology, 93*(10), 1218-1222.

Apold, J., Daniels, T. & Sonneborn, M., (2006). Promoting collaboration and transparency in patient safety. *Journal on Quality and Patient Safety, 32*(12), 672-675.

Association of periOperative Registered Nurses [AORN]. (2006). AORN guidance statement: Creating a patient safety culture. *AORN Journal, 83*(4), 936-941.

Ballard, L. (2006). Putting safety at the core. *Health Progress 87*(1), 29-34.

Blake, S. C., Kohler, S., Rask, K., David, A., & Naylor, D. (2006). Facilitators and barriers to 10 national quality forum safe practices. (*American Journal of Medical Quality, 21*(5), 323-334.

Boyle, S. M. (2004). Nursing unit characteristics and patient outcomes. *Nursing Economics, 22*(3), 111-119, 123.

Buerhaus, P. (2004). *Lucian Leape on patient safety in U.S. hospitals, 36*(4) 366-370.

Cabana M. D., Rand, C. S., Powe, N. R., Wu, B. W., Wilson, M. H., Abboud, P. C., & Rubin, H. R. (1999). Why don't physicians follow clinical practice guidelines? *Journal of the American Medical Association, 282*(15), 1458-1465.

Centers for Medicare & Medicaid Services (a). (2004). *National health care expenditure*. Retrieved on May 4, 2005, from http://www.cms.hhs.gov/publications/overview-medicare-medicaid/default2.asp

Centers for Medicare & Medicaid Services (b). (2006). Deficit Reduction Act. Retrieved February 8, 2008, from http://www.cms.hhs.gov/DeficitReductionAct/

Chavanu, K. (2005). Culture change is critical part in improved outcomes, underscores opportunities for improvement. *Health Care Benchmarks and Quality Improvement , 12*(17), 78-79.

Choudhry, N. K., Fletcher, R. H., & Soumerai, S. B. (2005). Systematic review: The relationship between clinical experience and quality of health care. *Annals of Internal Medicine, 142*(4), 260-73.

CINAHL® database. (n.d.). *CINAHL® Database, The*. Retrieved January 4, 2008, from http://www.ovid.com/site/catalog/DataBase/40.jsp

Clarke, J. R., Lerner, J. C., & Marella, W. (2007). The role for leaders of health care organizations in patient safety. *American Journal of Medical Quality, 22*(5), 311-318.

Cohen, M. M., Eustis, M. A., & Gribbins, R. E. (2003). Changing the culture of patient safety: Leadership's role in health care quality improvement. *Joint Commission Journal on Quality and Safety, 29*(7), 329-335.

Colla, J. B., Bracken, A. C., Kinney, L. M., & Weeks, W. B. (2005). Measuring patient safety climate: A review of surveys. *Quality & Safety in Health Care*, *14*(5), 364-366.

Committee on Quality of Health Care in America. (2001). *Crossing the quality chasm: A new health system for the 21st century.* Washington, D.C.: National Academy Press.

Connor, M., Ponte, P. R., & Conway, J. (2002). Multidisciplinary approaches to reducing error and risk in a patient care setting*. Critical Care Nursing Clinics of North America, 14,* 359-367.

Cook, A. F., Hoas, H., Guttmannova, K., & Joyner, J. C. (2004). An error by any other name. *American Journal of Nursing, 104*(6), 32-43.

Cydulka R. K., Rowe, B. H., Clark, S., Emerman, C. L., & Camargo, C.A. (2003). Emergency department management of acute exacerbations of chronic obstructive pulmonary disease in the elderly: The multicenter airway research collaboration. *Journal of the American Geriatric Society, 51*, 908-16.

DeWolf, L. K., Hatlie, M. J., Pugliese, G., & Wilson, N. J. (2003). What is working in patient safety? *Joint Commission Journal on Quality and Safety, 29*(7), 327-328.

DiBella, A. (2001). Reducing health risk. *Health Forum Journal,* July/August*,* 16-28.

Dickey, N. W. (2005). Creating a culture of safety. *Journal of Patient Safety, 1*(2), 75.

Does your organization have a 'culture of safety'? Here's how to find out. (2006). *Hospital Peer Review*, *31*(3), 29-33.

Effken, J. A., Brewer, B. B., Patil, A., Lamb, G. S., Verran, J. A., & Carley, K. (2005). Using OrgAhead, a computational modeling program, to improve patient care unit safety and quality outcomes. *International Journal of Medical Informatics, 74*(7-8), 605-613.

