Evaluating the Effect of Safety Culture on Error Reporting: A Comparison of Managerial and Staff Perspectives

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American Journal of Medical Quality published online 28 July 2014
DOI: 10.1177/1062860614544469

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What is This?
Medical errors cause widespread harm and are known to be preventable. In *To Err Is Human*, the Institute of Medicine defines a medical error to be the failure of a planned action to be completed as intended, or the use of a wrong plan to achieve an aim.\(^1\) Despite the additional emphasis on quality in the years after that report was released, a recent study estimated the annual cost from adverse events (ie, errors that harm patients) to be $4.4 billion.\(^2\)

Near misses are events or situations that have the potential to harm a patient but do not produce patient injury because of chance, prevention, or mitigation.\(^1,3\) Near misses have similar causal pathways to adverse events and provide opportunities for quality improvement.\(^4\) They encompass more than 50% of all errors and are up to 100 times as common as adverse events.\(^1,5\)

There is some evidence that increased reporting of near misses leads to improved outcomes. Error reporting culture and safety performance indicators are correlated.\(^6\) One study of medication error reporting found that reports were used to enhance the communication process, provide impetus for education or training, and change policies.\(^7\)

Given that error reporting is associated with improved outcomes, an important question is whether medical errors are sufficiently reported. The evidence suggests they are not. Studies in the United States and the United Kingdom illustrate that underreporting of adverse events may be as high as 96%.\(^8\) Even hospitals that use electronic incident reporting systems capture only 10% of errors.\(^9\)

Ultimately, patient safety is a critical component of medical quality. Poor patient safety can affect the quality of medical care, particularly in regard to medical errors. Adverse events from patient safety failures include such adverse quality outcomes as death, reduced quality of life, hospital-acquired infections, and medication errors.\(^10\)

The present study adds 4 elements to the existing literature on error reporting. First, it models 9 often-cited organizational factors associated with patient safety and error reporting to identify those most critical. Relatively
little is known about the antecedents of error reporting, but an existing safety culture framework\textsuperscript{11} posits specific mechanisms that can be used to test error reporting. Although other studies have provided insights into factors associated with error reporting, they did not test the factors collectively, nor did they identify those of greatest importance using inferential statistics. The closure of this gap is highly relevant given hospital resource constraints and the tradeoffs between patient safety and costs.

Second, this analysis examined the differences in perceptions of management and clinical staff. No prior study used inferential statistics to look at differences in survey responses of management and clinical staff to determine if associations between organizational factors and error reporting differ between the 2 groups.

Third, this research examines a large national sample of hospitals, in contrast to small quantitative or qualitative studies. One study used regression but studied different elements of safety culture in 3 hospitals: safety procedures, safety information flow, and priority of safety.\textsuperscript{12} This study expands on the previous study through the examination of nonpunitive response to reporting, staffing, teamwork, and learning activities such as error feedback and organizational learning. It also attempts to generalize findings to US hospitals.

Fourth, this study analyzes nonpunitive response to error reporting in the context of the person who commits the error. Previous studies examined the effect of nonpunitive responses directed toward the person reporting the error,\textsuperscript{13,14} but there is an equal relevance for nonpunitive policies directed toward the person committing the error.

Vogus and colleagues consider safety culture to be impacted by enabling, enacting, and elaborating actions that affect outcomes of medical quality.\textsuperscript{11} Enabling refers to leader actions that direct attention to safety and make it safe to speak up to improve safety. In this stage, leaders create an environment for staff to communicate safely when faced with safety threats. The enacting stage centers on frontline staff actions that highlight threats to safety and mobilize resources to reduce those threats. Elaborating consists of learning practices that reflect on safety outcomes and feedback to modify safety practices.

The variables in the Hospital Survey on Patient Safety Culture (HSOPS) data set translate well to a conceptual model, as shown in Figure 1. Leadership participation in safety activities is associated with better medical quality outcomes.\textsuperscript{15} In a literature review, Pfeiffer et al identified a fear of blame and lack of time for reporting as common barriers to reporting.\textsuperscript{16}

As shown in Figure 1, the enacting or shared care stage includes teamwork within units and teamwork across units as variables. A Joint Commission study found that 70% of preventable errors that resulted in death or serious injury were caused by frontline communication

\textbf{Figure 1. Conceptual model.}
failures.\textsuperscript{17} A study of employee voice found that employees were less silent when they identified with their workgroup and perceived a high level of justice judgment of employees in the workplace.\textsuperscript{18}

The elaborating or organizational learning stage includes organizational learning and error feedback. Small studies found evidence that elaborating activities, such as organizational learning and feedback-seeking, are associated with development of new practices that reduce errors or improve error reporting.\textsuperscript{7,16} Given findings from previous studies, the present study had the following hypothesis:

**Hypothesis 1:** Higher scores for organizational factors influencing safety will be associated with perceptions of higher frequencies of error reporting.

