Published in final edited form as:

J Nurs Care Qual. 2019 ; 34(3): 230–235. doi:10.1097/NCQ.0000000000000368.

Manifestations of High Reliability Principles on Hospital Units With Varying Safety Profiles: A Qualitative Analysis

Sarah E. Mossburg, PhD, RN,

Doctoral student, Johns Hopkins School of Nursing, Baltimore, MD, Smossbu1@jhmi.edu | 703-582-6856

Sallie J. Weaver, PhD,

Associate Professor, Johns Hopkins School of Medicine & School of Nursing, & Armstrong Institute for Patient Safety & Quality, Baltimore, MD

MarieSarah Pillari, BSN, RN, and

Research Assistant, Johns Hopkins School of Medicine, Baltimore, MD

Elizabeth Daugherty Biddison, MPH, MD

Associate Professor of Medicine, Johns Hopkins School of Medicine, Baltimore, MD

Abstract

Background: To prevent patient harm, health care organizations are adopting practices from other complex work environments known as high reliability organizations (HRO).

Purpose: The purpose was to explore differences in manifestations of HRO principles on hospital units with high and low safety performance.

Methods: Focus groups were conducted on units scoring high or low on safety measures. Themes were identified using a grounded theory approach, and responses were compared using qualitative thematic analysis.

Results: High-performers indicated proactive responses to safety issues and expressed understanding of systems-based errors, while low-performers were more reactive and often focused on individual education to address issues. Both groups experienced communication challenges, although they employed different methods of speaking up.

Conclusion: Some HRO principles were present in the language used by our participants. High-performers exhibited greater manifestations of HRO, although HRO alone was insufficient to describe our results. Mindful organizing, which expands on HRO, was a better fit.

Keywords

communication; high reliability organizations; mindful organizing; patient safety; teamwork

Regulatory and government agencies are encouraging hospitals to adopt high reliability principles—though there is little guidance about what doing so looks like in the context of a

large hospital or health system.^{1–3} Given that gap, health care organizations are encouraged to consider the examples of other highly reliable organizations in an attempt to make meaningful gains in patient safety and resilience in the face of continuous change.⁴ Workers in other highly complex work environments including aircraft carriers, air traffic control in commercial aviation, and nuclear power plants have been able to achieve nearly error-free safety records.⁵ Research to better understand underlying mechanisms of success in these organizations has revealed a set of common operational characteristics, now known as High Reliability Organization (HRO).⁶ These operational characteristics include: preoccupation with failure, avoidance of simplification, sensitivity to operations, building resilience, and deference to expertise.⁶ HRO provides organizations the ability to safely adapt in the context of continual change, allowing them to mitigate errors and prevent harm. As a result, many health care organizations have begun to incorporate the concepts of HRO into both operations and safety training.

Despite the growing interest in pursuing high reliability, HRO constructs remain underexplored in health care, including in large academic hospitals, which may be characterized by variation in policies and procedures, norms, and leadership across work areas or units.^{1,4} Successfully embedding principles of HRO into an organization's culture can shape clinician behavior and communication and, ultimately, improve patient outcomes. HRO-based safety huddles have been shown to improve communication, empowerment, accountability, and a sense of community, creating a culture of collaboration and collegiality.⁷ The combination of espoused values in the form of care pathways combined with an underlying high level of safety organizing led to lower levels of reported medication errors.⁸ Use of in situ simulation has been shown to increase reliability through surfacing latent safety threats.⁹ Researchers found a clinically significant increase in the number of event reports in the 6-month period after nurses received a high reliability educational program, indicating an increase in the HRO principle preoccupation with failure.¹⁰

Limited research to date compares manifestations of HRO among hospital units with high and low safety performance. This type of research can provide a basis for translating theoretical HRO principles into clinical and administrative practice, furthering the pursuit of HRO in health care and achieving the aim of delivering safe, high-quality care. To fill this gap, we sought to explore the differences in HRO across units with varying performance on safety climate and process measures. If differences exist, it substantiates the belief that HRO has the potential to enhance safety performance in health care. To this end, we performed a secondary analysis of qualitative focus group data collected from units with differing safety performance. Specifically, we asked: Do high- and low-performing units differ in the manifestation of HRO? And, is the HRO model sufficient to explain the patterns we are seeing?

