Patient safety climate (PSC) perceptions of frontline staff in acute care hospitals: Examining the role of ease of reporting, unit norms of openness, and participative leadership

Shahram Zaheer
Liane Ginsburg
You-Ta Chuang
Sherry L. Grace

Background: Increased awareness regarding the importance of patient safety issues has led to the proliferation of theoretical conceptualizations, frameworks, and articles that apply safety experiences from high-reliability industries to medical settings. However, empirical research on patient safety and patient safety climate in medical settings still lags far behind the theoretical literature on these topics.
Purpose: The broader organizational literature suggests that ease of reporting, unit norms of openness, and participative leadership might be important variables for improving patient safety. The aim of this empirical study is to examine in detail how these three variables influence frontline staff perceptions of patient safety climate within health care organizations.
Methodology: A cross-sectional study design was used. Data were collected using a questionnaire composed of previously validated scales.
Findings: The results of the study show that ease of reporting, unit norms of openness, and participative leadership are positively related to staff perceptions of patient safety climate.
Practice Implications: Health care management needs to involve frontline staff during the development and implementation stages of an error reporting system to ensure staff perceive error reporting to be easy and efficient. Senior and supervisory leaders at health care organizations must be provided with learning opportunities to improve their participative leadership skills so they can better integrate frontline staff ideas and concerns while making safety-related decisions. Finally, health care management must ensure that frontline staff are able to freely communicate safety concerns without fear of being punished or ridiculed by others.

Key words: ease of error reporting, participative leadership, patient safety climate, patient safety outcomes, unit norms of openness

Shahram Zaheer, MSc, *is a PhD Candidate, School of Health Policy and Management, York University, Canada.*
Liane Ginsburg, PhD, *is Associate Professor, School of Health Policy and Management, York University, Canada. E-mail: lgins@yorku.ca.*
You-Ta Chuang, PhD, *is Associate Professor, School of Administrative Studies, York University, Canada.*
Sherry L. Grace, PhD, *is Associate Professor, School of Kinesiology and Health Science, York University, Canada.*

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The cost of medical errors in modern health care provision is enormous both in terms of finance and patient well-being. The Institute of Medicine (IOM, 2000) estimated that 44,000–98,000 Americans die annually because of medical errors and that the annual costs for adverse events are between $38 and $50 billion. Similarly, a number of international studies have found significant rates of medical errors and associated costs with the delivery of health care services (e.g., Vincent, Neale, & Woloshynowych, 2001). As a result of this work, health care organizations have increasingly come under pressure from accreditation and other safety agencies in the United States, the United Kingdom, and Canada to improve patient safety (Ginsburg et al., 2009), and patient safety has emerged as one of the most prominent topics of concern among health care organizations.

In the health care domain, application of standardized clinical interventions has seen much success in minimizing medication errors, improving anesthesia care, and reducing diagnostic and treatment errors (Ruchlin, Dubbs, Casllahan, & Fosina, 2004). There is also, however, a growing recognition that the climate of a setting is an important contextual factor that influences the likelihood of successful implementation of patient safety improvement interventions such as checklists (e.g., Bosk, Dixon-Woods, Goeschel, & Pronovost, 2009) and initiatives to reduce central line infections in the intensive care unit (e.g., Pronovost et al., 2006).

Indeed, there is increasing empirical support for the importance of patient safety climate (PSC) as a dependent variable in its own right. Recent studies examining the relationship between certified nursing assistants' (Bonner, Castle, Men, & Handler, 2009) and managers' (Thomas et al., 2012) perceptions of PSC and resident outcomes found a significant relationship between PSC and rates of falls and daily restraint use. Recent work in acute care is also beginning to provide empirical support for the relationship between PSC and patient safety outcomes (e.g., Singer, Lin, Falwell, Gaba, & Baker, 2009). Finally, there is also a growing body of empirical evidence to support the relationship between safety climate and safety behaviors and outcomes in industries outside of health care (e.g., Clarke, 2006). The importance of PSC is further evidenced by inclusion of its measurement as a required organization practice for accreditation in some jurisdictions (Accreditation Canada, 2012).

Amidst this growing support for the importance of PSC, it was recently suggested that stakeholders including hospitals have underestimated the resources and commitment required to successfully implement context-specific delivery system interventions such as safety climate change to improve patient safety (Singer & Vogus, 2013). Indeed, the scientific community knows little about the factors influencing safety climate, and such knowledge is essential for fostering such a climate within organizations. This study aims to evaluate and build on the work of previous researchers by identifying how three key variables suggested by the organizational literature—ease of reporting, unit norms of openness, and participative leadership—influence frontline staff perceptions of PSC in a health care setting.

Literature Review and Study Hypotheses

As an overview, Figure 1 outlines the conceptual model for this study in which ease of reporting, unit norms of openness, and participative leadership are three factors hypothesized to influence frontline staff perceptions of the two most salient dimensions of PSC—senior and supervisory leadership support for patient safety. Employee perceptions of ease of reporting are included in our model as they reflect a key safety-relevant aspect of an organization's operations. Unit norms of openness and participative leadership are robust constructs in organizational behavior and reflect general communication norms and patterns likely to influence safety-specific communication and staff perceptions of managerial commitment to and prioritization of patient safety in health care organizations. Each of the study variables in this model are discussed in more detail below.

