Improving Patient Safety through High Reliability Organizations

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Abstract

Preventable medical errors result in the loss of 200,000 lives per year with associated financial and operational burdens on organizations and society. Widespread preventable patient harm occurs despite increases in healthcare regulations. High reliability organization theory contributes to improved safety and may potentially reverse this trend. This single case study explored the introduction of a safety culture and subsequent improvements in patient safety in a reliability-seeking organization. Fourteen participants from a subacute nursing facility were selected using purposeful sampling criterion. Data were collected through participant interviews, document reviews, and group observation. Five themes emerged from an analysis of collected data including process standardization, checks and redundancy, authority migration, communication, and teamwork. The themes uncovered the need for extensive education and training, communication, and teamwork to improve patient safety. The results of the study may be useful to improve safety and enhance leadership to promote a culture of safe patient care.

Keywords

High Reliability Organizations, Patient Safety, Subacute Nursing Facility, Case Study

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Preventable medical errors result in the loss of 200,000 lives per year with associated financial and operational burdens on organizations and society. Widespread preventable patient harm occurs despite increases in healthcare regulations. High reliability organization theory contributes to improved safety and may potentially reverse this trend. This single case study explored the introduction of a safety culture and subsequent improvements in patient safety in a reliability-seeking organization. Fourteen participants from a subacute nursing facility were selected using purposeful sampling criterion. Data were collected through participant interviews, document reviews, and group observation. Five themes emerged from an analysis of collected data including process standardization, checks and redundancy, authority migration, communication, and teamwork. The themes uncovered the need for extensive education and training, communication, and teamwork to improve patient safety. The results of the study may be useful to improve safety and enhance leadership to promote a culture of safe patient care. Keywords: High Reliability Organizations, Patient Safety, Subacute Nursing Facility, Case Study

Preventable errors in patient care continue to occur despite the efforts of regulators, government, and healthcare organizations. These errors cause harm to patients, and present financial and operational burdens on an organization (Colón-Emeric et al., 2010). The number and impact of errors is astounding. Andel, Davidow, Hollander, and Moreno (2012) reported that over 200,000 deaths occur annually due to medical errors. Between 2003 and 2010, there were 1.04 million medication errors reported to the United States Pharmacopeia MEDMAX system (Schiff, 2015). Researchers estimated an annual cost for preventable errors of nearly $38 billion (Debourgh & Prion, 2012). Additional organizational costs may include staffing, supplies, and litigation. Staff are adversely affected when a patient is harmed, and an organization engaged in unsafe care may experience high turnover (Goh, Chan, & Kuziemsky, 2013; O'Bierne, Sterling, Palacios-Derflingher, Hohman, & Zwicker, 2012). Punitive costs have additionally contributed to the rising cost of healthcare, and some organizations have responded by engaging in defensive medicine (Catino, 2009).

Yin (2014) identifies the case study as a tool for exploring a business phenomenon. In a qualitative case study, Yin further states that the results from multiple qualitative studies may be combined to enhance generalizability, as a large sample size does in a quantitative study. In this qualitative single case study, we explored the introduction of a safety culture and subsequent improvements in patient safety in a reliability-seeking organization. Fourteen

participants from a subacute nursing facility were selected using purposeful criterion sampling. We collected data through participant interviews, document reviews, and group observation. Five themes emerged from an analysis of collected data including process standardization, checks and redundancy, authority migration, and communication and teamwork. We begin this paper with the background of High Reliability Organizations.

Background

Preventable medical harm remains a persistent problem (Diller et al., 2013). Recent changes from the Centers for Medicare and Medicaid (CMS) increases the accountability for errors by restricting financial reimbursement for poor patient care (Knudson, 2013). For example, Medicare discontinued additional payments for certain hospital-acquired conditions that CMS deemed preventable (Lee et al., 2012). Thus, medical providers are at risk if strategies are not in place to address patient safety and quality.

Many healthcare administrators and regulators have initiated changes without making significant progress (Diller et al., 2013; Sheps & Cardiff, 2011). However, some administrators have made progress in reducing preventable errors, improving patient safety, and reducing operational costs while complying with regulatory demands. One organization quickly grew to become one of the largest pediatric intensive care units in the United States, yet maintained a mortality rate lower than smaller organizations (van Stralen, 2008). Another organization reported that they averted 1,500 deaths in 2010 (Pryor, Hendrich, Henkel, Beckmann, & Tersigni, 2011). A subacute nursing facility reduced 911 calls, installed Intensive Care Unit (ICU) ventilators, and improved the quality of life for chronically ill patients (van Stralen, Calderon, Lewis, & Roberts, 2008). These organizations attributed their success to the application of High Reliability Organization (HRO) theory.

