

ASSESSMENT OF LATENT ORGANIZATIONAL RISK:
AN APPLICATION OF HIGH RELIABILITY PRINCIPLES AND
ORGANIZATIONAL ACCIDENT THEORY

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Abstract

Problem-Theory

For over fifteen years, the health care industry has fallen short in its search for effective strategies to reduce incidents of medical error and eliminate preventable harm. Patients continue to be harmed at alarming rates by the very health care delivery system intended to heal them. Early human error and systems theory combined with more contemporary theory about organizing highly reliable systems has inspired the development of a novel framework to define Latent Organizational Risk.

Methods

Based on this framework, a practical method was developed to identify latent adaptive organizational risk using secondary data commonly collected by hospitals in the United States. Clinical units with signals of adaptive risk were identified by triangulation of unit-level safety culture, employee engagement and patient experience data at five hospitals within a large academic medical center. After a feedback intervention, units with high adaptive risk were compared with units without adaptive risk in terms of their safety and teamwork climate. The conceptual framework also informed development of a practice tool to guide leaders in assessing the latent patient safety risks associated with their strategic and financial decisions. Likewise, the tool encouraged leaders to design appropriate mitigation strategies to reduce the technical and adaptive risks that may be created by or hinder successful improvement efforts.

Results

Data from 356 units in five hospitals across the Johns Hopkins Health System were subjected to the triangulation methodology. Sixteen units were determined to be at high latent adaptive risk. Significant improvements in safety and teamwork climate were realized in those units following a feedback intervention. In a separate initiative, the Latent Risk Assessment tool was used by health

care leaders to proactively identify downstream risks of high level leadership decisions, and to develop habits for high reliability organizing.

Conclusions

For health care to achieve a level of safety commensurate with high reliability industries, fundamental changes are needed in how care processes are planned and organized. One key challenge ahead for health care leaders will be the adoption of new leadership habits to achieve more reliable and safe health care. An essential role for health leaders will be the analysis of existing data sources to identify, understand and mitigate risk of patient harm. Using the methods and tools outlined in this thesis, leaders will be able to expand their capacity to create the safe delivery systems our patients need and deserve.

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Thesis Overview

Manuscript One: Latent Organizational Risk: A Conceptual Framework for Understanding Leaders' Role in Human Error

This manuscript outlines a conceptual framework for understanding the role played by organizational conditions in creating latent risk conducive to frontline care provider mistakes. Inspired by classic theories of human error, organizational accidents, and high reliability, this novel construct is a synthesis of these theories, which provides the foundation of this thesis, as well as future study. Recognizing that organizational risk is created at many levels, this manuscript focuses on the risk spawned from the upper echelons of an organization that manifests in the organizational culture and at the frontlines of care. Awareness of the origin of these risks will build a deeper understanding of the etiology of preventable harm and strategies to prevent unsafe acts by frontline caregivers.

Manuscript Two: Assessing Latent Adaptive Organizational Risk: A Practical Approach

Building on the concepts described in manuscript one, this paper outlines a method for using commonly available secondary data to identify signals of clinical units at risk. A triangulation methodology is described, which integrates three different data sources: unit-level safety culture, employee engagement, and patient experiences. Leaders accountable for the performance of units at risk received a leadership feedback intervention, followed by analysis of improvements in safety and teamwork climate scores post-intervention. While units whose leaders received the interventions made statistically significant improvements over units without the intervention, no differences were seen after controlling for baseline scores. Despite limitations of this analysis, it demonstrates how organizations can use existing intelligence, without new data collection, to identify units at risk.

Manuscript Three: Latent Risk Assessment Tool for Leaders: Implications for Practice and Policy

To date, interventions to improve quality of care and patient safety have been targeted to the sharp end of care delivery through standardized work and focus on delivering evidence-based care. Few tools exist to help leaders systematically identify the latent risk created from decisions made at the higher levels of an organization. This paper describes a tool designed for use by leaders that enables them to assess and mitigate latent risks before implementation of organizational change. An example case illustrates how the tool might be used.

Conclusions

The adoption of new leadership habits to achieve more reliable and safe health care will be a challenge for health care leaders in the years ahead. This thesis introduces new lenses through which leaders can consider their role in creation of safe delivery systems. Using existing data sources to identify, understand, and mitigate risk of patient harm is a fundamental role for health leaders. The methods and tools outlined in this work expands health care leaders' capacity to ensure safe health care delivery.

Manuscript One: Latent Organizational Risk: A Conceptual Framework for Understanding the Health Care Leaders' Role in Human Error

Abstract

Summary:

The study of medical errors in health care and strategies to prevent harm has been the subject of intense analysis and debate for more than fifteen years. The focus has largely been on interventions to reduce harm caused at the point of care delivery. Less focus has been devoted to reduction of risk produced at the distal leadership levels of an organization. This paper synthesizes existing theoretical models to help explain and understand the role health care leaders' play in creating, identifying and mitigating latent risk at the frontlines of care.