METHODS

Design and sample

Direct care nurses and nurse leaders working in 2 large tertiary medical centers located in the Mid-Atlantic region were invited to participate. A 2 × 2 cluster sample was used to identify eligible units based on 2 measures of safety performance: unit-level patient safety

climate scores measured using the Safety Attitudes Questionnaire (SAQ) and hand hygiene adherence (Supplemental Digital Content, Figure 1).¹¹ We sampled 2 units in each of the possible category combinations for safety climate and hand hygiene (high/high, high/low, low/high, low/low). Units scoring in the top quartile of the SAQ Safety Climate domain were designated high-performers, while those scoring in the bottom quartile of this domain were considered low-performers for this measure. Both hospitals use a secret observer method for documenting hand hygiene adherence. Units performing in the top and bottom quartiles for hand hygiene adherence were designated as high- and low-performers respectively for this measure. Additional details of the sampling methodology are reported in Weaver and colleagues.¹² This secondary analysis focused on qualitative data from the units with concordant scores (high/high or low/low). The parent study included 7 out of 8 eligible units; 2 adult intensive care units, 2 adult inpatient general units, 2 pediatric intensive care units, and 1 emergency department. Data analyzed for this study were from 4 of those units. All direct care nurses and nurse leaders in each unit were eligible to participate in the study. Institutional Review Board approval was obtained for the original study prior to any data collection.

Data collection

Participants took part in a unit-based focus group with nurses and nurse leaders in separate groups to reduce potential social desirability bias. A semi-structured interview guide was created by the investigator team using an iterative process based on the key aims of the larger project (Supplemental Digital Content, Table 1). Investigators with experience conducting focus groups led each of the sessions, with a second member of the research team present to take notes. Focus groups were audiotaped and transcribed by a professional service.

Data analysis

Using a grounded-theory approach, themes were identified in the data until saturation was reached. Each transcript was independently coded using NVIVO qualitative data analysis software by at least 2 coders for consensus (QSR International, Melbourne, Australia). Disagreements were resolved through discussion. Qualitative thematic analysis was conducted to examine responses comparing the units in the high/high-performing safety groups to the units in the low/low-performing safety groups.

RESULTS

Mean participant age was 39, and 98% were female. On average, participants had worked on their current unit for 8.5 years, and 56% had a bachelor's degree. Additional participant demographic information is reported in Supplemental Digital Content, Table 2.

Definitions of patient safety and key components

Focus group participants across all settings and role types defined patient safety as keeping patients free from harm. A version of "speaking up" was included in 5 out of 7 focus groups when defining safety. Both focus groups from high performing units further extended this definition to include "being heard" as a component of speaking up. Another common topic

that surfaced was the concept of a non-punitive or blame-free environment as part of the definition of safety culture. The high-performing, leadership focus groups described patient safety as an integral part of everything that they did on the unit. The quote below illustrates the HRO principle preoccupation with failure.

It's not like you put a checklist into place and now you are...providing safe patient care, it's... woven throughout orientation and beyond. It's a journey for us, not just a stop along the way... We are constantly infiltrating our lives with patient safety... andin this unit, it's one of those domains that we still focus on even though we score high in that domain all the time.

When asked what keeps safety culture a priority or what interventions had been implemented to improve safety culture, groups responded in a variety of ways. Formal mechanisms to improve patient safety, such as Comprehensive Unit-Based Safety Program (CUSP) meetings, safety rounds or event reporting systems were commonly mentioned. However, 1 of the high-performing units did not mention formal mechanisms, instead discussing the longevity of the leadership team, staff inclusion in safety projects, and embedding safety discussions into staff meetings. A high- and a low-performing unit indicated that education kept safety a priority with staff. Also in line with preoccupation with failure, participants from both of the high-performing units indicated that being proactive and unafraid of taking risks was critical to maintaining a high level of patient safety. Examples of proactive behavior to address safety included the use of simulation and willingness to try new projects to prevent safety problems.

Response to safety issues

Further exhibiting preoccupation with failure, participants from both high and low-performing units reported immediate response to safety events via debriefings or huddles. Other mechanisms that were used to communicate safety events included safety rounds, staff meetings, shared decision-making councils, CUSP meetings and event reporting systems. Reports of receiving follow-up after completing electronic event reports were inconsistent among the units.