Managers tend to have a more positive view of safety than clinical staff.\textsuperscript{20} Frontline clinical staff, predominantly nurses, are most likely to report errors, while managers control resources. Thus, it is important to identify whether organizational factors associated with error reporting differ between groups. As a result, the second hypothesis was specified as follows:

**Hypothesis 2:** Management and clinical groups will have different perspectives about organizational factors contributing to patient safety and these differences will be reflected in different perceptions about frequencies of error reporting.

Finally, although the investigation was framed to test these hypotheses, another aim of this study was exploratory. One of the study goals was to identify the organizational factors that were most highly associated with error reporting. Although nonpunitive response to errors, staffing sufficiency, and error feedback are commonly referenced as factors that affect error reporting,\textsuperscript{16} there is no consensus of the single organizational factor that has the greatest perceived effect on error reporting. This answer is important because it can help leaders better focus resources to increase reporting and improve medical quality of care.

**Methods**

**Data and Sample**

The data source for this study was the Agency for Healthcare Research and Quality’s HSOPS comparative database. The database is a central repository for survey data from hospitals in all 50 states plus US territories that voluntarily administered the HSOPS survey.

The HSOPS survey has been shown to be a reliable survey instrument that can be studied at multiple levels of analysis. Psychometric analysis conducted by multiple studies confirmed that the HSOPS dimensions, each comprised of 3 to 4 survey questions, are reliable measures that are valid at the individual, unit, and hospital levels, and can be used by researchers to assess patient safety culture.\textsuperscript{21,22}

The data set incorporated surveys completed by hospital staff from 2008 to 2011 and was aggregated to the hospital level. Hospitals submitted data annually for a range of 1 to 4 years. Data from prior years was used in the data set only when a hospital did not submit 2011 data; older data were replaced with more recent data. Data proportionally came from the following survey years: 2011 (41\%), 2010 (35\%), 2009 (20\%), and 2008 (4\%). As identified by Smits et al, there is significant clustering of responses at the hospital level, confirming that the HSOPS survey can measure group culture and not solely individual attitudes.\textsuperscript{23} The hospital was used as the unit of analysis in order to provide desired hospital-level interpretations and to group staff who had similar experiences.

A total of 1081 hospitals contributed to the data set used. Of those, 29 hospitals were removed because of missing data, leaving a final study sample of 1052 hospitals and 515 637 individual responses. A total of 1047 hospitals had responses from both managers (36 290 respondents) and clinical staff (237 409) and were used to compare management and clinical staff perspectives. For these analyses, clinical staff included physicians, physician assistants, nurse practitioners, registered nurses, licensed practical nurses, and medical assistants.

**Measures**

The HSOPS survey used a 5-point Likert-type scale with the following choices for most questions: strongly disagree, disagree, neither agree nor disagree, agree, and strongly agree. Some questions had response options as follows: never, rarely, sometimes, most of the time, and always. If questions were positively worded, responses were considered positive if the person agreed or strongly agreed; if the questions were negatively worded, responses were considered positive if the person disagreed or strongly disagreed. The percent positive scores for the 3 to 4 related questions that comprise each organizational factor were averaged to represent the variable value.

The predictor variables of interest were perceptions of the following: supervisor support for safety, organizational learning, teamwork within units, communication openness, error feedback, nonpunitive response to error, management support for patient safety, staffing levels, and teamwork across units. Supervisor support demonstrated the priority a supervisor placed on safety. Organizational learning reflected continuous improvement regarding patient safety,
in which mistakes led to positive changes and improvements were evaluated for their effectiveness. Teamwork within units exhibited the support and respect that people have for one another within a unit. Communication openness was the comfort level of staff to question those with more authority when something did not seem right. Error feedback was whether feedback was given after an error report, and whether staff discussed ways to prevent recurrence of errors. Nonpunitive response to errors reflected whether the person who committed an error was punished. Management support was the prioritization and interest hospital management placed on safety. Staffing levels conveyed whether there was enough staff to appropriately handle patient care. Teamwork across units examined the coordination of patient care from one unit to another.