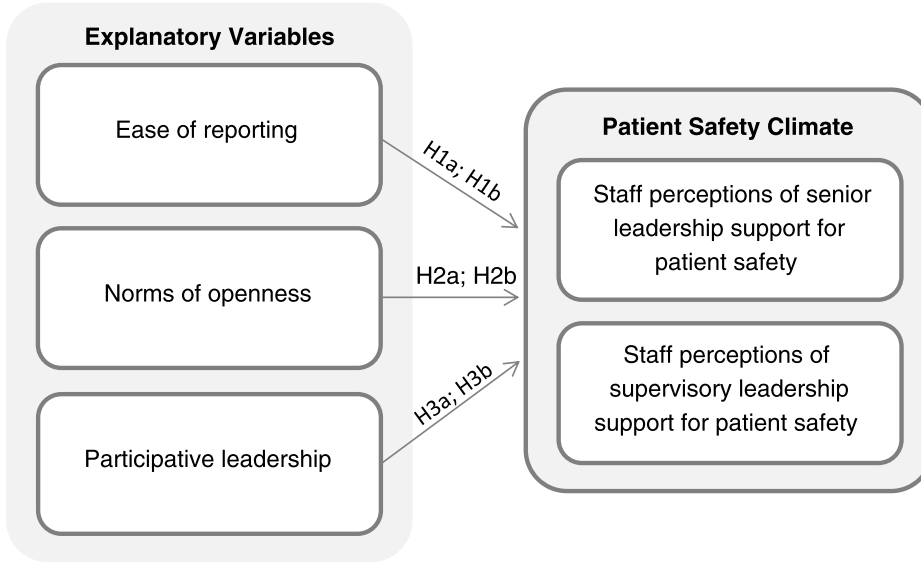
PSC

There is considerable overlap between the terms climate and culture within the organizational literature, but there are subtle yet important differences between these two terms. Climate involves employee perceptions concerning the procedures, practices, and kinds of behaviors that get rewarded and supported with regard to a specific strategic focus such as patient safety (Zohar & Hofmann, 2012). Culture resides at a deeper level and can be defined as the shared basic assumptions, values, and beliefs that characterize a setting. It is easier to measure and manipulate climate, whereas culture is more deeply ingrained and resistant to change. The two concepts should not be considered as representing two distinct phenomenon (Garavan & O'Brien, 2001) but, instead, different layers of the same phenomena (Schein, 1990).

At this juncture, it is useful to note that a social organization has multiple coexisting domain-specific climates such as a safety climate, justice climate, business ethics climate, customer service climate, and so forth (Zohar & Hofmann, 2012). Conceptually, it is important to distinguish between these coexisting climates, to study their interactions and their causal effects. In practice, this should lead to better designed climate change interventions as practitioners can more ably focus resources on domain-specific climate changes (e.g., those that target "safety" climate).

Figure 1

Conceptual model



As we consider the domain-specific "safety" climate, there are numerous definitions and measures of safety climate within health care and other industries. Safety climate was originally conceptualized by Zohar as frontline workers perceptions of management commitment to safety. Consequently, safety climate was defined and measured as staff perceptions of a series of dimensions that reflect "management commitment to safety" such as prioritization of safety by the organization, sharing or reporting of safety information across an organization, emphasis on safety training, and so forth (Singer & Vogus, 2013; Zohar, 1980). Others have defined and measured safety climate much more broadly. Indeed, Singer and Vogus recently pointed out that there has been a proliferation of safety climate dimensions, many of which can arguably be considered antecedents or outcomes rather than components of safety climate (Singer & Vogus, 2013; Zohar, 2008). For example, the Agency for Healthcare Research and Quality uses a very broad set of dimensions to define safety climate that includes dimensions of job satisfaction and staffing. However, there is an increasing concern that inclusion of a broad set of related but distinct dimensions under the umbrella of a safety climate can dilute the significance of this domain (Singer & Vogus, 2013; Zohar & Hofmann, 2012), and it has been suggested that we return to a more focused definition of safety climate for both conceptual and practical purposes (Singer & Vogus, 2013).

In the current article, we adhere to Zohar's (1980) more focused conceptualization of safety climate, which concentrates on management commitment to safety. We operationalize this measure of PSC as individual-level employee perceptions of supervisory leadership and senior leadership support for patient safety. A focus on leadership dimensions of PSC is further supported by others who found that leadership support for safety is one of the most important and psychometrically robust dimensions of PSC in the safety literature (Flin, Mearns, O'Connor, & Bryden, 2000; Zohar, 2008). Leaders shape the climate of an organization by their preoccupations, preferences, symbolic actions, resources, rewards, punishments, responses to organizational crises, and so forth. (Schein, 1990). These preferences and priorities are reflected in frontline staff perceptions of PSC.

We define and measure PSC as leadership support for safety at two levels—senior and supervisory. We do so because climate is a multilevel construct—employees differentiate between the priorities of senior management and unit supervisors, resulting in the emergence of perceptions of two concurrent safety climates (Zohar, 2000, 2008; Zohar & Hofmann, 2012). Adopting a multilevel safety climate perspective is especially important in loosely coupled organizations such as hospitals where unit supervisors can often exercise discretion in implementing policies created by senior management. Perceptions of supervisory and senior leadership support for safety will be consistent, widely shared, and positive in an organization with a strong and positive PSC; however, employee perceptions of supervisory and senior leadership commitment to safety may differ in an organization with a weak safety climate. Indeed, one key aspect of evaluating PSC lies in examining consistency between organizational-level safety policies and procedures

and implementation practices in subunits that are subject to supervisory discretion (Zohar & Hofmann, 2012).

Ease of Reporting

Our measure of ease of reporting is operationalized in terms of how easy it is for individuals to report minor events, moderate events, and major near-miss events. Reason (1997) believed that ease of error reporting is part of a safety culture. However, as noted, we have conceptualized PSC in a much more focused way. In addition, survey items soliciting general perceptions of an organization's operations (such as reporting processes) reflect more general employee perceptions, not climate perceptions (Zohar & Hofmann, 2012). We see ease of reporting as a component of the information technology domain rather than a component of safety climate. There is a large body of empirical work that has studied information technology and climate as related but separate variables (e.g., Gallivan & Srite, 2005).