Methods:

Drawing on principles of high reliability, theory of human error, and an organizational accident model, a framework was developed to explain the connection between frontline caregiver behavior and the organizational conditions that increase risk for error. The concept of Latent Organizational Risk is described with examples of how organizational conditions are created to produce such risk.

Discussion:

The Latent Organizational Risk model provides a novel framework to base future study of health care leadership and practice. With a more proactive understanding of latent risk, methods and tools to aid in eliminating preventable harm can be developed.

Introduction

Since publication of the landmark Institute of Medicine (IOM) report in 2000, *To Err is Human*¹, marginal and debatable progress has been made in preventing harm resulting from medical errors. Efforts to improve safety over the past sixteen years have focused largely on clinicians and *sharp-end* errors in care delivery. Unfortunately, too often the acts of individuals that become the focus of investigation rather than the risks within the system that predisposed them to commit an error. While some errors may be explained by individual behavior alone, others occur when well-intentioned health care workers attempt to carry out their duties within a system that is not designed to prevent or defend against failure^{2,3}. Demonstrable improvements in quality of care will require a fundamental change in how the health care delivery system is organized and managed. Thought leaders in health care are turning to high reliability science for strategies to chart a future course in which health care delivery is as reliable and safe as nuclear power and high speed railroad industries. Organizing work systems to anticipate, contain and recover from mistakes is foundational to achieving reliability⁴. The mindful organizing habits of high reliability organization (HRO) leaders enable the identification of latent and manifest threats followed by quick responses to them⁵. Yet, such practices in health care have not been broadly adopted by health care leaders, nor health care workers in general.

For health care to organize more similarly to HROs, more proactive leadership and management habits are required. Unfortunately, health care leaders lack practical strategies to identify risks, and often fail to recognize how their decisions contribute to or defend against risks to patients created by such decisions. Prominent safety experts such as James Reason and Charles Vincent have offered theoretical models examining how accidents occur in an organization and leadership's role in addressing system problems.⁶⁻⁸ The overarching goal of this applied thesis is to build on and synthesize existing conceptual models to explain the relationship between latent adaptive and technical organizational conditions that predispose errors & violations. We do this first

by defining the concept of latent organizational risk, discussing the theoretical grounding for this definition, and then present a conceptual framework articulating key antecedents and potential outcomes of latent organizational risk. Finally, we offer possible practical implications and a series of future research directions for this framework for health care leaders. Drawing on theory, this paper describes a unifying conceptual framework for understanding latent organizational risks that coalesce to create conditions ripe for errors that have the potential to result in patient harm.

Theoretical Background and Grounding

The theoretical foundation for the concept of latent organizational risk derives from Vincent's adaptation of Reason's organizational accident theory⁸, which described human error and the organizational processes that contribute to unwanted incidents. We also draw on Ronald Heifetz's transformational adaptive leadership theory to provide a perspective of effective problem identification and change management strategies^{9,10}. We acknowledge that transformational leadership models like Heifetz's, while popular over the past quarter-century, remain largely underdeveloped and lack empirical validation¹¹. We recognize the lack of empirical evidence for these models, nevertheless our framework builds upon practices widely embraced by and used in health care to provide a useful construct for understanding latent organizational risk. Despite drawbacks, these theories have been chosen because of their wide application in implementation of patient safety and quality interventions¹².

Reason's cognitive psychology theory of organizational accidents points to latent system failures as the precursor to errors that may contribute to accidents^{6,7,13}. He categorizes failures within a system as either active or latent, which can be "distinguished both by who committed the failures and by the time they take to have a serious impact upon the integrity of the system"^{7 p.223}. Active failures in health care occur at the *sharp-end*, or when the clinicians closest to the patient interact with the hazardous processes in carrying out their care delivery responsibilities in which the negative effects are often immediate¹⁴. In contrast, latent failures are usually created by well-

intentioned but inadequately planned decisions at the higher levels of a health care system – or *blunt-end* – by regulators, managers, administrative leaders, suppliers, or policy makers; often with a delayed impact¹⁴.

Vincent's organization accident model shown in Figure 1^{3,8,15}, illustrates the trajectory of circumstances leading up to an incident, and how latent failures contribute to human error that can result in an unexpected incident. To conceptualize how an incident occurs, Vincent suggests that latent failures may be created by the organizational culture, operational processes, or management decisions. Risks are created anywhere within the system and lie dormant until the right conditions converge to produce error- and violation-prone conditions. These conditions contribute to unsafe acts made by clinicians at the sharp end of care. While defenses are often employed to prevent such error from reaching the patient, the effectiveness of these strategies vary widely. Reason's metaphor of aligning holes in Swiss cheese illustrates these unreliable defenses and barriers¹⁶.