Englander, R., Hodson, R. J., & Terrengrossa, R. A. (1996). Economic dimensions of slip and fall injuries. *Journal of Forensic Science, 41*, 733-746.

Evans, D., Hodgkinson, B., Lambert, L., & Wood, J. (2001). Falls risk factors in the hospital setting: A systematic review. *International Journal of Nursing Practice, 7,* 38-45.

Farrell, V. E. & Davies, K. A. (2006). Shaping and cultivating a perioperative culture of safety. *AORN Journal, 84*(5), 857-860.

Federal Register. (2008). *Federal Register*, 72(162), 47200-47218. Retrieved February 8, 2008, from http://www.gpoaccess.gov/fr/retrieve.html

Fischer, I. D., Krauss, M. J., Dunagan, W. C., Birge, S., Hitcho, E., Johnson, S. et al. (2005). Patterns and predictors of inpatient falls and fall-related injuries in a large academic hospital. *Infection Control and Hospital Epidemiology, 26*(10), 822-827.

Frankel, A., Gandhi, T. K., & Bates, D. W. (2003). Improving patient safety across a large integrated health care delivery system. *International Journal for Quality in Health Care, 15*(Suppl 1), 31-40.

Frankel, A. & Haraden, C. (2004). Shuttling toward a safety culture: healthcare can learn from probe panel's findings on the Columbia disaster. *Modern Healthcare, 34*(1), 21.

Freed, G. L., Pathman, D. E., Konrad, T. R., Freeman, V. A., & Clark, S. J. (1998). Adopting immunization recommendations: A new dissemination model. *Maternal and Child Health Journal, 2*(4), 231-39.

Gelinas, L. S. & Loh, D. Y. (2004). The effect of workforce issues on patient safety. *Nursing Economics, 22*(5), 266-272.

Gochnour, G., Ratcliffe, S., & Stone, M. B. (2005). The UTAH VBAC Study. *Maternal & Child Health Journal, 9*(2), 181-88.

Hader, R. (2007). Get your board on board. *Nursing Management,* June, 32-36.

Halm, E. A., Atlas, S. J., Borowsky, L. H., Benzer, T. I., Metlay, J. P., Chang, Y. C., et al. (2000). Understanding physician adherence with a pneumonia practice guideline: Effects of patient, system, and physician factors. *Archives of Internal Medicine, 160*, 98-104.

Hansen, M. M., Durbin, J., Sinkowitz-Cochran, R., Vaughn, A., Langowski, M., & Gleason, S. (2003). Do no harm: Provider perceptions of patient safety. *Journal of Nursing Administration, 33*(10), 507-508.

Harris, J. S., Mueller, K., Low, P., Peplowski, B., & Koziol-McLain, J. (2000). Suggested improvements in practice guidelines: Market research to support clinical quality improvement. *Journal of Occupational & Environmental Medicine, 42*(4), 377-84.

Hauck L. D., Adler, L. M., & Mulla, Z. D. (2004). Clinical pathway care improves outcomes among patients hospitalized for community-acquired pneumonia." *American Journal of Epidemiology, 14*(9), 669-75.

Hausdorff, J. M., Rios, D. A., & Edelber, H. K. (2001). Gait variability and fall risk in community-living older adults: A 1 – year prospective study. *Archives of Physical Medicine and Rehabilitation, 82*(8), 1050-1056.

Health and Medical Care Archive. (n.d.). Retrieved on October 17, 2004 from http://www.icpsr.umich.edu/HMCA

Hitcho, E. B., Krauss, M. J., Birge, S., Dunagan, W. C., Fischer, E., Johnson, S., et al. (2004). Characteristics and circumstances of falls in a hospital setting. *Journal of General Internal Medicine, 19*, 732-739.

Houser, J. (2003). A model for evaluating the context of nursing care delivery. *Journal of Nursing Administration, 33*(1), 39-47.

Institute of Medicine (IOM) of the National Academics of Sciences. (2006). *Mission*. Retrieved January 5, 2008, from http://www.iom.edu

Johnson, K. & Maultsby, C. (2007). A plan for achieving significant improvement in patient safety. *Journal of Nursing Care Quality, 22*(2), 164-171.

Kaissi, A. (2006). An organizational approach to understanding patient safety and medical errors. *The Health Care Manager, 25*(4), 292-305.

