

MEDICAL ERROR REPORTING AND PATIENT SAFETY:  
AN EXPLORATION OF OUR UNDERREPORTING  
DILEMMA

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## ABSTRACT

Studies suggest that the majority of hospital errors go unreported. Equally disturbing is that data surrounding near miss events that could have harmed patients has been found to be even sparser. At the core of any medical error reporting effort is a desire to obtain data that can be used to reduce the frequency of errors, reveal the cause of errors, and empower those involved in the healthcare delivery system with the insight required to design methods to prevent the flaws that allow mistakes to occur. Aligned with the adage that “we can’t fix what we don’t know is broke”, the question is raised why does underreporting exist?

The likelihood of reporting medical errors is explored as a manifestation of culture. Factors studied include communication and feedback, teamwork, fear of retribution, and leadership support (top management and supervisor). Data is presented using a nationally recognized instrument—the Agency for Healthcare Research and Quality (AHRQ) Culture of Safety survey. Findings from the research are mixed with little positive relationship between the model and number of events reported although each factor is found to be positively associated with an employee’s perceived frequency by which near miss and no harm events are reported. While advances in patient safety have materialized, the act of employees’ actually reporting events still pales in comparison to the number of errors that have likely occurred, regardless of efforts to advance culture.

To explore influencers beyond those found in the AHRQ Culture of Safety survey, an overlapping model is presented. This includes studying various underlying factors, such as understanding what constitutes a reportable event, ease of reporting, and

knowledge of the processes supporting data submission, along with attempting to better assess the impact of the direct supervisor and incentives in influencing behavior. Findings suggest that these additional factors do contribute, albeit modestly, to the act of reporting errors. When adding tenure and patient interaction to the model, a higher percentage of the variance is explained. In terms of perceived frequency of reporting near misses and no harm events, this model yields similar results to the first, explaining approximately 28% of the variance. The two factors most positively associated with perceived frequency of reporting near miss and no harm events are communication and feedback and infrastructure —suggesting that some unexplored relationship may exist between the overlapping models.

This dissertation is dedicated to my husband and two sons who, at times, served as a sounding board. They have learned more about patient safety than they ever imagined and, more often than not, found me sequestered in my home office on weekends. This research is also dedicated to the Temple University Fox School of Business faculty who created this doctorate in business administration and are committed to partnering with opinionated and busy executives, like myself, desiring to add applied research to an arsenal of tools. Lastly, I wish to thank my friends, classmates and fellow Cancer Treatment Centers of America<sup>®</sup> colleagues who encouraged me along the way. My topic is one that is dear to all of us, as we understand the challenges ahead and collectively work to reduce avoidable medical harm in healthcare. Through our heightened awareness, more robust and meaningful data acquisition and sharing, and collaboration to build a knowledgebase focused on error prevention strategies, we are one step closer to eliminating the likelihood of an error touching those we love. To patients and their caregivers everywhere—this is our first commitment.

## ACKNOWLEDGMENTS

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Data used in the analysis for “Moving Beyond Leadership Support and Culture in Identifying Factors that Matter in Increasing Error Reporting: Findings From a Geographically Dispersed Network of Specialty Hospitals” was derived from Cancer Treatment Centers of America<sup>®</sup> 2016 Culture of Safety Survey using the AHRQ survey combined with customized questions piloted and approved as part of the organization’s ongoing commitment to assessing elements of patient safety and medical error reporting.

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# CHAPTER 1 INTRODUCTION

## Problem Statement

This dissertation consists of two essays in a stream of research, fueled by the insight that advances in healthcare patient safety are slow to materialize, with true gains that are considered marginal by most. A pivotal moment in the history of the patient-safety movement can be traced to a single document by the Institute for Medicine (IOM). This report, released in 1999 and titled “To Err is Human: Building a Safer Health System,” was monumental in that no longer was harm seen as an inevitable consequence of medical practice. A new era was ushered in. As new skills were developed, we learned more about the factors leading to human error while acknowledging the complexities of the healthcare environment in which the potential for human harm was present. The numbers of Americans dying annually from medical errors was shockingly translated into the equivalent of a jumbo jet crashing every day in the United States (U.S.)—providing a vivid and tangible icon to the problem’s magnitude (Wachter, 2008). Yet, the answers then and now remain elusive; the dollars spent fixing the systems and processes that allow these errors to occur remain limited.

Healthcare will always remain an environment in which high-pressured, fast-paced, critical and life-saving and threatening decisions are made and where mistakes are likely to occur. While preventable medical errors have economic costs with estimates ranging from \$17–\$29 billion per year, these errors also result in the loss of trust in the healthcare system by patients and providers alike (Doll, 2010). In his 2010 assessment of the nation’s progress in making healthcare safer, Wachter, a physician executive and

highly regarded expert in patient safety, gave the U.S. a grade of B-. This grade reflected only a modest improvement from 2004–2009 over his earlier grade of a C+ for the five-year period that immediately followed the IOM report. When asked to explain his rationale, he cited “hard evidence of improved outcomes remaining elusive because of our rudimentary measurement capacity in safety” (Wachter, 2010). Gaps in knowledge exist. Analyzing and learning from mistakes (as well as from other safety-related data) results in new knowledge about the skills needed to minimize the likelihood of repeating such occurrences as well as the behaviors that influence adverse events and system redesign opportunities that otherwise would go unnoticed (Flin, 2008).

#### Justification for Research

This research is not to suggest that many well-intended individuals are not committed to making our healthcare system safer. They are. Most errors are made by highly skilled, talented, and caring individuals who are working in dysfunctional systems. It is with this understanding, that this researcher asserts that to make healthcare safer, we need more data enabled through our increased reporting of medical errors and near misses events. Without reporting, we lack the data to understand the human factors that contribute to errors as well as our system design failures. With data, efforts can be made to minimize, catch, and mitigate errors by ensuring staff have the appropriate, non-technical skills to perform their complex, high-risk work (Flin, 2008). With data, we gain the insight needed to reconfigure our systems, overcoming the two well-known sayings from quality guru W. Edwards Deming that not only will “a bad system beat a good person every time,” but “every system is perfectly designed to get the result that it does.” Reporting errors is fundamental to error prevention.

The IOM report also emphasized the importance of reporting errors, noting that using systems and providing information on insights gained improves safety. To effectively avoid errors that can harm patients, improvements must be made to the underlying problems. By analyzing reported errors, many “hidden dangers” (deviations or variations) are revealed that point to system vulnerabilities, rather than intentional acts of clinician performance (Wolf, 2008). Reporting errors that result in patient harm, along with those events that are considered near misses (i.e., an event where harm to a patient was avoided through purposeful detection or by chance), are critical. The latter, believed to occur 300 times more frequently than events resulting in harm, may appear trivial, but have the potential to significantly strengthen processes of care and improve the overall safety of care being delivered today by further uncovering potential hazards. The purpose of reporting is to learn from the experience—ensuring all responsible parties are aware of major hazards, allowing for the monitoring of progress to prevent errors, and when used as the basis for more in-depth analysis, promoting new insights regarding future risks or hidden dangers that require attention (Leape, 2002).

### Definitions and Key Terms

In healthcare, when these checks and balances fail, an error that reaches the patient may result in any number of consequences. For this research, an error, in its simplest terms, is considered to be any deviation from generally accepted practice. Errors that reach the patient, depending upon their level of harm, may be precursor events or serious safety events. When no or only minimal harm is involved, errors are typically labeled as precursor events. Errors are typically noted as serious safety events when harm occurs at a level deemed moderate to severe, either temporary or permanent, requiring

some level of intervention to recover. Serious safety events may also result in patient death. An error that does not reach the patient because it is caught by a detection barrier or mere chance is typically labeled a near miss event. Combined, robust data surrounding both types of events, actual (regardless of level of harm) and near miss, are what organizations seek to capture in safety event reporting systems. Examples of events by level of harm and label are presented in Table 1.

	Death	Failure to appropriately diagnosis and treat a heart attack
Serious Safety Event	Severe to Moderate Permanent Harm	<ul style="list-style-type: none"> <li>• Wrong site procedure resulting in removal of the wrong limb</li> <li>• Misdiagnosis of a stroke resulting in permanent brain damage</li> <li>• Incorrect dosing of radiology contrast resulting in the loss of renal function</li> </ul>
	Severe to Moderate Temporary Harm	<ul style="list-style-type: none"> <li>• Medication error resulting in the need to resuscitate</li> <li>• Failure to implement fall prevention protocol resulting in fracture</li> <li>• Return to the operating room for removal of a retained sponge</li> </ul>
Precursor Event	Minimal to No Harm	<ul style="list-style-type: none"> <li>• Excess radiation therapy resulting in skin color change</li> <li>• Failure to properly access an IV site resulting in bruising and swelling</li> <li>• Procedure performed with an unsterile instrument resulting in no detectable infection</li> </ul>
Near Miss	Barrier to Chance Avoidance	<ul style="list-style-type: none"> <li>• Medication error caught prior to administration by nurse using “5 rights”</li> <li>• Family member reminding a physician of a patient allergy before a medication is about to be administered</li> <li>• Patient treated by a clinician who neglects to wash her hands after treating a previous patient who was being treated for a hospital-acquired infection</li> </ul>

Fortunately, today’s modern safety movement has replaced “shame and blame” with a recognition that catastrophic failures can occur in complex organizations despite

multiple levels of defenses against failures or mistakes (Reason, 1990). The historical approach to gathering data regarding medical errors has been by pen and paper, although now the vast majority of providers have established electronic systems for data entry by employee, and compilation by key safety professionals assigned to this data mining. These systems, however, are plagued by several generally accepted problems, including an acknowledgment that most of these systems are “voluntary” such that the frequency of reporting will be influenced by many factors other than the actual number of events or near misses occurring. Reports, in most cases, are submitted by employees; the more serious events normally require some level of reporting to an external regulatory agency. Some, but not all states, have adopted laws necessitating reporting of certain types of events depending upon severity. Further, not only do reporting requirements differ in terms of their voluntary and mandatory nature, so too do systems differ in respect to anonymity, confidentiality, and the amount of details captured from one organization to the next. Therefore, analysis of data is constrained by the vulnerabilities of underreporting and the incompleteness and inconsistencies of the entries themselves, which may only present part of the picture (Flin, 2008).

Lastly, disclosure of medical errors is another type of event reporting in some literature streams. For purposes of this research, reporting (practitioners’ accounting of mistakes) and disclosing (sharing mistakes with patients and their significant others) events are considered to be two separate and distinct acts. A medical error reported is defined as an account of the event or near miss that conveys the details of the event, including the when, where, and who—often implicating healthcare providers in the event. Events may be identified and reported by providers, patients, or significant others.

## Dissertation Research Stream

Despite recent focus on the introduction of techniques and strategies to promote safety awareness, efforts to specifically increase the reporting of medical errors and near misses across all healthcare providers have been spotty, with little documented sustainable success. Notwithstanding, a hospital that is data driven has the opportunity to learn from its failures and successes. In such circumstances, a maturity materializes as the organization proactively identifies and improves unsafe processes (Sammer, 2010). This research stream is intended to explore the notion of medical error reporting and what has been identified as an underreporting dilemma.

Essay 1 begins by exploring various aspects of culture defined in the context of a commonly used assessment tool. Essay 2 moves beyond these factors to build a narrative around infrastructure, incentives, and more narrowly consider the role of the supervisor. Viewed together, the essays lay the groundwork for subsequent studies, both empirical in nature and with a practitioner in mind, to grow the literature regarding healthcare's adoption of strategies to promote increased medical error reporting.

## CHAPTER 2 MEDICAL ERROR REPORTING—DOES CULTURE REALLY MATTER?

### Motivation for Research

One in five individuals (or 22%) report that they or a family member have experienced a medical error in their lifetime (Davis, 2002). Nationally, this statistic translates into an estimated 22.8 million people with at least one family member who have experienced a mistake in a doctor's office or hospital (Davis, 2002)—underscoring the need for patients to protect themselves and their families from the very care intended to heal them. The 1999 IOM report, “To Err is Human: Building a Safer Health System,” estimated that there are 44,000–98,000 deaths annually due to medical errors, which may only be the tip of the iceberg (IOM, 1999). More current research suggests up to 440,000 Americans die annually from preventable hospital errors. Medical errors now surpass stroke as the third leading cause of death in the U.S.—errors that could be prevented if we commit to designing safer healthcare systems and learning from our mistakes. To accomplish the latter, we need data from actual events as well as near misses. Fundamentally, we need to understand and eliminate the barriers that undermine our efforts toward greater transparency in reporting.

In today's healthcare system of conflicting incentives and sometimes mixed messages, there is an inherent tension between employee hesitancy in reporting errors and near misses and the moral responsibility to fully disclose these events. Few mandated circumstances exist where errors must be reported externally (i.e., sentinel events). Within the walls of each provider, the need has never been greater for a support system that promotes the voluntary organization-wide reporting of near misses, and precursor

and serious safety errors. Tension diminishes our ability to significantly advance patient safety, mitigate the risk of repeat errors, and create higher reliability systems. Operating in an environment in which robust data and an openness to discuss mistakes is often lacking, our ability to learn as a healthcare community suffers. Events occurring, but labeled near misses given they did not reach the patient or events occurring and reaching the patient, but resulting in no to minimal harm or need for intervention, often go unreported. Considered events with similar causal pathways as those resulting in harm, these types of events have been estimated to encompass more than 50% of all errors and are up to 100 times more prevalent and symptomatic of larger systemic issues (Richter, 2015). Most importantly, events that are not reported are lost opportunities to learn. Despite our best attempts during the last 10 years, our efforts have fallen short in addressing our underreporting dilemma.