The IOM report "To Err Is Human" recommended that the establishment of an error reporting system is an important step that health care organizations must take to improve patient safety standards. As a consequence, many health care organizations have implemented error reporting systems; however, recent research has shown that some health care organizations still lack an effective error reporting system (e.g., Jeffs, Law, & Baker, 2007). In addition, the scientific community has come to realize that the presence of an error reporting system by itself is not sufficient to increase reporting of medical errors and to improve patient safety. Research has linked a number of factors to underreporting of medical errors such as fear of repercussion, belief that error reporting will not lead to safety improvements, lack of confidentiality, and legal concerns (e.g., Garbutt et al., 2008; Moumtzoglou, 2010).

An additional barrier that has been recently linked to underreporting of medical errors by health care staff is the complexity that is often associated with the process of reporting (Cohen et al., 2004). A recent study that surveyed 1,082 U.S. physicians to examine why physicians are reluctant to report medical errors to existing error reporting systems found that physicians believe current error reporting systems are inadequate—85% of respondents indicated that they would be more willing to report errors if the error reporting process led to system improvements, and 66% indicated that they would be more willing to report if the reporting process took fewer than 2 minutes to complete (Garbutt et al., 2008). A recent study of Greek physicians also found that physicians underreport errors because the process is too cumbersome (Moumtzoglou, 2010). Accordingly, we suggest that an efficient and easy-to-use error reporting system will facilitate reporting and will therefore be related to a more positive PSC in a health care organization.

Hypothesis 1b: Ease of error reporting of patient safety events will be positively related to staff perceptions of senior leadership support for patient safety.

Hypothesis 1b: Ease of error reporting of patient safety events will be positively related to staff perceptions of supervisory leadership support for patient safety.

Unit Norms of Openness

Our measure of unit norms of openness has its origins in Edmondson's work on team psychological safety. Team psychological safety refers to a "shared belief that the team is safe for interpersonal risk taking" and that an individual team member will not be embarrassed, rejected, or punished for speaking up (Edmondson, 1999, p. 354). Accordingly, in this study, unit norms of openness are operationalized as general communication norms pertaining to raising problems, taking interpersonal risks, and asking for help. Furthermore, Edmondson conceptualized a different construct—supportiveness of organization context (sample item: "excellent work pays off in this company")—as a related but separate construct from team psychological safety. We see perceptions of context support defined in terms of resources and rewards by Edmondson as conceptually similar to Zohar's (1980) definition of safety climate. Consequently, in this study, general norms of openness (as opposed to safety-specific norms) are seen as a potential antecedent of PSC.

Unit norms of openness are characterized by a nonpunitive environment where staff members feel safe to voice their concerns and by open communication channels that enable staff members to share information and knowledge and ask for help (Chuang, Ginsburg, & Berta, 2007). This is at odds with traditional medical models where precision in diagnosis and treatment is expected and providers are often blamed and disciplined when errors are identified (Kalisch & Aebersold, 2006; Ruchlin et al., 2004). Instead, the patient safety literature is clear that focusing on addressing latent or system failures (rather than blaming individuals) will prove to be more fruitful in improving PSC and patient safety more generally. Moreover, health care is an inherently interdependent system, and health care providers, working alone, cannot lower mortality rates or cut costs or reduce error rates (Berwick, 2003). They must work on problems in a way that recognizes this interdependency—open communication is an essential ingredient for successfully addressing problems in interdependent settings.

Evidence is starting to emerge supporting the relationship between norms of openness, open communication in particular, and safety climate in health care settings (e.g., Cohen et al., 2004; Liu, Kalisch, Zhang, & Xu, 2009; Verschoor et al., 2007). Although most of these studies are single-site studies or were conducted in other international

contexts (Liu et al., 2009), insights from this work suggest that unit norms of openness will promote a nonpunitive working environment and open communication, thus leading to a safety-oriented climate.

Hypothesis 2a: Unit norms of openness will be positively related to staff perceptions of senior leadership support for patient safety.

Hypothesis 2b: Unit norms of openness will be positively related to staff perceptions of supervisory leadership support for patient safety.

Participative Leadership

Research from the industrial safety literature such as the energy and manufacturing sectors has served as the primary source of information for health care organizations trying to implement leadership-level initiatives in their quest to improve PSC. Flin and Yule observed that transformational leadership as an immediate supervisory style is positively linked to employee perceptions of safety climate in industrial settings. At a generic level, transformational leadership can be characterized as participative leadership. However, industrial workplaces typically differ in their organizational structure, climate, and leadership hierarchy compared with health care organizations (Flin & Yule, 2004). Moreover, the research that does exist on leadership and safety issues in medical settings has primarily focused on senior leadership and management. For example, research in acute care organizations has shown that senior leadership patient safety walk-rounds are an effective strategy to improve PSC (e.g., Frankel et al., 2008; Verschoor et al., 2007). Leadership walk-rounds are based on a participative leadership approach and are characterized by senior leadership soliciting and integrating frontline staff concerns and ideas on safety issues into decision-making processes. At an immediate supervisory level (e.g., frontline managers), however, literature on the role of participative leadership in medical settings is primarily theoretical (e.g., Flin & Yule, 2004; Mohr, Abelson, & Barach, 2002).

Participative leaders exhibit coaching behaviors that encourage unit members to speak openly and share their concerns (Chuang et al., 2007). Participative leaders obtain opinions, ideas, and suggestions from subordinates and integrate this information into decision-making processes. This is important because frontline staff are more likely to be aware of patient safety problems that are most evident at the point of care (Singer et al., 2009). Accordingly, senior and supervisory leaders who use participative approaches to leadership are more likely to be aware of the current safety challenges and better prepared to take appropriate corrective action. Consequently, it is hypothesized that participative leadership will be positively related to staff perceptions of senior and supervisory leadership support for safety.

Hypothesis 3a: Participative leadership will be positively related with staff perceptions of senior leadership support for patient safety.

Hypothesis 3b: Participative leadership will be positively related with staff perceptions of supervisory leadership support for patient safety.