Reason describes latency in terms of "failures" suggesting a process has not gone according to plan. In this paper we will refer to the vulnerabilities created by latent conditions as "risk", implying that the potential for failure exists. Latent risks are generally rooted in the behaviors, decisions, and norms perpetuated by managers and senior leaders of an organization. In health care, such risks may be created by changes in resource allocation, supply chain, patient volume, or technology. Because front line staff may not be aware of these changes in their system, managers and leaders play an essential role in identifying and mitigating the risks.

Weick and Sutcliffe describe HROs as having cognitive and behavioral norms of respectful interactions, heedful interrelations, and a mindful infrastructure – all required to achieve reliable performance.^{17,18} In contrast to Reason and Vincent's "failure" centered model, Weick and Sutcliffe's high reliability theory offers a more positive valenced approach to understanding the organizational norms required to succeed. The principles of a mindful infrastructure support individual and organizational habits that encourage and value the following: (1) preoccupation with

failure; (2) reluctance to simplify; (3) sensitivity to operations; (4) commitment to resilience; and (5) deference to expertise^{17,18}. This model is a more integrated conceptualization of the adaptive and technical components of an organization without suggesting specific error causation. Nonetheless, it does reinforce the role of culture in organizational performance and offers specific organizing principles that will drive performance and defend against failure.

To explore mitigation strategies, we looked to Heifetz's adaptive leadership theory, which distinguishes between the technical and adaptive nature of organizational problems^{9,10}. Technical problems have a known, specific solution with skilled individuals who know their role in the path to resolving the issue. When an elevator malfunctions, for example, a skilled mechanic is immediately dispatched to fix it and prevent injury to passengers. If the mechanic cannot fix the elevator, a clear path for escalation and resolution is defined, with the goal of restoring safe elevator function. Adaptive problems, however, are not as clearly understood; nor is there known solutions and specific people to fix them. Solving adaptive problems requires leadership to seek solutions that engage stakeholders, facilitate learning, and encourage new ideas for problem resolution^{9,10}. In contrast, gathering a group of stakeholders to discuss how to fix the elevator would not be an efficient and effective means to address the technical problem. While the problem-solving necessary to resolve the elevator malfunction may also include adaptive solutions that require a leader to consider the socio-cultural environment of their mechanics, the example is intended to illustrate technical problems. Although, an adaptive approach may be appropriate to address a problem such as high employee turnover. While the problem may have a technical component (e.g., wages), it may also be related to issues rooted in the attitudes, beliefs, and values of the organization and its employees.

These two types of problems and their unique solutions align with the solutions described by Reason to defend against unsafe acts.⁷ While retraining, redesign, use of memory aids, and improved information may be effective *technical* defenses against errors, they may not be effective at mitigating the risk of violations. Conversely, *adaptive* strategies targeted at improving attitudes, beliefs, norms,

morale and safety culture are recommended to reduce violations, but might not help with error reduction.

Understanding the contrast and interdependence between the adaptive and technical nature of organizational risks and the different tools required to address them is critical in effective risk mitigation. Heifetz postulates that “the most common cause of failure in leadership is produced by treating adaptive challenges as if they were technical.”^{10 p.19} This difference in the nature of organizational problems is particularly important to consider as it applies to understanding latent risk and human error, and to developing mitigation strategies to reduce preventable harm in health care.

A Framework for Defining Latent Organizational Risk

The need for a synthesized model of latent organizational risk is based on three notions. First, the salience of the Reason and Vincent accident causation models for health care, especially their concept of latent risks. Second, the importance of distinguishing technical and adaptive problems in organizations. And third, the slow progress in reducing harm and the lack of leadership tools to consider latent risks of high-level decisions or lack of decisions.

Inspired by these foundational models, we synthesized a conceptual framework for understanding latent organizational antecedents to unsafe acts characterized as latent organizational risk (Figure 2). Described in two parts, the concept of latent *technical* organizational risk is defined as conditions formed by management and policy decisions governing system design that create a work environment conducive to errors. Latent *adaptive* organizational risk is defined as the conditions that manifest in the organizational culture, creating a work environment enabling socially oriented unsafe acts of violation. These risks can be introduced at multiple levels of the organizations. Hospitals, like all organizations, do not have one overall culture, rather levels of cascading sub-cultures, such as department, unit, role, and bargaining unit.