Noble and Pronovost (2010) highlight the challenges associated with the lack of good data from which to learn, acknowledging that this absence of data results in epidemiological bias comparable to nonrandom samples. Minor events, more serious events, and inaccurate rates all contribute to skewed data and gaps in knowledge. The lack of feedback when errors are reported and a fear of personal consequences are cited as common barriers to low participation rates. While emphasizing the shortcomings of today's reporting systems and the negative impact on learning and a true ability to reliably measure improvements in harm reduction, the researchers stop short of proposing interventions beyond mandatory reporting to increase staff accountability.

Work by Reason (1997) argues that for error management to positively impact patient safety, organizations must promote a culture of reporting. Reason elaborates on

the concept through a focus on practical interventions, such as de-identification of reporters, protecting those who do report, and providing meaningful feedback on issues identified through the reporting of events.

Further, several authors have more than adequately demonstrated the negative effect of underreporting from the perspective of learning. Paterick (2009) states “the most detrimental error is failing to learn from an error.” To this end, the past couple of decades have seen an increase in the implementation of event reporting systems in many high-risk industries as a means of learning and promoting process improvement. These systems are based on the assumption that the individual at the front line is the best equipped to provide insight to the rest of the organization regarding process and system failures, waste or inefficiencies, if reporting is encouraged and meaningful data is gathered.

Notwithstanding the many similarities between healthcare and other complex industries, such as nuclear power and aviation that value event-reporting systems, reporting has not been well received by the healthcare community. This lack of receptiveness suggests that certain factors may contribute more heavily to an individual’s likelihood of reporting medical errors and near misses in his or her organization.

#### Literature Review

Studies have shown that physicians as a group are reluctant to report medical errors (Paterick, 2009), and that underreporting of events may be as high as 96 percent. These findings also suggest that the success of a reporting system is often determined by the attitudes and perceptions of frontline care providers. In their research, Harper and Helmreich (2005) summarize preliminary recommendations for successful implementation of an event-reporting system. Citing work completed during the

University of Texas' Human Factors Research Project in which a survey instrument was designed to assess a wide array of attitudes deemed relevant by healthcare providers, barriers to the implementation of an effective safety event reporting system were identified. Findings suggest that while a significant percentage of care providers felt a strong professional obligation to report errors, without immunity from punishment and a guarantee that the information reported would be used to make changes in the system, underreporting would continue.

Efforts to date have failed to integrate process (re)design with human behavior expectations and accountability. One essential aspect cited as improving patient safety focuses on the need for healthcare organizations to promote a "just" culture, and to banish the blame and shame culture that often leads to silence, or worse, secrecy, when reacting to medical errors. Kiekkas (2011) asserts that a culture that promotes patient safety must be a lived experience. The role of a just culture is to balance individual employee accountability with that of organizational responsibility to fix less than effective processes and learn from failures. Organizations are in need of a culture in which trust is central, as well as the staff feel valued and supported by leadership and peers. A shift to a culture in which reporting is embraced as a norm requires a change in thinking about the value of reporting medical errors and a comfort that such reporting will not evoke punitive action unless a blatant disregard for safety has occurred.

Naveh (2006) investigated the relationship between safety climate and personnel readiness to report treatment errors across different hospital departments, exploring the experiences of three hospitals. Multiple safety climate aspects were measured using questionnaires that focused on: the way caregivers perceive safety procedures; the safety

information flow in their department; and the relative priorities given to safety in the department. A department's readiness to report errors was measured by tallying their annual number of errors reported. The analysis concluded that the more the staff perceives procedures as appropriate and safety information as readily available, the greater the willingness to report errors. These relationships significantly differed depending on the department type, suggesting that other factors contributed to this willingness beyond the organization's tangible policies and procedures. Later, research by Naveh (2014) suggests that underreporting will continue to occur, at least in part that many errors are only visible to the individual making them. This visibility results in a unique circumstance and responsibility vested almost entirely in the individual and that individual's perception of his or her organizational safety climate.

Conversely, Rathert (2007) begins with a conceptual model that specifies how work environment variables should be related to nurse and patient outcomes, including patient safety. Hospital units with climates deemed more patient centered employed nurses with greater staff satisfaction and fewer medical errors. Perceptions were examined from nurses in multiple U.S. acute care hospitals. The study concluded that nurses in patient-centered environments also reported that they felt more comfortable reporting errors than those in environments deemed less focused on the patient. Research by Derickson (2015) further substantiates that a safe work environment contributes to employees feeling comfortable in noting errors. Systematic changes are necessary to encourage and reward feedback, contributing to establishing this comfort. Psychologically unsafe hospitals were those locations from which employees were less likely to report errors.

Although healthcare providers acknowledge their role in monitoring and improving patient care, nurses involved in a study of three acute care hospitals expressed fear as a primary influencer in reporting errors. In the study, the fear of repercussion, retribution, and labeling were among the most significant inhibitors to reporting medical errors (Attree, 2007). While additional disincentives to raising safety concerns were also identified from structured interviews, of lesser importance were issues such as little to no confidence that action would be taken to address future risk or limited confidence in the value of reporting systems. Regardless of the extent of the disincentives identified, the researcher acknowledged that if an open culture that embraces quality, safety and learning is to exist, underreporting must be addressed. Additional research by Hartnell (2012) concludes that influencers for medical error reporting can be placed into three themes: patient protection, professional compliance, and provider protection. Influences encompass a desire for immunity/protection from legal action as well as from censure, harsh criticism, or blame. Barriers cited included reporter burden, professional identity, information gap, organizational factors, and fear.

### Conceptual Model and Hypotheses

This research suggests that our ability to improve patient safety through learning is compromised by our inability to operate from a place of more complete data pertaining to actual medical errors and near miss events given a number of cultural factors that influence reporting. A responsibility exists to patients and to one another as healthcare providers to revisit current practices and factors influencing the likelihood to report errors, creating long-term strategies to overcome any barriers impacting this likelihood. Only when we understand the significance of the factors influencing reporting, and their

impact on human behaviors, relationships, and actions, will our ability to create enhanced, targeted strategies and tactics associated with increased reporting be possible.

This research begins with a conceptual model that specifies how key factors (or influencing themes) fit together and impact the number of events reported and the perceived frequency of reporting near miss or no harm events as illustrated in Figure 1.

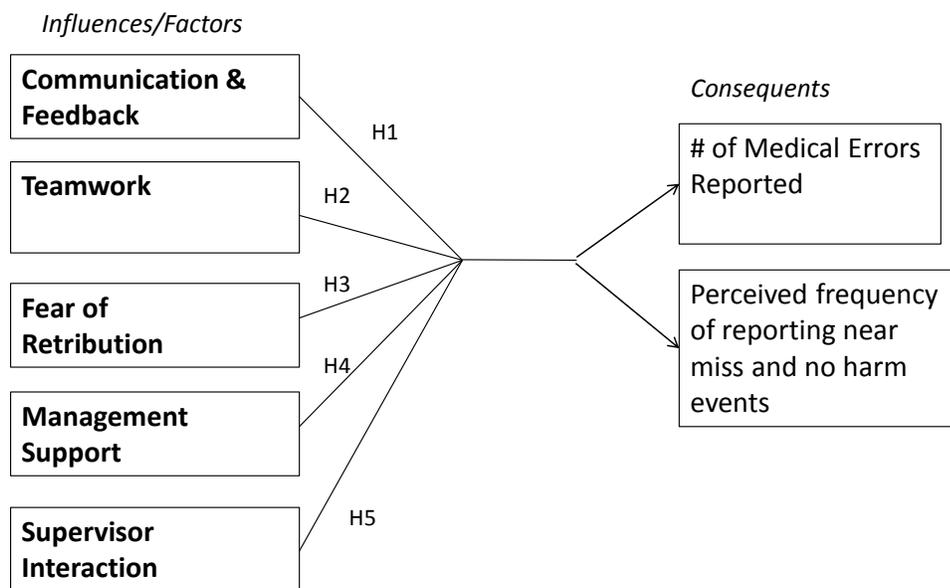


Figure 1. Conceptual Model—Cultural Influences on Reporting

The research is intended to quantify the factors that most significantly influence the two dependent variables and are the most pervasive in terms of our ability to easily overcome such factors when acting as barriers. Further, although a broad range of factors have been researched in studies and exist in various models (Throckmorton, 2007; Uribe,

2002; Espin, 2009), most studies have failed to recognize the relationship between variables and which variables are more positively associated with reporting. The following sections further present the model outlining relevant concepts, defining associated concepts, and describing key themes.

#### Current State—Data Wanted

According to the AHRQ (2004) changes in organizational culture, the involvement of key leaders, the education of providers, the establishment of patient safety-related committees, the development and adoption of targeted practices and strategies, and the use of technology are all essential elements in reducing medical errors and improving patient safety. With the understanding that underreporting exists, regardless of the reasons for underreporting, insufficient medical error data limits our ability to gain critical insight into what can and has gone wrong in the provision of high-quality and safe care. Most clinical experts and researchers agree that the more systematic review and sharing of data would lead to more effective interventions and risk mitigation—saving lives and reducing unnecessary healthcare expenses associated with preventable medical errors. Errors that result in serious patient injury or death, as well as errors that result in little or no patient injury when aggregated, trended, and studied by practitioners, can identify patterns of system failures. Analysis of reported errors and near misses reveal the many hidden dangers that exist and point to system and process vulnerabilities that would otherwise go undetected.

#### *The Act of Reporting*

Time and effort have been exerted across many healthcare organizations to create awareness of the importance of patient safety with formalized programs educating

employees and leaders alike on what constitutes medical errors and the circumstances that contribute to high-risk situations and behaviors. The IOM (1999) defines an error as “the failure of a planned action to be carried out as intended (i.e., an error of execution) or the use of a wrong plan to achieve an aim (i.e., an error of planning).” All errors do not result in harm to a patient. Errors that have the potential for harm that do not reach the patient because of chance or some level of intervention are referred to as near misses. Errors that reach the patient, but result in no negative outcome for the patient, are most often referred to as precursor events. Errors that reach the patient and result in death or some level of harm, temporary or permanent, and require some level of intervention are referred to as serious safety events. Lastly, not all patient harm is the result of a medical error or can be prevented (i.e., adverse events).

The study of medical errors and patient safety requires data on events resulting in harm and those that do not. Patient safety is an essential attribute of quality care and an ethical and moral imperative. Part of the Hippocratic Oath, the first commitment of the healthcare system and the providers operating within it is to do no harm. Education has focused on an employee’s obligation to protect against errors, reduce the risk of harm to patients, and learn from past events. Patient safety education will often focus on this inherent commitment in any patient-provider relationship. A just culture of patient safety coursework typically outlines what it means to balance the responsibility between the organization for designing safe systems/processes and that of the individual for placing patient safety first and following rules, policies, and procedures intended to protect against harm. This approach also includes a responsibility for greater transparency of events and reporting when things go wrong. Awareness and educational efforts have

mixed reviews as to their effectiveness in increasing the likelihood of open reporting. A study conducted by Espin (2009) in which nurses' perceptions of errors and error-reporting practices found that inherent in this discussion is the need for organizations to define what constitutes an error or near miss so that ambiguity in the value of reporting is diminished.

The belief that the right systems must be in place to promote reporting as critical to the safety movement is not a new concept. Since the early 1990s, The Joint Commission on the Accreditation of Healthcare Organizations has advocated for the development of mandatory or voluntary reporting processes promoting the aggregation and analysis of data, which will reduce medical errors. Yet, twenty years later, while reporting systems remain the cornerstone of our ability to examine and scrutinize contributing factors and root causes of events and near misses, no national standards nor common taxonomy exist. Albeit an environment in which pen and paper is now far from the norm, electronic reporting in and of itself does not increase the likelihood of reporting. Electronic systems can, if not created with the end user in mind, lead to increased complexity, increased staff time for reporting, and increased frustration when systems are experiencing downtime or perceived to be ill-conceived in their design.

### *Cultural Factors Influencing the Likelihood of Reporting*

#### *Communication and Feedback*

Hohenhouse (2008) and Karlsen (2009) address reporting from the perspective that many systems ineffectively prevent errors and impact change. If the reporting process is viewed as a bureaucratic administrative task with little impact on redesign and feedback actions taken in response to events reported, adoption will wane and efforts to

encourage reporting will be futile. Nagamatsu (2009) furthers this notion by stating that if the act of reporting is to be embraced voluntarily, it must be perceived as a mechanism for learning so that clinicians do not act defensively. Reporting processes lacking system orientation, provider responsiveness, and expert analysis are perceived as having limited value (Hohnehaus, 2008; Nagamatsu, 2009). Error feedback and organizational learning were among the most significant predictors to the frequency of error reporting in a recent study conducted by Richter (2015). Stated simply, there must be a perceived notion of benefit to others grounded in actions taken and communicated in response to the error reported.

Hypothesis 1a: The number of medical errors reported is positively associated with communication and feedback mechanisms.

Hypothesis 1b: The perceived frequency by which near miss and no harm events are reported is positively associated with communication and feedback mechanisms.

