The patient safety chain: Transformational leadership’s effect on patient safety culture, initiatives, and outcomes

Kathleen L. McFadden a,*, Stephanie C. Henagan b, Charles R. Gowen III b

a Department of Operations Management and Information Systems, Northern Illinois University, Barsema Hall 328, DeKalb, IL 60115-2854, USA
b Department of Management, Northern Illinois University, Barsema Hall 245, DeKalb, IL 60115-2854, USA

1. Introduction

Some organizations require great attention to preventing mistakes because errors could have serious implications to public safety. High reliability organizations (HROs) refer to organizations or systems that operate in complex and hazardous conditions and yet consistently achieve nearly error-free performance. They are termed HROs because they seem to function in a more reliable fashion than other similar organizations. Classic examples of HROs can be found in the aviation industry, the nuclear power industry, and some sections of the military. Failure rates in these organizations are much lower than those found in healthcare, an industry where injury to the public is a major concern. Healthcare organizations would benefit from operating as HROs. We propose that HRO status can be achieved through a systematic process linked to top leadership. We empirically test this proposition by building a model for improving patient safety in hospitals.

Although operations management traditionally has been concerned with improving quality and reducing defects in manufacturing settings, recent research in this field has expanded to include the study of errors and safety in service industries such as aviation and healthcare (e.g., Barnett and Higgins, 1989; Tucker, 2004). Product defects in manufacturing are synonymous with operational failures in aviation or healthcare, which have the potential to impact public safety. Safety is a critical component of quality improvement, and the term “operations safety” has emerged as a new and growing area of interest in the field (McFadden and Hosmane, 2001). Since Brown (1996) encouraged researchers to adopt safety in research agendas, and Brethauer (2004) stressed the need for more service research on improving safety in healthcare, the problem of medical errors and their consequences is now receiving more attention in operations management literature (e.g., Tucker, 2004; Gowen et al., 2006).

Healthcare has become one of the largest service sectors of our economy, accounting for about 15% of Gross
Domestic Product and providing the greatest number of new jobs of any industry in the United States (Mandel, 2006). Improving patient safety is one of the most highly publicized and critical issues facing this industry today. Although patient safety, defined by the National Patient Safety Foundation as “the avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of healthcare,” is not a new concept, the first report issued by the Institute of Medicine (IOM), entitled To Err is Human: Building a Safer Health System (IOM, 2000), broke the silence that had originally surrounded medical errors and their consequences. Their findings indicated that as much as 58% of the 98,000 error-related deaths that occur annually may be preventable. Consequently, the IOM recommended rigorous and widespread changes in healthcare processes. In addition, in November of 2000, The Leapfrog Group was established by a coalition of major employers in order to initiate breakthrough improvements in safety and reduce preventable medical errors, which are defined as “the failure of a planned action to be completed 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)” (IOM, 2000, p. 28). The Leapfrog Group and the IOM reports, along with the Joint Commission’s adoption of patient safety standards and patient safety goals (Joint Commission, 2009) have put serious pressure on hospitals to develop patient safety initiatives (PSI) designed to reduce medical errors. Nonetheless, hospitals have been slow in meeting patient safety goals and inconsistent in implementing safety systems (Longo et al., 2007), despite the unprecedented focus on patient safety over the last 10 years.

Prior to the first IOM report (2000), most efforts to reduce errors and improve patient safety focused on individuals rather than systems or processes (Woodhouse et al., 2004). In 1984, Perrow argued that about 70% of accidents in general were associated with human error. This error rate was substantiated in the highway traffic safety literature (Brehmer, 1990), as well as in aviation safety research (McFadden and Hosmane, 2001). Although humans often play a role in the occurrence of errors, the first IOM report used the popular adage of Alexander Pope – to err is human – to make the point that blaming individuals for being human is not an effective way to improve patient safety. Recent evidence now suggests that the majority of errors more accurately stem from system and process failures as opposed to human failures (Reason, 1990; Chassin and Becher, 2002; Gaba et al., 2003; Tucker, 2004). With this new focus on systems and processes has come the identification of more effective methods for improving patient safety, including redesigning the hospital work environment, modifying systems and processes to make them more redundant, and implementing PSI, or activities intended to prevent or ameliorate adverse outcomes or injuries stemming from the process of healthcare.

Empirical studies have found fewer medical errors tend to occur in hospitals that embrace a culture of safety (Katz-Navon et al., 2005), possess a group-oriented organizational culture (Stock et al., 2007), and implement PSI (McFadden et al., 2006a). Further research has shown the costly impact of medical errors, both financially (to the tune of $51,000 to $27 million per year for a 204-bed hospital at 75% occupancy) and in terms of customer dissatisfaction, hindrance to employees, and reduction of quality of care (Tucker, 2004). Of particular relevance to the present study, McFadden et al. (2006a) identified several barriers to the implementation of PSI in hospitals, including lack of top management support, lack of resources, lack of incentives, and lack of knowledge. On the other hand, something as simple as perceived importance of PSI was shown to facilitate their implementation.

Given this increased emphasis on improving patient safety, this study seeks to identify a clear model of patient safety and its foundations. Specifically, this paper builds on high reliability organization theory (HROT) by testing the existence of a systematic process that is linked to safety improvements in hospitals. Although no empirical evidence currently exists in the literature to support a patient safety chain model, the prevailing research tends to substantiate such a concept. The unique contribution of this paper is to demonstrate that the patient safety chain can provide an impetus for healthcare organizations to achieve HRO status. Therefore, we use the terminology “patient safety chain” to reinforce that the focus of our paper is the model as a whole - a chain of mediated relationships, rather than the individual links in the chain (a set of bivariate relationships), as we follow the theme of HROs throughout our discussion of the model. Specifically, we propose that improving safety begins with top management’s support of such efforts through the use of transformational leadership (TFL), the effects of which will “trickle down” through the links in our proposed chain, being ultimately related to improved safety outcomes. Following HROT’s emphasis on leadership as an important factor in creating an HRO, this study provides evidence that hospitals wishing to reduce errors will need to focus their energies towards this top “link” in the chain. Specifically, we propose that TFL in hospitals will be associated with the creation of a patient safety culture (PSC), which then corresponds with the adoption of PSI and ultimately with positive improvements in patient safety outcomes (PSO). In the following section, we examine the literature that supports our theory.

2. Conceptual background

2.1. TFL and PSC

HROT is based on the idea that errors can be prevented through top leadership commitment and an organizational culture of reliability (La Porte, 1996). In contrast, Normal Accident Theory is based on the belief that accidents are inevitable or “normal,” and takes a rather pessimistic approach about the possibility of effectively preventing errors in complex environments (Perrow, 1984). HROT has identified senior leadership behavior and attitudes as being linked to high reliability (La Porte, 1996; Roberts et al., 2001). Moreover, it is believed that HROs have less error because they have embraced the notion of a “safety culture,” or a culture of reliability, and researchers argue that creating redundancy of systems, training, and learning can result in improvements in safety, even for a complex, tightly coupled
system (Roberts, 1990b; Gaba, 2001; Ruchlin et al., 2004). The theories of leadership and safety culture derived from studies of HROs are useful to hospitals as they work towards improved PSO (Reason, 2000).