Conceptual Framework

High Reliability Organizations are organizations that conduct operations with minimal error, over an extended time, and consistently make decisions that result in high quality and high reliability (Roberts, 1990). HRO theory is interdisciplinary in nature, and has been a part of programs to improve safety in military, commercial aviation, public safety, and nuclear power organizations (Casler, 2013; O'Neil & Kriz, 2013). Much of the early HRO literature originated from within the firefighting industry. Safety concerns grew after several unnecessary deaths occurred during two major wild-land fires (Weick, 1996). Principles stemming from HRO theory are also increasingly used in healthcare (Hartmann, Meterko, Zhao, Palmer, & Berlowitz, 2013; Thomassen et al., 2011). The structure of HRO centers on several basic principles that together promote a culture of safety. These structures include (a) developing and maintaining standard processes; (b) implementing checks and redundancy to mitigate potential failure; (c) deferring to individuals with the most information; and, (d) developing teams that openly communicate about failure to prevent recurrence of unsafe incidents (Hartmann et al., 2013). An organization that is reliability-seeking is preoccupied with failure and actively works toward building and enhancing a culture of safety (Bigley & Roberts, 2001; Roberts & Bea, 2001; Shabot, Monroe, Inurria, Garbade, & France, 2013).

HRO principles are gaining ground in healthcare (Chassin & Loeb, 2013), though the penetration within the industry is still limited. HRO influences the rate of patient safety indicators (PSIs) in an organization (Singer, Lin, Falwell, Gaba, & Baker, 2009), human error attributable to fatigue and stress (Norris, Currie, & Lecko, 2012), and development of interdepartmental teams with open channels of communication (Riley, Davis, Miller, & McCullough, 2010). Healthcare is unique compared to these other industries. In healthcare,

adverse events can happen frequently and may affect a single patient rather than a large group (Bagnara, Parlangeli, & Tartaglia, 2010). Healthcare organizations need a structure to support safety processes, and safety must be an organizational goal (Hartmann et al., 2013). In contrasting organizational culture and safety climate, Hartmann et al. described culture as a set of values that guide individual behaviors, while climate is more involved in organizational behaviors and goals. An HRO requires a management-led organizational climate committed to safety, where management fosters a safety culture in which employees may internalize safety initiatives and contribute individually to the safety climate.

Three of the authors have over 80 years combined experience in health and human services. One author served in the United States Navy, which is the organization where some of the early HRO research was conducted. All authors are presently working in higher education, as faculty or administrators. The improvement of patient safety is a priority for the authors, who share an interest in making an impact on the safety culture in the fields of health and human services.

Research Method and Design

Our study was a case study design, as outlined by Yin (2014). The purpose of a case study is to gather comprehensive data from different sources for a specific case with predefined scope (Houghton, Murphy, Shaw, & Casey, 2013). This design was appropriate because our goal was to explore what components of HRO theory were useful in reducing risks to patient safety in a subacute nursing facility.

This qualitative, single case study explored how the perceptions and experiences of nursing and respiratory staff affected the successful transition of the organization into a reliability-seeking organization. The qualitative case study design was selected because a case study can be used to expand existing theory or to confirm prior discoveries (Houghton, Casey, Shaw, & Murphy, 2013). A case study is also appropriate to understand a shared experience within its context (Watkins, 2012). The following question framed our research: what components of HRO theory were useful in reducing risks to patient safety in a subacute nursing facility? The purpose of this study was to identify how the application of HRO theory was understood and applied by frontline staff during the organizational transition toward reliability to guide other organizations similarly committed to improving safety.

The setting for the study was a Medicare designated subacute facility. Subacute facilities provide skilled services to patients immediately after, or instead of, acute hospitalization to treat complex medical conditions (CMS, 2012). We purposefully selected 14 participants from a subacute nursing facility that serves high-risk, technology-dependent children in the western United States. To receive care, patients must depend on one or more technologies, which may include ICU-level ventilators, or gastrostomy or jejunostomy tubes. The facility employs clinical, dietary, childhood development staff, and additional support staff. The clinical staff employed at the facility includes nurses, respiratory care practitioners, and certified nursing assistants. Participants were selected from nursing and respiratory care specialties and were not managers at the time of the organizational transition toward high-reliability.

Data Collection

The study was initiated upon approval by the Walden University Institutional Research Board, with the associated approval number of 10-03-13-0313263. Data collection included semistructured interviews, observations of nursing and respiratory staff, and organizational documentation reviews regarding the application of HRO theory and improvement in patient

safety. Our strategy aligns with what Yin (2014) describes as triangulation. The process of triangulation includes gathering data from two or more sources (Bekhet & Zauszniewski, 2012), and is a major advantage of a case study design (Yin). While the primary researcher knew some participants through prior employment at the facility, we took steps to minimize bias. We followed the strategy of Anderson (2010) who indicated that to reduce bias, the researcher must put aside prior knowledge of the problem and focus solely on data collection.