Methods

The data used in this study were taken from a larger set of data collected by Chuang and colleagues in which they surveyed patient safety officers (PSOs), patient care managers (PCMs), and frontline staff from acute care hospitals in Ontario, Canada, to examine the factors that influence unit- and organizational-level learning from preventable adverse events and near misses (Chuang et al., 2007; Ginsburg et al., 2010). Given our focus on the factors that influence staff perceptions of PSC in this article, the current study utilized data collected from nurses, pharmacists, and physicians.

Study Design and Data Collection Procedures

For the broader study noted above, a letter was sent to the chief executive officer of all 118 general acute care hospitals in Ontario inviting the organization to participate in a survey of their PSO and PCMs. Sixty-nine hospitals (53%) agreed to participate. This study focuses on a subset of 24 hospitals that were asked to participate in a staff survey of nurses, physicians, and pharmacists (in addition to the PSO and PCM surveys). These 24 hospitals were selected from community and teaching hospital groups in the province using proportional random sampling. Thirteen of twenty-four hospitals (54%) agreed to participate. Chief executive officers in hospitals that agreed to participate directed the researchers to the PSO who served as the primary contact person for subsequent study-related interactions. The researchers then contacted the PSOs to obtain staff lists for nurses, pharmacists, and physicians in the organization who met the study inclusion criteria. Staff inclusion criteria were all registered nurses and registered practical nurses and pharmacists who work >15 hours per week and all staff physicians. Casual staff were excluded as they often work across multiple units. In total, 14,725 eligible frontline nurses, physicians, and pharmacists were identified for inclusion in the study.

Questionnaires were couriered to hospitals then sent out through internal mail to all 14,725 eligible frontline nurses, physicians, and pharmacists. A modified Dillman (2007) approach was utilized that involved a reminder card at 2 weeks, followed by a full mailing 3 weeks later to all nonrespondents. Ethics approval was obtained from York University's Human Participants Review Committee as

well as several hospital research ethics boards that required their own approval.

Measures

The Modified Stanford Instrument-2006 (MSI-2006) was used to measure staff perceptions of PSC. The MSI-2006 consists of 27 items measuring four PSC dimensions (senior leadership support for safety, supervisory leadership support for safety, perceived state of safety, and shame and repercussions of reporting). Revisions to the MSI-2006 have since seen the removal of the perceived state of safety and repercussions of reporting dimensions because of weaker statistical properties (Ginsburg et al., 2009) and data interpretation problems (Ginsburg, Norton, Castel, Murray, & Tregunno, 2010). As a consequence, the current study utilizes data from 14 items that measure the two most robust dimensions of PSC: senior leadership and supervisory leadership support for patient safety.

The senior leadership support for safety dimension has seven items and reflects "the extent to which staff perceive that patient safety is valued by senior leadership and is a priority in the organization" and was shown to have strong reliability ($\alpha = 0.88$, test–retest $r = .82$; Ginsburg et al., 2009). Cronbach's alpha for organization leadership for safety within the context of the current study data was also found to be 0.88, confirming the internal consistency reliability of this dimension (sample item: "Senior management considers patient safety when program changes are discussed"). The supervisory leadership dimension was shown to have strong reliability ($\alpha = 0.81$, test–retest $r = .82$; Ginsburg et al., 2009, p. 211) and consists of seven items (e.g., "My supervisor/manager overlooks patient safety problems that happen over and over"). Four of these items are taken from the Agency for Healthcare Research and Quality supervisory leadership scale (Nieva & Sorra, 2003), whereas the other three are related to "perceptions regarding assessment and management of risks to patients, and rewards for identifying safety problems" (Ginsburg et al., 2009, p. 211). The Cronbach's alpha for this dimension based on the current data set was 0.81.

Explanatory Variables

Unit norms of openness are operationalized using the validated dimension of team psychological safety from Edmondson (1999). This scale consists of seven items and had an alpha of 0.69 in our study sample (sample item: "People on this unit are able to bring up problems and tough issues"). We operationalized participative leadership using the validated dimension of representation/participation from the Fisher and Bibo (2000) three-dimensional model of leadership. This scale is measured using five items (e.g., "The unit leader encourages suggestions from group members") and had an $\alpha = 0.87$. The measure of ease of reporting was developed for the broader study and consists of three items that ask about how easy it is for individuals to report minor events, moderate events, and major near-miss events (e.g., "Individuals involved in major near misses have a quick and easy way to capture/report on what happened"). The Cronbach's alpha for ease of reporting within the context of current study was 0.93.

All study variables were measured using a 5-point Likert scale where 1 corresponds to "strongly disagree" and 5 corresponds to "strongly agree." Negatively phrased items on these scales were reverse-coded so that a high score on an item corresponds with a high score on the measure. For respondents who answered at least half of the questions in a dimension, a mean dimension score was calculated.

The frontline provider questionnaire also obtained data on a number of sociodemographic variables including functional background, educational level, age, and gender. These demographic variables were converted to dummy variables to incorporate them in hierarchical regression analysis. The categories of "medicine," "diploma," "<30," and "female" were used as the reference groups for functional background (nursing and pharmacy), highest level of education (bachelor, MD, and other), age (31–40, 41–50, 51–60, >60), and gender (male), respectively. Finally, frontline staff that participated in the current study were nested in 13 different hospitals. Consequently, 12 dummy variables were created to control for organization-level effects in our regression analyses.

Statistical Analyses

First, we calculated Cronbach's alpha (α) values for all main study variables to assess their reliability in the current data set (reported above). Simple bivariate regression models were used to examine associations between the dependent variables and independent variables. This was followed by hierarchical regression analyses to examine the variance in each of the two PSC outcome variables that is explained by the demographic variables and key study explanatory variables.