The term “safety culture” was first introduced by the International Nuclear Safety Advisory Group shortly after the Chernobyl disaster in 1986. The International Atomic Energy Agency defines safety culture as “that assembly of characteristics and attitudes in organizations and individuals which establish that, as an overriding priority, safety issues receive the attention warranted by their significance.” Organizations with a strong safety culture value safety and strive to make it their number one priority (Katz-Navon et al., 2005). Commitment to safety involves providing the necessary resources, incentives, and rewards to promote and improve safety. A common dimension of safety culture found in the healthcare literature relates to employees’ perceptions of the general priority assigned to safety within a hospital (Katz-Navon et al., 2005). Whereas debate continues over the exact components needed to create a PSC within a hospital, six essential components drawn from HROTs have been identified here, and are also based on the research of Singer et al. (2003):

- Caring and safe environment free of blame – Leadership listens to and cares about patient safety concerns. The response to the problem focuses on improving system performance rather than on blaming individuals.
- Commitment and drive to be a safety-centered institution – The resources, incentives, and rewards are provided by the organization to allow this commitment to occur.
- Communication – Action is taken on patient safety suggestions when communicated.
- Collegiality and openness about errors – Colleagues encourage employees to report safety concerns, and there is an openness about errors and problems.
- Priority of safety – Patient safety is constantly reinforced as the primary priority.
- Safety – Management does not knowingly compromise patient safety concerns for productivity.

In order to create a PSC and achieve a reduction in errors, the literature continually points to the role of leadership in instilling a clear, supportive culture that nurtures individual efforts (Ruchlin et al., 2004) and that is non-punitive, just, and supportive of those who have erred (Cohen et al., 2003). A strong PSC can help reduce medical errors. However, the literature suggests that few hospital CEOs have made safety a top priority or devoted the necessary resources to PSI (Leape and Berwick, 2005). Research has found much discrepancy among hospitals in top leadership’s commitment to a PSC (Singer et al., 2003).

Creating a culture that supports patient safety is likely to require significant organizational change within a hospital. It is widely accepted in the literature that top leadership is an important driver of successful organizational change (Buch and Rivers, 2001). Kotter (1990) specifies three key leadership tasks that must be performed in order for organizational change, such as the creation of a PSC, to take place. Senior leadership must first establish direction in the organization. To accomplish this, one must develop and articulate a compelling vision that will guide activities. Top leadership must next align people to the task by talking about their most important values and beliefs and emphasizing the importance of having a collective sense of mission and strong sense of purpose. Given that the development of a vision is not a solitary endeavor, successful alignment requires effective communication on an ongoing basis, and communication tends to build the cohesiveness and cooperation necessary for successful organizational change. Finally, leadership must motivate and inspire employees by expressing confidence that goals will be achieved, speaking optimistically about the future, and talking enthusiastically about what needs to be accomplished. Kotter (1990) adds that in addition to these three key tasks, effective leadership must also involve the consideration of the moral and ethical consequences of decisions.

The Multifactor Leadership Theory (Bass and Avolio, 2000) has been applied in the management literature (e.g., Colbert et al., 2008), as well as in the healthcare literature (Kanste et al., 2007). It proposes three distinct leadership styles: TFL (based on charisma-inspiration), transactional leadership (based on rewards and punishments), and laissez-faire leadership (lack of leadership). TFL has been proposed and supported as the most successful among the three leadership styles (Bass, 1990; Bass and Avolio, 2000; Bass and Riggio, 2006; Tichy and Ulrich, 1984). The charisma-inspiration dimension of the TFL style, which emphasizes leadership behaviors that provide “followers with a clear sense of purpose that is energizing and a role model for ethical conduct which builds identification with the leader and her/his articulated vision” (Bass and Avolio, 2000; p. 29), most closely matches Kotter’s (1990) task requirements needed to facilitate organizational change.

The charisma-inspiration dimension of TFL also aligns well with Grabowski and Roberts (1997) theory regarding the typical decision-making style found in leaders of HROs. Schulman (1996, p. 80) argues that some HROs may realize high reliability objectives because leaders display “transformational heroics.” Admiral Rickover, who created a new culture for the United States nuclear Navy fleet, is an example of a leader in an HRO. Lehman (1989, p. 62) describes him as having a “certain mystical and untouchable aura,” and Bierly and Spender (1995, p. 651) portray him as a “profoundly visionary figure” and “an extremely charismatic figure for a certain group of people.” Most would agree that Admiral Rickover was an inspirational role model with a clear vision for the organization. Admiral Rickover’s success can be viewed in terms of the positive role that a TFL style may have in creating and promoting a culture of safety within an HRO. Therefore, we hypothesize the first link in the patient safety chain as follows:

**H1.** Transformational leadership will be positively associated with a patient safety culture.

### 2.2. PSC and PSI

From the perspective of total quality management (TQM), medical errors can be considered defects. Therefore,
it seems logical to draw on the principles of TQM to develop methods that may be used to improve patient safety, which include initiatives for prevention of errors, decreasing their likelihood, and reducing or preventing their negative impact. These activities are referred to as patient safety initiatives, or PSI. The literature on patient safety has identified several strategies for reducing errors. In addition, the Agency for Healthcare Research and Quality published an extensive review of practices that appear to reduce the likelihood of errors. McFadden et al. (2004) were the first to develop a coherent set of PSI drawn from TQM and HRO literature. These PSI include forming a partnership of all stakeholders, reporting errors without blame, open discussion about errors, cultural shift, education and training programs, statistical analysis of error data, and system redesign. The common theme that ties these initiatives together is an emphasis on the process over the individual.

The first initiative critical to enhancing safety is the creation of a partnership with all stakeholders (Vanderveen, 1991; Klein et al., 1998; Kumar and Subramanian, 1998; Doolan and Bates, 2002). Stakeholders in HROs include regulatory overseeing bodies like the Nuclear Regulatory Commission and the Federal Aviation Administration (FAA), as well as user and client groups, such as aviators or government officials. These groups serve as “watchers” to support and reinforce the safety culture (La Porte, 1996). In healthcare, stakeholders include physicians, nurses, administrators, trustees, insurers and patients. Studies have found that more effective solutions are generated in an organization when all members work together to create ideas and generate improvements (Kumar and Subramanian, 1998). Moreover, studies have shown that an important factor in the success of TQM implementation is the cooperation of different functions and groups responsible for quality, to include not only top management but also employees, suppliers, and customers (Deming, 1986; Ahire et al., 1996; Black and Porter, 1996; Flynn and Saladin, 2001). When striving for improved quality or patient safety, it is important to understand the needs and perspectives on all constituents and to gain the support and commitment of everyone within the organization.