### *Teamwork*

An individual's likelihood of reporting is partially shaped by an environment composed of his or her peers and the group norms, espoused values, shared meanings, "rules of the game," habits of thinking, and observed behavioral regularities in and across the organization. Teamwork is often considered a form of horizontal or group shared accountability. Bognar (2008) focused on the importance of teamwork and the fact that errors occur, carry personal burden to providers, and that a reluctance to share these events with others exists is dictated by culture and group norms. Behavioral choice, intention, and response all matter in a complex system that recognizes the inherent nature

of unintentional human error or the willingness to accept at-risk behaviors and exhibit a tolerance for reckless behavior across peers (Gorzeman, 2008). A lack of: open conversation, establishment of a learning environment, cooperation and teamwork, and employee empowerment are symptomatic of a culture not conducive to reporting. According to Derickson (2015), given that most errors are due to system failures, not incompetent or reckless individuals, events are best addressed through systematic interventions, such as focusing on group norms where respect exists along with teamwork in the unit.

Hypothesis 2a: The number of medical errors reported is positively associated with teamwork.

Hypothesis 2b: The perceived frequency by which near miss and no harm events are reported is positively associated with teamwork.

### *Fear of Retribution*

Fear of retribution is often cited as a barrier to reporting errors. This fear encompasses concerns of competency and job security. Fear of retribution may include perceptions about how the data submitted will be used, and the written and unwritten rules of the organization. Lehmann (2007) cites fear of reprisal and the additional time needed to report as the two primary disincentives to reporting. Case study findings illustrated the value of a new system for reporting that countered these two disincentives, adopting a policy change removing a point system that had progressively disciplined nurses for errors. Inherent in this factor is a sense of personal accountability often related to ones' personal value system. While the patient safety movement has progressed from a person approach that viewed errors as a result of insufficiency to a systems approach that

accepts humans as fallible, fear of repercussions remains a pivotal obstacle to reporting errors and unsafe practices, with physicians and nurses experiencing this fear, albeit differently (Castel, 2015).

Hypothesis 3a: The number of medical errors reported is negatively associated with fear of retribution.

Hypothesis 3b: The perceived frequency by which near miss and no harm events are reported is negatively associated with fear of retribution.

### *Leadership*

Leaders must accept the responsibility for patient safety by visibly supporting this commitment. To promote safer systems and safety-first expectations, leaders must role model behaviors. As this commitment cascades through the organization, employees become engaged at multiple levels as part of the improvement dialogue (Kachalia, 2013; Nelson, 2005). This effort also includes the establishment of accountability systems promoted through the hierarchical structure, articulated through written and verbal expectations, and practiced through behavior that drives individual compliance. Research by Detert (2010) expands on the role of management and the antecedents of voice in organizational hierarchies by focusing on such leadership influences, noting the importance of addressing “power” gradient in organizations committed to breaking down barriers. According to Zaheer (2015), norms of openness and participatory leadership impact the patient safety climate, defined as staff perceptions of senior leaders making patient safety an organizational priority. The need for management at the top and direct supervisory levels to engage staff in dialog, as teams and individuals, without the fear of retribution, all relate to effective and visible leadership. While applying accountability

systems across employee groups, departments, and disciplines is not an easy task, it must begin at the top with management's commitment and cascade down to supervisors.

Hypothesis 4a: The number of medical errors reported is positively associated with management support.

Hypothesis 4b: The perceived frequency by which near miss and no harm events are reported is positively associated with management support and action.

Hypothesis 5a: The number of medical errors reported is positively associated with supervisor interaction.

Hypothesis 5b: The perceived frequency by which near miss and no harm events are reported is positively associated with supervisor interaction.

## Methods

### *Tool, Data, and Sample*

For this research, the dataset from the AHRQ Hospital Survey on the Culture of Patient Safety, a free-of-charge reliable and valid staff survey designed to help hospitals assess the culture in their institutions, was used. Acknowledged as a key component of quality, healthcare providers are challenged by various external regulatory and accrediting agencies, as well as interested quasi-governmental groups, to continuously improve; there is an increasing recognition of the importance of establishing a culture of patient safety. Hospitals are encouraged and, in many cases required by certain accreditation standards, to use this survey or a similar survey every 12–18 months to: 1) raise staff awareness about patient safety; 2) diagnose and assess the current status of patient safety culture; 3) identify strengths and areas for patient safety culture

improvement; 4) examine trends in the patient safety culture change over time; and 5) evaluate the cultural impact of patient safety initiatives and interventions. The survey also allows for internal and external comparisons. To that end, AHRQ has established a comparative database as a central repository for survey data from organizations that have administered the assessment (AHRQ, 2004).

More specifically, the database is composed of data submitted from U.S. hospitals that have administered the survey and want to voluntarily contribute. There are a total of 44 close-ended items in the survey, excluding demographic questions pertaining to work unit and background. In total, the assessment should take approximately 10–15 minutes to answer, and is considered easy to complete given its use of mostly agree/disagree or never/always response categories. In addition to close-ended questions, comments are captured in one open-ended question. Scripting is provided to organizations using the tool suggesting that all employees be encouraged to participate in the survey, including those with and without direct patient care responsibilities as well as full-time physicians. Participants are informed that their responses are completely confidential and vital to improving the care provided and creating a safer environment for patients and employees. Twelve areas of safety culture are measured by the tool, including: frequency of event reporting, overall perceptions of safety, supervisor/management expectations, organizational learning, teamwork in units, communication openness, feedback and communication, non-punitive responses to error, staffing, hospital management support, teamwork across units, and handoffs and transitions. Questions fall under the following headings: work area/unit,

supervisor/manager, communications, frequency of events reported, patient safety grade, your hospital, number of events reports, and background information.

The comparative database only accepts data submissions every two years, allowing the researcher to access the most recent data available at the time of this study representing July 1, 2011–June 30, 2013 submissions. The researcher used the HSOPS de-identified data set, including the 2014 Individual Data File, 2014 Position Data File, and 2014 Hospital Data File.

There are a few limitations associated with this data set that should be acknowledged. First, several nationally recognized culture-of-safety survey tools are available for use. Many tools have also demonstrated validity, consistency, and reliability in the peer-reviewed literature. Some hospitals have also indicated a desire to create and use their own tools. While the AHRQ instrument is considered among the top-cited and most well-respected tools, those using it and contributing to its data set may not fully represent the national landscape. As a convenience sample, it has the potential for response bias among organizations using it or employees choosing to respond. For the 2014 data set, 612 hospitals contributed, constituting 384,997 individual responses. For this research, the unit of analysis was the individual respondent.

### *Measures*

Most of the survey items ask respondents to provide answers that reflect their beliefs using a 5-point Likert scale in terms of agreement (strongly agree, agree, neither agree or disagree, disagree, and strongly disagree) or frequency (always, most of the time, sometimes, rarely, or never). Since some questions are worded positively and negatively, negatively-worded items were reverse coded for this research. Predictor

variables were aligned with five categories of influencers: communication and feedback; teamwork; fear of retribution; management support; and supervisor interaction with a select number of questions mapped to each factor. This mapping represented just more than 51% (20 of 39) of the total number of questions on the survey. The survey excluded the five questions considered outcome related and demographic/background in the count.

Two dependent variables of interest were selected. The number of events reported by the respondent in the last 12 months is a single-item measure using a numeric response category. In addition, three additional questions that pertain to respondent’s perception of frequency of reporting near miss and no harm errors in their workplace were used with scores transformed into a numeric scale and mean score for each respondent. Respondent perception of overall safety with participants awarding the organization a “safety grade,” also considered a possible outcome variable, was not used in this research. Questions of interest are mapped in Table 2.

Table 2		
AHRQ Survey Questions of Interest		
Theme	Code	Question
Communication Feedback	C1	We are given feedback about changes put into place based on events reports
	C2	Staff will freely speak up if they see something that may negatively affect patient care
	C3	We are informed about errors that happen in this unit
	C4	Staff feel free to question the decisions or actions of those with more authority
	C5	In this unit, we discuss ways to prevent errors from happening again
Teamwork	A1	People support one another in this unit
	A3	When a lot of work needs to be done quickly, we work together as a team to get the work done
	A4	In this unit, people treat each other with respect
	A11	When one area in this unit gets really busy, others help out

Table 2 Continued						
AHRQ Survey Questions of Interest						
Fear of Retribution	A8r	Staff feel like their mistakes are held against them				
	A12r	When an event is reported, it feels like the person is being written up, not the problem				
	A16r	Staff worry that mistakes they make are kept in their personnel file				
	C6r	Staff are afraid to ask questions when something does not seem right				
Management Support	F1	Hospital management provides a work climate that promotes patient safety				
	F4	There is good cooperation among hospital units that need to work together				
	F8	The actions of hospital management show that patient safety is a top priority				
	F9r	Hospital management seems interested in patient safety only after an adverse event happens				
Supervisor Interaction	B1	My supervisor says a good word when he/she sees a job done according to established patient safety procedures				
	B2	My supervisor seriously considers staff suggestions for improving patient safety				
	B4r	My supervisor overlooks patient safety problems that happen over and over				
Events Reported (DV)	G	Number of event reports you have filled out and submitted, in the past 12 months				
		None	1 to 2	3 to 5	6 to 10	11 to 20
Perceived Frequency of Reporting Near Misses & No Harm (DV)	D mean	1. When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?				
		2. When a mistake is made, but has no potential to harm the patient, how often is this reported?				
		3. When a mistake is made that could harm the patient, but does not, how often is this reported?				

It should be noted that additional variables of interest were considered as potential moderators or mediators, but not pursued as part of this first essay, including such considerations as hospital size, geographic region, staff position/discipline, and tenure/length of service. Further, while also considered to be of interest, no information

was available on age or gender for this data set given the anonymity of those responding to the survey. Lastly, the data was cleaned for blank records where responses to all survey items were missing, with the exception of a demographic item.

### *Data Analysis*

For purposes of this research, the higher scores associated with the independent variables described in the framework are posited to be positively associated with the number of errors reported in the past 12 months as well as the perceived frequency by which near misses or no harm events are reported in the respondents' work unit. All statistical analyses were performed using IBM SPSS Statistics 24. A Principle Component Analysis (PCA) was conducted and used as a variable reduction technique to maximize the amount of variance accounted for in the observed variables. This approach allowed the researcher to affirm groups of observed variables that tend to "hang together" empirically. Once completing the factor analysis, the reliability of the five factors derived was tested calculating a Cronbach's Alpha for each. This effort allowed the researcher to ensure the reliability of the scales as consistently reflecting the factors measured. Lastly, a multiple regression analysis was conducted to test the strength of the relationship of the factors (independent variables/influence categories) to the dependent variables, both number of events actually reported and perceived frequency by which reporting near misses occurs. These analyses were conducted using the SPSS default linear regression. Correlation matrices, a multiple *R*-square, and ANOVA were produced to test the model. Descriptive statistics were also calculated for the two dependent variables, along with each of the independent variables (factors reflective of the questions of interest) to determine the sample means and standard deviations.

## Results

Characteristics of the data set are presented in Table 3. Each of these descriptors, organizational and individual in nature, may influence the number of errors reported and perceived frequency by which near misses and no harm events are reported. No single characteristic appeared to be overly disproportionate to the healthcare industry profile in accordance with statistics compiled by the American Hospital Association concerning hospital geographic distribution or size based upon beds (American Hospital Association, 2011).

In respect to facility size, 56% of the respondents worked in facilities with 300 beds or more. In terms of location, the highest percentage of respondents (44.1%) came from the east coast (combined New England, Mid-Atlantic, and South Atlantic). This number is followed by 28.9% and 12.0% in the East North Central and Mountain/Pacific regions, respectively.

Missing values did exist in respect to position and tenure, suggesting some concern of anonymity. Registered Nurses accounted for 32.5% of the dataset. This statistic was followed by the category Other at 21.4% and Technician at 10.3%. Combined, physicians and resident physicians composed 4.4% of the respondents. The highest percentage of respondents indicated years of service between one to five years (at 35.7%). A cumulative percent of 49.3% of respondents were at 5 or less years of service. Those respondents indicating six or greater years of service were 43.6%, while 7.1% of the data set had no response associated with this question.