Notably, high- and low-performing units provided differing responses to "safety glitches," which appear to illustrate distinct levels of the HRO principle avoidance of simplification. Responses from participants on low-performing safety units were primarily focused on providing education and information to those who were deemed to have erred. One nurse leader commented: *"our nurses are good at putting in [event reports] when they see stuff like that, ... and then we'll talk to the nurses and educate them."*

In contrast, participants from high-performing units talked about using event reporting systems to highlight system errors.

"We don't look at a mistake as being an order of fault, we look at it as being a process error....I feel like the whole culture has changed...where you didn't do something, we tend to look right at the whole process behind it, because if you made that mistake then who is to say 5 other people couldn't make it?"

Similarly, high- and low-performing units expressed differences in proactive versus reactive methods to identify safety issues. While proactive identification of safety issues was recognized as universally important, the low-performing safety units did not articulate concrete methods used to identify issues. Participants on 1 low-performing unit viewed this as a responsibility of leadership. In contrast, both high-performing units indicated methods for proactively identifying safety issues on their units.

Communication and teamwork

Participants on 3 out of 4 units talked about the presence of good teamwork among nurse colleagues on the unit, although all reported varying quality of communication and teamwork with other disciplines and departments. One low-performing unit indicated that teamwork within their unit was lacking. Both high- and low-performing safety units described experiencing problems with handoff communication between units, with the majority of those comments being from low-performing units. In those units, patient transfers to the unit were highlighted as a time when they experienced poor communication, often characterized by the nurse not receiving adequate information about the patient. Participants described difficulty getting in touch with transferring nurses and a reliance on documented information to fill this gap.

Challenges with physician communication were reported across all focus groups. Some of this was attributed to frequency of physician contact and proximity of physician offices, which may be attributable to systems rather than unit-based issues. Communication with physician groups that were routinely on a unit was easier than with physicians who rotated through. Rotating physicians were difficult to get in touch with and unaware of unit norms. However, there were also unit-based communication issues. Staff on a low-performing unit reported that physicians were communicating with the case managers instead of the nurses, possibly indicating a lack of sensitivity to operations.

It seems as if the physicians use the case managers or communicate with them more than they do the nurses, who [are] actually at the bedside of the patient caring for the patient. I find a problem with that.”

Participants on both units with low safety performance acknowledged problems with communication and teamwork with physicians, but did not discuss any strategies to improve relationships. The high-performing safety units discussed several methods previously employed or currently in use to promote good communication across disciplines. Multidisciplinary rounds were noted to facilitate communication among team members in both high and low-performing safety units.

High- and low-performing safety units described using different methods of communication when speaking up about safety concerns. High-performing units strongly and consistently indicated feeling comfortable speaking up directly to address safety issues. Furthermore, they fostered this behavior in new staff: *“encouraging the younger nurs(es) to speak up and trust your gut... those feelings are always right and it’s okay to ask questions.”*

Low-performing units tended to use less direct methods for speaking up. For example, staff described writing safety issues on an anonymous clipboard that the charge nurses would

then address at CUSP meetings. This unit described event reporting negatively, which is perhaps associated with their need for anonymity. Another low-performing safety unit described using a physician colleague as a gatekeeper for communicating issues with the rest of the physician team, suggesting that communication across disciplines was sharply limited.

DISCUSSION

HRO principles were present in the language and descriptions used by focus groups when talking about patient safety on their units. Consistent with theoretical descriptions, there appear to be differences in the degree of manifestation of these principles in the high- and low-performing safety units. Similar to other research comparing evidence of levels of high reliability in practice, our data indicate that higher performing units tend to have greater evidence of these principles than lower performing units.¹³

Preoccupation with failure is described as a continuous effort by organizations to stay aware of and seek to prevent potential risks to patient safety.⁵ It is characterized as including both immediate responsiveness to safety events and proactively seeking out potential circumstances that may lead to system failures.⁵ Our data showed that preoccupation with failure was present in high-performing units and inconsistent in low-performing units. Both types of units indicated immediate responses to safety events as well as articulating the importance of proactive identification of potential system failures. Patient safety and continuous improvement was seen as an integral part of the framework of the high-performing units. These groups spoke about multiple ongoing efforts to improve patient safety proactively. In contrast, low-performing units more often described reactive responses from leadership, signaling the opposite of preoccupation with failure.