Katz, D. A. (1999). Barriers between guidelines and improved patient care: An analysis of AHCPR's unstable angina clinical practice guideline. *Health Services Research, 34*(1Pt 2), 377-89.

Ketring, S. P. & White, J. P. (2002). Developing a systemwide approach to patient safety: The first year. *Journal on Quality Improvement, 28*(6), 287-295.

Kohn, L. T., Corrigan, J. M., & Donaldson, M. S. (Eds.). (2000). *To err is human: Building a safer health system.* Washington, D.C.: National Academy Press.

Kogan, J. R., Reynolds, E. E., & Shea, J. A. (2001). Ongoing physician performance—How do we know? Resident and faculty adherence to common guidelines. *Academic Medicine, 76*(10), S27-S29.

Leape, L. L. & Berwick, D. M. (2005). Five years after *To Err Is Human*: What have we learned? *Journal of the American Medical Association, 293*(19), 2384-90.

Leape, L. L., Berwick, D. M., & Bates, D. W. (2002). What practices will most improve safety? Evidence-based medicine meets patient safety. *Journal of the American Medical Association*, *288*(4), 501-507.

Lee, K. C., Finkelstein, J. A., Miroshnik, I. L., Rusinak, D., Santoli, J. M., Lett, S. M., & Lieu, T. A. (2004). Pediatricians' self-reported clinical practices and adherence to national immunization guidelines: The introduction of pneumococcal conjugate vaccine. *Archives of Pediatric and Adolescent Medicine, 158*(7), 695-701.

Leonard, M., Graham, S. & Bonacum D. (2004). The human factor: The critical importance of effective teamwork and communication in providing safe care. *Quality and Safety in Health Care, 13*(Suppl 1), 85-90.

Levit, K., Smith, C., Cowan, C., Sensenig, A., & Catlin, A. (2004). Health spending rebound continues in 2002. *Health Affairs, 23*(1), 147-59.

Lindblad, B., Chilcott, J., & Rolls, L. (2004). Mary Lanning Memorial Hospital: Communication is key. *Joint Commission Journal on Quality and Safety,30*(10), 551-558.

Liu, Z., Shilkret, K. L., & Finelli, L. (1998). Initial drug regimens for the treatment of tuberculosis: Evaluation of physician prescribing practices in New Jersey, 1994 to 1995. *Chest, 113*(6), 1446-51.

Marx, D. *Patient safety and the 'Just Culture': A primer for health care executives.* Medical Event Reporting System for Transfusion Medicine. Retrieved January 30, 2008, from http://www.mers-tm.net/support/Marx_Primer.pdf

Maue, S. K., Segal, R., Kimberlin, C. L., & Lipowski, E. E. (2004). Predicting physician guideline compliance: An assessment of motivators and perceived barriers. *American Journal of Managed Care, 10*(6), 383-91.

McCarthy, D. & Blumenthal, D. (2006). Stories from the sharp end: Case studies in safety improvement. *The Milbank Quarterly, 84*(1), 165-200.

McCracken, G. H., Jr. (2001). Clinical practice guidelines for the diagnosis and treatment of respiratory tract infections. *American Journal of Managed Care, 7*(6 Suppl), S183-91.

McGillis Hall, L., Doran, D., & Pink, G. H. (2004). Nurse staffing models, nursing hours, and patient safety outcomes. *Journal of Nursing Administration, 34*(1), 41-45.

MEDLINE®. (2007). *Fact sheet.* Retrieved January 4, 2008, from http://www.nlm.nih.gov/pubs/factsheets/medline.html

Morath, J. & Leary, M. (2004). Creating safe spaces in organizations to talk about safety. *Nursing Economics, 22*(6), 344-354.

Nadzam, D., Atkinds, P. M. Waggoner, D. M. & Shonk, R. (2005). Cleveland clinic health system: A comprehensive framework for a health system patient safety initiative. *Quality Management in Health Care, 14*(2), 80-90.

National Guideline Clearinghouse™. (n.d.). Retrieved on July 24, 2005, from http://www.ahrq.gov/clinic/ngcfact.htm

National Quality Forum. (2006). *Safe practices for better healthcare.* Washington, DC: National Quality Forum.