The second initiative is the development of an effective system for reporting errors without blame (Leape, 1994; Uribe et al., 2002). HROs are known for rewarding the discovery and reporting of errors, believing it is more valuable for employees to report a mistake immediately as opposed to trying to cover it up or simply ignore it (La Porte, 1996; Rochlin, 1996). The FAA established a voluntary Aviation Safety Reporting Program in 1975 as a means of encouraging pilots, controllers, mechanics, dispatchers and others to report safety-related errors in a timely manner without fear of disciplinary action (FAA, 1997). On the other hand, healthcare employees tend to be afraid to report errors for fear of punishment. Evidence of this phenomenon was demonstrated in a study of 182 intensive care personnel (Sexton et al., 2002), which found that many medical errors were not reported by the medical staff due to concerns and fears surrounding their personal reputation (76%), malpractice lawsuits (71%), disciplinary action by licensing boards (64%), and job loss (63%). Driving out fear underlies Deming’s (1986) philosophy. He explained a common problem in the manufacturing setting was workers being afraid to report quality problems because they might not meet their quotas, their incentive pay might be reduced, or they might be blamed for the problems in the system (p. 62). A key factor in increasing the reporting of errors has been to establish trust and mutual respect between administrators and frontline employees within an organization (Firth-Cozens, 2004). Cox et al. (2006) provided evidence from two case studies, within the specific context of HROs, of the importance of trust and its related impact on safety culture. A variety of studies have explored the role of error reporting systems (Walshe et al., 1995; Chiang, 2001; Doolan and Bates, 2002), all suggesting that the focus be on the process rather than on the individual reporting the error (Leape, 1994).

The third initiative critical to patient safety is fostering open discussions of errors (Vanderveen, 1991; Klein et al., 1998). Open discussion of quality problems is a basic principle of TQM (Deming, 1986; Ahire et al., 1996; Flynn and Saladin, 2001). In HROs, communication about all types of errors flows freely within the system, and employees feel comfortable to discuss mistakes and report them (Rochlin, 1996). Admiral Rickover specifically believed concealing errors was dangerous because leaders could become disconnected and the organization would not learn from the mistakes (Bierly and Spender, 1995). Within a hospital setting, focus groups, quality circles, or other methods that foster open communication about errors are methods found to be effective in reducing errors (Vanderveen, 1991; Mullins and Schmele, 1993; Edmondson, 1996, 1999; Klein et al., 1998). Tucker (2007) found that psychological safety (the belief that employees can discuss errors without blame) was positively associated with performance improvements among frontline personnel in hospitals. The intent is to foster an environment where information and knowledge can be shared freely and individuals feel comfortable and safe discussing errors.

The fourth initiative involves a cultural shift within an organization to a systems viewpoint (Klein et al., 1998; Ruchlin et al., 2004). Rather than a hospital’s traditional approach of “naming, blaming, and shaming” (Reason, 2000, p. 768) when errors occur, which is another form of the “Theory of Bad Apples” (Berwick, 1989, p. 53), a change in thinking about errors and what causes them needs to occur. HROs base this organizational shift on evaluating the overall effects on the reliability and performance of the system (Rochlin, 1996). This includes a shift from a focus on individuals to a focus on a systems approach which sees errors as “consequences rather than causes” (Reason, 2000, p. 768). This initiative is based on the idea of changing the system or conditions under which individuals work as opposed to trying to change the human condition. Deming (1986) also believed that a shift towards system thinking was needed in organizations as they embraced the TQM philosophy.

The fifth initiative for improving safety is providing employees with education and training in error-reduction techniques (Huq and Martin, 2000; Becher and Chassin, 2001). Employee training is an important element of TQM
systems (Deming, 1986; Saraph et al., 1989; Ahire et al., 1996). The aviation industry has been using education and training programs as a method to enhance safety for many years, stressing the importance of communication and teamwork techniques (Hemlinrich et al., 1986). Other HROs, like the Navy’s nuclear submarine service, conduct drills and training exercises even during peacetime (Bierly and Spender, 1995). Part of the reason HROs subject workers to extensive and continuous training is to ensure that they can respond quickly and effectively to hazardous situations without requiring close supervision or guidance (Rijpma, 2003). Healthcare is adapting some of these HRO concepts to enhance patient safety (Makary et al., 2006), such as behavior-based training to improve team performance.

The sixth initiative is conducting statistical analysis of data collected on errors (Walshe et al., 1995; Becher and Chassin, 2001). Similarly, a component of TQM systems advocates the use of statistical methods to study quality issues (Deming, 1986; Ahire et al., 1996; Flynn and Saladin, 2001). In HROs, this includes accident modeling, and the analysis of reliability statistics (La Porte, 1996). Beyond data collection, quantitative techniques must be used to systematically analyze data and look for trends (Bedard and Johnson, 1984; Plsek, 1995; Klein et al., 1998). As more comprehensive data are collected about errors, more sophisticated statistical modeling techniques might be employed to analyze complex relationships and interactions that occur among variables that may be related to medical errors.

The seventh and final initiative is redesigning the system or process itself, another fundamental element of the TQM approach (Deming, 1986; Flynn and Saladin, 2001). Underlying HROs is the principle that characteristics of the system performing a task affect the safety associated with that task (Perrow, 1984; Rijpma, 1997; Bain, 1999; Gaba, 2001). From the HRO point of view, redesign might involve adding redundancy to a system (Rijpma, 1997; Bain, 1999). It might focus on one part of the system or take on a much broader scale. At its broadest, system redesign may involve business process reengineering of core systems and processes (Newman, 1997). The intent is to reconstruct the system so that it is difficult or impossible to make a mistake. However, if a mistake is made, employees are trained to correct it at the source.

Lukas et al. (2007) argue that using traditional TQM techniques will not yield sustainable change without being supported by the culture and structure of the larger organization. Therefore, a culture emphasizing patient safety should be a driving force behind the implementation of these seven PSI. Stock et al. (2007) concluded that a group culture with its emphasis on flexibility, personal relations, commitment, teamwork, loyalty, and mentoring was positively associated with the use of PSI in hospitals. Many of the components of a group culture are similar to a PSC. Moreover, organizations achieve HRO status through the creation of a culture of reliability that encourages uniform attitudes and behaviors related to error prevention (Singer et al., 2003; La Porte, 1996; Rochlin, 1996). Based on this theoretical and empirical evidence, we hypothesize the second link in the patient safety chain as follows:

**H2.** Patient safety culture will be associated with increased implementation of patient safety initiatives.

### 2.3. PSI and PSO

As described above, HRO’s implement safety initiatives that have resulted in remarkable safety outcomes. Consider the extraordinarily low accident rate among the U.S. Navy aircraft carriers and the fact that there has never been a deck fire other than battle damage since 1969 (Roberts et al., 1994). Within commercial aviation, the FAA’s Air Traffic Control System, where controllers handle millions of aircraft in U.S. airspace, has not had a mid-air collision when both aircraft were under positive control for the last few decades (Roberts, 1990a). The most important outcome for HROs is high operational reliability (Roberts et al., 1994), and these hazardous organizations have achieved a high level of safety over long periods of time (Roberts, 1990b).