Attention, memory, and knowledge-based errors align with latent technical risks in the model because these unsafe acts respond favorably to technical defenses such as workflow design, cognitive aids, better information sharing, and application of workload standards ⁷. The extent to which these technical defenses are implemented influences the risk to recover from error and prevent harm. To date, these errors have largely been perceived to be the fault of the employee rather than fallible latent organizational decisions for which defenses were not developed. One example, may be the selection and implementation plan for an electronic medical record system may introduce latent technical risks into a health care system.

This framework suggests that violations are preceded by adaptive latent risks. For example, poor morale on a unit creates an environment conducive to normalizing deviations from known best practices. Prevention of these unsafe acts require changes in attitudes, beliefs, norms, morale, and safety culture in the local area where work is performed. This dichotomous description of latency is meant to illustrate the contrasting origins of these unsafe acts. In reality, both technical and adaptive risk may simultaneously precede significant untoward events. Understanding both is critical to effective organizational learning.

The organizational conditions outlined in Table 1 are adapted from Reason's work ⁷ and help us understand some of the antecedents to technical and adaptive latent risks that can prompt unsafe acts. Through active efforts to study and better understand the connection between these conditions and human behavior, we identify management practices that mitigate latent risk and create a favorable environment within which workers can succeed rather than fail.

The Latent Organizational Risk model describes a framework to understand more systemically how organizational culture, managerial decisions, and operational processes influence human error. Theoretically, the antecedents of latent risk (Table 1) create conditions in which unsafe acts of human error and violation may transpire. Consider the downstream implications of financial decisions that increase workload or reduce training resources. These decisions are often made

without frontline input to an assessment of risk. Yet the conditions created by these decisions are conducive to technical human errors of cognition by frontline caregivers.

Likewise, the implications of culture, be it organizational, departmental, unit-based or role-based, are often in the blind spot of leaders, yet are palpable to frontline employees. When organizational norms do not support strong morale, value standard work and the growth of safety culture, violation condoning norms are cultivated. Under these conditions, latent adaptive risk is created and organizational values in quality are compromised.

Identifying Latent Risks

In order to use this framework for identification of latent risks, health care leaders must consider the contributions of their strategic, resource, and operational decisions, as well as their personal behavior in creating risk-laden conditions. The identification of latent technical risks will require organizational capacity to investigate events using a human factors and systems engineering approach. “Human factors is the scientific discipline concerned with the understanding of interactions among humans and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance”¹⁹. “Systems engineering integrates all the disciplines and specialty groups into a team effort forming a structured development process that proceeds from concept to production to operation”²⁰. Usability testing, sound workflow design, and both macro- and micro-ergonomic approaches are some strategies to identify and mitigate technical risks within an organization. The Joint Commission recently identified “human factors” as a leading contributing factor to reported sentinel events²¹. With this recognition, the health care industry has great opportunity to understand the interface between humans and work processes, furthering our understanding of latent technical risks.

Identifying latent adaptive organizational risk will require diverse sources of intelligence to understand the cultural norms of an organization from the perspective of employees and the

consumers of their services – patients. This may involve quantitative measures of employee reported safety climate or employee engagement, or less measurable or structured information from discussions, focus groups, or comments offered through surveys or observing behaviors. For example, an organization’s culture might be defined by the worst behavior leaders tolerate. Leaders often tolerate bad behavior from physicians who bring in large amounts of revenue, despite evidence that disruptive behavior negatively affects patient satisfaction, outcomes, and costs of care ^{22,23}. Costs of adverse events, nurse turnover, malpractice suits are the financial consequences of such behavior. In addition, compliance, organizational reputation and consumer confidence can be compromised by tolerance of chronic disruptive interactions ²⁴. While disruptive physicians cause the problems, the latent adaptive risk lies with leadership’s encouragement, incentivizing, ignoring, or tolerating such disruptive behavior.

Mitigating latent adaptive organizational risks will require that an organization foster an environment that supports open communication and invites frontline providers to voice their concerns about patient safety and respond accordingly to mitigate the risk of harm to patients. This culture must be cultivated at all levels and pertinent areas of the organization and all roles, including governing boards that chart a strategic course; chief financial officers who allocate financial resources for care delivery; human resource professionals who guide hiring and separation practices; chief operating officers who define service lines and operational systems; or chief information officers who determine the health information technology deployment strategies. Latent risks are created and evident in each of these spheres of leadership within health care.

Practice Implications

Health care leaders must develop the skills and habits that lead to consideration of latent adaptive and technical factors when making decisions. While this model can support their efforts, a number of barriers need to be resolved. Such barriers include training in safe system design, competency to lead safety initiatives, and tools for health care leaders to identify potential latent risks.