We designed semistructured interview questions (see Appendix A) to allow flexibility and consistency. Interviews took place in a meeting room assigned by the organization administrators. The meeting room was located in an unoccupied wing of the building, apart from peers or supervisors. The room had limited access, and the participants were able to speak freely without fear of someone overhearing the conversation. Meeting in a familiar place was beneficial for the participant. The primary researcher conducted individual interviews to protect the participant's privacy and to encourage open communication. After each interview, we transcribed the interview verbatim. Because the organization's leaders were interested in the outcome of this study, participants participated in the interview during their scheduled work period.

Observational data for this study came from direct observations of caregivers during the course of their daily routines. The primary researcher observed interactions between nursing and respiratory staff during shift changes and group rounds. Observations occurred during 30-minute intermittent periods over the timespan of one week. We used an observation guide to determine which HRO concepts are exhibited among the nursing and respiratory staff. Extensive notes were taken during observations. These notes included data regarding staff interactions with peers and staff in non-clinical positions, general communication styles, and any occurrences or interactions that were relevant in answering the research question. These notes did not contain protected health information or compromise the rights of the patients.

Healthcare organizations maintain extensive documentation in compliance with regulatory agencies. This documentation was useful to confirm information obtained through interviews and observations. The primary researcher reviewed the organization's Policy and Procedure manual, de-identified statistical data on patient safety from prior research, data reflecting 911 emergency calls, hospital transfer records, and training documents. All documents reviewed for the purpose of triangulation were provided by facility administrators and did not contain patient identifiers. Proprietary information was not disclosed during the document reviews. This confidentiality ensured that the patients and the organization are protected from unnecessary exposure.

Data Analysis

Data were coded manually using Microsoft Excel. Key words and concepts were identified through an extensive review of the transcribed interviews. Frequently used words or phrases were organized by frequency of use. From this organized list, primary and secondary codes were determined based on similarity. The following participant response represents the code for Safer Care. In response to a question about the safety culture after the transition toward reliability, Participant 12 said, "It improved. I mean, the patient care improved immensely. Patients weren't sent out, you know, every week." In another response to a question about the role participants play in patient safety, the code of Teamwork was established. "There is a lot more teamwork on the floor, helping one another. Making sure that, you know, nobody hurt their back, or the residents. More Hoyer lift use (Participant 2)."

During coding and analysis, the data were compared with descriptions identified in the literature review of High Reliability Organizations. Data that corroborated the conceptual

framework were identified and explored. This was done to identify the extent the staff adopted or integrated HRO concepts.

Research Findings

The research subquestion addressed in this study was what components of HRO theory were useful in reducing risks to patient safety in a subacute nursing facility? Themes from participant responses included policies, patient care improvements, education & training, staff improvements, quality of life, safety, communication, teamwork, and risk mitigation. Of these themes, policies, education & training, safety, communication, teamwork, and risk mitigation directly correspond with HRO principles. Subthemes in patient care improvements, staff improvements, and quality of life were also consistent with HRO theory. Themes were further categorized as they were applicable to specific HRO concepts including (a) process standardization, (b) checks and redundancy, (c) authority migration, and (d) communication and teamwork.

Process Standardization

Participant responses detailed the changes that occurred during the organizational transition toward reliability. Policies and procedures enforced strategies to protect the staff and patient from injuries. Participant 2 stated, "I think it was a little more lax back then, as time went on we just got more and more rules - as far as having two people with moving residents, and changing them and bathing them." Once new policies were implemented, they were promptly distributed among the staff. As Participant 1 described it, "I know whenever we have new policies they post it up on the board, or we go over it at staff meetings."

One policy was implemented to ensure mindfulness. Staff is required to stay in their assigned patient rooms at all times, or find a replacement before leaving. Participant 3 said, "When you're in there, with the room, you have to have the apnea monitor on at all times. Someone always has to be there at all times." Four other participants made similar comments. Another policy designed to prevent accidents is the requirement that bed rails be up at all times. "Just making sure side rails are up, and things are off of the floor, and the floors are clean and tidy; that kind of thing" (Participant 8). This was echoed by Participant 11, who said, "The rails will be all the time up." Managers also implemented certain infection control procedures. Staff must change tracheostomy ties immediately after patient baths to prevent irritated skin conditions (Participants 1 & 14). Participant responses indicated that organizational leaders implemented, and continue to implement standard processes to improve safety.