Table 3			
AHRQ Sample Characteristics			
Organizational	N	Percent	Cumulative
<b>Bed Size</b>			
6–24 beds	2,632	0.7	0.7
25–49 beds	12,884	3.3	4.0
50–99 beds	24,385	6.3	10.4
100–199 beds	58,638	15.2	25.6
200–299 beds	70,707	18.4	44.0
300–399 beds	60,370	15.7	59.6
400–499 beds	44,001	11.4	71.1
500+ beds	111,380	28.9	100.0
<b>Region</b>			
New England/Mid-Atlantic	90,647	23.5	23.5
South Atlantic	79,143	20.6	44.1
E North Central	111,435	28.9	73.0
E South Central	21,494	5.6	78.6
W North Central	14,911	3.9	82.5
W South Central	21,258	5.5	88.0
Mountain/Pacific	46,109	12.0	100.0
Individual	N	Percent	Cumulative
<b>Position</b>			
No response/missing value	17,507	4.5	4.5
Registered Nurse	125,185	32.5	37.1
PA/NP	4,725	1.2	38.3
LPN	4,668	1.2	39.5
PCT/Aide	20,808	5.4	44.9
Attending Physician	12,205	3.2	48.1
Resident Physician	4,505	1.2	49.2
Pharmacist	6,909	1.8	51.0
Dietician	2,403	0.6	51.7
Clerk/Secretary	21,765	5.7	57.3
Respiratory Therapist	7,757	2.0	59.3
PT, OT, ST	9,087	2.4	61.7
Technician	39,641	10.3	72.0
Administration	25,589	6.6	78.6
Other	82,243	21.4	100.0
<b>Tenure</b>			
No response/missing value	27,440	7.1	7.1
Less than 1 year	52,438	13.6	20.7
1 to 5 years	137,401	35.7	56.4
6 to 10 years	74,430	19.3	75.8
11 to 15 years	41,780	10.9	86.6
16 to 20 years	21,043	5.5	92.1
21 years or more	30,465	7.9	100.0

To better understand and identify underlying variables (or factors) that explain a pattern of correlations in the set of observed variables, a Principle Component Analysis (PCA) was conducted. Most researchers agree that while the PCA method is not a type of factor analysis, it is one of the most common extraction methods and yields very similar results to more traditional factoring methods, such as principle axis and minimal likelihood. Theoretically, component analysis assumes that the component is a composite of the observed variables and that individual item scores cause the component (Beavers, 2013). Interpretability of factors was improved through use of varimax rotation, suggesting a believed independence of factors by the researcher. Descriptive statistics, including a mean score and the standard deviation for all independent variables are presented in Table 4, with those items reverse coded noted. Scores ranged from 2.95 with a standard deviation of 1.102, to a high of 4.15 with a standard deviation of 0.875.

Code/Question	Mean	Std. Deviation
B1. My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures.	3.85	1.046
B2. My supervisor/manager seriously considers staff suggestions for improving patient safety.	3.90	1.001
B4R. My supervisor/manager overlooks patient safety problems that happen over and over. (REVERSE CODED)	3.96	1.058
C1. We are given feedback about changes put into place based on event reports.	3.65	1.012
C3. We are informed about errors that happen in this unit.	3.82	1.011
C5. In this unit, we discuss ways to prevent errors from happening again.	3.97	.963
C2. Staff will freely speak up if they see something that may negatively affect patient care.	3.99	.913

Table 4 Continued		
Descriptive Statistics for All Independent Variables		
C4. Staff feel free to question the decisions or actions of those with more authority.	3.33	1.123
A1. People support one another in this unit.	4.10	.915
A3. When a lot of work needs to be done quickly, we work together as a team to get the work done.	4.12	.875
A4. In this unit, people treat each other with respect.	3.91	.967
A11. When one area in this unit gets really busy, others help out.	3.71	1.027
A8R. Staff feel like their mistakes are held against them. (REVERSE CODED)	3.26	1.126
A12R. When an event is reported, it feels like the person is being written up, not the problem. (REVERSE CODED)	3.27	1.093
A16R. Staff worry that mistakes they make are kept in their personnel file. (REVERSE CODED)	2.95	1.102
C6R. Staff are afraid to ask questions when something does not seem right. (REVERSE CODED)	3.68	1.033
F1. Hospital management provides a work climate that promotes patient safety.	3.91	.924
F4. There is good cooperation among hospital units that need to work together.	3.50	.927
F8. The actions of hospital management show that patient safety is a top priority.	3.88	.986
F9R. Hospital management seems interested in patient safety only after an adverse event happens. (REVERSE CODED)	3.44	1.130

In scanning the significance values on the Correlation Matrix, no values were greater than 0.05 and no correlation coefficients were greater than 0.755 indicating no problems with singularity in the data. The determinant value is 6.331E-5. The Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy statistic, which varies between 0 and 1, has a value of 0.937 signifying correlations are very compact and that an analysis of this nature should yield distinct and reliable factors. Barlett's Test of Sphericity was used to test the null hypothesis that the original correlation matrix is an identity one, desiring a

value less than 0.05 to test for significance. For this data, Barlett’s test is highly significant ( $p < 0.001$ ), also affirming the analysis as being appropriate. See Appendix A.

Eigenvalues associated with each factor were examined before extraction, after extraction, and after rotation. Five factors explain 65.970% of the total variance, within the desired 60.0–70.0 range. Given that rotation optimizes the factor structure and equalizes the relative importance of the factors, following rotation, factor 1 accounts for 16.672% of the total variance, followed by 15.042%, 12.809%, 12.339%, and 9.108%, respectively. The average communality is greater than 0.6 at 0.659 (see Appendix B). By design, factor loadings less than 0.4 were suppressed, and the variables (questions) were listed in the order of size of their factor loadings (see Table 5). Variable labels are included to aid in interpretation. Common themes emerged that are consistent with the model. These themes reinforce each factor as a subcomponent of a culture of safety, and by extension, are believed to influence the likelihood of reporting medical errors and near misses and no harm events.

Table 5 Rotated Component Matrix, 5 Factors Loaded					
	F1: Communi- cation & Feedback	F2: Teamwork & Respect	F3: Fear of Retribution	F4: Manage- ment Support	F5: Supervisor Interaction
C3. We are informed about errors that happen in this unit.	.794				
C1. We are given feedback about changes put into place based on event reports.	.720				
C5. In this unit, we discuss ways to prevent errors from happening again.	.718				
C2. Staff will freely speak up if they see something that may negatively affect patient care.	.654				
C4. Staff feel free to question the decisions or actions of those with more authority.	.638				

Table 5 Continued Rotated Component Matrix, 5 Factors Loaded					
	F1: Communi- cation & Feedback	F2: Teamwork & Respect	F3: Fear of Retribution	F4: Manage-ment Support	F5: Supervisor Interaction
A1. People support one another in this unit.		.819			
A3. When a lot of work needs to be done quickly, we work together as a team to get the work done.		.804			
A4. In this unit, people treat each other with respect.		.784			
A11. When one area in this unit gets really busy, others help out.		.656			
A16R. Staff worry that mistakes they make are kept in their personnel file. (REV CODE)			.815		
A8R. Staff feel like their mistakes are held against them. (REVERSE CODE)			.782		
C6R. Staff are afraid to ask questions when something does not seem right. (REV CODE)			.452		
F8. The actions of hospital management show that patient safety is a top priority.				.777	
F1. Hospital management provides a work climate that promotes patient safety.				.739	
F9R. Hospital management seems interested in patient safety only after an adverse event happens. (REVERSE CODED)				.682	
F4. There is good cooperation among hospital units that need to work together.				.613	
B4R. My supervisor/manager overlooks patient safety problems that happen over and over. (REVERSE CODED)					.719
B2. My supervisor/manager seriously considers staff suggestions for improving patient safety.	.409				.646
B1. My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures.					.638

To ensure that the scale consistently reflected the factors measured, the reliability of the five (groupings) was tested by calculating a Cronbach's Alpha score for each.

Generally scores above 0.7–0.8 are considered acceptable; values that are substantially lower indicate an unreliable scale. Based on a review of the Item-Total Correlation Matrix for each factor, no values are less than 0.3, signifying items correlate well with the scale overall. In respect to the alpha, if the item was deleted, none of the variables (questions) would substantially affect reliability with values as follows: communication and feedback (factor 1) with 5 items and an overall  $\alpha = 0.854$ ; teamwork (factor 2) with 4 items and an overall  $\alpha = 0.849$ ; fear of retribution (factor 3) with 4 items and an overall  $\alpha = 0.793$ ; management support (factor 4) with 4 items and an overall  $\alpha = 0.784$ ; and supervisor interaction (factor 5) with 3 items and an overall  $\alpha = 0.747$  with one item higher at .860. While higher, both values reflect a reasonable degree of reliability.

Lastly, to determine the importance of these factors in the context of the model, considering each dependent variable separately, Multiple Linear Regression was used. Model summary statistics and predictor variables (coefficients) were reviewed to determine if the model is meaningful with the factors of interest contributing to it. In respect to the first dependent variable of actual events reported in the last 12 months, the result is 0.129, indicating that the linear combination of the five factors (independent variables) weakly predicts the dependent variable. The  $R$  square ( $R^2$ ) indicating the proportion of variance that can be explained in the dependent variable is 1.7%. Results associated with the test of significance for the  $R$  and  $R^2$  using the  $F$ -statistic are presented in Appendix C and include a  $p$ -value, which is well below .05 ( $p < .001$ ) concluding that the findings are statistically significant.

The  $p$ -value for each of the five factors is statistically significant ( $p < .001$ ). Using the standardized coefficients ( $\beta$ ), values closely mirror the regression coefficients ( $b$ )

indicating that management support and action (- 0.117) has the strongest relationship with the number of errors reported. See Table 6.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	1.716	.002		964.883	.000
	Communication & Feedback	-.029	.002	-.029	-16.550	.000
	Teamwork	.031	.002	.031	17.443	.000
	Fear of Retribution	.033	.002	.033	18.594	.000
	Management Support	-.118	.002	-.117	-66.264	.000
	Supervisor Interaction	.011	.002	.011	6.405	.000

Findings differ in respect to the second dependent variable of perceived frequency of reporting near miss events and events resulting in no harm, with an  $R$  of 0.523, and an  $R^2$  of 0.274, indicating 27.4% of the variance can be explained. Results associated with the test of significance for the  $R$  and  $R^2$  using the  $F$ -statistic for this analysis also include a  $p$ -value well below .05 ( $p < .001$ ), concluding these findings are statistically significant and are presented in Appendix D.

The  $p$ -value for each of the five factors is statistically significant ( $p < .001$ ). Based on the standardized coefficients ( $\beta$ ), with values slightly higher than the regression coefficients ( $b$ ), communication and feedback has the strongest relationship to the

perceived frequency of reporting (0.416), followed by management support (0.237). See Table 7.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
	(Constant)	3.806	.001		2615.859	.000
	Factor score 1 Communication & Feedback	.396	.001	.416	272.082	.000
	Factor score 2 Teamwork	.136	.001	.143	93.512	.000
	Factor score 3 Fear of Retribution	.099	.001	.105	68.432	.000
	Factor score 4 Management Support	.225	.001	.237	154.999	.000
	Factor score 5 Supervisor Interaction	.103	.001	.109	71.075	.000

#### Support for the Conceptual Model

The researcher found mixed support for the model. Hypotheses associated with the dependent variable of actual events reported in the past 12 months, while significant, showed only very modest associations with strong teamwork and decreased fear of retribution. The single most strongly associated factor that was negatively associated with the number of events reported was management support. Communication and feedback also had a negative association. These findings were both statistically significant. Hypotheses associated with the second dependent variable, employee-perceived

frequency by which errors (near misses and no harm) are reported, differed in that all five factors showed a positive association. Each factor was at a level deemed significant.

It is important to understand that  $R^2$  measures explanatory power, not fit. Further, in models dealing with human behavior, as opposed to physical processes, lower  $R^2$  values are expected.

### Discussion

Patient safety and error reporting is a complex subject. Various unique aspects of healthcare and the hospital delivery system add to this complexity. Human behavior is much more difficult to predict. Personal motivation, and peer, human resource, and leadership support are believed to be key contributors to a patient safety-driven culture. Employees who are part of a culture that values and is committed to patient safety should be more likely to report medical errors and near misses than those who are not, assuming there is a belief system that values reporting. Many factors are believed to influence and motivate employees to behave in certain ways and yet, despite various efforts, the underreporting of errors continues to be prevalent. The intent behind this research was to generate legitimacy as to which factors contribute or weigh more heavily in respect to the number of actual events reported as well as the perceived frequency by which near miss and no harm reporting occurs.

This research concludes that differences may exist in respect to the impact that various strategies have on the actual act of reporting by the individual versus the perceived frequency by events that are reported across the unit by this same individual. In respect to the former, interventions and resources expended on exclusively focusing on enhancing a culture of safety as perceived by its employees may have only a marginal

impact, if any, on errors actually reported. In turn, data is not enriched nor is our ability to design safer systems based on failures enhanced. A negative relationship, albeit slight, exists between communication and feedback and management support, suggesting other factors may be affecting individual reporting. It is possible, however, that this finding may be influenced by those organizations that are further along in their safety work. Reporting in some way may be negatively perceived by respondents desiring to project a level of subject matter competency, employee accountability, or advancements in individual or organizational thinking as it pertains to patient safety; this possibility cannot be controlled for in the data set. Perhaps in wanting to project a level of commitment, goals have been set associated with harm elimination that are contrary to the need to capture more, not less, data.

Findings appear to contradict these same factors' strong positive association with the perceived frequency by which near misses and no harm events are reported, again suggesting the existence of a sort of social desirability. Of particular interest is the importance placed on communication and feedback in the model with respondents indicating a desire for closing the loop when errors are reported, including: information on the event; discussion about and feedback on the changes implemented to avoid future reoccurrence; and an openness to speak with a questioning attitude when something does not feel right.

The finding that the (elimination of) fear of retribution has the largest association with actual events reported, yet the smallest association with perceived frequency of reporting near miss and no harm events amongst the five factors, appears somewhat consistent with other research findings that this is a factor that does influence behavior,

more so than intent or perception. Understanding that the point of the model is not prediction, this small, but reliable, relationship may be an avenue for further study.

Based on the results, the researcher recommends that efforts be revisited by those wanting to increase reporting. Research should reach beyond those efforts that focus solely on organizations' culture of patient safety.