Consistent with the literature, hospital variables were included to control for bed size (8-level categorical variable), region (8 levels), whether it was a teaching hospital, and whether it was a government hospital.

The dependent variable was a high frequency of error reporting. This variable was derived from respondents’ perceptions about how often an error was reported. Questions about error reporting focused on near miss errors (ie, errors that were made but did not result in harm to the patient). Near misses were used because of the available data, but near misses have similar causal pathways to adverse events and provide opportunities for quality improvement.4 The dependent variable was calculated in the same manner as the predictor variables.

Analysis

A weighted least-squares multiple regression analysis was used to examine the association between organizational factors potentially affecting safety and a high frequency of error reporting. The weights applied were based on the number of hospital respondents divided by the number surveyed. The research team considered hospitals with a greater proportion of respondents to offer more precise information and so gave them higher weights.

To reduce concerns about multicollinearity, variance inflation factors (VIFs) were obtained for each model. Each variable VIF was less than 6, with an average below 3. The VIFs are under the threshold of 10, considered to be a serious concern.24

All statistical analyses were performed using Stata, release 11 software (StataCorp LP, College Station, Texas).

Results

The mean hospital survey response rate was 52%, with 458 completed surveys per hospital. Table 1 shows respondent demographics and overall perspectives about organizational factors that can influence patient safety. The characteristics of the hospitals, in terms of teaching hospital, government ownership, geographic region, and bed size, were consistent with the overall distribution of hospitals registered with the American Hospital Association. Additional analyses enabled the research team to test the study hypotheses, as described in the sections below.

Support for Conceptual Model: Effects of Organizational Factors on Error Reporting

The research team found support for the conceptual model suggesting that enabling, enacting, and elaborating actions are associated with error reporting frequency. Although each stage of the model had at least one element that was statistically significant, the elaborating actions had the greatest effect on perceptions about a high frequency of error reporting. The elaborating stage’s 2 variables, organizational learning and error feedback, were the only variables that were statistically significant for both the management and clinical staff groups.

Of the 9 primary independent variables tested, error feedback showed the largest effect on error reporting. As shown in Table 2, error feedback had the strongest positive effect on error reporting for each group: all hospital staff (β = 0.47, 95% confidence interval [CI] = 0.39-0.54), management (β = 0.44, 95% CI = 0.35-0.53), and clinical staff (β = 0.37, 95% CI = 0.30-0.44).

Multiple regression models applied separately to the clinical staff and management data indicated that organizational learning had the next largest effect on error reporting for both the management (β = 0.20, 95% CI = 0.09-0.31) and clinical groups (β = 0.14, 95% CI = 0.06-0.23).

Associations Between Organizational Factors and a High Frequency of Error Reporting

Hypothesis 1 was only partially supported by the multiple regression analysis of all hospital staff, as shown in Table 2. The variables communication openness, management support for safety, teamwork across units, feedback on errors, and nonpunitive response to errors were all significantly associated with a perceived high frequency of error reporting. Specifically, management support for safety, teamwork across units, error feedback, and nonpunitive response to error reporting were positively associated with a perceived high frequency of error reporting, as expected. In contrast, communication openness was negatively associated with a high frequency of error reporting in the multiple regression model of all hospital staff.
The model $R^2$ with all independent variables was 0.65, while the $R^2$ for the model with only control variables was 0.22. Thus, the organizational factors of safety explained a considerable amount of variation in error reporting.

### Table 1. Respondent Demographics and Summary Statistics for Organizational Factors Contributing to Safety Culture.a

<table>
<thead>
<tr>
<th>Respondent demographicsb</th>
<th>n</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nurse (RN, LPN, LVN)</td>
<td>173 296</td>
<td>34</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>100 914</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Technician (EKG, lab, radiology)</td>
<td>52 730</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Administration/management</td>
<td>37 296</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Unit assistant/clerk/secretary</td>
<td>31 631</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Physician, physician assistant, nurse practitioner</td>
<td>28 363</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Patient care assistant/hospital aide/care partner</td>
<td>27 026</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Therapist (respiratory, physical, occupational, speech)</td>
<td>24 021</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Pharmacist</td>
<td>9600</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Dietitian</td>
<td>5156</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Missing demographic information</td>
<td>25 604</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

Organizational factors contributing to safety culturec
- Error reporting: 63
- Supervisor support: 75
- Organizational learning: 72
- Teamwork within units: 80
- Communication openness: 62
- Error feedback: 65
- Nonpunitive response to errors: 44
- Staffing levels: 57
- Management support: 72
- Teamwork across units: 59

Abbreviations: EKG, electrocardiogram; LPN, licensed practical nurse; LVN, licensed vocational nurse; RN, registered nurse.

a$N = 1052$ hospitals; 515 637 staff.
bMean reflects percent of total respondents who belong to a specific staff group.
cMean reflects the average percentage of respondents at each hospital who agreed or strongly agreed with survey questions. Survey question responses were based on a 5-point Likert-type scale.