Previous healthcare research, on the other hand, has found considerable differences between perceived level of importance of PSIs and the actual level of implementation of these initiatives within hospitals. Smaller discrepancies between these two variables have been associated with positive PSO, such as the reduction in severity and frequency of errors, whereas larger discrepancies have been associated with internal organizational barriers (McFadden et al., 2006b). Moreover, studies have found that the implementation of TQM initiatives have resulted in positive organizational outcomes (Garvin, 1986; Retitsberger and Daniel, 1991; Cole, 1999; Sila, 2007). Other studies in the TQM and HRO literature support this relationship and emphasize the roles human resources or other practices such as high-commitment strategy play in improving performance outcomes (Bou and Beltran, 2005; Ericksen and Dyer, 2005; Goldstein and Naor, 2005; Prajogo and McDermott, 2005; Rahman and Bullock, 2005; Nair, 2006). For example, implementing healthcare employee commitment and control initiatives and TQM practices has been shown to be positively associated with both quantitative and qualitative outcomes, including heightened awareness of errors, increased understanding of errors, and the reduction in the frequency, impact, and severity of errors (Gowen et al., 2006). In addition, prior studies have found that the greater the level of PSI implementation, the higher the level of hospital benefits (McFadden et al., 2006a), including quality improvements, customer satisfaction increases, net cost savings, reduced frequency of errors, and reduced severity of errors. Katz-Navon et al. (2005) also found a linear relationship between managerial safety practices (low vs. high) and the number of treatment errors in hospitals. Given this body of evidence, we hypothesize the third link in the patient safety chain as follows:

**H3.** Implementation of patient safety initiatives will be associated with positive patient safety outcomes.

### 3. The patient safety chain

We have discussed the theoretical explanations for why medical errors occur and have reviewed the literature
related to leadership, safety culture, and PSI. The literature presented here is consistent with the theoretical tenets of TQM and specific managerial approaches for reducing medical error drawn from HROT. Prior research has clearly found leadership and culture to be critical in the successful implementation of TQM (Detert et al., 2000; Buch and Rivers, 2001; Beer, 2003; Kujala and Lillrank, 2004), and this has been shown to be true when tested specifically in hospital settings (Meyer and Collier, 2001).

The theory behind the Malcolm Baldrige National Quality Award (MBNQWA) is that “leadership drives the system that creates results” (Wilson and Collier, 2000; Flynn and Saladin, 2001), and this Baldrige Framework has been given empirical support within hospitals (Goldstein and Schweikhart, 2002). Based on the tenets of these prior findings, we believe the improvement of patient safety in hospitals results from a systematic process, beginning at the highest level of the organization with top management. Fig. 1 graphically displays the conceptual model that guides this study. If the following hypotheses are supported, this will provide empirical evidence for the existence of a patient safety chain.

3.1. Indirect effects of TFL on PSI

In our discussions above, we explained why TFL would be related to PSC, and why PSC would be related to PSI. Studies have shown that leadership also has an influence on the implementation of safety initiatives in HROs (La Porte, 1996; Roberts et al., 2001). We therefore would expect TFL to be related to the implementation of PSI indirectly through its association with PSC. However, it is unlikely that the entire relationship between TFL and PSI can be explained by this indirect link because there are other likely organizational mechanisms through which top leadership could have an effect on PSI. For example, financial resources, human resources, or information technology could also be factors (Goldstein and Schweikhart, 2002; McFadden et al., 2004). We thus hypothesize the following:

H4. Patient safety culture will partially mediate the relationship between transformational leadership and patient safety initiatives.

3.2. Indirect effects of PSC on PSO

Numerous studies in the literature suggest that organizational culture is associated with positive performance outcomes (Nahm et al., 2004). HROT suggests that embracing a safety culture helps explain the improved safety outcomes of HROs, and studies in healthcare settings have found organizational culture to be positively associated with PSO (Katz-Navon et al., 2005; Stock et al., 2007). For instance, Katz-Navon et al. (2005) examined safety climate as a predictor of medical errors and found that a climate emphasizing safety moderated the relationship between safety practices and the frequency of medical errors. Stock et al. (2007) more broadly investigated overall organizational culture in hospitals and reported that PSI partially mediated the relationship between a group (and rational) organizational culture and error reduction outcomes. Overall, this body of literature indicates that organizational culture results in such benefits as a reduction in frequency, severity, and/or impact of medical errors, as well as improvements in quality, customer satisfaction, and net cost savings. Given these findings, we expect that PSC will be positively related to PSO via the hypothesized correlation between PSC and PSI discussed previously. However, it is unlikely that the entire relationship between PSC and PSO can be explained by this indirect relationship. There are other potential organizational mechanisms through which PSC could affect PSO, such as the implementation of other quality or human resource practices not specifically captured in the PSI. Thus we assert the following:

H5. Patient safety initiatives will partially mediate the relationship between patient safety culture and patient safety outcomes.

3.3. Indirect effects of TFL on PSO

Some empirical studies (Hoffmann et al., 2003; Zohar, 2003) have found that different leadership styles have very different effects on safety performance, depending on the priority they place on patient safety. Given the previously hypothesized relationships between (1) TFL and PSC, (2) PSC and PSI, and (3) PSI and PSO, we expect the effects of TFL to “trickle down” through the links in the patient safety chain and ultimately be associated with improved safety outcomes for patients.

Although the idea of a “trickling down” effect is not common in operations management literature, it was illustrated in a seminal work by Heskett et al. (1994) in which they provide a model of the service profit chain. The
service profit chain proposes that internal service quality drives employee satisfaction; employee satisfaction drives loyalty and productivity; employee loyalty and productivity drives external service value; external service value drives customer satisfaction; customer satisfaction drives customer loyalty; and customer loyalty drives revenue growth and profitability. Later studies provided empirical support for the model’s propositions (Schneider et al., 2005); however some of the proposed relationships might require additional empirical research (Brown and Hyer, 2007). The service profit chain has received substantial attention in the field of operations management (Metters and Vargas, 2000; Meyer and Collier, 2001; Stanley and Wisner, 2001; Hill et al., 2002), and the model appears in some operations management textbooks (e.g., Collier and Evans, 2007; Fitzsimmons and Fitzsimmons, 2008).