Hierarchical regression involves theoretically based decisions for how predictors should be entered into the analysis and enables a researcher to examine the change in variance associated with independent variables over and above variance explained by independent variables entered earlier in the model. Demographic variables are typically good candidates for the first step in a hierarchical regression analysis as they are static variables of interest and should be entered before the dynamic variables (Petrocelli, 2003). Hence, the current study placed the four demographic covariates in the initial block of the hierarchical regression. On the basis of the same guidelines, organization dummy variables were placed in the second block to control for potential organization-level effects. Ease of reporting was placed in the third block of hierarchical regression analysis as it is a relatively static variable, closely linked to the presence, absence, and/or type of error reporting system in

an organization. Unit norms of openness were entered in block 4 right after the ease of reporting variable as past research (e.g., Kalisch & Aebersold, 2006) has shown that clarification of and commitment to unit norms is an essential starting step of any attempt to change or modify a unit climate. Finally, unit norms of openness and participative leadership are closely linked to each other (Leana, 1985), and entering participative leadership in the final block of hierarchical regression analysis can help to tease out the amount of variance in PSC accounted for by participative leadership over and above that accounted for by unit norms of openness. The results were interpreted by examining change in r^2 (Δr^2), and the statistical significance was reported at $p < .05$.

Results

Of 14,725 eligible nurses, pharmacists, and physicians, 2,495 returned a completed frontline staff questionnaires (response rate = 17%). Eighty-five percent of study respondents were women. Most respondents were frontline nurses (84%) and had a diploma (54%) as their highest level of education. The age demographic showed a bell curve pattern with most of the respondents being near the middle age category. The proportion of nurses (81%) and physicians (13%) in our respondent group was similar to their proportions in our full sample where 79% were nurses and 16% were physicians. We did not have other demographic information for the full sample. Bivariate analyses revealed significant correlations between the dependent variables and independent variables. However, multicollinearity is not a concern as variance inflation factor analysis showed that each of the three main study independent variables (ease of reporting, unit norms of openness, and participative leadership) have a value less than 1.5, whereas the average variance inflation factor score for all the independent variables included in the final study analyses is 3.9 (Katz, 2006, p. 70).

Tables 1 and 2 show the results of the two hierarchical regression analyses that examined the variance in senior leadership support for safety (Table 1) and supervisory leadership support for safety (Table 2) explained by demographic variables (functional background, highest level of education, age, and gender) and key study explanatory variables (ease of reporting, norm of openness, and participative leadership).

The first hierarchical regression analysis shows that the demographic variables, when entered in block 1 of the regression model, explain a small but statistically significant

Table 1

Results of the first hierarchical regression analysis (DV = senior leadership support for safety)

	Model 1, β	Model 2, β	Model 3, β	Model 4, β	Model 5, β
Block 1: demographics					
Nursing	.089	.068	.036	.115	.164
Pharmacy	.207	.240	.200	.193	.211
Bachelor	.203***	.164***	.161***	.137***	.113***
MD	.184	.156	.127	.065	.091
Other	.025	.009	.007	.025	.023
Age, years					
31–40	.078	.083	.086	.113*	.091
41–50	.046	.081	.069	.086	.080
51–60	.074	.100	.073	.074	.078
>60	.302**	.317***	.231**	.217**	.191**
Male	−.082	−.077	−.056	−.032	−.024
Block 3					
Ease of reporting			.297***	.227***	.174***
Block 4					
Norms of openness				.450***	.202***
Block 5					
Participative leadership					.405***
Total r^2 (adjusted)	.013***	.057***	.177***	.265***	.359***
Change in r^2	.017***	.049***	.119***	.087***	.094***

Note. $N = 2211$. Organization dummy variables were entered in block 2 to control for organization effects (β values for each hospital not shown).

*$p \leq .05$.

**$p \leq .01$.

***$p \leq .001$. Asterisks refer to significance of multiple linear regression coefficients (β).

Table 2

Results of the second hierarchical regression analysis (DV = supervisory leadership support for safety)

	Model 1, β	Model 2, β	Model 3, β	Model 4, β	Model 5, β
Block 1: demographics					
Nursing	−.213	−.209	−.256	−.115	−.102
Pharmacy	−.229	−.181	−.223	−.224	−.216
Bachelor	.073*	.058	.055	.029	.004
MD	−.103	−.093	−.138	−.204	−.176
Other	−.063	−.052	−.057	−.033	−.034
Age, years					
31–40	.037	.047	.050	.078	.054
41–50	.035	.060	.051	.072	.067
51–60	.074	.099	.076	.078	.084*
>60	.214*	.215**	.143	.124	.099
Male	−.119*	−.121*	−.098	−.061	−.053
Block 3					
Ease of reporting			.243***	.162***	.104***
Block 4					
Norms of openness				.512***	.240***
Block 5					
Participative leadership					.443***
Total r^2 (adjusted)	.003	.040***	.147***	.297***	.448***
Change in r^2	.007	.043***	.106***	.149***	.149***

Note. $N = 2211$. Organization dummy variables were entered in block 2 to control for organization effects (β values for each hospital not shown).

*$p \leq .05$.

**$p \leq .01$.

***$p \leq .001$. Asterisks refer to significance of multiple linear regression coefficients (β).

amount of variance in senior leadership support for safety (block 1: $\Delta r^2 = .017$, $p \leq .001$ in Table 1). However, it is important to note that only the β coefficients for having a bachelor's degree (β = .203, $p \leq .001$ in Table 1) and age of >60 years (β = .302, $p \leq .01$ in Table 1) in model 1 are significant.

Table 2 shows that the demographic variables, when entered in block 1 of the regression model, do not explain a significant amount of variance in supervisory leadership support for safety (block 1: $\Delta r^2 = .007$, *ns* in Table 2); however, the β coefficients of bachelor's degree (β = .073, $p \leq .05$ in Table 2), age of >60 years (β = .214, $p \leq .05$ in Table 2) and men (β = −.119, $p \leq .05$ in Table 2) dummy variables are still shown to be statistically significant. Organization dummy variables when entered in block 2, explains 4.9% ($p \leq .001$ in Table 1) of unique variance in senior leadership support for safety and 4.3% ($p \leq .001$ in Table 2) of unique variance in supervisory leadership support for safety.