### Contribution and Future Research

While this research provides insight on the cultural influences (or lack thereof) on the act of reporting and perceived frequency by which near miss and no harm errors are reported along with their interdependencies, questions remain on multiple levels. There are many directions researchers may take for future study. In particular, this research suggests at least five distinct paths, which are outlined below.

First, additional research probing any one of these factors more deeply may yield new insight. For example, the field would benefit from a better understanding of those factors contributing to an individual's comfort in reporting that may be subcategorized into many intrinsically motivated factors or knowledge-based influencers that have not been researched. Further, given this researcher's findings that suggest the act of reporting and perceived frequency by which (others) reports may focus on very different issues, there may be value further exploring fear of retribution, including: lack of trust of supervisors and the organization to do the right thing, feelings of incompetence, concerns regarding peer pressure, and perceptions of "tattling" or "whistle-blowing" when reporting involves other professionals.

Second, research is needed on factors outside of the AHRQ instrument moving beyond those cultural influences studied that may contribute to underreporting, including

technology as an enabler and infrastructure. Research of this nature may explore associations between the act of reporting and the establishment of systems and processes that ease the burden of reporting and capturing the right amount of information cognizant of the time and follow up necessary to have sufficient details of errors and near misses. With today's technologically savvy employee and advances in automation, how do we employ such strategies as skip logic, auto-populating features, and point-and-click technologies to simplify and streamline work flow? Similarly, how do these systems allow for the creation of more meaningful reports to view trends and investigate the common reoccurring themes in our data sets to promote the desired follow-up and action?

Third, research is needed to expand the model to other populations across the care continuum, e.g., providers of home health services, outpatient clinics and surgery centers, nursing homes, and behavioral health facilities. In addition to expanding the model to other healthcare settings, moderating or mediating factors may be worthy of more in-depth analysis in hospitals. This effort could focus on differences in organizational type, such as ownership, across specialty providers, or years of effort associated with patient safety, as well as employee demographics, such as gender, age, race/ethnic background, tenure, or role. Each factor may yield new or different insights.

Fourth, research is needed on the impact of reporting on the types of errors occurring, to correlate the types of errors being underrepresented. For example, is underreporting limited to near misses or are precursor events also of concern? Are there differences as it relates to the number of events that result in actual patient harm, from moderate to severe, to requiring observation versus intervention? Are there differences in respect to the type of category of error itself (e.g., medication errors occurring at any time

in the closed-loop process, hospital-acquired infections, delayed treatment, wrong-site surgery)?

Fifth, research is needed on those factors that may incentivize and reward greater reporting as opposed to focusing on the barriers. This approach may include research on interventions that are tactical and goal-related, as well as policy-driven. This effort may be further supported by researching organizations that have achieved increased reporting. Through case studies, findings associated with increased reporting as an ideal state may present insight into actions to provide knowledge of best practices from a practitioner perspective.

Despite the limitations outlined in the data set and analysis, as well as the areas for additional study, this research can be contextualized meaningfully in the broader patient safety discussion literature. This research has practical implications for today's manager in the form of resource allocation as well as new strategies to encourage reporting, understanding the lack of substantiated success associated with voluntary reporting promoted solely through a focus on the cultural factors outlined.

CHAPTER 3  
INFRASTRUCTURE AND INCENTIVES: ADDITIONAL FACTORS THAT  
MATTER IN INCREASING MEDICAL ERROR REPORTING  
—FINDINGS FROM A NETWORK  
OF SPECIALTY HOSPITALS

Motivation for Research

More robust data regarding medical errors and near misses occurring in healthcare serves as the foundation to understand and reduce the risk of repeating such errors. To this end, much work has focused on the importance of culture as a key factor in advancing the discussion of patient safety. Yet, current research on this topic by the researcher has shown that the number of actual medical errors reported and the perceived frequency of reporting near miss and no harm events may not be as significantly influenced by culture as originally thought. An effective reporting structure encourages and maintains employees' willingness to speak without fear of reprisal or discrimination. An effective reporting structure embraces principles associated with feedback loops and leaders' role modeling behavior, in which change is initiated from identified redesign opportunities. However, no assumption can be made that when a leadership team promotes a culture committed to patient safety that employees will naturally begin to report safety errors and near misses, fully disclosing the magnitude of the opportunity. To the contrary, there are a variety of organizational and psychological barriers that must be addressed before a reporting culture flourishes (Birnbach, 2013).

The influence of management support and supervisor interaction on reporting medical errors and the perceived frequency by which near misses and no harm events are reported was studied in essay 1. With this knowledge, a new, but related, question

emerges: what impact do the factors of infrastructure and incentives, in addition to management support and a personal relationship with one's supervisor, have on influencing reporting in the context of a specialty provider focused on patient safety?

### Conceptual Model and Hypotheses

While multiple variables have been widely accepted as influencing an organization's commitment to safety and, by extension, are believed to impact reporting medical errors as well as the perceived frequency by which events are reported, these studies often heavily emphasize culture, including this researcher's own efforts presented in the first essay. Minimal research has attempted to assess culture in the broader context of top leadership verses supervisor support, coupled with a focus on incentives and infrastructure. This research addresses this gap and seeks insight on factors beyond a culture deemed important and/or posited to be foundational in terms of knowing what to report, how to report, and why to report. This research also draws on the need to further explore the employee-supervisor personal relationship, separate from top management, as factors influencing the likelihood to report errors and near misses. Lastly, three additional variables were controlled for and included tenure of the hospital, staff position, and patient interaction. A model for consideration is outlined in Figure 2.

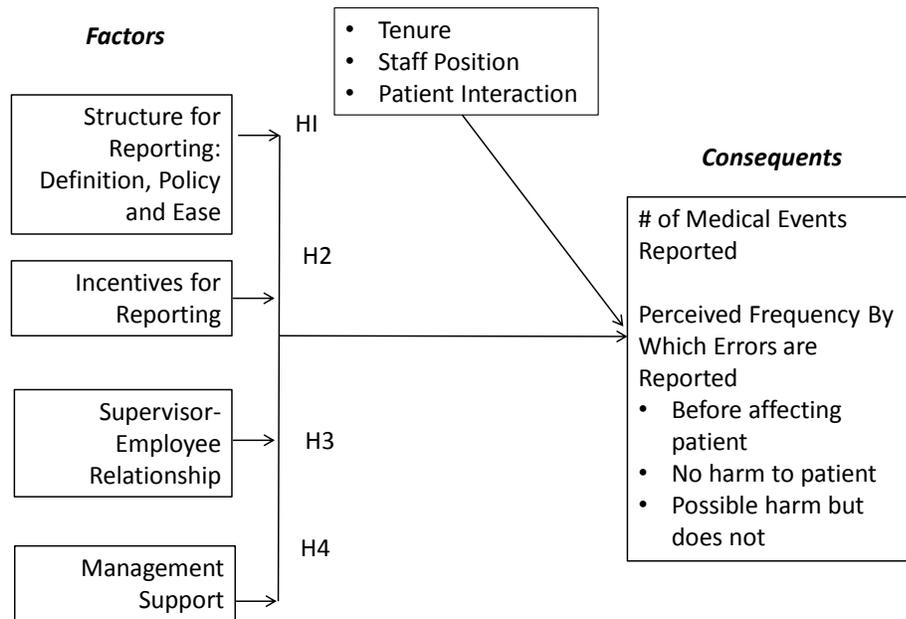


Figure 2: Identifying Factors That Matter

In this model, a series of hypotheses will be tested to assess the strength of the relationship between the independent and dependent variables. In particular, two researcher-defined factors (infrastructure and incentives) are introduced, along with a modification to the leadership construct. Top management questions of interest (variables) are consistent with the essay 1, minus the inclusion of a question focused on cooperation across units. This question had the lowest factor loading in the first study. Secondly, the supervisor role was recast by the researcher to focus on a more personal one-to-one relationship.

### *Infrastructure for Reporting (Definition, Reporting System, and Policy)*

An error is defined as an act of commission (doing something wrong) or omission (failing to do the right thing) that leads to an undesirable outcome or significant potential for such an outcome (Wachter, 2008). Events that reach the patient and result in some level of harm are most commonly categorized as minimal, moderate, or severe depending on the extent of interventions needed to reverse or lessen the impact of the error. These types of events are also typically classified as resulting in temporary or permanent harm. Errors that do not reach the patient, in many situations only by chance, are most often referred to as near misses. One of the foundational acknowledgements that must exist in identifying errors and near misses is the acceptance that events do happen (Doll, 2010). Yet, research by Jeffe (2004) suggests that that the severity of the situation, the likelihood or a recurrence, and whether the error “would be found out any way” were often deciding factors as to whether or not an event should be reported, as opposed to a demonstrated understanding as to what to report.

Effective event reporting systems are critical to enabling those responsible for evaluating errors and near misses to understand their impacts and causes (World Health Report, 2005). The main reason for reporting events is the belief that patient safety can be improved by learning from actual occurrences and near misses, rather than pretending that they never happened (Mahajan, 2010). According to Mahajan (2010), four basic activities must be apparent for an event reporting system to be effective and foster learning: data input must be independent and non-punitive; data must be of sufficient quality in terms of the right mix of discrete fields and free expression; experts must have

access to the data to generate meaningful insight; and feedback must be enabled and supported from multiple sources and levels.

Yet, safety event reporting systems often differ from one hospital to the next. Minimal consistency exists as to the types or errors that should be reported with differences existing from organization to organization and internally from unit to unit. In common is their intent to solicit details concerning events based on a variety of organizational definitions that internally created and often loosely based on various external agencies' guidelines, recommendations, or standards. Given a variety of factors contribute to how these systems are established and maintained, the vast majority of event reporting systems also engage the healthcare employee as the primary arbiter of what constitutes a report-worthy event (Huerta, 2016). Referred to in some organizations as occurrence or incident reporting systems, these systems (regardless of being electronic or paper-based) become an organization's notification mechanism of an actual negative outcome and or a source for recognizing a potential problem (Dunn, 2010).

A useful tool or set of instructions used to indicate processes are completed in a consistent, timely and repeatable way, standard work is, by many, considered a tenant of highly reliable organizations. Generally, organizational policy or standard work instructions provide the who, what, when, where, why, and how of a process. In medical error reporting, standard work instructions equate to clarity of submission expectations to reduce ambiguity. Ever evolving, work instructions should be considered best in class to accomplish the desired outcome: thorough, effective, and efficient reporting. While significant variation in how errors are defined may exist in the external environment, internally, a well-crafted policy outlining what information is reported, who should be

involved in the reporting, and how errors will be investigated and action plans developed to decrease the risk of future occurrence is critical, along with instilling a belief that it is beneficial to adhere to policy (Wolf, 2008). Cooperation for obtaining information and reporting it at a level of detail to provide insight on redesign implications is key.

Hypothesis 1: The extent to which an infrastructure exists outlining the “what, how, and when” of reporting positively increases the number of medical errors reported and perceived frequency by which near misses and no harm events are reported.

### *Incentives for Reporting*

Incentives may take different shapes, but typically fall into two categories: monetary and non-monetary. The latter may take the form of public praise or recognition, job enrichment/goal-oriented assignments, or contests with awards or giveaways. By definition, an incentive is anything that incites or tends to incite an action or greater effort for a desired outcome. While substantial research exists citing numerous barriers to reporting medical errors and near misses, research is lacking in how to effectively implement systems that incentivize reporting. Expecting staff members to report all types of errors and near misses may be idealistic and impractical given its time consuming nature without the proper support and reinforcement, and must include an alignment of organizational and individuals factors that encourage such reporting (Uribe, 2002).

Hypothesis 2: The extent that reward systems and incentives exist, promoting the reporting of events increases the number of medical errors reported and perceived frequency by which near misses and no harm events are reported.

### *Supervisor-Employee Relationship*

No two supervisors are alike. Team leaders direct and coordinate team activities, assign responsibilities, and assess performance. They establish a positive or negative team atmosphere. The thoughts and behaviors of the team are influenced by its supervisors' thoughts and ideas. Effective leadership has proven to be a critical component for maintaining safe performance in the workplace (Flin, 2008). In a study by Appelbaum (2016), psychological safety was also found to be a predictor of intention to report adverse events, along with perceived power distance and leader inclusiveness—both influencing one's willingness to report events. Event reporting is shaped by relationships and climate. Many event reporting efforts fail to acknowledge the complexity of the environments in which care is delivered, including the many factors that influence the trust. One-on-one direct and personal supervisor support may minimize any perceived negative consequences attributed to event reporting, and to the contrary, if appropriate behaviors are role-modeled, may increase the likelihood of reporting by rewarding and recognizing contributions.

Hypothesis 3: The personal backing by an employee's direct supervisor positively influences the number of medical errors reported and the perceived frequency by which near misses and no harm events are reported.

### *Management Support*

A culture of safety begins with top leadership. A common theme prevalent in most research suggests that senior management is critical in fostering and nurturing a culture of safety. It is the management of the hospital that decides whether or not to

acknowledge the high-risk nature of the environment in which providers operate and seeks to align vision, staff competency, and financial and human resources from the boardroom to the frontline with a commitment to patient safety as an organizational priority (Sammer, 2010).