Evidence of the trickling down effect of leadership on hospital outcomes was found in a recent case study of twelve U.S. healthcare systems (Lukas et al., 2007). In this study, leadership set the path for quality improvements in hospitals by showing a commitment to quality and change and promoting such improvements throughout the organization. This, in effect, “steered change through the organization’s structures and processes” (p. 315). The study specifically identified passion, inspiration, motivation, and leading by example to be necessary leadership qualities for the implementation of these improvements. These qualities assisted the leaders in driving change throughout their hospitals by creating a sense of urgency, setting a clear direction, reinforcing expectations, and providing needed support for the changes taking place. The qualities identified by this extensive case study exemplify the charismatic-inspirational element of TFL. As a result of this type of leadership, improvement initiatives were implemented, the alignment of goals was achieved, and the integration of structures and processes resulted. Just as inspirational leadership proved to be a driving force for quality improvement in this case study, we hypothesize that TFL will be associated with improved PSO by “trickling down” through the links in the patient safety chain.

H6. Patient safety culture and patient safety initiatives will partially mediate the relationship between transformational leadership and patient safety outcomes.

4. Methodology

4.1. Data collection

We employed a survey methodology to collect data used to test our research hypotheses, using the hospital organization as the unit of analysis. An initial questionnaire was tested in a pilot survey sent to several hospital Quality Directors in our local area. Phone interviews were also initially conducted to improve the clarity and reduce any ambiguity of the questions.

To obtain a list of US hospitals, we utilized a directory of medical organizations posted on the website www.Hospitalallink.com. We were able to obtain telephone numbers for 3061 of the organizations listed at the time on this website. After eliminating non-hospital organizations (i.e., clinics, mammography centers, and associations), we made multiple attempts to contact via telephone the Quality Director, Risk Manager, Director of Nursing, and Information Systems Director for the remaining hospitals. Calls were made with the intent of receiving multiple responses from each hospital. Only those hospitals in which we were able to speak with someone personally (N = 626) received our survey.

During the phone call we explained to respondents that the focus of our study was patient safety and the reduction of medical errors. By calling the personnel directly, we were able to explain the purpose of the survey, ensure that the surveys were emailed to the appropriate individuals and that email addresses were accurate and current. Flynn et al. (1990) advocate this to be an effective means for increasing response rates. The contacted personnel received our survey via an email attachment along with a cover letter, outlining our research focus on patient safety and the reduction of medical errors. Three rounds of email reminders spaced approximately 3 weeks apart were sent out.

Completed surveys were received from 371 hospitals for a response rate of 59.3%. This response rate compares favorably with the recommended range of 50–60% required to reasonably assure generalizability (Flynn et al., 1990) and the response rates cited in other published survey-based research studies (Vickery et al., 1993; Ramamurthy, 1995). To improve reliability, we limited our final dataset to those hospitals for which we received completed surveys from at least two separate respondents, thus yielding a final sample of 212 hospitals. Our sample includes Veteran Administration, psychiatric, rehabilitation, for-profit and non-profit hospitals, ranging in size from 6 to 800 beds. At least one hospital from each of the 50 United States was included in the 212 responding hospitals. Comparing characteristics of this sample of 212 multiple-respondent hospitals with the hospitals with only one respondent, there were no statistically significant differences in terms of number of beds (mean = 162.82 vs. 140.31, respectively; t = –1.09; p = .28) or number of full-time equivalent (FTE) employees dedicated to error prevention (mean = 3.33 vs. 2.15, respectively; t = –1.91; p = .06). Fifteen percent of our sample consisted of teaching hospitals – a reasonable representation of 20% of such hospitals nationally, as estimated by the American Hospital Association (2002). The responses received from multiple raters from each hospital were averaged for each item. All inter-rater reliability values were measured at the item level and were significant at the p < .005 level, with an average intra-class correlation coefficient value of 0.71.

4.2. Variables

The key constructs in our conceptual framework are TFL, PSC, PSI, and PSO. The questionnaire items were drawn from the literature discussed above and are reproduced in Appendix A. TFL was measured by eight items asking respondents to assess the frequency with which each item described the top leadership (CEO) at their hospitals. These items were measured using a previously published 5-point scale (Bass, 1990, 1999; Bass and Avolio, 2000) and were
intended to capture leadership behaviors demonstrated by the hospital CEO. More specifically, these items were intended to measure the charisma-inspiration dimension of TFL, which best captures leadership at the organizational level of analysis. The PSC construct represented shared beliefs, attitudes and values of the organization in regards to patient safety and was measured on a 6-point scale using six items taken from a previously published safety climate survey (Sexton and Thomas, 2003). Although the original survey included 19 items, we reduced this number to include only those items that measured safety at the organizational level and were most closely aligned with the six components of a culture of safety drawn from HROT and described previously. Our survey items covered the major patient safety topics outlined in Singer et al. (2003) and Gaba et al. (2003). PSI was also measured on a 6-point scale using seven items asking the respondent to assess the level of implementation of each of seven activities designed to improve patient safety. PSI differs from PSC in that PSIs are rooted in actions, whereas PSCs are rooted in beliefs and values. These items were taken from prior literature in the area of medical errors (Stock et al., 2007). Finally, PSO was measured on a 6-point scale using five items taken from the work of Kazandjian and Lied (1999), Spath (2000), Gowen et al. (2006), McFadden et al. (2006a), and Stock et al. (2007). These prior studies included items such as quality improvement, customer satisfaction increase, and net cost savings. Given the focus of this study, we limited the items to only those related to patient safety. These included reduction in the frequency, severity, and impact of errors, as well as increased understanding and awareness of errors.

The Cronbach’s alpha scale reliability values for these four constructs consisted of a range of .83 – .93, which was beyond the minimum acceptable level of .60 for exploratory research (Flynn et al., 1990) and .70 for general research (Nunnally and Bernstein, 1994). Skewness and kurtosis levels were checked for every item of all constructs and were not significant. We used Harman’s one-factor test to check for the presence of common method bias (Podsakoff and Organ, 1986). Harman’s one-factor test resulted in five factors accounting for 58% of the variance, with the first factor accounting for about 38%. Because a single factor did not occur and no factor accounted for most of the variance, the single method of data collection was an acceptable risk (Podsakoff et al., 2003).