Checks and Redundancy

Checklists and redundant procedures were developed in the organization. Managers use checklists as they make rounds (Participant 1). Transfer packets are also included any time a patient is transferred to ensure medication and relevant patient information is passed on to other caregivers (Participant 1). Patient assessment forms were adapted to improve the quality of reporting, which prompted staff to include critical information that might have been forgotten (Participant 8). These checklists and procedures take into account human factors, such as momentary lapses in attention to make sure that critical information is recorded and distributed to other caregivers to ensure patient safety.

Checks may also include enhanced reporting. Staff has access to a form designed to enable anonymous reporting of incidents or unsafe conditions (Participant 1). This form serves as a check to make sure that managers know all the information, especially if it is something

the staff is not comfortable discussing in public. Managers can distribute this information, and changes can be made as required. Organizational policies were also adapted to increase redundancy.

Organizational policies designed to improve redundancy included the bath buddy system, lifting procedures, and preventative care. Nursing and respiratory managers compare reports at the end of their shifts to make sure no information was left out of the reports (Participant 1). Tracheostomy ties are changed and baths given with at least two staff members. "If we are going to do a shower, we have to have a bath buddy" (Participant 13). Four other participants made similar comments regarding bath buddies. The second staff member can call for help if a problem occurs, and the first staff member can immediately begin addressing the problem (Participant 13). Weight limits are in place, and specific equipment is designated when bathing, lifting, or transferring a patient. Participant 8 described these policies, and the description was similar to comments from seven other participants.

> Two persons had to go to the showers. I remember that. And baths always had to be a two-person job. Lifts and transfers. Anybody over 30 pounds was a mandatory two-person lift. And the Hoyer lift. I think it was after 40 pounds you had to use the Hoyer lift.

By ensuring staff work together on routine tasks, the potential for error is reduced and organizational knowledge is increased. Participants noted that there is greater awareness about the roles of their counterparts in different departments. Staff was cross-trained to increase the response time to patients in early stages of a medical crisis. Participant 8 described the cross-training.

> The nurses were also cross trained. We had to take a vent management class. Not that we would be doing any of the changes or anything on the ventilator, but more so you would recognize when there was a problem. You would recognize what the different alarms were on the vent.

Cross training staff so they learn what different alarms mean, or pay attention to symptoms not specific to one's own area of care, improves the response times for minor changes that might otherwise go unnoticed.

Authority Migration

The component of authority migration is found in the participant responses regarding empowerment or decision-making. Frontline employees are often better able to notice subtle differences in the condition of a patient, which makes them an ideal resource for discovering potential problems (Mauelshagen, Denyer, Carter, & Pollard, 2013). An organization with a strong safety culture will empower employees to make decisions (Singer et al., 2009). The comments from participants indicated that they understood this cultural framework.

Participant 6 discussed early responses, stating the staff is able to catch potentially unsafe things quickly. Participant 12 made a similar statement, indicating that the staff was able to recognize the early signs of a problem.

> Well, it really improved patient safety, because we were able to put them on ventilators here, and we definitely know what we are doing. We did it by observation. We did it by monitoring sats and end tidal CO_2s, without blood

gases. And we were able to keep patients that would have gone out. We got them over the acute phase of their disease process.

These responses are representative of similar comments made by several participants. The responses support the idea that the frontline staff is able to recognize subtle changes that might not be easily detected by management (Mauelshagen et al., 2013). An organization that recognizes the value of early detection would do well to empower employees to make decisions to address quickly unsafe conditions.

Participants consistently described the concepts of decision making and empowerment. Staff felt that they were given the opportunity to provide input in the care of the patients (Participant 8). Participant 12 said that because the staff was empowered to make decisions, the staff took ownership of their decisions. Staff empowerment resulted from the implementation of HRO (Participant 9). Participants commented that they were well trained in their fields, and that management recognized this training by empowering them to make decisions (Participants 6 & 12). The organization actively included staff in identification of risks, and empowered staff to act to mitigate those risks (van Stralen et al., 2008). Participant responses indicated that the staff felt empowered to make decision that would make their patients safer.

Communication and Teamwork

Managers and administrators encouraged communication, and communication requirements were built into organizational policies. Communication was a regular theme in the data. Participant 2 said, "I think everybody's a little bit more verbal. You know, if they see a problem they let you know – let the right person know." Another participant talked about the effect approachability of managers had on communication. "I think department communication really relies on the people in those management positions – how easy they are to approach. When I first started working, the nursing manager was very difficult to approach. The team we have now …is easy to approach (Participant 10)." Managers held an open door policy to encourage staff to communicate any issues, problems, or concerns.