National Quality Forum. (2009). *Safe Practices for Better Healthcare–2009 Update: A Consensus Report.* Washington, DC: National Quality Forum

Nieva, V. F. & Sorra, J. (2003). Safety culture assessment: A tool for improving patient safety in healthcare organizations. *Quality and Safety in Health Care, 12,* ii17-ii23. Retrieved August 18, 2009, from http://qshc.bmj.com/content/12/suppl_2/ii17.full.pdf

Nurmi, I. S., Luthje, P. M., & Kataja, J. M. (2004). Long-term survival after falls among the elderly in institutional care. *Archives of Gerontology & Geriatrics, 38(*1), 1-10.

O'Connell, B., & Nyers, H. (2001). A failed fall prevention study in an acute care setting: Lessons from the swamp. *International Journal of Nursing Practice, 7,* 126-130.

Odwazny, R., Hasler, S., Abrams, R., & McNutt. R. (2005). Organizational and cultural changes for providing safe patient care. *Quality Management in Health Care, 14*(3), 132-143.

Organizing for safety: Third report of the ACSNI (Advisory Committee on the Safety of Nuclear Installations) study group on human factors. (1993). *Health and Safety Commission (of Great Britain).* Sudbury, England: HSE Books.

Paine, L.A., Baker, D.R., Rosenstein, B., & Pronovost, P. J. (2004). The Johns Hopkins Hospital: Identifying and addressing risks and safety issues. *Joint Commission Journal on Quality and Safety, 30*(10), 543-550.

Pascal HealthBench™ Version 1.7. (2009). Pascal Metrics Inc. Washington, DC.

Pathman, D. E., Konrad, T. R., Freed, G. L., Freeman, V. A., & Koch, G. G. (1996).The awareness-to-adherence model of the steps to clinical guideline compliance: The case of pediatric vaccine recommendations. *Medical Care, 34*(9), 873-89.

Poe, S. S., Cvach, M. M., Gartrell, D. G., Radzik, B. R., & Joy, T. L. (2005). An evidence-based approach to fall risk assessment, prevention, and management. *Journal of Nursing Care Quality, 20*(2), 107-116.

Preventing death and injury from medical errors requires dramatic, system-wide changes. (1999). Retrieved January 4, 2008, from http://www8.nationalacademies.org/onpinews/newsitem.aspx?RecordID=9728

Pronovost, P., Holzmueller, C. G., Needham, D. M., Sexton, J. B., Miller, M. Berenholtz, S., Wu, A. W., Perl, T. M., Davis, R., Baker, D., Winner, L. & Morlock, L. (2006). How will we know patients are safer? An organization-wide approach to measuring and improving safety. *Critical Care Medicine, 34*(7), 19881995.

Pronovost, P., & Sexton, B. (2005). Assessing safety culture: Guidelines and recommendations. *Quality and Safety in Health Care, 14*, 231-233.

Pronovost, P. J., Weast, B., Holzmueller, C. G., Rosenstein, B. J., Kidwell, R. P., Haller, K. B., et al. (2003). Evaluation of the culture of safety: Survey of clinicians and managers in an academic medical center. *Quality & Safety in Health Care*, *12*, 405-410.

Rapala, K. & Kerfoot, K.M. (2005). From metaphor to model: The clarion safe passage program. *Nursing Economics, 23*(4), 200-203.

Reiling, J. (2004). Facility design focused on patient safety. *Frontiers of Health Services Management, 21*(1), 41-46.

Rose, J. D., Thomas, C. S., Tersigni, A., Sexton, J. B. & Pryor, D. (2006). A leadership framework for culture change in health care. *Joint Commission Journal on Quality and Patient Safety, 32*(8), 433-442.

Sammer, C. E., Lykens, K., & Singh, K. P. (2008). Physician characteristics and the reported effect of evidence-based practice guidelines. *Health Services Research, 43*(2), 569-581.

Sammer, C. E., Lykens, K., Singh, K. P., Mains, D. A., & Lackan, N. A. (in press). What is patient safety? A review of the literature. *Journal of Nursing Scholarship.*

Schein, E. (1997) *Organizational culture and leadership.* Retrieved February 19, 2009 from http://www.tnellen.com/ted/tc/schein.html.

Sexton, J. B., Helmreich, R. L., Neilands, T. B., Rowan, K., Vella, K., Boyden, J., et al. (2006). The safety attitudes questionnaire: Psychometric properties, benchmarking data, and emerging research. *BMC Health Services Research, 6(*44).