Simply stated, a culture committed to patient safety is one that permeates all levels of an organization and includes an acknowledgement of the complexities and high-risk, error-prone nature of healthcare. This culture embraces a “just” system of accountability in which there is: a careful and deliberate balance between an organization’s responsibility for creating systems that work and an individual’s responsibility to act in accordance with the rules that govern the organization; collaboration across ranks to seek solutions to systems vulnerabilities; and an allocation of resources (financial and human) to address safety concerns (Wachter, 2008; Boothman, 2016). An organization’s safety culture is a product of its 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 (Health and Safety Commission Advisory Committee on the Safety of Nuclear Installations, 1993).

Hypothesis 4: Management support in which a culture of patient safety is valued increases the number of medical errors reported and the perceived frequency by which near misses and no harm events are reported.

## Methods

### *The Data Set*

The study was conducted across a network of five specialty oncology hospitals geographically dispersed across the U.S., including centers in Arizona, Illinois, Georgia, Oklahoma, and Pennsylvania. For this research, the AHRQ Hospital Survey on Patient Safety Culture Survey was used, coupled with 15 organizationally defined custom questions addressing the additional factors of interest. At its core, the AHRQ survey is intended to identify strengths and areas for improvement; it focuses almost exclusively on promoting a culture that values patient safety. Of particular interest were questions pertaining to the dimension of culture defined by AHRQ as “Hospital Management” reflective of top leadership support. The researcher-defined questions will expand the set of independent variables, including questions surrounding: clarity as to what constitutes a reportable safety event; the ease of safety event reporting; expectations articulated through policy and standard work instructions for safety event reporting; and incentives aligned with the act of safety event reporting of those errors resulting in harm, precursor events, and near misses. Lastly, a series of custom questions were also added to better explore the importance of a personal relationship between the supervisor and employee.

Respondents employed by the network’s hospitals are encouraged to take the survey, which is conducted every 12–18 months. Data collection for this round of surveying, incorporating the researcher-defined questions, occurred from September 28–October 24, 2016. Once placed in the field, the survey was accessible for a total of 27 days. There are a total of 44 close-ended items on the validated tool, excluding

demographic questions pertaining to work unit and background. An additional 11 areas of safety culture are measured beyond Hospital Management Support, as outlined in essay 1. Most of the survey items ask respondents to answer using a 5-point Likert response scale in terms of agreement (strongly agree, agree, neither agree or disagree, disagree, and strongly disagree).

Researcher-defined questions were interwoven into the questionnaire, which was administered via a survey hyperlink in an email from each of the network hospitals' chief executive officer. Responses to 23 questions were extracted for this study, three for each factor (or theme) of interest along with five demographic questions to understand the characteristics of the respondents. Of these 18 questions to assess associations, 15 questions will constitute researcher-custom questions for the custom factors of interest; three questions will come from the AHRQ standard tool pertaining to management support. Two dependent variables of interest, including the number of events reported by the respondent in the last 12 months (actual events), and three questions combined to reflect a respondent's perception of the frequency of reporting near miss and no harm events. The latter includes when a mistake is made, but is caught and corrected before affecting the patient, or has no potential for harm or does not harm, and how often these events are reported? Each of these questions are contained in the AHRQ tool.

A response rate of just over 53% of all employees was achieved constituting a robust sample of 2,103 completed surveys from the network's hospital employee base of 4,632 individuals at the time of survey.

### *Piloting the Custom Questions*

The custom questions were first tested using a small sample (N = 12) of employees from the network. The pilot consisted of each participant independently being asked to read a brief introduction outlining the organization's commitment to patient safety, acknowledging the upcoming survey, and emphasizing the importance of candid feedback. Pilot participants were then asked to review the researcher-defined questions by "thinking out loud" in selecting his/her response. In particular, comments regarding understanding the question (interpretation), comfort in responding, and whether the response scale made sense were solicited. Pilot participants were considered similar to the actual employee population. Participants represented a small cross-section of individuals, including one manager, three nurses, and seven miscellaneous staff roles with various years of service and background. Two of the 12 participants were male. The original questions piloted and their introductory language can be found in Appendix E.

Survey responses were reviewed along with participant feedback, looking for any inconsistencies or unexpected answers with necessary changes to the custom survey questions made prior to implementing it on a large scale (Suskie, 1996). Points considered included:

1. Does each question measure what it is supposed to measure?
2. Are all the words understood?
3. Do all respondents interpret the question in the same manner?
4. Does it collect the information desired?
5. Is the time allotted for completion reasonable?

The time for completion of the questions was deemed appropriate, estimated at no longer than 5 additional minutes, based on researcher observation. The questions, as revised and embedded into the final survey instrument, are shown in Table 8 along with the instructions for completion and survey response scale.

Table 8					
Custom-Defined Questions					
<i>Please indicate your agreement or disagreement with the following statement about your immediate supervisor/manager or person to whom you directly report.</i>					
	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
My supervisor is committed to patient safety.	<input type="checkbox"/>				
My supervisor encourages my speaking up for patient safety regardless of the situation.	<input type="checkbox"/>				
My supervisor backs me up when it comes to reporting safety events.	<input type="checkbox"/>				
<i>Please indicate your agreement or disagreement with the following statement about your hospital.</i>					
	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I know what is considered a reportable event.	<input type="checkbox"/>				
Policies on reporting medical errors and near misses are followed.	<input type="checkbox"/>				
When an event occurs, I am guided by our organizational policies as to how and what to report.	<input type="checkbox"/>				
It is easy for me to report medical errors and near misses.	<input type="checkbox"/>				
Policies clearly reflect my responsibility for reporting medical errors and near misses along with the organization's responsibility for follow-up.	<input type="checkbox"/>				
The definition of what constitutes a medical error is clear.	<input type="checkbox"/>				

Table 8 Continued					
Custom Defined Questions					
<i>Please indicate your agreement or disagreement with the following statement about your hospital.</i>					
	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
The definition on what constitutes a near miss event is clear.	<input type="checkbox"/>				
Our current approach to reporting medical errors and near misses captures the right detail for a reportable event.	<input type="checkbox"/>				
Reporting errors and near misses in safety is supported by our organization's goals and priorities.	<input type="checkbox"/>				
My organization encourages near miss reporting as a good thing.	<input type="checkbox"/>				
Our current approach to reporting safety concerns promotes reporting both medical errors and near misses.	<input type="checkbox"/>				
We are recognized for speaking up and reporting safety events.	<input type="checkbox"/>				

### *Data Analysis*

For this research, higher scores described in this model are hypothesized as being positively associated with the number of errors reported by participants during the last 12 months as well as the perceived frequency of reporting near miss and no harm events. All statistical analyses were performed using IBM SPSS Statistics 24.

A PCA was conducted to ensure each custom or thematically defined question hung together as hypothesized to identify the likelihood of reporting with larger concepts (infrastructure for reporting, incentivizing reporting, supervisor–employee relationship, and management support). Each of the four factors was then tested in respect to

reliability, calculating each group's Cronbach Alpha. Once completed, a multiple regression analysis was performed to test the strength or the relationship of the factors constituting the two dependent variables, the number of actual events reported, and the perceived frequency by which near misses and no harm events are reported. Lastly, three additional variables were controlled for to determine their impact on the dependent variables in the model. This included tenure or length of service in the hospital, staff position (as customized by the network), and direct versus no direct contact with patients. The latter is defined as a yes or no in response to the question.

## Results

Characteristics of the data set are presented in Table 9 and include data pertaining to staff position, years of hospital service, and direct versus no direct patient interaction. The largest proportion of respondents categorized themselves as "other" at 43%, followed by Registered Nurse at 20.7%, and administration/management at 11.4%. Physicians accounted for 2.7% of all respondents selecting a position of association; 9.5% of respondents left the question blank. This result differed from the data set characteristics used in essay 1, suggesting a possible strong desire for participants in essay 2 to remain anonymous. The highest frequency of tenure fell at one to five years of hospital service with 55.8% of all participating. More than 22% of participants indicated six to ten years of service. A total of 9.8% of respondents indicated they had been on staff for less than one year, while 5.8% indicated a length of service of 16 years or greater. Compared to the national set, the percentage of new staff at the specialty network is higher. The majority of respondents, 1,311 or 62.3%, have direct interaction with patients.

Table 9				
Data Set Characteristics				
Respondent Staff Position				
	Frequency	Percent	Valid Percent	Cumulative Percent
Other	904	43.0	47.5	47.5
Registered Nurse	435	20.7	22.8	70.3
Physician Assistant/Nurse Practitioner	29	1.4	1.5	71.8
LVN/LPN	20	1.0	1.1	72.9
Patient Care Assistant/Aide	73	3.5	3.8	76.7
Physician	57	2.7	3.0	79.7
Pharmacist	38	1.8	2.0	81.7
Dietitian	22	1.0	1.2	82.9
Unit Assistant/Clerk/Secretary	86	4.1	4.5	87.4
Administration/Management	240	11.4	12.6	100.0
Total	1904	90.5	100.0	
Missing	199	9.5		
Total	2103	100.0		
Respondent Years of Service in Hospital				
Less than 1 year	192	9.8	9.8	
1–5 years	1089	55.8	65.7	
6–10 years	431	22.1	87.8	
11–15 years	125	6.4	94.2	
16–20 years	62	3.2	97.4	
21 or more years	51	2.6	100.0	
Total	1950	100.0		
Missing	153			
Total Responses	2103			
Respondent Interaction with Patients				
Direct Interaction with Patients	1311	62.3	67.2	67.2
Non-Direct Interaction with Patients	639	30.4	32.8	100.0
Total	1950	92.7	100.0	
Missing	153	7.3		
Total	2103	100.0		

As an additional point of reference, in comparing the network’s findings to that of the most current AHRQ data set for the questions of interest, for which comparison data is available, the network outperformed in each. This comparison includes the three questions associated with management support, questions pertaining to the number of actual events reported, and perceptions of near miss and no harm reporting (dependent variables). These comparisons are provided in Table 10 (Cancer Treatment Centers of America, Culture of Safety Survey Enterprise-Wide Report, October 2016).

Table 10		
Comparison National and Network		
	National	Network
Management provides climate that promotes safety.	81%	87%
Management shows that safety is a priority.	76%	78%
Management interested in safety only after adverse event. (REV CODED)	61%	63%
Mistake made, but caught, how often reported?	62%	69%
Mistake made, but no potential to harm, how often reported?	63%	66%
Mistake made could harm, but does not, how often reported?	75%	77%
No events reported in past 12 months.	55%	57%
1 to 2 events reported in past 12 months.	27%	21%
3 to 5 events reported in past 12 months.	12%	14%
6 to 10 events reported in past 12 months.	4%	8%
11 to 20 events reported in past 12 months.	2%	5%
21 or more events reported in past 12 months.	1%	4%

Descriptive statistics produced for the independent variables, including a mean and standard deviation, are presented in Table 11. One item was reverse coded. Scores

ranged from a low of 3.60 with a standard deviation of 1.164, to a high of 4.38 with a standard deviation of 0.749.

	N	Mean	Std. Dev
1. My supervisor/manager is committed to patient safety	2045	4.36	.746
5. My supervisor/manager encourages my speaking up for safety	2036	4.25	.818
6. My supervisor/manager backs me up when it comes to reporting events	2031	4.24	.829
1. Hospital management provides a work climate that promotes patient safety	1947	4.16	.824
8. The actions of hospital management show that patient safety is a top priority	1923	4.05	.953
9. Hospital management seems in patient safety only after an adverse event happens (REV CODE)	1916	3.60	1.156
12. I know what is considered a reportable event	1925	4.25	.724
13. Policies on reporting medical errors and near misses are followed	1867	3.95	.843
14. When an event occurs, I am guided by policy as to how and what to report	1900	4.07	.814
15. It is easy for me to report medical errors and near misses	1889	3.99	.853
16. Policies clearly reflect my responsibility for reporting along with the organization's responsibility for follow up	1891	4.02	.814
17. The definition of what constitutes a medical error is clear	1896	4.07	.761
18. The definition of what constitutes a near miss is clear	1901	4.08	.749
19. Our current approach to reporting captures the right amount of detail	1875	3.96	.798
20. Reporting errors and near misses is supported by our goals and priorities	1898	4.17	.729

Table 11 Continued			
Descriptive Statistics--All Independent Variables			
	N	Mean	Std. Dev
21. My organization encourages near miss reporting as a good thing	1898	4.12	.797
22. Our current approach to reporting safety concerns promotes reporting both errors and near misses	1894	4.12	.756
23. We are recognized for speaking up and reporting safety events	1898	3.80	.959

For the each of the dependent variables of interest (actual errors reported and perceived frequency of reporting near miss and no harm events) frequency tables were produced. See Tables 12 and 13.