Financial pressures can obstruct efforts to mitigate such risks while time pressures can create urgency that foreshadows risk reduction. For example, many health systems implemented electronic health records with poor usability and significant latent risks, yet were largely unaware of the risks of both a technical and adaptive nature. Investments in human factors professionals to help design and assess system vulnerabilities is lagging. Health care leaders need to conduct exploratory problem-solving more transparently and explicitly balance production pressures and finances with safety. Too often, health care workers conceptualize safety as binary -- safe or unsafe -- rather than as a continuous variable where leaders make explicit and transparent decisions regarding how safe they can afford to be. Health care has a long way to go towards empirically quantifying risks and benefits of safety decisions. Finally, health care leaders and safety researchers need to integrate all quality and safety efforts into an operating management system, viewing safety not as a project but as a performance system²⁵. While some management practices, such as Lean methods, are associated with improved organizational performance²⁶, limited evidence demonstrates specific management practices that reduce latent risks – particularly those that influence resource allocation, safety culture, staff training programs, supervision, and adoption of new technology.

Research Directions

In order for health care to make improvements in safety that surpass those made in the last 15 years and resemble HROs, it is essential that new lenses be created to understand how errors and patient harm continue to occur. The conceptual framework we outlined in this paper offers several avenues for future applied research. First, it will be important to study how antecedents and contributing factors identified in our framework coalesce to produce conditions of latent adaptive or technical risk, and how those risks influence error and the ability to recover from error. It will be important to validate the framework and determine if errors or violations occur more often in the presence of latent organizational risk. To build safer systems, health care leaders must be able to

identify the factors that create latent risks and conditions in which frontline caregivers are more prone to unsafe acts.

Second, for this conceptual framework to be validated, methods to identify and measure latent adaptive and technical risks must be created and tested. Once tools are available to identify risk, further examination of associations with frontline caregiver behavior and unsafe acts will strengthen this construct.

Third, implementation science might apply this framework to better understand organizational conditions that improve compliance with known best practices to prevent harm. It will be important to study how an organizational culture preoccupied with safety can be created and sustained, like that of high reliability organizations, to reduce provider violations that may result in patient harm. For example, good hand hygiene habits are a global initiative but remain an area of potential violations. Higher hand hygiene compliance has been associated with positive safety culture²⁷. Similarly, social cohesion among unit teams has been associated with greater compliance with hand hygiene practices²⁸. Understanding the latent risks that undermine these best practices will help health care leaders establish a culture that values and rewards safe practice. Many hospitals dutifully collect safety culture data to demonstrate compliance with regulatory requirements, but might not use these data with a learning orientation aimed at identifying adaptive risk and strategies for improvement within their units, departments and organization.

Fourth, health care management research should focus on the impact of “blunt-end” decision making and system design on “sharp-end” behavior choices. For example, take a decision made about resource allocation and examine how caregiver behavior is impacted.

Fifth, human factors research is needed to advance the usability of devices, equipment and other technology to reduce technical latent risks and errors. It is imperative to understand the human interface with technology if we are to keep patients safe, especially with the widespread innovation of health technology and incentives to rapidly adopt health information technology

systems. With human factors being the most frequent contributor to sentinel events reported to The Joint Commission, there are significant opportunities to look at how our medical equipment, devices, and processes introduce risk ²¹.

Finally, human resources research is needed to identify the practices that support allocation of sufficient staffing resources and the reduction of workplace stress, and provide appropriate supervision. These are important building blocks to a safe, reliable, and resilient system -- not just an expense that needs to be managed. In a human system--like health care, our most valuable resources are the clinicians and support staff who render care. Understanding and mitigating the latent risks that may set them up to fail is critical if we are to advance the safety and quality of health care.

Conclusion

The failure of health care leaders to systematically identify, mitigate, and defend against latent risks explains, in part, the slow progress toward reducing patient harm. It is incumbent upon health care leaders to be mindful of the risks and consequences their decisions and practices may create. Our framework can provide the lenses they need to accomplish these objectives and offer a new perspective on medical error that could help health care achieve the same safety status as other high reliability industries.