Shaw, R., Drever, F., Hughes, H., Osborn, S., & Williams, S. (2005). Adverse events and near miss reporting in the NHS. *Quality & Safety in Health Care, 14*(4), 279-283.

Singer, S. J., Gaba, D. M., Geppert, J. J., Sinaiko, A. D., Howard, S. K., & Park, K. C. (2003). The culture of safety: Results of an organization-wide survey in 15 California hospitals. *Quality & Safety in Health Care*, *12*, 112-118.

Smith, A. P. (2002). In search of safety: An interview with Gina Pugliese. *Nursing Economics, 20*(1), 6-12.

Sochalski, J. (2004). Is more better? The relationship between nurse staffing and the quality of nursing care in hospitals. *Medical care, 42*(2 Suppl), 67-73.

STATA™ *Inter-Cooled Stata 8.1* (2003). StataCorp. College Station, TX.

STATA™ Version 10.1. (2008). StataCorp. College Station, TX.

St Pierre, J. (2006). Staff nurses' use of report card data for quality improvement: First steps. *Journal of Nursing Care Quality*, *21*(1), 8-14.

Strauss, A. & Corbin, J. (1998). Basics of qualitative research: Techniques and procedures for developing grounded theory. Thousand Oaks, CA.: Sage Publications.

Sulla, S. J., & McMyler, E. (2007). Falls prevention at Mayo Clinic Rochester: A path to quality care. *Journal of Nursing Care Quality*, *22*(2), 138-144.

The Joint Commission (a). (2009). Standards. Retrieved February 16, 2009, from http://www.jointcommission.org/

The Joint Commission (b). (2009). Sentinel event statistics. Retrieved October 24, 2009, from http://www.jointcommission.org/NR/rdonlyres/67297896-4E16-4BB7-BF0F-5DA4A87B02F2/0/se_stats_trends_year.pdf

Thomas, E. J., Sexton, J. B., Neilands, T. B. Frankel, A. & Helmreich, R. L. (2005). The effect of executive walk rounds on nurse safety climate attitudes: A randomized trial of clinical units. *BMC Health Services Research 5*(28) accessed http://www.biomedcentral.com 1472-6963/5/28 on May 19, 2007.

Timmermans, S. & Mauck, A. (2005). The promises and pitfalls of evidence-based medicine. *Health Affairs, 24*(1): 18-28.

vanderHelm, J., Goossens, A., & Bossuyt, P. (2006). When implementation fails: The case of a nursing guideline for fall prevention. *Joint Commission Journal on Quality & Patient Safety, 32*(3), 152-160.

Vogus, T. J. & Sutcliffe, K. M. (2007). The Safety Organizing Scale: Development and validation of a behavioral measure of safety culture in hospital nursing units. *Medical Care, 45*(1), 46-54.

Waldrop, R. D., Prejean, C. & Singleton, R. (1998). Overuse of parenteral antibiotics for wound care in an urban emergency department. *American Journal of Emergency Medicine, 16*(4), 343-45.

Ward, M. M., Vaughn, T. E., Uden-Holman, T., Doebbeling, B. N., Clarke, W. R., & Woolson, R. F. (2002). Physician knowledge, attitudes and practices regarding a widely implemented guideline. *Journal of Evaluation in Clinical Practice, 8*(2), 155-62.

Weingart, S. N., Farbstein, K., Davis, R. B., & Phillips, R. S. (2004). Using a multihospital survey to examine the safety culture. *Joint Commission Journal on Quality & Safety*, *30*(3), 125-132.

Weinstock, M. (2007). Can your nurses stop a surgeon? *H & HN September,* 3848.

Wittington, J. & Cohen, H. (2004). OSF healthcare's journey in patient safety. *Quality Management in Health Care, 12*(1), 53-59.

Wolfe, R. M., Sharp, L. K., & Wang, R. M. (2004). Family physicians opinions and attitudes to three clinical practice guidelines. *Journal of the American Board of Family Practice, 17*(2), 150-57.

Yates, G. R., Bernd, D. L., Sayles, S. M., Stockmeier, C. A., Burke, G. & Merti, G. E. (2005). Building and sustaining a systemwide culture of safety. *Journal of Quality and Patient Safety, 31*(12), 684-689.