In addition to the variables presented above, we also examined three control variables that could have impacted the study variables – size of hospital (in terms of beds), number of FTEs dedicated to error prevention, and type of hospital (teaching vs. non-teaching). Hospital size has been considered in prior healthcare research (McCallion et al., 2000; Li and Bensen, 2003) because larger organizations may have more resources to devote to reducing errors. Similarly, the number of FTE employees dedicated to error prevention could also affect implementation and error outcomes (McFadden et al., 2006a,b; Stock et al., 2007). Moreover, teaching hospitals may approach patient safety differently from non-teaching hospitals. However, an analysis of variance showed no significant differences between teaching and non-teaching hospitals among any of the study variables. Initial regression analyses of the model also showed no significant effects of size or the number of FTEs dedicated to error prevention, and these controls were therefore removed from further analyses to both maximize statistical power and eliminate the possibility of biased parameter estimates due to the inclusion of unnecessary control variables (Becker, 2005).

### 5. Analyses and results

Variable means, standard deviations, intercorrelations and Cronbach’s alpha reliability coefficients among the study variables are shown in Table 1. All of the measures used in this study displayed acceptable psychometric properties, with the lowest reliability estimate being .83 for PSO. Correlations among the study variables were strong, with the strongest ($r = .62$) between PSI and outcomes. Multicollinearity was not a concern, however, as all tolerance levels were well above the accepted cut-off value of .10 (Hair et al., 2006, p. 230), ranging from .59 to .97.

Anderson and Gerbing (1988) two-step approach was utilized to test the proposed patient safety chain using EQS 6.1. For the first step, confirmatory factor analysis was conducted using the measurement model, which included the four latent constructs representing TFL, PSC, PSI, and PSO[$\chi^2$(293, $N = 212) = 469.20; Comparative Fit Index (CFI) = .95; Bentler-Bonett Non-Normed Fit Index (NNFI) = .94; root mean square error of approximation (RMSEA) = .05; standardized root mean residual (SRMR) = .05; $\chi^2$/d.f. = 1.60]. These results met Hu and Bentler (1999) conservative two-index presentation criteria for good model fit. Though the chi-square statistic was significant, which can be expected with larger sample sizes (Baggozi and Yi, 1988; Hair et al., 2006), the normed chi-square fell below the recommended 3.0 maximum (Kline, 2005). As can be seen in Table 2, all items loaded significantly on their corresponding constructs, giving evidence of convergent validity. Discriminant validity

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean (S.D.)</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Transformational leadership (TFL)</td>
<td>3.43 (.80)</td>
<td>(.93)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Patient safety culture (PSC)</td>
<td>3.53 (.75)</td>
<td>.53*** (.91)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Patient safety initiatives (PSI)</td>
<td>3.01 (.87)</td>
<td>.42*** .53*** (.86)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Patient safety outcomes (PSO)</td>
<td>3.80 (.59)</td>
<td>.30*** .44*** .62*** (.83)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Size (# beds)</td>
<td>162.82 (204.66)</td>
<td>.09 .05 .10 −.01 −</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. FTE (safety employees)</td>
<td>3.33 (7.16)</td>
<td>.05 .05 .08 −.01 .12 −</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$N = 212$; Cronbach’s alpha scale reliabilities appear on the diagonal. $*** p < .001$. 

Table 1

Means, standard deviations, and intercorrelations of study variables.
was supported by examining whether the average variance extracted (AVE) by the items making up a construct was greater than the average shared variance between two constructs (Fornell and Larcker, 1981), which was the case for all four constructs. Providing evidence of the scales’ internal consistencies, both Cronbach’s alphas and composite reliabilities were well over the recommended 0.70 minimum (Nunnally and Bernstein, 1994) for all constructs. Composite reliabilities are calculated in the context of the measurement model and are thus considered a more appropriate statistic than Cronbach’s alpha (Fornell and Larcker, 1981). Factor loadings, t-values, composite reliabilities, and AVE values can be found in Table 2.

The structural model was analyzed to complete the second step. The hypothesized structural model was a mediated model consisting of paths between the four study variables, whereby TFL was hypothesized to influence PSC, PSC was hypothesized to partially mediate the relationship between TFL and PSI, and PSI was hypothesized to partially mediate the relationship between PSC and PSO. Additionally, an indirect relationship was also hypothesized between TFL and PSO, as partially mediated through both PSC and PSI. We assessed mediation by comparing the fit of three alternative models. The initial model was tested by fitting the least constrained model to the data, which was the partially mediated model that included all possible direct and indirect effects of TFL throughout the patient safety chain. Fit statistics for this and the subsequent models are shown in Table 3.

Table 2
Results of confirmatory factor analysis.

<table>
<thead>
<tr>
<th>Constructs and scale items</th>
<th>Factor loadings</th>
<th>t-Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational leadership* (CR = .933; AVE = .637)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Talks about... values...</td>
<td>.765b</td>
<td>-</td>
</tr>
<tr>
<td>2. Talks optimistically...</td>
<td>.731</td>
<td>11.166</td>
</tr>
<tr>
<td>3. Talks enthusiastically...</td>
<td>.864</td>
<td>13.675</td>
</tr>
<tr>
<td>4. Specifies the importance...</td>
<td>.832</td>
<td>13.048</td>
</tr>
<tr>
<td>5. Considers the moral...</td>
<td>.608</td>
<td>9.059</td>
</tr>
<tr>
<td>6. Articulates a compelling vision...</td>
<td>.828</td>
<td>12.968</td>
</tr>
<tr>
<td>7. Emphasizes the collective mission...</td>
<td>.848</td>
<td>13.355</td>
</tr>
<tr>
<td>8. Expresses confidence...</td>
<td>.874</td>
<td>13.872</td>
</tr>
<tr>
<td>Patient safety culturec (CR = .911; AVE = .632)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Organization is a caring and safe place</td>
<td>.798b</td>
<td>-</td>
</tr>
<tr>
<td>2. Leadership driving to be patient safety-centered</td>
<td>.826</td>
<td>13.434</td>
</tr>
<tr>
<td>3. Management acts on patient safety suggestions</td>
<td>.772</td>
<td>12.290</td>
</tr>
<tr>
<td>4. Colleagues encourage to report patient safety concerns</td>
<td>.719</td>
<td>11.227</td>
</tr>
<tr>
<td>5. Patient safety reinforced as priority</td>
<td>.850</td>
<td>13.967</td>
</tr>
<tr>
<td>6. Patient safety not compromised for productivity</td>
<td>.799</td>
<td>12.852</td>
</tr>
<tr>
<td>Patient safety initiatives (CR = .859; AVE = .468)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Input from all stakeholders</td>
<td>.743b</td>
<td>-</td>
</tr>
<tr>
<td>2. Reporting errors without blame</td>
<td>.703</td>
<td>9.898</td>
</tr>
<tr>
<td>3. Open-ended discussion groups</td>
<td>.568</td>
<td>7.924</td>
</tr>
<tr>
<td>4. Change in thinking about errors</td>
<td>.773</td>
<td>10.925</td>
</tr>
<tr>
<td>5. Education/training of employees</td>
<td>.714</td>
<td>10.058</td>
</tr>
<tr>
<td>6. Statistical analysis of error data</td>
<td>.605</td>
<td>8.462</td>
</tr>
<tr>
<td>7. Systems redesign</td>
<td>.639</td>
<td>9.247</td>
</tr>
<tr>
<td>Patient safety outcomes (CR = .828; AVE = .494)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Reduction in frequency of errors</td>
<td>.592b</td>
<td>-</td>
</tr>
<tr>
<td>2. Reduction in severity of errors</td>
<td>.610</td>
<td>7.091</td>
</tr>
<tr>
<td>3. Increased understanding of errors</td>
<td>.815</td>
<td>8.564</td>
</tr>
<tr>
<td>4. Heightened awareness of errors</td>
<td>.790</td>
<td>8.423</td>
</tr>
<tr>
<td>5. Reduction in impact of errors</td>
<td>.679</td>
<td>7.653</td>
</tr>
</tbody>
</table>

CR: composite reliability; AVE: average variance extracted. t-Values are significant at \( p < .001 \).