Management conducts "whiteboard meetings" to convey reminders about duties and policies, and to alert the staff to problems that need to be addressed (Participant 5). We conduct in-services in response to safety incidents (Participant 1). Participant 12 said that the use of a knowledge base helped to make patients safer. Knowledge transfer occurred because of the high level of communication between staff members (Participant 12). Participant 3 suggested that showing how things can go wrong if the policies are not followed is useful in training new staff. This idea was similar to what Participant 8 said about how important it is that new staff absorbs the training received in preceptor classes. Participant 12 discussed how failures might be system problems rather than individual problems, which is consistent with what Roberts and Bea (2001) said on the matter. Failures are regularly reflected upon within the organization to prevent future occurrences. Additionally, pertinent information is communicated to relevant staff to prevent potential failures.

Participants discussed differences in communication that occurred because of the organizational transition toward reliability. Some of the participant responses concerned the sharing of information with team members. This includes letting other departments and colleagues know what is going on with a patient (Participants 5 & 6), sharing insights or lessons learned with other team members (Participant 10), or making sure relevant information is passed on to the appropriate personnel (Participant 1).

Teamwork was also a common theme in the participant responses. The types of teamwork frequently referenced by the participants included departmental integration, lifting

or bathing in staff pairs, and other similar team activities. The concept of teamwork relating to HRO theory also includes how participants saw their roles within the organization. Participant 12 said that with HRO theory, staff is aware of their roles within the team. Participant 7 said that the staff is on the same page. Participant 8 said that staff is aware of the role they play in safety. "It made them feel that they were doing an important part in maintaining the safety of the kids. I think we felt like we just played a really important part in maintaining the safety of the patient." These comments are representative of the larger theme of teamwork within the organization. The staff feels confident that they play a significant role in keeping patients and fellow staff safe.

Summary of HRO Themes

Organizational leaders implemented policies and procedures to develop and maintain standard processes. The policies and procedures were also used in implementing checks and redundancy to mitigate potential failure. Policies regarding the empowerment of staff and encouraging decision-making by the staff were in support of the HRO concept of authority migration, or letting the person with the most information make decisions. Teams were developed, and reporting was emphasized in support of the HRO concept of open communication between team members to reduce repeated failures.
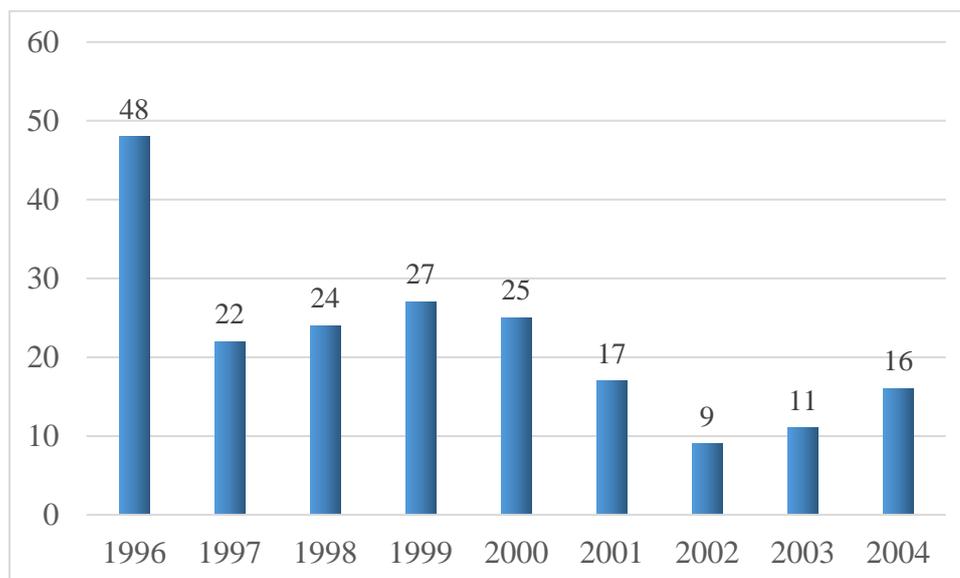
Document Reviews

Figure 1. 911 Calls Placed During the Transition toward Reliability. Data obtained from internal document review.

A review of internal documentation supported organizational assertions that patient safety improved. Typical nursing homes will call 911 to transfer patients to acute care hospitals when a patient's health deteriorates, not being equipped to respond to rapidly changing conditions (van Stralen et al., 2008). As the organization developed a culture of safety, the staff gained skills required to handle dynamic patient conditions within the facility, reducing their dependence on external healthcare services. Facility records showed the number of 911 calls

dropped significantly between 1996 and 1997, and remained low through 2004. The majority of these calls were placed to address respiratory distress.