Ease of reporting explains a significant amount of variance in senior leadership support for safety (block 3: $\Delta r^2 = .119$, $p \leq .001$ in Table 1) and supervisory leadership support for safety (block 3: $\Delta r^2 = .106$, $p \leq .001$ in Table 2), over and above that which is explained by demographic variables and hospital dummies. When entered in block 4, Tables 1 and 2 show that unit norms of openness explain a significant amount of variance in senior leadership support for safety (Table 1: block 4 $\Delta r^2 = .087$, $p \leq .001$) and supervisory leadership support for safety (Table 2: block 4 $\Delta r^2 = .149$, $p \leq .001$), over and above variance explained by demographic variables and ease of reporting. Finally, participative leadership explains a significant amount of variance in senior leadership support for safety (block 5: $\Delta r^2 = .094$, $p \leq .001$ in Table 1) and supervisory leadership support for safety (block 5: $\Delta r^2 = .149$, $p \leq .001$ in Table 2) over and above variance explained by all of the previous variables. Overall, in both models, each of our three explanatory variables of interest explains roughly 10%–15% of variance beyond variance explained by previous variables in the model.

Discussion

The current study examined how ease of reporting, unit norms of openness, and participative leadership influence frontline staff perceptions of PSC. All six study hypotheses were supported. Each is discussed below in the context of the current literature. The results of the study support hypotheses 1a and 1b as ease of reporting is shown to be positively related to each of the two dimensions of

PSC. Ease of reporting explains a significant amount of variance in senior leadership support for safety (12%) and supervisory leadership support for safety (11%) over and above that explained by demographic variables. These findings suggest that efforts made by organizations to ensure that reporting systems not only exist, but are genuinely conducive to reporting, are recognized by frontline staff and contribute to staff assessments of an organization's safety commitment. Ease of reporting should provide an organization greater learning opportunities through increased event reporting, which may in turn facilitate an even stronger PSC. For example, Bonner et al. (2008) found that nursing homes with higher PSC scores have higher rates of error reporting compared with nursing homes with lower PSC scores. Similarly, Cohen et al. (2004) found that error reporting increased from 35 events/1,000 patient days to 125 events/1,000 patient days because of the implementation of a safety program that included making event reporting easier at a community hospital. This increase in error reporting was paralleled by a significant improvement in staff perceptions of PSC.

Our results support hypotheses 2a and 2b as unit norms of openness are shown to be positively related to both dimensions of PSC. Unit norms of openness explained a significant amount of variance in perceptions of senior leadership support for safety (9%) and supervisory leadership support for safety (15%) over and above that explained by demographic variables and ease of reporting. Our results are consistent with Liu et al. (2009), Verschoor et al. (2007), and others, who found that open communication and nonpunitive environment are positively associated with frontline staff perceptions of PSC. Hence, it is useful for a health care unit or an organization looking to strengthen or improve its PSC to work on more concrete approaches to fostering unit norms of openness that are characterized by a nonpunitive environment and open communication channels.

Our results also support hypotheses 3a and 3b as participative leadership was shown to be positively related to the two dimensions of PSC we examined. Participative leadership explains a significant amount of variance in senior leadership support for safety (9%) and supervisory leadership support for safety (15%) over and above that explained by demographic variables, ease of reporting, and unit norms of openness. These findings are consistent with previous research that has shown the importance of a participative leadership style to safety climate in health care (Jeffs et al., 2007; Ruchlin et al., 2004) and in other industries (Fisher & Bibo, 2000; Flin & Yule, 2004).

One of the main aims of using hierarchical regression analysis was to tease out the amount of unique variance in the two PSC variables accounted for by participative leadership, unit norms of openness, ease of reporting, and demographic variables. In this way, we could examine the extent to which unit norms of openness and participative leadership share variance and are linked, as suggested by Leana (1985). Our data support unit norms of openness and participative leadership as unique concepts that play equally important roles in understanding frontline staff perceptions of PSC.

Finally, it is useful to comment on the observed differences in overall variance accounted by each of the two hierarchical regression models. The first hierarchical regression model accounted for 36% of overall variance in senior leadership support for safety, whereas the second hierarchical regression model accounted for 45% of overall variance in supervisory leadership support for safety. This observed difference in overall variance accounted for by the model makes sense given that unit norms of openness and participative leadership variables are focused on the "unit" level and, likely as a consequence, explain more variance in supervisory leadership support for safety—a construct that also focuses on the unit level—compared with senior leadership support for safety.

Findings from the hierarchical regression analysis are useful in understanding how frontline staff demographic variables such as age and educational level can influence staff perceptions of PSC. Older age (>60 years) shows a positive relationship with senior leadership support for safety and supervisory leadership support for safety. The most experienced frontline staff in a health care setting (perhaps also with the longest tenure in the organization) may become more conscious of and perhaps more tolerant and accepting of the organization's PSC. Another interesting finding of our study is that the baccalaureate-prepared nurse demographic variable is positively related to both dimensions of PSC. Nurses holding a bachelor's degree as their highest level of education are more likely to have positive perceptions of PSC compared with nurses with a diploma as their highest level of education. Baccalaureate nursing programs may provide more learning opportunities related to patient safety issues because of the curriculum structure and a longer program of study compared with a diploma nursing program. Interestingly, baccalaureate trained nurses are likely to be younger than diploma trained nurses so recent nursing graduates, although younger, may be getting more patient safety exposure in their training. More positive PSC scores from baccalaureate-prepared nurses are consistent with recent research that identified higher levels of self-reported patient safety competence among nurses at later stages of their training (Ginsburg, Tregunno, & Norton, 2013). Together, these findings may underscore the influence of formal health professional training on frontline staff perceptions of PSC.