Leaders' actions provide a framework for staff to determine leader values, guiding subsequent actions of staff in daily work patterns.¹ These core cultural assumptions based on leadership behaviors may serve to undermine structures and processes that would otherwise lead to high reliability safety practices.⁴ We also see the importance of leadership in descriptions of key factors that keep safety a priority on high-performing units. Both empowering leaders and active simulation, highlighted by our high-performing units, have previously been identified as antecedents to collective mindfulness, or the ability of a group to collectively understand and respond to rapidly changing situations.²

Examples of sensitivity to operations were present in our data. Sensitivity to operations includes 2 aspects, first ensuring that appropriate attention is placed on the frontline worker who carries out the organizational work, and second situational awareness, which is thought to result from frequent interactions between workers.⁵ Three of our units indicated that multidisciplinary rounds provide safety benefits. This could be because multidisciplinary rounds create an opportunity for disciplines to interact frequently enough to create a shared situational awareness that allows for continual adjustment of the plan of care to avoid adverse events and errors. In contrast, the example from a low-performing unit of physicians communicating with case managers in preference to nurses shows a potential lack of sensitivity to operations. Depending on what is being communicated, both may need to take part in the discussion.

Avoidance of simplification involves taking a nuanced approach to problem solving based on the broader concept of systems thinking.⁵ Exploration of organizational responses to errors provides a way to identify manifestations of this principle. Person-based responses are considerably less effective than system-based responses, and may indicate a less sophisticated understanding of causal factors.¹⁴ Our high-performing units indicate a refined understanding of the nature of systems thinking, exhibiting higher levels of avoidance of simplification. This is evident in their approach to evaluating the process behind an error and the understanding that multiple people could have made the same mistake. The low-performing units more often described person-based solutions, likely an oversimplification of the problem.

HRO principles seem increasingly important to ensure safer hospital environments, and their presence was clearly noted in our findings. However, a large part of the discussion in our focus groups clustered around issues of communication and did not fit into a HRO principle. This led us to explore alternative models, such as mindful organizing. Mindful organizing combines the components of HRO with respectful interaction, and heedful interrelations, and has been associated with fewer medication errors and patient falls.^{1,15} Respectful interaction is founded on the tenets of trust, trustworthiness and self-respect. In organizations with respectful interaction, people are more likely to share information that may conflict with the majority view, which is critical to increase reliability. Heedful interrelations are present when individuals understand their role in greater organizational goals and are able to maintain this understanding as they perform their jobs. When people relate to each other using heedful interrelating, their behaviors exhibit thoughtful attention to interrelationships among other employees.¹⁶

We see evidence of the principle of respectful interactions in the extension of the definition of patient safety to include speaking up. Definitions of respectful interactions in the literature often include speaking up, even when it is difficult, based on trust of one's own perceptions and trust of a colleague's willingness to listen.⁵ This principle appears to be more firmly rooted in the high- than the low-performing units. Staff on high-performing units articulated a belief in their clinical judgement and ability to identify safety issues. This differs from the use of anonymous methods in the lower performing units where there did not appear to be a strong sense of trust either in self or others.

Descriptions of handoff communications point to potential problems with heedful interrelating on the transferring or accepting units, or both. Without a clearer picture of the factors that are causing the problems (eg transferring unit not giving adequate report versus accepting unit not facilitating receiving report), it is difficult to ascertain the source of the lack of heedful interrelating. Further research that directly explores the full spectrum of mindful organizing is warranted to better illustrate both differences in heedful interrelating among high- and low-performing safety units and the full value of the construct to ongoing safety efforts overall.

Limitations

We did not see clear evidence of either the presence or absence of several mindful organizing principles, including building resilience and deference to expertise. This may be

because the research questions were not explicitly designed to illustrate their presence. It is possible that with different questions, participant answers may have described the presence or absence of these principles. As the questions were not directly designed to elicit this information, our research method provides some insulation against response bias, strengthening our findings. Additionally, the patient population and staffing structures among compared units were not identical, possibly influencing the results.