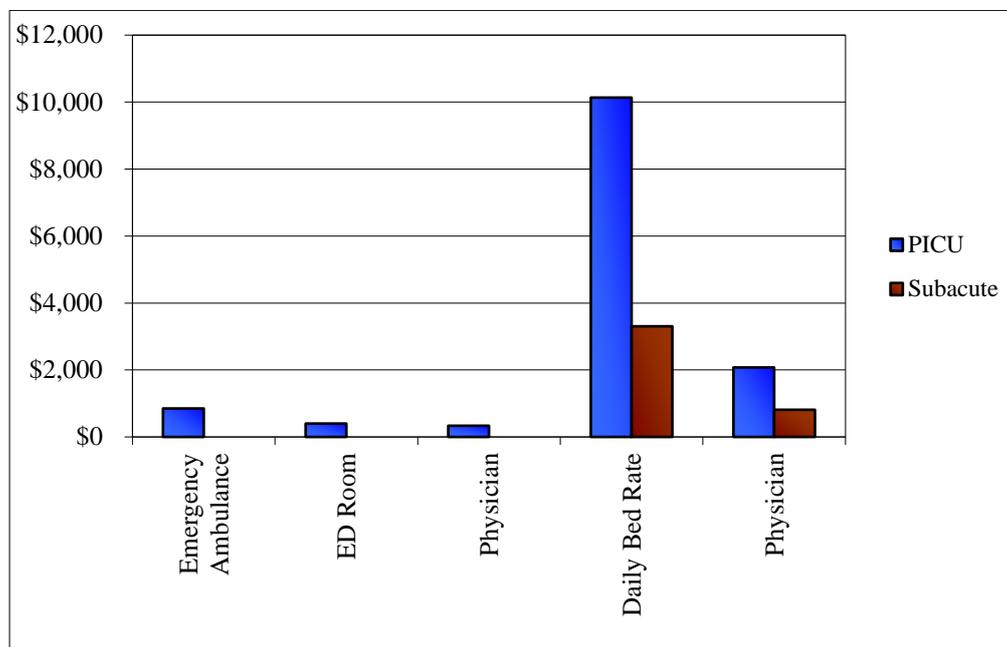**Contrasting Costs of ICU and Subacute Care**

Figure 2. Contrasting Costs of ICU and Subacute Care. Data obtained from internal facility document review.

Documents also indicated the cost savings attributed to the improvement of patient care. These savings are indicated in Figure 2. The cost of four days of care in a pediatric ICU was compared to three days at the facility, and indicated a cost savings of $6,830. Comparing the costs of physician services during the same period showed an additional savings of $1,263. This data is useful in understanding the changes attributed to the organizational shift toward reliability within the context of the transition.

Negative Feedback Model

We created a negative feedback model (Figure 3) to indicate the relationship between outside and internal influences on patient safety and quality of care. Feedback models are used to illustrate the effect decisions and actions have on processes and outcomes (Sterman, 1989). The model reflects the literature concerning the costs and causes of adverse patient safety events, and reflects both the literature and the data obtained in this study regarding the benefits of using HRO principles to improve safety. Regulations are implemented in response to adverse patient safety events, yet may have a negative impact on patient or consumer satisfaction measures. This negative impact is mitigated if the regulations are supplemented with HRO principles.