Finally, our results indicate that, although frontline staff that participated in the study were nested in 13 different health organizations, organization-level effects accounted for a fairly small proportion of variance (<5%) in our models. When we controlled for hospital-level effects, our three independent variables of interest continued to explain a significant amount of variance in staff perceptions of both leadership dimensions of PSC.

Study Limitations

There are some limitations to this study that should be acknowledged. First, the response rate for the staff questionnaire was only 17%. A selection bias might be at work in our study as it was based on volunteer participation of hospitals and frontline health care staff. Second, self-report questionnaire data can be subject to social desirability biases. Efforts were, however, made to reassure respondents that their responses would be confidential (e.g., completed questionnaires were mailed directly back to the researchers' home department at the university). However, it is unclear how much this may have influenced the study data. Although both of these first two limitations may impact the absolute scores on the study variables of interest, these two limitations are less likely to impact the relationships we examined between study variables. Third, we need to be cognizant of the potential for common method bias to inflate relationships in this study given that our explanatory and dependent variables come from the same source. Fourth, the study design was cross-sectional, and therefore, causal conclusions cannot be drawn. Fifth, the study data were collected in 2007, and although the contextual variables we studied remain important to patient safety, the age of the data should be acknowledged. Finally, the results may only be generalizable to similar health care systems; however, findings were concordant with the literature derived from broader North American samples (e.g., Cohen et al., 2004, Garbutt et al., 2008; Ginsburg et al., 2009; Verschoor et al., 2007).

Study Implications

The findings of our study have both research and practice implications.

Research Implications

Twelve years after the publication of the IOM report, "To Err Is Human," empirical research on patient safety and PSC in medical settings still lags far behind the theoretical literature on these topics. The importance of an easy-to-use reporting system to improve error reporting and PSC is a relatively new avenue of research, as traditionally, the scientific community has considered the mere presence of an error reporting system to be sufficient to improve PSC. Past research has shown that nonpunitive environments and open communication channels are positively related to PSC. However, there is a lack of empirical research on participative leadership and PSC in medical settings. Moreover, no other empirical study that we could find has systematically examined the relative importance of unit norms of openness and participative leadership to PSC. The current study contributes to scientific knowledge in the area of patient safety by demonstrating that ease of reporting, unit norms of openness, and participative leadership are all positively related to frontline staff perceptions of PSC in acute care hospitals.

Practice Implications

Frontline staff must perceive error reporting systems to be convenient and easy to utilize if these systems are to have a positive effect on error reporting, PSC, and ultimately, patient outcomes. Health care management needs to actively seek feedback from frontline staff during the design and implementation stages of an error reporting system to ensure that staff can easily integrate reporting into their daily routines. Moreover, health care organizations need to provide leadership training opportunities for both senior and supervisory leaders to help them transform their traditional reliance on bureaucratic decision making to a more participative decision-making approach. Efforts are also required at frontline and senior levels of management to create an environment where staff feel they can openly communicate safety concerns. Finally, on the staff side, there is a need to provide continuous safety training opportunities for frontline clinical staff to cover known gaps in the safety training caregivers receive during their formal education process (e.g., Ginsburg et al., 2013).

Conclusion

The recent emphasis on patient safety in health care can be traced back to the publication in 1999 of the IOM report, "To Err Is Human." This report and subsequent research on patient safety suggests that the presence of a safety-oriented climate is essential for making health care safer. The current study builds on past research in the broader organizational literature and used a cross-sectional survey to examine how ease of reporting, unit norms of openness, and participative leadership influence frontline staff perceptions of PSC. The results indicate that these three variables explain a significant amount of variance in each of two key dimensions of PSC. The findings of our study have important implications for researchers as well as managers and organizations trying to improve PSC.

References

Accreditation Canada. (2012). *Canadian health accreditation report—Required organizational practices: Emerging risks, focused improvements*. Ottawa, ON: Accreditation Canada.

Berwick, D. M. (2003). Improvement, trust, and the healthcare workforce. *Quality and Safety in Health Care, 12*(Suppl 1), i2–i6.

Bonner, A. F., Castle, N. G., Men, A., & Handler, S. M. (2009). Certified nursing assistants' perceptions of nursing home patient safety culture: Is there a relationship to clinical outcomes? *Journal of American Medical Directors Association, 10*, 11–20.

Bosk, C. L., Dixon-Woods, M., Goeschel, C. A., & Pronovost, P. J. (2009). The art of medicine: Reality check for checklists. *Lancet, 374*(9688), 444–445.

Chuang, Y., Ginsburg, L., & Berta, W. B. (2007). Learning from preventable adverse events in health care organizations: Development of a multilevel model of learning and propositions. *Health Care Management Review, 32*(4), 330–340.

Clarke, S. (2006). The relationship between safety climate and safety performance: A meta-analytic review. *Journal of Occupational Health Psychology, 11*(4), 315–327.

Cohen, M. M., Kimmel, N. L., Benage, M. K., Hoang, C. C., Burroughs, T. E., & Roth, C. A. (2004). Implementing a hospitalwide patient safety program for cultural change. *Joint Commission Journal on Quality and Safety, 30*(8), 424–431.

Dillman, D. A. (2007). *Mail and internet surveys: The tailored design method*. New York: Wiley.

Edmondson, A. (1999). Psychological safety and learning behavior in work teams. *Administrative Science Quarterly, 44*(4), 350–383.

Fisher, G., & Bibo, M. (2000). No leadership without representation. *International Journal of Organisational Behaviour, 6*(2), 307–319.

Flin, R., Mearns, K., O'Connor, P., & Bryden, R. (2000). Measuring safety climate: Identifying the common features. *Safety Science, 34*, 177–192.

Flin, R., & Yule, S. (2004). Leadership for safety: Industrial experience. *Quality and Safety in Health Care, 13*(Suppl II), ii45–ii51.

Frankel, A., Grillo, S. P., Pittman, M., Thomas, E. J., Horowitz, L., Page, M., & Sexton, B. (2008). Revealing and resolving patient safety defects: The impact of leadership walkrounds on frontline caregiver assessments of patient safety. *Health Services Research, 43*(6), 2050–2066.