### Table 2. Predictors of High Perceived Frequency of Error Reporting: Weighted Least-Squares Multiple Regression Results.a,b

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Partial $R^2$</th>
<th>$\beta$</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Feedback</td>
<td>0.14</td>
<td>0.47</td>
<td>0.39 to 0.54</td>
</tr>
<tr>
<td>Organizational Learning</td>
<td>&lt;0.01</td>
<td>0.08</td>
<td>−0.01 to 0.16</td>
</tr>
<tr>
<td>Management Support</td>
<td>&lt;0.01</td>
<td>0.08</td>
<td>0.01 to 0.15</td>
</tr>
<tr>
<td>Teamwork Across Units</td>
<td>&lt;0.01</td>
<td>0.09</td>
<td>0.03 to 0.14</td>
</tr>
<tr>
<td>Supervisor Support</td>
<td>&lt;0.01</td>
<td>−0.02</td>
<td>−0.11 to 0.06</td>
</tr>
<tr>
<td>Communication Openness</td>
<td>0.01</td>
<td>−0.09</td>
<td>−0.17 to 0.00</td>
</tr>
<tr>
<td>Nonpunitive Response to Errors</td>
<td>&lt;0.01</td>
<td>0.06</td>
<td>0.01 to 0.12</td>
</tr>
<tr>
<td>Teamwork Within Units</td>
<td>0.01</td>
<td>0.05</td>
<td>−0.03 to 0.13</td>
</tr>
<tr>
<td>Staffing</td>
<td>&lt;0.01</td>
<td>0.01</td>
<td>−0.04 to 0.06</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.
aWeight was a hospital’s overall response rate; $n = 1052$.
bControls included teaching hospital, government hospital, bed size, and region.
c$R^2$ was .65 for model with control, predictor variables. $R^2$ was .22 for model with only control variables.
d$P < .05$. ***$p < .001$.

The model $R^2$ with all independent variables was 0.65, while the $R^2$ for the model with only control variables was 0.22. Thus, the organizational factors of safety explained a considerable amount of variation in error reporting.

### Similarities and Differences of Perceptions Between Managers and Clinical Staff

A few notable differences also were found in comparisons between management and clinical staff perceptions...
that support Hypothesis 2. For each variable of interest, as shown in Table 3, managers averaged significantly higher positive perceptions of organizational factors that influence safety than did clinical staff.

In additional analyses comparing these respondent groups, it was found that management and clinical staff respondents differed significantly with regard to their perceptions of teamwork across units, nonpunitive response to errors, and management support for safety. As shown in Table 4, although nonpunitive response to errors, teamwork across units, and supervisor support were significantly associated with error reporting among management respondents, these associations were not significant in the clinical staff analysis. At the same time, management support was significantly associated with error reporting for clinical staff respondents but not for management respondents.

Discussion

Despite efforts of hospital leaders, underreporting of errors continues to be a significant problem. Although

Table 3. Comparison of Management and Clinical Staff Perceptions of Organizational Factors Contributing to Safety Culture.a,b

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Management Mean</th>
<th>Clinical Mean</th>
<th>Difference</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error Reporting</td>
<td>70.9</td>
<td>62.9</td>
<td>8.0</td>
<td>***</td>
</tr>
<tr>
<td>Supervisor Support for Safety</td>
<td>86.3</td>
<td>73.2</td>
<td>13.1</td>
<td>***</td>
</tr>
<tr>
<td>Organizational Learning</td>
<td>84.3</td>
<td>72.1</td>
<td>12.2</td>
<td>***</td>
</tr>
<tr>
<td>Teamwork Within Units</td>
<td>89.4</td>
<td>79.9</td>
<td>9.5</td>
<td>***</td>
</tr>
<tr>
<td>Communication Openness</td>
<td>77.5</td>
<td>60.0</td>
<td>17.5</td>
<td>***</td>
</tr>
<tr>
<td>Error Feedback</td>
<td>79.3</td>
<td>61.3</td>
<td>18.0</td>
<td>***</td>
</tr>
<tr>
<td>Nonpunitive Response to Errors</td>
<td>63.4</td>
<td>42.2</td>
<td>21.2</td>
<td>***</td>
</tr>
<tr>
<td>Staffing Levels</td>
<td>66.0</td>
<td>57.3</td>
<td>8.7</td>
<td>***</td>
</tr>
<tr>
<td>Management Support for Safety</td>
<td>85.8</td>
<td>67.6</td>
<td>18.2</td>
<td>***</td>
</tr>
<tr>
<td>Teamwork Across Units</td>
<td>68.0</td>
<td>57.0</td>
<td>11.0</td>
<td>***</td>
</tr>
</tbody>
</table>