Patient Safety Culture and High Reliability Organizations: A Negative Feedback Model
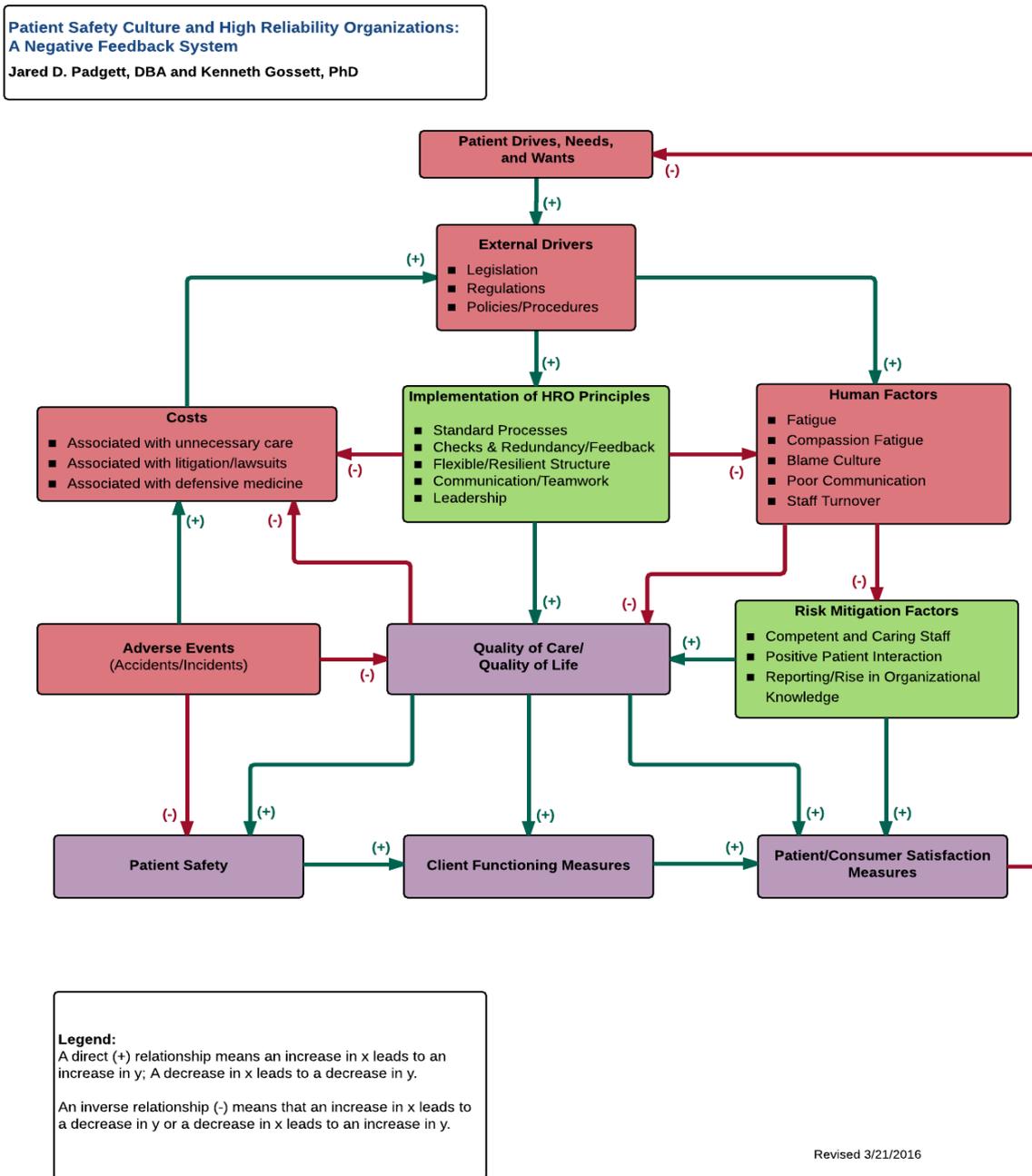

Figure 3. Padgett, J. D. & Gossett, K. D. (2014). Patient Safety Culture and High Reliability Organizations: A Negative Feedback System. Adapted from Gossett (1989).

Patient drives, needs, and wants are the outside driver in this negative feedback system (Figure 3). These drives, needs, and wants are directly related to the implementation of regulations. As patients are harmed or are concerned about safety, regulators take action and pass laws, implement rules and regulations, and require policies and procedures to be established by health and human service administrators. Regulations have a direct relationship

with human factor errors, indicating that an increase in regulations contributes to an increase in human factor errors. Poor communication, blame culture, compassion fatigue, and staff turnover are associated with increased demands and pressure resulting from increased regulations and scrutiny. Patient satisfaction measures have an inverse relationship with patient drives, needs, and wants as well. This means that as patient satisfaction increases, the factors that contribute to an increase in external regulations decreases. Costs associated with unnecessary care, litigation, and defensive medicine, are directly related with regulations. Costs increase as the number of regulations increase.

As indicated in the model (Figure 3), when regulations are used in conjunction with HRO principles, costs associated with adverse events decrease, and human factor errors also decrease. When human factors, including blame culture, compassion fatigue, and poor communication are reduced, staff competency, organizational knowledge, and a positive relationship between patients and care staff increase. This, in turn, leads to an improvement in the quality of patient care, an improvement in client functioning measures, and improvement in patient safety or satisfaction measures.

Adverse events are inversely related to patient safety and quality of care. When adverse events decrease, patient safety improves. Adverse events are directly related to increased costs, stemming from litigation, unnecessary care instigated by regulations, and defensive medicine in response to regulations. Quality of care and quality of life are directly related to client functioning measures, which are directly related to patient and consumer satisfaction measures, and in turn reduce the demands for services based on needs and wants of the patients.

This model is structured around existing literature regarding the problem of patient safety in healthcare, and the steps taken to reduce risks and improve care. The study findings are consistent with HRO literature regarding the improvement in quality of care and in reporting incidents to regulators. Participants identified specific policies and procedures implemented to mitigate the risk of harm to patients and staff. Some of the new procedures limited costs associated with additional lab work and 911 transfers.

Human factors were also identified in the study findings. A reduction of blame and a commitment to improving organizational knowledge contributes to open lines of communication and improved teamwork. Many of the participants had been working for the organization for over 10 years, which suggests the culture change was also effective in reducing turnover.

The model also identifies the relationship between patient satisfaction measurements and patient drives, needs, and wants. This inverse relationship completes the feedback loop. As patient satisfaction is improved, the drives, needs, and wants that lead to increased legislation and regulation are reduced. When patients are harmed, new legislation and regulations increase.