Organizing for highly reliable care requires that leaders gather diverse sources of information to create a nuanced picture of their organization. It also requires that leaders understand safety science to distinguish between adaptive and technical problems, and the errors or violations that these problems create. It requires leaders to explicitly consider risks and benefits to patients' safety and financial performance of their decisions. Leaders are responsible for understanding and mitigating the latent risks of the complex systems of care created by the decisions and strategic direction of the organization. The conceptual framework set out in this paper serves as a starting point for building that understanding. By connecting the distal decision making and managerial

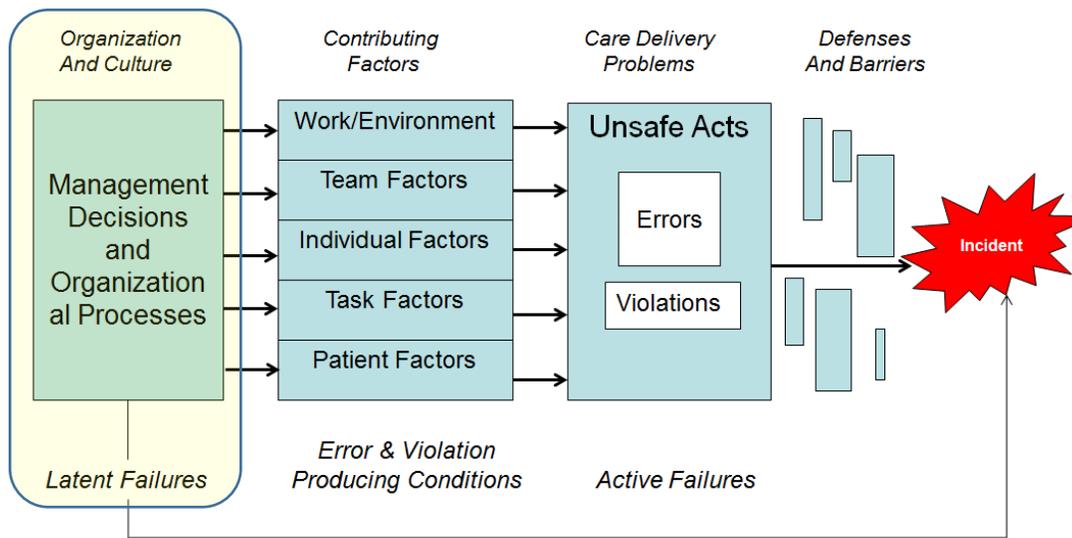
practices with the people most proximal to the delivery of care and the organizational mission, a more sophisticated understanding of the interdependency within our health care organizations is created.

Tables & Figures

Table 1. Organizational Conditions for Unsafe Acts ⁷

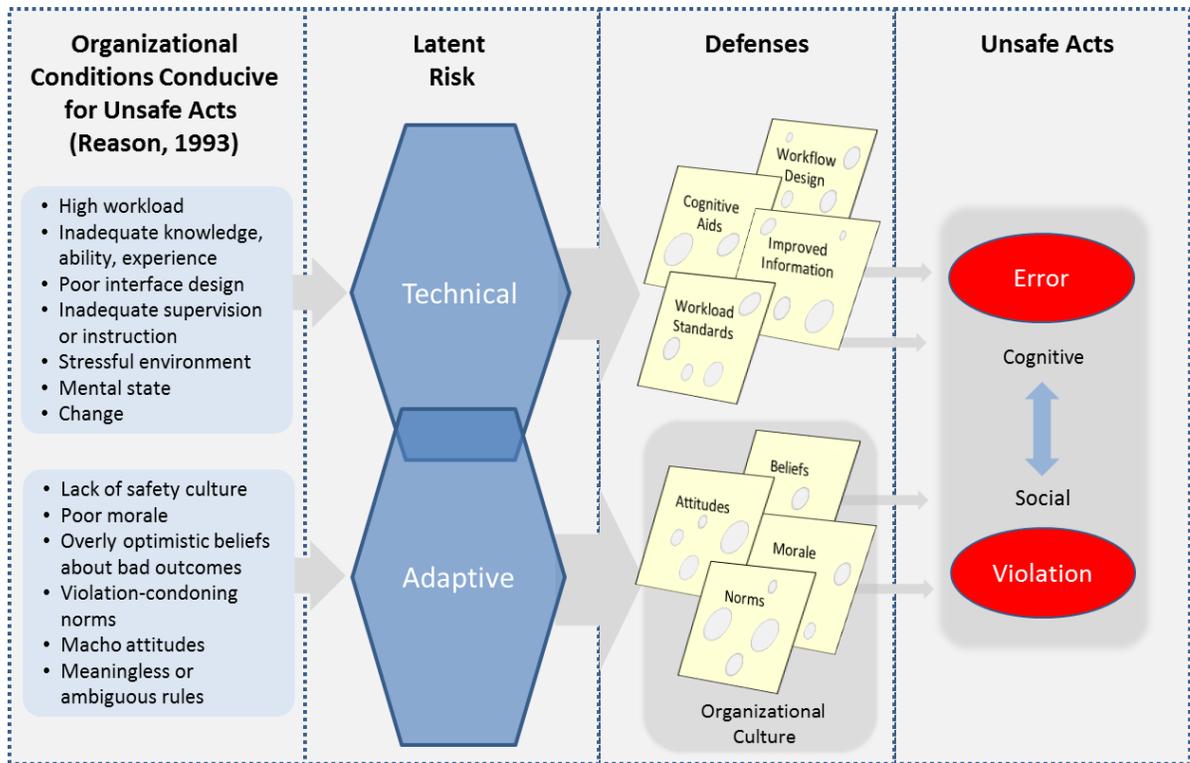
Antecedents to Technical Latent Risks	Antecedents to Adaptive Latent Risks
<ul style="list-style-type: none"> • High workload • Inadequate knowledge, ability or experience • Poor user interface design • Insufficient supervision or instruction • Stressful environment • Individual resilience and mental state • Organizational change • Procurement and supply chain policies 	<ul style="list-style-type: none"> • Lack of Safety Culture • Poor morale • Overly optimistic beliefs about bad outcomes • Violation-condoning norms • Hazardous attitudes • Meaningless or ambiguous rules • Lack of understanding of latent risks in leaders decision • Failure to explicitly consider and communicate risks injected into a system from leaders decision