aQuestion responses were based on a 5-point Likert-type scale.
bValues reflect the average percent of people at each hospital who agreed or strongly agreed with the questions that related to the variable of interest; n = 1047 hospitals.
cManagement consists of hospital staff who selected their primary staff position as administration/management.
dClinical staff consists of physicians, physician assistants, nurse practitioners, registered nurses, licensed practical nurses, and medical assistants.

Table 4. Weighted Least-Squares Multiple Regression of Perceptions About Organizational Factors Contributing to Safety Culture and High Frequency of Error Reporting: Comparison of Management and Clinical Staff Perceptions with Distinct Models.a

<table>
<thead>
<tr>
<th>Variable Name</th>
<th>Management β</th>
<th>95% CI</th>
<th>Clinical Staff β</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor Support</td>
<td>-0.16</td>
<td>-0.27 to -0.06</td>
<td>**</td>
<td>-0.01</td>
</tr>
<tr>
<td>Organizational Learning</td>
<td>0.20</td>
<td>0.09 to 0.31</td>
<td>***</td>
<td>0.14</td>
</tr>
<tr>
<td>Teamwork Within Units</td>
<td>-0.06</td>
<td>-0.18 to 0.06</td>
<td></td>
<td>0.05</td>
</tr>
<tr>
<td>Communication Openness</td>
<td>-0.01</td>
<td>-0.10 to 0.08</td>
<td></td>
<td>-0.04</td>
</tr>
<tr>
<td>Error Feedback</td>
<td>0.44</td>
<td>0.35 to 0.53</td>
<td>***</td>
<td>0.37</td>
</tr>
<tr>
<td>Nonpunitive Response to Errors</td>
<td>0.10</td>
<td>0.03 to 0.17</td>
<td>**</td>
<td>0.03</td>
</tr>
<tr>
<td>Staffing</td>
<td>-0.06</td>
<td>-0.14 to 0.01</td>
<td></td>
<td>-0.02</td>
</tr>
<tr>
<td>Management Support</td>
<td>0.09</td>
<td>0.00 to 0.18</td>
<td></td>
<td>0.11</td>
</tr>
<tr>
<td>Teamwork Across Units</td>
<td>0.12</td>
<td>0.05 to 0.18</td>
<td>***</td>
<td>0.03</td>
</tr>
</tbody>
</table>

Abbreviation: CI, confidence interval.
aWeight was hospital’s overall response rate; n=1047 hospitals; controls included teaching hospital, government hospital, bed size, and region; management and clinical staff models were run separately.
bManagement consists of hospital staff who selected their primary staff position as administration/management.
cThe R² for the management model was .32.
dClinical staff consists of physicians, physician assistants, nurse practitioners, registered nurses, licensed practical nurses, and medical assistants.
eThe R² for the clinical staff model was .53.

**P < .01. ***P < .001.
hospitals pour money into initiatives that create incident reporting systems, previous studies did not focus on the singular most important antecedent to error reporting. Similarly, differences between management and clinical staff had not been examined using inferential statistics.

In the present study, elaborating actions, specifically error feedback and organizational learning, had the greatest associations with perceptions of a high frequency of error reporting. The significance of these factors likely indicates that staff want to see their prior reporting taken seriously. Since only a fraction of recommended patient safety improvements can be adopted because of constraints on finances and staffing,25 attention to these factors is clearly important.

Furthermore, although the finding that communication openness was negatively associated with error reporting was unexpected, the research team believes this finding can be interpreted in the context of patient safety culture. It is possible that in hospitals with more communication openness, staff may be inclined to fix problems as they learn about them rather than wait and formally report errors.