Limitations

Data were obtained from the staff of a small, subacute nursing facility. However, because there are applications for larger facilities and hospitals, further research within the context of these larger organizations may be required. The collected data came from a small group of participants within the target organization. A larger group may yield different results or could further support the findings in this study.

A perceived limitation of the case study design is a lack of generalizability (Yin, 2014). Yin described the way empirical studies and qualitative studies build upon prior work. The new work adds to the generalization of findings. Future research in other organizations may build on this data and expand the generalizability of this study.

Organizations may also perceive value as relevant, relative to the specific geographic area. Although healthcare regulations vary within the United States and internationally, the

international and interdisciplinary nature of HRO mitigates this perceived limitation. Patients across international boundaries are at risk, which further reduces the geographic limitation of this study.

Discussion

Study findings were consistent with the literature on using HRO to improve patient safety. These principles included an organizational focus on discovering and mitigating risks, and a commitment to consistent and constant improvement. The policies and procedures implemented by organizational leaders were consistent with the HRO concepts leading to the development of standard processes; implementing checks and redundancy; encouraging open and honest feedback free from a risk of retribution; developing a flexible and resilient structure; improving communication and teamwork; and enhancing decision making and leadership skills for all staff, regardless of rank or position.

Though this study was designed to explore the improvement of patient safety, several participants offered insight into the improvement of staff safety. This affected the way the staff viewed their role in the organization, and improved trust between staff and the organization, which had an effect on the perceptions and attitudes of staff as new policies and procedures were developed. Additional research may be conducted to further explore how focusing on staff safety affects an organization's culture.

Conclusion

The qualitative, explorative single case study was useful in exploring how the application of HRO principles positively affected the successful transition of a healthcare organization into a reliability-seeking organization. The use of interviews, document reviews, and group observations helped in exploration of the staff's experiences during the transition, and how their active participation affected the transition process. These triangulated data sources contributed to the validity and applicability of the study.

Study findings were in alignment with the literature review, and add to the literature in the fields of healthcare and patient safety. Transitioning to a reliability-seeking organization contributes to a reduction in safety incidents, improves staff perceptions of the organization, and reduces costs attributed to unsafe care. One recommendation based on the outcome of this study is that management should continue to promote HRO theory to the staff, and increase the training and educational opportunities for staff. Another recommendation is that organizational leadership reviews the current physician-staff hierarchy and renew some of the empowerment and decision-making authority of the staff that has waned over time.

Patient safety errors are costly to the patient and to the organization treating the patient. Governmental regulations have not been effective in reducing preventable harm to patients (Downey, Hernandez-Boussard, Banka, & Morton, 2012). Physicians have created silos to protect themselves from unrealistic expectations of perfection (Sheps & Cardiff, 2011). Blame culture contributes to covering up incidents rather than improving organizational learning (Moumtzoglou, 2010; Saleh, Marias, Bakolas, & Cowlagi, 2010). Regulators may improve reporting by incorporating HRO theory into new or updated regulations. The increase in reporting could help propagate the theory throughout the industry, which would contribute to an industry-wide reduction in patient harm. This would reduce the estimated $38 billion (Debourgh & Prion, 2012) spent on addressing safety incidents, and improve the quality of life for patients. Transitioning to a reliability-seeking organization will contribute to improved reporting to regulatory entities, enhance the safety of staff and patients, contribute to staff loyalty, and reduce operational and punitive costs.

Study findings and this negative feedback model may be used to assist organizations in determining areas for improvement to improve patient safety. The model will be useful for regulators interested in assisting in industry-wide improvement in patient care. By learning how to work together, organizations and regulators can reduce errors in care, which will improve patient safety and reduce organizational costs.

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Appendix

Appendix A: Interview Questions

1. What was the safety culture like at the organization before HRO was introduced?
2. Describe the current safety culture in the organization.
3. How did you perceive your role in the safety of your patients before learning about HRO?
4. Describe how you see your role in the safety of your patients now.
5. Describe your interactions with members of other departments before HRO was adopted.
6. How did your interactions with these other departments change after learning about HRO?
7. Describe how your daily tasks changed during the transition.
8. Describe any policies or procedures that changed as a result of the transition.
9. Describe how the managers and administrators handled the transition process.
10. Describe the communication between departments since HRO was introduced.
11. What influence did the application of HRO theory have in improving patient safety?
12. In what way did the shift toward reliability affect your perception of the organization?
13. How did the shift toward reliability affect your perception of your job?
14. How could the transition have been managed better?
15. How has HRO helped improve the lives of the patients?
16. What components of HRO theory have been useful in reducing risks to patient safety?
17. Describe any cost savings you are aware of since HRO was introduced.
18. What were the most important improvements in patient safety since the transition toward reliability?

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