APPENDIX

SAFETY ATTITUDES QUESTIONNAIRE®

Safety Attitudes Questionnaire®, 2009 Version (sample)
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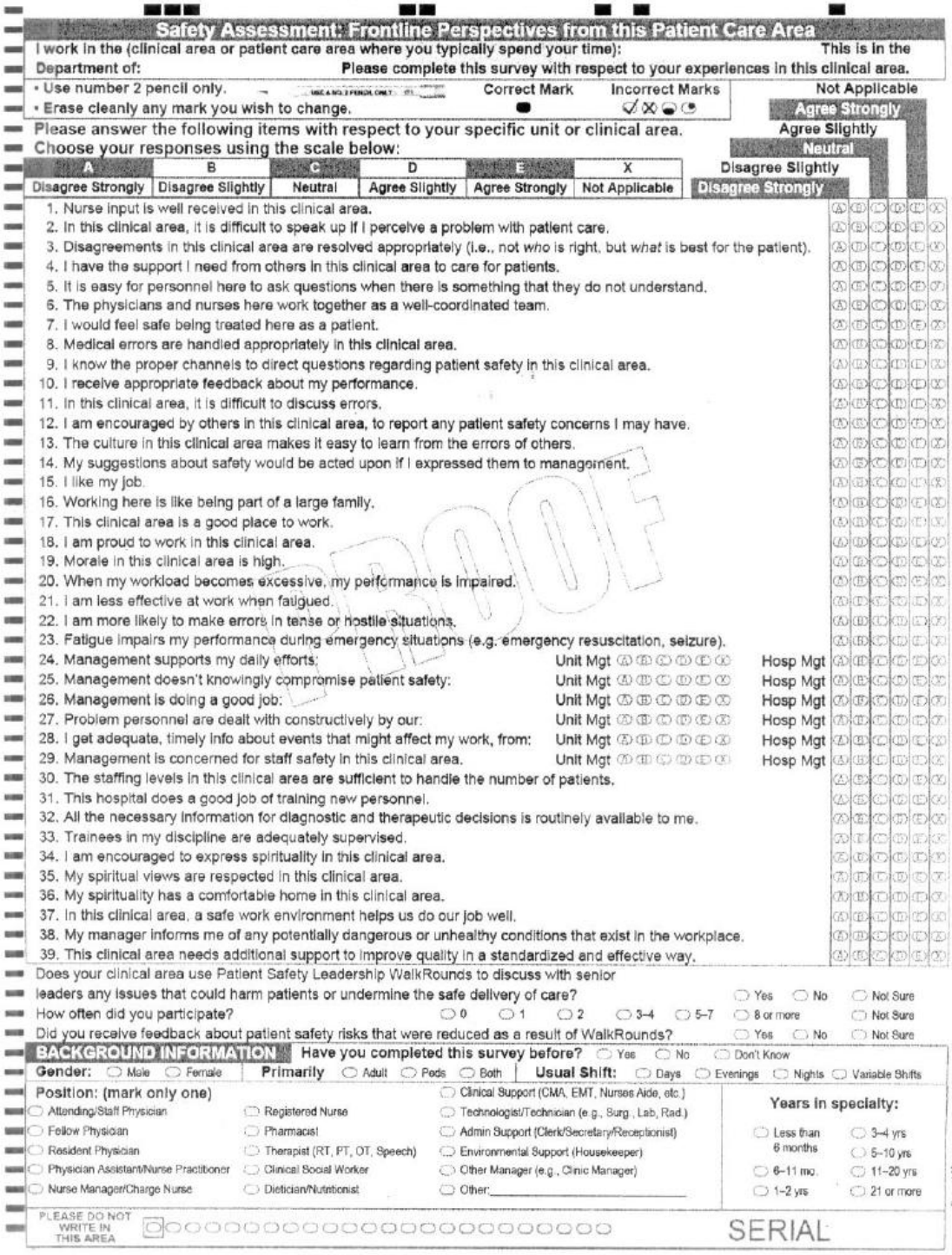

Safety Assessment: Frontline Perspectives from this Patient Care Area

I work in the (clinical area or patient care area where you typically spend your time): This is in the Department of: Please complete this survey with respect to your experiences in this clinical area.

- Use number 2 pencil only. Correct Mark ● Incorrect Marks ✓ ✗ ◒ ◔
- Erase cleanly any mark you wish to change.