* These are word indicators only, not the complete MLQ items. The items were reproduced by special permission of the Publisher, MIND GARDEN, Inc., www.mindgarden.com, from the “Multifactor Leadership Questionnaire for Research” by Bernard M. Bass and Bruce J. Avolio. Copyright 2000 by Bernard M. Bass and Bruce J. Avolio. All rights reserved. Further reproduction is prohibited without the Publisher's written consent.

b Item was fixed to 1 to set the scale.

c Items were reproduced by permission from the University of Texas, Center of Excellence for Patient Safety Research & Practice, http://www.uth.tmc.edu/schools/med/med/patient_safety/survey&tools.htm.

Table 3
Fit statistics for alternative structural models.

<table>
<thead>
<tr>
<th>Model</th>
<th>( \chi^2 )</th>
<th>d.f.</th>
<th>( \chi^2/\text{d.f.} )</th>
<th>CFI</th>
<th>NNFI</th>
<th>RMSEA</th>
<th>SRMR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Hypothesized model</td>
<td>469.20</td>
<td>293</td>
<td>1.60</td>
<td>.95</td>
<td>.94</td>
<td>.05</td>
<td>.05</td>
</tr>
<tr>
<td>2. Fully mediated model</td>
<td>476.30</td>
<td>296</td>
<td>1.61</td>
<td>.95</td>
<td>.94</td>
<td>.05</td>
<td>.06</td>
</tr>
<tr>
<td>3. Final model</td>
<td>470.64</td>
<td>295</td>
<td>1.60</td>
<td>.95</td>
<td>.94</td>
<td>.05</td>
<td>.05</td>
</tr>
</tbody>
</table>

Note: \( N = 212; \chi^2/\text{d.f.:} \) normed chi-square; CFI: Comparative Fit Index; NNFI: Bentler-Bonett Non-Normed Fit Index; RMSEA: root mean square error of approximation; SRMR: standardized mean root square residual.
The partially mediated model provided excellent fit to the data \([\chi^2(293, N = 212) = 469.20; \text{CFI} = .95; \text{NNFI} = .94; \text{RMSEA} = .05; \text{SRMR} = .05; \chi^2/\text{d.f.} = 1.60]\), but Wald statistics indicated the direct paths between TFL and PSO and between PSC and PSO should both be removed. In addition, the path coefficients for these relationships were not significant. Therefore, a second model (as shown in Fig. 3) was tested with these two paths eliminated, such that any effects of TFL and PSC on PSO were indirect through the other variables in the chain. Eliminating these paths resulted in no significant changes in model fit \([\Delta \chi^2(2, N = 212) = 1.44, p = .05; \Delta \text{CFI}, \text{NNFI}, \text{RMSEA}, \& \text{SRMR} = 0]\), thereby identifying this second model as the more parsimonious of the two. The fully mediated patient safety chain (as shown in Fig. 2) was also tested by constraining all but the direct paths from TFL to PSC, from PSC to PSI, and from PSI to PSO. The second model fit the data better than the fully mediated model \([\Delta \chi^2(1, N = 212) = 5.66, p < .05]\) and was thus retained as the final model.

Table 4 presents the final model’s direct, indirect and total effects of the study variables. Examination of the paths in the final model (also depicted in Fig. 3) indicated support for the direct relationships put forth in Hypotheses 1, 2 and 3. Support was also found for the partially mediated relationship between TFL and PSI through PSC, as predicted in Hypothesis 4. The relationship between PSC and PSO, however, was fully mediated through PSI rather than partially mediated as predicted in Hypothesis 5. Whereas indirect effects were significant, no direct effects were found between TFL and PSO. This indicated that TFL’s relationship with outcomes (Hypothesis 6) was fully mediated through the other two variables in the model. In sum, the overall pattern of results provides support for the patient safety chain presented, suggesting that increases in patient safety in hospitals are largely (standardized total effect = .73) associated with increases in the implementation of PSI, which are linked to both TFL and a culture emphasizing patient safety.

6. Discussion

This is the first study to provide empirical evidence for the existence of a patient safety chain, which is a set of linkages related to improvements in patient safety in hospitals. By exploring processes and strategies used within HROs that lead to improved error outcomes, we developed and tested a model that is applicable to hospital settings. Specifically, this study found that improving patient safety begins at the top of the organization with a hospital CEO who possesses a TFL style, and it empirically demonstrates that the charismatic-inspirational leadership style is directly related to a culture of safety within the hospital, which is tied to the successful implementation of PSI, and ultimately to improved PSO. These PSO include the reduction in the frequency, severity, and impact of errors, as well as heightened awareness and understanding of errors.

Whereas organizations in other industries have been able to achieve high reliability, healthcare organizations have struggled with the problem of reducing medical errors (Gaba, 2001). We are supporting HROT by providing evidence of its applicability in a new industry for which higher reliability has been demanded. The validity of our model as a whole is

![Fig. 2. Fully mediated path model for the patient safety chain.](image1)

![Table 4](image2)

*Standard errors in parentheses. ns: not significant.

\* \( p < .05 \).

\*** \( p < .001 \).
demonstrated via structural equation modeling, as all of the hypothesized relationships are tested simultaneously. The results presented here therefore advance our overall understanding of processes and systems and their relationship to errors. Specifically, our results demonstrate that service organizations such as hospitals that are striving for reduction in errors need to use a systems approach whereby top leadership supports the patient safety culture and the implementation of safety initiatives. This study suggests that the TFL style contributes to the achievement of the cultural shift needed for safety initiative implementation to take place in an effective manner. More specifically, the charismatic-inspirational leader helps permeate safety values throughout the entire system. As a result of cultural influence, employees share in valuing safety as a priority of the organization. This serves as a form of normative control (Saxberg and Slocum, 1968; Sathe, 1983; Schein, 1983) that ensures safety initiatives are enacted appropriately and uniformly, a necessary condition for HROs (Gaba, 2001). The mediated relationships supported in this study lend evidence to a chain of linkages that may help ensure desired patient safety outcomes are achieved.