Table 12				
Number of Errors Reported in the Past 12 Months				
	Frequency	Percent	Valid Percent	Cumulative Percent
No event reports	1068	50.8	54.2	54.2
1-2 event reports	403	19.2	20.5	74.7
3-5 event reports	249	11.8	12.6	87.4
6-10 event reports	128	6.1	6.5	93.9
11-20 event reports	71	3.4	3.6	97.5
21 event reports or more	50	2.4	2.5	100.0
Total	1969	93.6	100.0	
Missing	134	6.4		
Total	2103	100.0		

Table 13 Perceptions of Frequency of Reporting Near miss and No harm Events				
	Frequency	Percent	Valid Percent	Cumulative Percent
When a mistake is made, but caught before affecting patient, how often is it reported?				
Never	30	1.4	1.6	1.6
Rarely	149	7.1	7.8	9.4
Sometimes	409	19.4	21.5	30.9
Most of the Time	640	30.4	33.7	64.6
Always	672	32.0	35.4	100.0
Total	1900	90.3	100.0	
Missing	203	9.7		
Total	2103	100.0		
When a mistake is made, but no potential to harm patient, how often is it reported?				
Never	38	1.8	2.0	2.0
Rarely	154	7.3	8.1	10.1
Sometimes	448	21.3	23.6	33.7
Most of the Time	615	29.2	32.4	66.2
Always	642	30.5	33.8	100.0
Total	1897	90.2	100.0	
Missing	206	9.8		
Total	2103	100.0		
When a mistake is made that could harm the patient but does not, how often is it reported?				
Never	28	1.3	1.5	1.5
Rarely	86	4.1	4.5	6.0
Sometimes	315	15.0	16.6	22.7
Most of the Time	604	28.7	31.9	54.5
Always	861	40.9	45.5	100.0
Total	1894	90.1	100.0	
Missing	209	9.9		
Total	2103	100.0		

In scanning the significance values on the Correlation Matrix, no values were greater than 0.05, and with the exception of one, no correlation coefficients were greater than 0.746, suggesting no need to eliminate variables or for multicollinearity to be a factor. In reviewing the KMO measure of sampling adequacy, a score of 0.943 was derived. A value close to 1 (the KMO statistic varies from 0 to 1) indicates that patterns of correlations are relatively compact, such that the factor analysis should yield distinct and reliable factors. Bartlett's measure tests the null hypothesis that the original correlation matrix is an identity one, suggesting if insignificant, that no relationship in the data exists. The statistic derived was highly significant ( $p < 0.001$ ).

Eigenvalues associated with each factor were examined before extraction, after extraction, and after rotation. Four factors explained 71.143% of the total variance. In determining how many factors should be retained, the researcher elected to keep the factors that in total accounted for 70–80% of the variance, an accepted rule of thumb in the literature. The analysis was performed a number of times to ensure the best interpretation of the factor solution. In reviewing the communalities, common or shared variance differs from a low of 0.570 for question #12 pertaining to knowing what is considered a medical error, to a high of 0.835 for question #6 regarding supervisor backing (see Appendix F). Factor loadings less than 0.5 were suppressed by design to make interpretations easier. Common themes are consistent with the researcher's model, revealing the questions of interest are composed of four subscales: infrastructure, incentives, employee-supervisor relationship, and management support with the Rotated Component Matrix presented in Table 14.

Table 14 Rotated Component Matrix				
	Component			
	1	2	3	4
1. My supervisor/manager is committed to patient safety.	.829			
5. My supervisor/manager encourages my speaking up for patient safety.	.824			
6. My supervisor/manager backs me up when it comes to reporting safety events.	.739			
1. Hospital management provides a work climate that promotes patient safety.	.730			
8. The actions of hospital management show that patient safety is a top priority.	.727			
9. Hospital management seems interested in patient safety only after an adverse event happens. (REV CODED)	.698			
12. I know what is considered a reportable event.	.639			
13. Policies on reporting medical errors and near misses are followed.	.635			
14. When an event occurs, I am guided by organization policy as to how and what to report.		.733		
15. It is easy for me to report medical errors and near misses.		.713		
16. Policies clearly reflect my responsibility for reporting and the organization's responsibility for follow up.		.666		
17. The definition of what constitutes a medical error is clear.		.605		
18. The definition of what constitutes a near miss is clear.			.863	
19. Our current approach to reporting medical errors and near misses captures the right detail.			.846	
20. Reporting errors and near misses is supported by our organization's goals and priorities.			.787	
21. My organization encourages near miss reporting as a good thing.				.772
22. Our current approach to reporting safety concerns promotes reporting.				.765
23. We are recognized for speaking up and reporting safety events.				.726

To ensure that the scale consistently reflected the construct measured, the reliability of the four factor loadings was tested. A Cronbach's Alpha Score was calculated for each and is reflected in Table 15. In a reliable scale, all items should correlate with the total. In this data set, all factors scored higher than 0.76 indicating strong reliability. In reviewing the Cronbach Alpha if an item was deleted, only two of the 18 variables (questions of interest) would slightly increase their overall alpha, from 0.764 to 0.798 for *hospital management seems interested in patient safety only after an adverse event* (management and support factor) and 0.867 to 0.891 for *we are recognized for speaking up and reporting safety events* (incentives factor). See Appendix G for detail.

Table 15			
Reliability Statistics			
	Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
Infrastructure	.923	.924	8
Incentives	.867	.877	4
Supervisor Employee Relationship	.871	.872	3
Management Support	.764	.781	3

To investigate the relationship between the dependent variable (number of events reported as well as perception of frequency of reporting near misses and no harm events) and the independent variables (factors 1, 2, 3, and 4) as defined by the PCA, a regression analysis was conducted. Prior to conducting the analysis, a mean score for the three questions constituting the second dependent variable on perceived frequency was

calculated. Further, given a summated rating scale was used to produce the interval-level data that is a prerequisite for certain types of statistics (means scores and correlations), the interval from one response option to another was assumed to be equal. Responses for each question (independent variable constituting the four factors) used balanced category labels (strongly disagree, disagree, neither, agree, and strongly agree) such that this assumption can be reasonably made (Spector, 1992).

In respect to the first dependent variable the number of actual events reported in the last 12 months, the result is 0.038, indicating the model weakly predicts the desired outcome. The proportion of variation accounted for in the model is 3.8%. Although small, the *p*-value (<0.0005) suggests the model is a good fit for the data. When adding hospital tenure, staff position, and patient interaction to the model, two of the three variables are statistically significant in improving the prediction. Model 2, with the interaction between hospital tenure and patient interaction and actual events reported, accounted for significantly more variance than just the four factors by themselves,  $R^2$  change = 0.018,  $p < 0.0005$ . See Table 16.

Model Summary Actual Errors Reported									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
4 Factors	.195	.038	.036	1.287	.038	17.403	4	1755	.000
Tenure and Patient Interact	.237	.056	.053	1.276	.018	16.909	2	1753	.000

In reviewing the regression coefficients factor 1, infrastructure, followed by factor 3, employee-supervisor relationship have the strongest positive association with the number of actual events reported in the last 12 months. Factor 4, management support, once again has a negative relationship. Length of service and patient interaction versus non-interaction do impact the relationship between factors 1 and 4 at a level determined to be statistically significant. See Table 17.

		B	Std. Error	Beta	<i>t</i>	Sig
Model	Constant	1.967	0.31		64.113	.000
	Infrastructure	.174	.031	.132	5.650	.000
	Incentives	.020	.031	.015	.645	.519
	Supervisor-Employee Relationship	.065	.031	.049	2.106	.035
	Management Support	-.176	.031	-.134	-5.736	.000
Model Additional Control Variables	Constant	1.915	.115		16.791	.000
	Infrastructure	.169	.031	.129	5.536	.000
	Incentive	.024	.030	.018	.778	.437
	Supervisor-Employee Relationship	.071	.030	.054	2.329	.020
	Management Support	-.174	.031	-.133	-5.673	.000
	<i>Tenue hospital</i>	.142	.029	.113	4.861	.000
	<i>Patient Interaction</i>	-.225	.066	-.080	-3.404	.001

Given that a regression coefficient is an estimated value describing the relationship between the dependent variable and independent variables (factors), the standard error of the coefficient measures how precisely the model estimates the unknown coefficient. When using SPSS, the formula contains some basic components such as standard error of regression, N, and deviations from means of independent variables. Usually, the calculated standard errors will be different because independent variables are different. In certain circumstances, when the deviations of all independent variables (or factors in this case) are the same or very close, the standard error of each coefficient could be the same or very close. This example is the case in this data set given the independent variables (infrastructure, incentives, employee-supervisor relationship, and management support) are Likert-scale variables and the number of observations is relatively large: 1,770 observations.

In terms of the second dependent variable perceived frequency in which near miss and no harm events are reported,  $R^2$  is 0.275 indicating the model predicts 27.5% of the variation. The  $p$ -value ( $<0.0005$ ) suggests the model is a good fit for the data. See Table 18.

Table 18									
Model Summary Perceived Frequency Near miss and No harm Reporting									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
	.525	.275	.274	.780	.275	165.105	4	1739	.000

When hospital tenure, staff position, and patient interaction as variables are added and controlled for in the model, none of the three variables were found to improve the prediction associated with the perceived frequency of reporting near misses and no harm events at a level that is significant. Therefore, no interaction effect can be implied in respect to changing the direction or magnitude of the relationship between infrastructure for reporting, incentives for reporting, employee-supervisor relationship, and management support and these third control variables.

Using the standardized coefficients ( $\beta$ ), values closely mirror the regression coefficients ( $b$ ) indicating that factor 1, infrastructure, has the strongest relationship with the perceived frequency in which near misses and no harm events are reported. See Table 19.

	B	Std. Error	Beta	t	Sig
Constant	3.998	0.19		214.193	.000
Infrastructure	.311	.019	.340	16.652	.000
Incentives	.183	.019	.201	9.832	.000
Supervisor-Manger Relationship	.216	.019	.235	11.488	.000
Management Support	.231	.019	.253	12.380	.000

## Discussion

This research moves beyond traditional factors in the AHRQ Culture of Safety survey and the commitment of leadership in ascertaining factors considered pivotal in the underreporting of medical errors and near miss events. Through the addition of custom questions, factors including an infrastructure promoting reporting, incentives for reporting, and supervisor relationship were examined. Two dependent variables were explored and the effects of tenure, staff position, and patient interaction controlled for as part of the model.

In respect to the number of medical errors reported in the last 12 months, the four factors are found to only weakly predict the outcome variable, although at a level deemed statistically significant. The factor having the greatest association with an increased number of errors reported pertains to infrastructure or staff knowing what to report, when to report it, and how to report it. Conversely and of greater interest is the continued finding that influence of management has an inverse or negative association with the number of events reported. This finding is contrary to some research that suggests that top leadership is a primary driver of all aspects of an organization's commitment to patient safety, including increased reporting. Further, tenure and direct patient contact were found to affect the likelihood of increased events reported with years of service positively associated and the lack of patient interaction negatively associated. This research suggests that as a staff member's tenure increases, so too may his/her trust and comfort in reporting errors, and/or knowledge contributing to a higher number of events reported. Years of service may lessen the perceived importance of management's influence on reporting behavior. Further, no significant differences were found relevant

to staff position and reporting behavior in the model. This finding calls into question the widely-held belief that significant differences exist across disciplines.

The four factors studied did explain a higher amount of variance in terms of the perceived frequency by which near miss and no harm events are reported. Infrastructure is again the factor with the greatest association, considered by the researcher as foundational to enhanced reporting, although all four factors were positively associated. Yet, the impact of the three additional factors controlled for (tenure, staff position, or patient interaction) each had no effect on the dependent variable in this model. This observation is consistent with the possibility that perceptions about reporting frequency (how one feels or thinks others would act in terms of near miss and no harm reporting) do not differ based on experience. This research is also consistent with all staff members, regardless of position and years of experience, recognizing that they are encouraged to use event reporting systems to identify potential and near miss events so that, organizationally, such occurrences can be evaluated and medical care processes improved.

A number of limitations should be acknowledged in respect to the data set. First, the proposed model was tested in the context of a network of specialty oncology providers considered a convenience sample. The network, although licensed as an acute care provider, may not represent the larger hospital community. Second, the network consists of five hospitals each strategically committed to eliminating preventable harm through efforts requiring time and resources devoted to advancing the dialogue around patient safety. As such, the experience at these hospitals may differ from those not as focused on error prevention, and error and near miss reporting. Third, the researcher

understands that regardless of the setting and any organizational advances made relevant to patient safety, the committing an error or near miss and reporting it remains an uncomfortable topic. Sensitivity in the data gathering phase is required to elicit candid responses. Fourth, it is recognized that the responses compiled could be compromised by a desire to project expertise given the network's existing emphasis on safety as an organizational priority. Lastly, in terms of the analysis itself, while commonly accepted in the social sciences, an assumption is made about the difference between the scale items used as independent variables as being equal for purposes of conducting the regression. There is no way to determine if the differences were in fact perceived by respondents as equidistant such that one unit difference refers to switching from one category to the next on the Likert scale.

#### Contribution to Future Research

While this research provides insight on factors contributing to the likelihood of reporting medical errors and near miss events beyond cultural aspects of an organization typically studied, much remains unexplained in respect to identifying barriers and/or accelerators to increased data acquisition. There are many directions researchers may take regarding future study. In particular, this researcher suggests at least following four additional areas for study as an outgrowth of this work.

In respect to data acquisition and analysis, first an opportunity may exist to obtain data segmented by voluntary versus mandatory systems where reporting expectations differ. While sparse, some literature does suggest that the latter—the voluntary reporting of events that result in little to no harm to patients—must be viewed as complementary to mandatory systems intended to capture greater detail regarding harm requiring

intervention. To encourage this level of reporting that focuses on identifying systematic issues that could lead to even more serious harm differences in submission processes and confidentiality, protections may be warranted. Further, the data may be categorized by level of harm to determine if an association exists in which the likelihood of reporting is based on discoverability of the error or near miss.