Not Applicable

Please answer the following items with respect to your specific unit or clinical area.
Choose your responses using the scale below:

A	B	C	D	E	X
Disagree Strongly	Disagree Slightly	Neutral	Agree Slightly	Agree Strongly	Not Applicable

Agree Strongly
Agree Slightly
Neutral
Disagree Slightly
Disagree Strongly

1. Nurse input is well received in this clinical area.
2. In this clinical area, it is difficult to speak up if I perceive a problem with patient care.
3. Disagreements in this clinical area are resolved appropriately (i.e., not *who* is right, but *what* is best for the patient).
4. I have the support I need from others in this clinical area to care for patients.
5. It is easy for personnel here to ask questions when there is something that they do not understand.
6. The physicians and nurses here work together as a well-coordinated team.
7. I would feel safe being treated here as a patient.
8. Medical errors are handled appropriately in this clinical area.
9. I know the proper channels to direct questions regarding patient safety in this clinical area.
10. I receive appropriate feedback about my performance.
11. In this clinical area, it is difficult to discuss errors.
12. I am encouraged by others in this clinical area, to report any patient safety concerns I may have.
13. The culture in this clinical area makes it easy to learn from the errors of others.
14. My suggestions about safety would be acted upon if I expressed them to management.
15. I like my job.
16. Working here is like being part of a large family.
17. This clinical area is a good place to work.
18. I am proud to work in this clinical area.
19. Morale in this clinical area is high.
20. When my workload becomes excessive, my performance is impaired.
21. I am less effective at work when fatigued.
22. I am more likely to make errors in tense or hostile situations.
23. Fatigue impairs my performance during emergency situations (e.g. emergency resuscitation, seizure).
24. Management supports my daily efforts: Unit Mgt Hosp Mgt
25. Management doesn't knowingly compromise patient safety: Unit Mgt Hosp Mgt
26. Management is doing a good job: Unit Mgt Hosp Mgt
27. Problem personnel are dealt with constructively by our: Unit Mgt Hosp Mgt
28. I get adequate, timely info about events that might affect my work, from: Unit Mgt Hosp Mgt
29. Management is concerned for staff safety in this clinical area. Unit Mgt Hosp Mgt
30. The staffing levels in this clinical area are sufficient to handle the number of patients.
31. This hospital does a good job of training new personnel.
32. All the necessary information for diagnostic and therapeutic decisions is routinely available to me.
33. Trainees in my discipline are adequately supervised.
34. I am encouraged to express spirituality in this clinical area.
35. My spiritual views are respected in this clinical area.
36. My spirituality has a comfortable home in this clinical area.
37. In this clinical area, a safe work environment helps us do our job well.
38. My manager informs me of any potentially dangerous or unhealthy conditions that exist in the workplace.
39. This clinical area needs additional support to improve quality in a standardized and effective way.

Does your clinical area use Patient Safety Leadership WalkRounds to discuss with senior leaders any issues that could harm patients or undermine the safe delivery of care? ○ Yes ○ No ○ Not Sure

How often did you participate? ○ 0 ○ 1 ○ 2 ○ 3–4 ○ 5–7 ○ 8 or more ○ Not Sure

Did you receive feedback about patient safety risks that were reduced as a result of WalkRounds? ○ Yes ○ No ○ Not Sure

BACKGROUND INFORMATION Have you completed this survey before? ○ Yes ○ No ○ Don't Know

Gender: ○ Male ○ Female | Primarily ○ Adult ○ Peds ○ Both | Usual Shift: ○ Days ○ Evenings ○ Nights ○ Variable Shifts

Position: (mark only one)

- ○ Attending/Staff Physician
- ○ Fellow Physician
- ○ Resident Physician
- ○ Physician Assistant/Nurse Practitioner
- ○ Nurse Manager/Charge Nurse
- ○ Registered Nurse
- ○ Pharmacist
- ○ Therapist (RT, PT, OT, Speech)
- ○ Clinical Social Worker
- ○ Dietician/Nutritionist
- ○ Clinical Support (CMA, EMT, Nurses Aide, etc.)
- ○ Technologist/Technician (e.g., Surg., Lab, Rad.)
- ○ Admin Support (Clerk/Secretary/Receptionist)
- ○ Environmental Support (Housekeeper)
- ○ Other Manager (e.g., Clinic Manager)
- ○ Other:_____

Years in specialty:

- ○ Less than 6 months
- ○ 6–11 mo.
- ○ 1–2 yrs
- ○ 3–4 yrs
- ○ 5–10 yrs
- ○ 11–20 yrs
- ○ 21 or more

PLEASE DO NOT WRITE IN THIS AREA SERIAL