6.1. Managerial implications and conclusions

This study has major implications for hospital leaders, especially given that improving patient safety has become a national priority. This study provides empirical support that the CEO’s leadership style is tied to PSO, suggesting that hospitals desiring to make patient safety improvements need to focus their attention on this top “link” in the chain. Our findings support both full and partial mediation as part of the patient safety chain model. Specifically, TFL has a direct relationship with creating a culture of patient safety and with the actual implementation of PSI. In addition, it has an indirect relationship with the implementation of initiatives as mediated through culture, and ultimately an indirect relationship with improved PSO as mediated through culture and initiatives. Therefore, these results indicate that the characteristics of charismatic-inspirational leaders are associated with the creation and fostering of a culture of safety, which includes making safety a top priority and devoting the necessary resources to PSI in order to realize maximal improvements in PSO.

Because our study presents evidence that TFL is linked to improving safety, healthcare CEOs interested in improving PSO at their hospitals should actively seek feedback from employees to ensure they are effectively practicing the TFL style. They must also recognize the need to follow a systematic approach in order to achieve the desired outcomes in the area of patient safety. This involves not only enhancing their TFL style, but also using this leadership style to create a culture of safety. Creating a safety culture essentially means that patient safety is the top priority, and leadership provides a caring, safe environment free of blame, with open communication and collegiality, and the commitment and drive to be a safety-centered institution. This enhances the likelihood of actual implementation of a variety of PSI designed to reduce the frequency, severity and impact of errors as well as an increased understanding and awareness of errors.

6.2. Limitations and future research direction

We must also acknowledge some limitations of our exploratory study. First, the reliance on perceptual data is a potential shortcoming common to survey research. Using multiple respondents from each hospital aids in addressing the first issue. In addition, studies suggest that self-reported assessments are highly consistent with more objective measures, especially when the respondents are at the appropriate level within the organization (Dess and Robinson, 1984; Robinson and Pearce, 1988; Ketokivi and Schroder, 2004). Similarly, Bommer et al. (1995) argue that subjective measures might not serve as proxies but objective measures are also no panacea due to their narrow focus. Second, the use of a single method of data collection is another potential limitation. However, triangulation with more objective data on PSO was prohibited due to the legal barriers to such information. In regards to the potential common method variance issue, the application of Harman’s one-factor test (Podsakoff et al., 2003) reported here suggests that the single method of data collection is an acceptable risk. Replication of our design and analyses would enhance the generalizability of our findings. Finally, there may be other managerial or organizational variables to consider as possible explanations for PSI and PSO, particularly as mediators between TFL and PSI. The fact that the relationship was partially mediated suggests the presence of other such variables.

The findings of this paper suggest several interesting areas for future research. For example, researchers may wish to explore other possible links in the patient safety chain. We have shown how leadership style, safety culture and safety initiatives are related to improvements in patient safety, but additional studies could explore the connections among these variables with organizational performance and competitive advantage. Moreover, it would also be interesting to explore other possible links, such as employee and customer satisfaction, relate to the patient safety chain. Whereas the transformational leadership style was shown here to be an important link in the chain, additional research should also examine other leadership styles, such as transactional and laissez-faire leadership, to determine their differential relationships with safety culture, initiatives and outcomes. Additionally, a longitudinal study of culture, initiatives and performance outcomes would provide hospital leadership with data on the state of patient safety improvements and outcomes over time. The model presented here follows a chain from transformational leadership to patient safety outcomes, but extending this model to investigate any feedback mechanisms throughout the chain would provide hospital leaders with a more fluid model for ongoing improvement. Although confirmatory factor analysis supported the distinction between PSC and PSI presented here, future studies might further explore any possible overlap between these constructs. Finally, though our results indicated the patient safety chain process is the same for large and small, teaching and non-teaching hospitals, future studies might further investigate the managerial implications for this chain among various other hospital settings.

The Joint Commission has exerted considerable pressure and placed a great deal of emphasis on the improvement of
patient safety in hospitals. In fact, hospital accreditation has been increasingly tied to PSO. Nonetheless, research indicates that hospitals have been slow and inconsistent in meeting patient safety goals (Longo et al., 2007) and “few have succeeded in making substantial transformations needed to achieve those aims” (Lukas et al., 2007). In order to strengthen the quality of care nationwide, it is imperative that hospitals develop effective solutions to decrease the frequency and severity of medical errors. This study provides the basis for a systematic approach to addressing patient safety that relates to improved PSO and provides practical guidance for both managers and researchers in addressing this very important national issue.

Appendix A. Questionnaire scale items

Respondents provided a score for each item below on a scale of 0–5, where 0 was “none,” 1 was “very low,” 2 was “low,” 3 was “moderate,” 4 was “high” and 5 was “very high.” However, based on Bass and Avolio (2000), the transformational leadership items were scored on a 0–4 scale, where 0 was “not at all,” 1 was “once in a while,” 2 was “sometimes,” 3 was “fairly often,” and 4 was “frequently, if not always.”

A.1. Transformational leadership (TFL)1

How frequently does each item below describe the CEO of your organization?

- Talks about ... values...
- Talks optimistically...
- Talks enthusiastically...
- Specifies the importance...
- Considers the moral...
- Articulates a compelling vision...
- Emphasizes the collective mission...
- Expresses confidence...

A.2. Patient safety culture (PSC)2

To what extent does your hospital exhibit each of these organizational characteristics?

- The organization is a very caring and safe place – The senior leaders listen to me and care about my patient safety concerns.
- The leadership is driving us to be a patient safety-centered institution.
- Management acts on my patient safety suggestions if I express them.
- Collegiality – my colleagues encourage me to report any patient safety concerns I may have.
- Patient safety is constantly reinforced as a priority.
- Safety – management/leadership does not knowingly compromise patient safety concerns for productivity.

A.3. Patient safety initiatives (PSI)

To what extent has your hospital implemented the following as a means of reducing errors?

- Input from all stakeholders on error reduction methods (e.g., administrators, doctors, nurses, patients).
- Reporting errors without blame.
- Open-ended discussion groups (discuss errors openly, face-to-face or otherwise).
- Cultural shift (change in thinking about errors; no more naming, blaming & shaming).
- Education and training of employees (e.g., doctors, nurses, administrators).
- Statistical analysis of error data.
- Systems redesign (restructuring the functioning of equipment, technology, procedures, etc.).

A.4. Patient safety outcomes (PSO)

To what extent have results been realized?

- Reduction in the frequency of errors.
- Reduction in the severity of errors.
- Increased understanding of errors.
- Heightened awareness of errors.
- Reduction in the impact of errors.

References