Second, research moving beyond self-reporting may be of interest—exploring additional means to obtain data regarding medical errors and near miss events. This approach may include technology-driven ways of identifying interactions and adverse events in areas such as medication prescribing, dispensing, and administration. Many newly developed electronic information systems, such as those enabling computerized order entry or bedside bar scanning, contain features alerting practitioners to contraindications, requiring acknowledgement or overriding to proceed with the desired patient interaction. These systems also collect data regarding interventions and allow the creation of reports that may yield new insight.

Third, to improve our understanding of the underreporting problem, a change in the method of inquiry, such as conducting qualitative research, may prove meaningful. This effort would require a shift to the “why” and “how” of reporting medical errors and near misses, rather than the “what, where, and when” of reporting. Researchers may consider case studies, focus groups, interviews, or mining open-ended survey questions to obtain deeper insight and context of factors impacting the likelihood of reporting.

Lastly, research of this nature, focused on constructs such as infrastructure, incentives, and leadership support in the quest to increase medical error and near miss reporting, may be replicated in other settings beyond a specialty network and/or providers

with an expressed commitment to patient safety and the prevention of harm. In respect to setting, findings may differ in areas outside of specialty care. Home health agencies, skilled nursing facilities, acute care providers, and surgical centers are all settings in which the study of near misses and medical errors may valuably mitigate risk and the likelihood of harm. Further, differences that are worthy of exploration may exist among those providers, regardless of care setting, that are new to the patient safety journey versus staff more advanced in their adoption of strategies and tactics intended to decrease preventable medical errors.

Despite the limitations outlined in the data set and analysis, as well as the various areas cited for additional study, the research is believed to be a meaningful contribution to the broader patient safety literature. From an applied research perspective, the practical implications for healthcare leaders includes the need to continue to focus on the tangible aspects of establishing the infrastructure for reporting first, including an understanding of what is reportable, when to report and how, especially with staff who are newer to the organization. Secondly, this approach includes a need to focus on incentives and the support of front-line supervisors in addition to the cultural influences promoted by top management.

## REFLECTION AND LOOKING AHEAD

This dissertation is an examination of the barriers to medical error reporting in today's healthcare organizations. The act of improving patient safety requires data from which to learn. It is inspired by the practitioner's personal and professional experiences in navigating the healthcare delivery system, which is an industry full of highly skilled, compassionate individuals who desire to provide care that is first and foremost safe every day. This research is inspired by a system, however, that challenges every care provider to do just that as the system's complexities test even the brightest in the best of circumstances. It is widely recognized that reported events underrepresent the true state of patient safety. The two studies present overlapping models that provide a partial explanation of the factors that influence the two common dependent variables of interest.

The first essay uses a standard instrument employed annually by hundreds of hospitals to assess organizational culture relevant to patient safety and attempts to correlate cultural factors most influential in impacting an employee's likelihood of reporting medical errors along with the perceived frequency by which near miss and no harm events are reported. Findings suggest factors most closely associated with a culture of patient safety do not necessarily translate to significant increases in the number of events reported; there is only a modest impact on the perception of frequent reporting of near misses. While much research has heavily emphasized the need for a culture characterized by anonymous reporting, the elimination of fear in reporting, and the importance of feedback mechanisms, other factors have often been overlooked and in fact are foundational to the act of reporting. Efforts to increase reporting must begin with a focus on improving knowledge of event reporting systems, addressing perceptions as to

what constitutes reportable events, and tackling the practical and psychological barriers to reporting (Kreckler, 2008). The second essay is therefore intended to evaluate such underlying factors. These findings suggest that any effort to increase reporting requires an effective infrastructure first. This research also cites a relationship between incentives and supervisor relationship with all factors influenced by length of service and patient interaction as important additional control variables in increasing the number of events reported. Together, these two studies advance a research stream intended to illustrate the complexity of issues associated with reporting, influencing advances in patient safety and, by extension, negatively impacting our ability to (re)design safer healthcare.

What emerges is an opportunity to combine the two models to determine if a more complete picture of barriers to reporting exists, increasing the amount of variance explained. To accomplish this, a new set of statistics could be calculated using the CTCA data set in which the factors explored in essay 1 are added to that of essay 2 and linear regressions produced exploring the association of the enhanced model and each dependent variable. To validate that each factor remains intact, a PCA could also be conducted.

From a practitioner perspective, there remains a desire to debunk myths that equate the lack of advancements in patient safety as attributable primarily to culture so that we may, as a field, expand our dialogue. This includes a discussion of definitions, policies and procedures, and system redesign strategies to overcome underreporting.

In addition, the act of turning medical errors and near miss reports into “results” in the form of safer care is in its early stages of development. Organizations that build feedback mechanisms into their reporting processes are believed to be the most effective

in improving patient safety. Improving patient safety requires a top-down and bottom-up commitment to change. Without this commitment, event and near miss reporting, robust or sparse, has little value.

In advancing the conversation of patient safety, the discussion of reported errors must take new meaning. Improving the reliability of complex systems, such as healthcare, in any setting, is not easy. There is no magic bullet or simple formula. Unlike clinical research studies focused on alternative treatments or trials of new medicines, patient safety involves real-world work processes and as such is “messy” for the evidence-based practitioner. It is difficult to isolate one factor or another when it comes to our medical error underreporting dilemma. At the core of the exploration may be an enlightened opportunity to engage our patients in the discussion in ways we have not before. Correlating the act of reporting all types of events with a reduction of the seriousness of these events remains relatively untested. At the core of this discussion must also be a desire to understand the inverse relationship that appears to exist in increased reporting of precursor and near miss events if we are to decrease those events which do result in harm and may have been prevented if we had more robust data from which to learn.

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APPENDIX A

ESSAY 1 KMO AND BARTLETT'S TEST

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.937
Bartlett's Test of Sphericity	Approx. Chi-Square	3093241.267
	df	190
	Sig.	.000

APPENDIX B

ESSAY 1 TOTAL VARIANCE EXPLAINED BY MODEL,  
5 FACTORS EXTRACTED

	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8.144	40.721	40.721	8.144	40.721	40.721	3.334	16.672	16.672
2	1.486	7.430	48.152	1.486	7.430	48.152	3.008	15.042	31.715
3	1.472	7.359	55.511	1.472	7.359	55.511	2.562	12.809	44.524
4	1.187	5.934	61.445	1.187	5.934	61.445	2.468	12.339	56.863
5	.905	4.526	65.970	.905	4.526	65.970	1.822	9.108	65.970
6	.761	3.803	69.773						
7	.682	3.411	73.183						
8	.622	3.112	76.296						
9	.556	2.778	79.074						
10	.523	2.613	81.687						
11	.481	2.404	84.091						
12	.439	2.193	86.283						
13	.433	2.167	88.450						
14	.407	2.033	90.483						
15	.373	1.865	92.348						
16	.361	1.806	94.154						
17	.337	1.685	95.839						
18	.314	1.572	97.411						
19	.281	1.405	98.815						
20	.237	1.185	100.000						

APPENDIX C

ANOVA FOR NUMBER OF EVENTS REPORTED

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5317.968	5	1063.594	1070.713	.000
	Residual	311885.339	313973	.993		
	Total	317203.306	313978			

APPENDIX D

ESSAY 1 ANOVA FOR PERCEIVED EVENTS REPORTED BY UNIT

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	76746.017	5	15349.203	23367.917	.000
	Residual	203775.715	310232	.657		
	Total	280521.733	310237			

## APPENDIX E

### ESSAY 2 PILOT CUSTOM QUESTIONS

At CTCA® our first commitment is to the safety of our patients and stakeholders. This commitment is inherent in Our Vision, Our Mission, Our Values, Our Promise, and Our Stakeholder Bond. We support a culture of patient safety and look to you, our stakeholders who are both directly and indirectly involved in patient care, to assess how we are doing and where we can improve.

Across CTCA, we are asking our stakeholders and physicians to take the time to offer feedback by completing this survey. Your responses are completely confidential and vital in helping us improve the care we provide and create a safe environment for our patients, their caregivers and CTCA stakeholders.

CTCA uses the Agency for Healthcare Research and Quality (AHRQ) Hospital Survey on Patient Safety Culture. AHRQ sponsored the development of a patient safety culture assessment tool for hospitals based on validated research designed to help hospitals assess the culture of safety in their institutions. The survey was first released in 2004 and since that time hundreds of hospitals within the US and around the world have implemented the survey.

The results of this survey will be shared across the enterprise once compiled and appropriate actions taken on opportunities identified. The survey asks for your opinions about patient safety issues, medical error, and event reporting in your hospital and will take about 5 to 10 minutes to complete.

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

Think about your hospital work area/unit	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
I know what would be considered a reportable event.	<input type="checkbox"/>				
The definition of what is considered a medical error and near miss is clear.	<input type="checkbox"/>				
I never second guess myself as to whether or not an event should be reported.	<input type="checkbox"/>				
Our policies regarding event reporting are consistently followed.	<input type="checkbox"/>				

APPENDIX E CONTINUED  
 ESSAY 2 PILOT CUSTOM QUESTIONS

Think about your hospital work area/unit	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
When an event occurs, I am guided by our organizational policies as to how and what to report.	<input type="checkbox"/>				
Our policies reflect a balance between organizational and individual responsibilities for error reporting.	<input type="checkbox"/>				

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

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
My supervisor is committed to patient safety	<input type="checkbox"/>				
My supervisor encourages my speaking up for patient safety regardless of the circumstance.	<input type="checkbox"/>				
I feel supported by my supervisor when it comes to reporting safety events.	<input type="checkbox"/>				

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

	Never	Rarely	Some - times	Most of the Time	Always
Our current safety event reporting system captures the right detail for a reportable event.	<input type="checkbox"/>				
Our current safety event reporting system makes it easy for me to report unsafe situations.	<input type="checkbox"/>				
I feel our current system for reporting safety events and near misses is user-friendly.	<input type="checkbox"/>				

APPENDIX E CONTINUED  
 ESSAY 2 PILOT CUSTOM QUESTIONS

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

Think about your hospital	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
Reporting errors and near misses is aligned with our organization's goals for patient safety.	<input type="checkbox"/>				
I am rewarded for speaking up and reporting safety events.	<input type="checkbox"/>				
My organization recognizes near miss reporting as a good thing.	<input type="checkbox"/>				

APPENDIX F

ESSAY 2 COMMUNALITIES

<b>Communalities</b>		
	Initial	Extraction
1. My supervisor/manager is committed to patient safety.	1.000	.756
5. My supervisor/manager encourages my speaking up for patient safety regardless of the situation.	1.000	.823
6. My supervisor/manager backs me up when it comes to reporting safety events.	1.000	.835
1. Hospital management provides a work climate that promotes patient safety.	1.000	.694
8. The actions of hospital management show that patient safety is a top priority.	1.000	.767
9. Hospital management seems interested in patient safety only after an adverse event happens. (Reverse Code)	1.000	.639
12. I know what is considered a reportable event.	1.000	.570
13. Policies on reporting medical errors and near misses are followed.	1.000	.569
14. When an event occurs, I am guided by our organizations policies as to how and what to report.	1.000	.655
15. It is easy for me to report medical errors and near misses	1.000	.602
16. Policies clearly reflect my responsibility for reporting medical errors and near misses along with the organizations.	1.000	.679
17. The definition of what constitutes a medical error is clear.	1.000	.782
18. The definition of what constitutes a near miss is clear.	1.000	.796
19. Our current approach to reporting medical errors and near misses captures the right detail.	1.000	.680
20. Reporting errors and near misses is supported by our organization's goals and priorities.	1.000	.776
21. My organization encourages near miss reporting as a good thing.	1.000	.758
22. Our current approach to reporting safety concerns promotes reporting both medical errors and near misses.	1.000	.807
23. We are recognized for speak up and reporting safety events.	1.000	.618

APPENDIX G

ESSAY 2 RELIABILITY CRONBACH'S ALPHA ITEM DELETED DETAIL

Cronbach's Alpha if Item Deleted	
<b>Factor Supervisor</b>	
1. My supervisor/manager is committed to patient safety.	.856
5. My supervisor/manager encourages my speaking up for patient safety regardless of the situation.	.801
6. My supervisor/manager backs me up when it comes to reporting safety events.	.794
<b>Factor Management</b>	
1. Hospital management provides a work climate that promotes patient safety.	.677
8. The actions of hospital management show that patient safety is a top priority.	.583
9. Hospital management seems interested in patient safety only after an adverse event happens. (Reverse Code)	.798
<b>Factor Infrastructure</b>	
12. I know what is considered a reportable event.	.921
13. Policies on reporting medical errors and near misses are followed.	.918
14. When an event occurs, I am guided by our organizations policies as to how and what to report.	.913
15. It is easy for me to report medical errors and near misses	.915
16. Policies clearly reflect my responsibility for reporting medical errors and near misses along with the organizations.	.911
17. The definition of what constitutes a medical error is clear.	.907
18. The definition of what constitutes a near miss is clear.	.906
19. Our current approach to reporting medical errors and near misses captures the right detail.	.912
<b>Factor Incentive</b>	
20. Reporting errors and near misses is supported by our organization's goals and priorities.	.815
21. My organization encourages near miss reporting as a good thing.	.820
22. Our current approach to reporting safety concerns promotes reporting both medical errors and near misses.	.798
23. We are recognized for speak up and reporting safety events.	.891