Gallivan, M., & Srite, M. (2005). Information technology and culture: Identifying fragmentary and holistic perspectives of culture. *Information and Organization, 15*, 295–338.

Garavan, T. N., & O'Brien, F. (2001). An investigation into the relationship between safety climate and safety behaviours in Irish organizations. *Irish Journal of Management, 22*(1), 141–170.

Garbutt, J., Waterman, A. D., Kapp, J. M., Dunagan, W. C., Levinson, W., Fraser, V., & Gallagher, T. H. (2008). Lost opportunities: How physicians communicate about medical errors. *Health Affairs, 27*(1), 246–255.

Ginsburg, L., Chuang, Y., Norton, P. G., Berta, W., Tregunno, D., Ng, P., & Richardson, J. (2010). The relationship between organizational leadership for safety and learning from patient safety failure events. *Health Services Research, 45*(3), 607–632.

Ginsburg, L., Gilin, D., Tregunno, D., Norton, P. G., Flemons, W., & Fleming, M. (2009). Advancing measurement of patient safety culture. *Health Services Research, 44*(1), 205–224.

Ginsburg, L. R., Norton, P. G., Castel, E., Murray, M., & Tregunno, D. (2010). MSI patient safety culture survey—2010 survey revisions: Creating the MSI-2010. Retrieved from http://www.yorku.ca/patientsafety/

Ginsburg, L. R., Tregunno, D., & Norton, P. G. (2013). Self-reported patient safety competence among new graduates in medicine, nursing and pharmacy. *BMJ Quality and Safety, 22*(2), 147–154.

Institute of Medicine. (2000). *To err is human: Building a safer health system*. Washington, DC: National Academy Press.

Jeffs, L., Law, M., & Baker, G. R. (2007). Creating reporting and learning cultures in health-care organizations. *The Canadian Nurse, 103*(3), 16–17, 27–28.

Kalisch, B. J., & Aebersold, M. (2006). Overcoming barriers to patient safety. *Nursing Economics, 24*(3), 143–149.

Katz, M. H. (2006). *Multivariable analysis: A practical guide for clinicians* (2nd ed.). Cambridge, UK: Cambridge University Press.

Leana, C. R. (1985). A partial test of Janis' groupthink model: Effects of group cohesiveness and leader behavior on defective decision making. *Journal of Management, 11*, 5–17.

Liu, Y., Kalisch, B. J., Zhang, L., & Xu, J. (2009). Perception of safety culture by nurses in hospitals in China. *Journal of Nursing Care Quality, 24*(1), 63–68.

Mohr, J. J., Abelson, H. T., & Barach, P. (2002). Creating effective leadership for improving patient safety. *Quality Management in Health Care, 11*(1), 69–78.

Moumtzoglou, A. (2010). Factors that prevent physicians reporting adverse events. *International Journal of Health Care, 23*(1), 51–58.

Nieva, V. F., & Sorra, J. (2003). Safety culture assessment: A tool for improving patient safety in healthcare organizations. *Quality and Safety in Health Care, 12*(Suppl 2), ii17–ii23.

Petrocelli, J. V. (2003). Hierarchical multiple regression in counseling research: Common problems and possible remedies. *Measurement and Evaluation in Counseling and Development, 39*, 9–22.

Pronovost, P. J., Berenholtz, S. M., Goeschel, C. A., Needham, D. M., Sexton, J. B., Thompson, D. A., … Hunt, E. (2006). Creating high reliability in health care organizations. *Health Services Research, 41*(4, Part 2), 1599–1617.

Reason, J. (1997). *Managing the risks of organizational accidents*. *American Psychologist,* Aldershot, Hampshire: Ashgate Publishing Limited.

Ruchlin, H. S., Dubbs, N. L., Callahan, M. A., & Fosina, M. J. (2004). The role of leadership in instilling a culture of safety: Lessons from literature. *Journal of Healthcare Management, 49*(1), 47–59.

Schein, E. H. (1990). Organizational culture. *American Psychologist, 45*(2), 109–119.

Singer, S., Lin, S., Falwell, A., Gaba, D., & Baker, L. (2009). Relationship of safety climate and safety performance in hospitals. *Health Services Research, 44*(2, Part 1), 399–420.

Singer, S. J., & Vogus, T. J. (2013). Safety climate research: Taking stock and looking forward. *Quality and Safety in Health Care, 22*, 1–4.

Thomas, K. S., Hyer, K., Castle, N. G., Branch, L. G., Andel, R., & Weech-Maldonado, R. (2012). Patient safety culture and the association with safe resident care in nursing homes. *The Gerontologist, 52*(6), 802–811.

Verschoor, K. N., Taylor, A., Northway, T. L., Hudson, D. G., Van Stolk, D. E., Shearer, K. J., McDougall, D. L., & Miller, G. (2007). Creating a safety culture at the children's and women's health center of British Columbia. *Journal of Pediatric Nursing, 22*(1), 81–86.

Vincent, C., Neale, G., & Woloshynowych, M. (2001). Adverse events in British hospitals: Preliminary retrospective record review. *British Medical Journal, 322*(7285), 517–519.

Zohar, D. (1980). Safety climate in industrial organizations: Theoretical and applied implications. *Journal of Applied Psychology, 65*(1), 96–102.

Zohar, D. (2000). A group-level model of safety climate: Testing the effect of group climate on microaccidents in manufacturing jobs. *Journal of Applied Psychology, 85*, 587–596.

Zohar, D. (2008). Safety climate and beyond: A multi-level multi-climate framework. *Safety Science, 46*, 376–387.

Zohar, D., & Hofmann, D. A. (2012). Organizational culture and climate. In S. W. J. Kozlowski (Ed.), *The Oxford handbook of organizational psychology* (Vol. 1, pp. 643–666). New York, NY: Oxford University Press.