CONCLUSION

Creating the conditions that enable HRO is a promising method by which health care organizations can strengthen the delivery of reliably safe care in the face of an environment characterized by high risk and constant change. Although HRO represents an important method to increase reliability it may not be enough in isolation. Our analysis suggests that mindful organizing may describe the full spectrum of necessary components necessary to providing safe care. The examples of mindful organizing principles found in this qualitative study (proactive identification of safety issues, immediate responses to safety glitches, multi-disciplinary rounds, speaking up directly, importance of leadership, etc.) suggest several pathways toward reliably safe outcomes. This exploration of HRO principles in practice helps illuminate a way for health care leaders to link the operationalization of these principles with unit-level safety performance and illustrates the degree to which HRO principles are more firmly rooted in high-performing safety units, supporting continued pursuit of HRO in health care. Research including more hospitals, with a variety of unit types and sizes will help to further characterize the presence and implementation of these principles in high-performing safety units.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Financial Support. This study was supported in part by a grant from the NIH NHLBI (K23HL098452 to the Johns Hopkins University) and a grant from the Johns Hopkins Institute for Clinical and Translational Research (ICTR) which is funded in part by Grant Number 1KL2TR001077-01 from the National Center for Advancing Translational Sciences (NCATS), a component of the National Institutes of Health (NIH), and NIH Roadmap for Medical Research. Its contents are solely the responsibility of the authors and do not necessarily reflect the official views of Johns Hopkins ICTR, NCATS, or NIH.

REFERENCES

1. Sutcliffe KM, Paine L, Pronovost PJ. Re-examining high reliability: actively organizing for safety. *BMJ Qual Saf.* 2016;263):248–251.
2. Sutcliffe KM, Vogus TJ, Dane E. Mindfulness in organizations: a cross-level review. *Annu Rev Organ Psychol Organ Behav.* 2016;31)55–81.
3. Chassin MR, Loeb JM. High-reliability health care: getting there from here. *Millbank Q.* 2013;913): 459–490.
4. Vogus TJ, Hilligoss B. The underappreciated role of habit in highly reliable healthcare. *BMJ Qual Saf.* 2016;253):141–146.
5. Sutcliffe KM. High reliability organizations (HROs). *Best Pract Res Clin Anaesthesiol.* 2011;252): 133–144. [PubMed: 21550539]

6. Vogus TJ, Sutcliffe KM. The safety organizing scale: development and validation of a behavioral measure of safety culture in hospital nursing units. *Med Care*. 2007;45(1):46–54. [PubMed: 17279020]
7. Goldenhar LM, Brady PW, Sutcliffe KM, Muething SE. Huddling for high reliability and situation awareness. *BMJ Qual Saf*. 2013;22(11):899–906.
8. Vogus TJ, Sutcliffe KM. The impact of safety organizing, trusted leadership, and care pathways on reported medication errors in hospital nursing units. *J Nurs Adm*. 2011;41(7–8 Suppl):S25–30. [PubMed: 21799353]
9. Wheeler DS, Geis G, Mack EH, LeMaster T, Patterson MD. High-reliability emergency response teams in the hospital: improving quality and safety using in situ simulation training. *BMJ Qual Saf*. 2013;22(6):507–514.
10. McFarland DM, Doucette JN. Impact of high-reliability education on adverse event reporting by registered nurses. *J Nurs Care Qual*. 2017;33(3):285–290.
11. Sexton JB, Helmreich RL, Neilands TB, et al. The safety attitudes questionnaire: psychometric properties, benchmarking data, and emerging research. *BMC Health Serv Res*. 2006;6(1):44–54.
12. Weaver SJ, Mossburg SE, Pillari M, Kent PS, Daugherty Biddison EL. Examining variation in mental models of influence and leadership among nursing leaders and direct care nurses. *J Nurs Care Qual*. 2018;33(3):263–271. [PubMed: 28968339]
13. Sullivan JL, Rivard PE, Shin MH, Rosen AK. Applying the high reliability health care maturity model to assess hospital performance: a VA case study. *Jt Comm J Qual Patient Saf*. 2016;42(9):389–399. [PubMed: 27535456]
14. Trbovich P, Shojania KG. Root-cause analysis: swatting at mosquitoes versus draining the swamp. *BMJ Qual Saf*. 2017;26(5):350–353.
15. Vogus TJ, Iacobucci D. Creating highly reliable health care: how reliability-enhancing work practices affect patient safety in hospitals. *Ind Labor Relat Rev*. 2016;69(4):911–938.
16. Weick KE, Roberts KH. Collective mind in organizations: heedful interrelating on flight decks. *Ad Sci Q*. 1993;38:357–381.