Figure 1. Vincent's (2010) Organizational Accident Model ⁸



Vincent (2010) *Patient Safety*, Adapted from Reason (1997)

Figure 2. Proposed theoretical framework for Latent Organizational Risk



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APPENDIX A1: Definition of Terms

Term	Definition
Adaptive	Capable of modifying to adjust to local culture and norms.
Error	Occasions in which a planned sequence of mental or physical activities fails to achieve its intended outcome. ^{6,29}
Failure	Omission of occurrence or performance; specifically : a failing to perform a duty or expected action ³⁰
Risk	Exposure to events which may threaten or damage the organization and its interests ²⁹
Technical	Of known mechanisms of operation, knowledge and resolution.
Violation	Deliberate deviations from some regulated code of practice or procedure. ⁷

Manuscript Two: Assessing Latent Adaptive Organizational Risk: A Practical Approach

Abstract

Objectives: The objectives of this paper are to describe a method to identify areas of latent adaptive organizational risk in hospital settings using secondary analysis of employee and patient reported survey data, and to study the association of leadership feedback about this risk with unit level safety and teamwork climate.

Study Design: Based on the theoretical underpinnings, conceptual framework, and literature review described in manuscript one, a two part design was used to achieve the study objectives. First, a deductive, qualitative subject matter expert driven process was created to identify patterns suggestive of unit-level latent adaptive organizational risk (LAR). This triangulation analysis was conducted using unit-level safety culture data collected from frontline care providers, employee engagement survey data collected from hospital employees, and patient reported care experience data collected during Fall 2013 from five hospitals across the Johns Hopkins Health System. Secondly, a retrospective study using unit-level safety and teamwork climate scores was designed to examine the impact of a feedback intervention on high-LAR units after two years.

Interventions: Leaders operationally responsible for the units identified at high latent adaptive risk were provided feedback resulting from this analysis. Thereafter, leaders were expected to report their plans for local intervention to the health system governing board. Local interventions included leadership change, physical unit improvement, team training, and staffing changes.

Outcome Measures: Unit safety and teamwork climate scores were examined for change after the feedback intervention was conducted using survey data collected in 2015, which was compared to the data collected in 2013.

Results: Average changes in safety and teamwork climate scores between the two survey administrations were compared using paired samples t-tests. Between 2013 and 2015, units at risk had significantly higher average changes in safety climate scores (mean change_{low LAR} = -0.001, mean change_{high LAR} = 0.14, $t = -3.01$, $p=0.0029$). Teamwork climate changes for high risk units were also significantly greater than low risk units (mean change_{low LAR} = -0.01, mean change_{high LAR} = 0.18, $t = -4.09$, $p=0.0001$).

A chi-square test of independence demonstrated a significantly greater proportion of high LAR work areas (53%) with an increase of ten percentage points or more in safety climate scores compared to non-LAR work areas (26%, $\chi^2 = 5.24$, $p = 0.02$). Additionally, a significantly larger proportion of high LAR work areas (80%) showed large improvements in teamwork climate scores compared to non-LAR work areas. (22%, $\chi^2 = 25.42$, $p = <0.0001$).

Multivariate linear regression was used to examine potential confounders of changes in safety and teamwork climate scores. No significant differences in safety climate change scores and teamwork climate change scores were observed based on unit type or unit size. Controlling for baseline scores, linear regression showed no significant difference in teamwork and safety change scores for LAR and non-LAR units.

Conclusions: This analysis provides some preliminary evidence that existing data sources may be used to identify units that have a common signal of adaptive risk. Feedback to leaders and custom interventions at the unit level demonstrated significant improvements in safety and teamwork climate. After controlling for baseline scores, no significant differences were between LAR and non-LAR units. Future research could strengthen this analysis by validating the concept of latent adaptive risk through examination of relationships with other unit level safety data and by addressing regression to the mean found in our analysis by using data sources not used in the identification of LAR.