This study also found that associations between perceptions about organizational factors and error reporting frequency differed for management and clinical staff. For management respondents, teamwork across units and nonpunitive response to errors were associated with perceived error reporting, while management support was not; however, the opposite was true for clinical staff respondents.

The finding of no association between perceived error reporting frequency and nonpunitive responses among clinical staff respondents is in contrast to the results of prior studies that have emphasized the importance of nonpunitive response. However, this may be attributed to study design differences. Previous studies examined the effect of nonpunitive responses directed toward the person who reported the error,13,14 while the present study focused on a nonpunitive response to the person who committed the error. One possible reason for the difference in nonpunitive response reflects that managers dispense punishment, while clinical staff receive it. Managers may believe that any punitive environment reflects negatively, while clinical staff may believe a punitive environment is only relevant if they are directly affected. Therefore, a nonpunitive policy directed toward the person committing the error may not have the desired impact on error reporting. Nonpunitive response programs should be examined in light of how such programs are directed, and for whom the responses are intended, rather than as one-size-fits-all initiatives.

Prior research has shown that clinical staff members are more likely to report errors than managers and that clinical staff perceptions are more closely aligned with actual safety outcomes.26,27 The findings of the present study suggest that managers may inadvertently hinder error reporting if they fail to realize the importance of their own support for safety and instead emphasize factors perceived as less influential by clinical staff. Managers need to acknowledge the perceptions of frontline staff and make support for safety a priority. Management can demonstrate support for patient safety by implementing a safety board with subcommittees and by including safety performance in the annual appraisal process.

Based on results of this study, the research team recommends management take actions to prioritize efforts to improve error feedback and increase organizational learning. Error feedback should be timely, and management should treat all reports seriously and demonstrate a commitment to learn from error reports.30 Feedback should be provided soon after the error report because delays between feedback and decisions hurt performance.31 Furthermore, management must be committed to using error reports to make changes in the work environment. Such changes demonstrate to staff that reporting can indeed make a difference. Finally, hospitals should use organizational learning activities to improve error reporting. Previous studies indicate that organizational learning can be improved through feedback associated with the development of new practices, safety rounds, and video reflexive ethnography.

Limitations and Suggestions for Future Research

Common method bias, the degree to which correlations are altered because of a method effect, is a potential problem in survey research and may appear when there is simultaneous measurement of predictor and outcome variables. This study assessed common method bias with Harman’s single-factor test and a confirmatory factor analysis, consistent with approaches used by other studies in the literature.34,35 These assessments indicated common method bias was not a significant threat to the validity of the findings ($\chi^2 = 3869.525$, degrees of freedom = 170, root mean square error of approximation = .144, comparative fit index = .503, Tucker–Lewis index = .444). Bias was controlled through the survey instrument using reverse-coded questions, spatial separation of dependent and independent variables, question order randomization, and survey respondent anonymity.

Another possible limitation of this study is that the responses are based on perceptions. Answers may reflect what respondents think is happening, but the reality may be different. However, research suggests that there is a link between perceptions of safety culture and safety outcomes. Mardon et al found that perceptions of patient safety were associated with adverse patient safety events.37 Other studies have found a similar relationship
between staff perceptions of safety culture and medical outcomes. Moreover, studies in other disciplines, such as environmental reporting, demonstrated a relationship between perceptions and reality.

Future research should assess the optimal approach by which to provide error feedback and determine whether a definitive link can be established between error reporting and medical errors. Considering the important role error feedback plays in increasing the frequency of error reporting, additional studies can analyze how different error feedback methods affect error reporting. Separately, research on the effect of error reporting on future errors should be conducted. No study demonstrates the effect of error reporting on the volume of future errors. Future research also can incorporate mixed methods to triangulate qualitative data from managers and clinical staff.

Conclusion

Medical errors unnecessarily inflate levels of morbidity and mortality and are largely preventable. This study found that hospital error reporting can be influenced by error feedback, leadership that demonstrates safety is a priority, and an environment that inspires organizational learning. However, perceptions about these organizational factors and their impact differ between hospital management and clinical staff. Because clinical staff members are more likely than managers to report errors, managers must be cognizant that their own perceptions may differ from clinical members. Knowledge of these differences may help hospitals optimize error reporting. Management can demonstrate support for safety rather than develop nonpunitive responses to staff who report errors.

Acknowledgments

We would like to thank the Agency for Healthcare Research and Quality for access to the data used in this study and the Healthcare Research and Educational Trust for facilitating data access.

Declaration of Conflicting Interests

The authors declared no conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

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