Introduction

Seventeen years after the landmark Institute of Medicine report, *To Err Is Human*, debate continues about whether health care delivery in America is any safer now than when the report was released in 2000¹. The initial report that publicized the epidemic of medical error called for mechanisms to monitor care and improve outcomes, and for changes in management practices, by learning from other safety vigilant industries. Health care has typically targeted the more visible problems, such as hospital-acquired infections and blood clots. One recent report claims there between 2010 and 2013, there were nine percent fewer hospital acquired conditions, saving as many as 50,000 lives and \$12 billion³¹. However, conflicting studies claim that as many as 400,000 people continue to die annually from preventable medical mistakes³². Less tangible recommendations to change leadership and management practices have not been well studied, likely because they lack specificity and clear direction.

Thought leaders are turning to safety strategies employed by high reliability industries in which risk is proactively identified and mitigated⁴. They also emphasize that we must create methods to measure conditions that create safety rather than limit ourselves to reactionary measures of specific harmful events³³. These ultra-safe industries proactively identify and mitigate latent hazards within their own organizations, seeking out weak signals from a variety of data sources to identify unsafe conditions that could lead to harm³⁴. These latent hazards are created by decisions made at the distal end of an organizational hierarchy by those whose ability to see the downstream impact of their decisions is thwarted by the distance between their role and patient care and the delay in time required for the failure to manifest⁷. Such hazards lurk in decisions and strategies about resource allocation, human resource practices, regulation and policy¹⁴. To date, practical approaches to proactively integrate quality and safety data in health care have lacked vision and defined methods to rapidly and effectively identify potential of latent conditions that increase risk of patient harm.

After a public incident that prompted deep and thoughtful organizational introspection, the Johns Hopkins Medicine governing board requested an analysis of organizational risk. The methods to identify risk described in this paper were developed with the goal of identifying unit-level signs of adaptive risks. This examination of existing unit level data across the health system was conducted to identify patterns of performance and to inform senior leaders of potential latent risks. Subsequent intervention and evaluation suggests that such analysis, feedback, and local intervention may contribute to significant improvement of safety and teamwork climate.

Background

Work by Michael West³⁵ revealed that the degree to which employees are engaged and perceive their workplace as safe is associated with complications and mortality of the patients for whom they care. While the West study was conducted as part of a research study rather than hospital operations, it suggests that unit characteristics, local unit culture, and patient reported experience could serve as a form of business intelligence that leaders can use to proactively assess and mitigate adaptive risks in their organization. Despite this evidence and the uptake of business intelligence strategies in other industries, health care rarely seeks to proactively identify risks or to triangulate data from a variety of sources to identify risks. Nevertheless, in seeking to be a high reliability organization, the ability to proactively identify risky units and identify interventions to mitigate those risks offers a promising strategy to improve patient outcomes in health care. To date, this approach focuses on risks within a patient care area and has not linked those risks to leadership behaviors. We hypothesize that identifying risks within units and linking those risks to leadership behaviors will provide health care leaders with valid and actionable areas to improve safety.

With external agencies such as the Centers for Medicare and Medicaid Services exceeding 1,700 defined measures of health care quality³⁶, many data are collected by hospitals to meet regulatory requirements or to inform specific operational priorities, such as patient safety culture and employee engagement data. A number of valid tools and best practices are being used to collect

these measures of performance and organizational context, yet little is known about the relationships between and among the concepts. Metrics are often developed independent of one another and are often administered and analyzed in a siloed manner. While little work to date has examined the associations or patterns among the diverse array of data collected, moderate associations have been recognized between safety culture and employee engagement³⁷. While these surveys and data collections have become a regular practice of many health care organizations, each set of results and interventions are often considered in isolation of the other, narrowing a leader's ability to identify areas of particular organizational risk.

Hence, the goal of this paper is to describe a practical approach to using existing sources of operational data to identify adaptive latent sources of risk for which focused interventions can be designed. We describe how one large academic medical center and health system attempted, as part of its broader patient safety efforts, to triangulate multiple sources of data in order to identify adaptive signals of latent risk within units. We demonstrate the operational and scientific value of triangulating three sources of existing data to identify subtle yet significant sources of organizational risk.

At Johns Hopkins Medicine, patient safety efforts to prevent patient harm are organized into three categories: risky providers, risky units and risky systems³⁸. In this paper we focus on a method to identify risky units. This novel strategy assesses risk in an acute hospital setting where the cultural, workforce and patient care norms and beliefs may create a risky, error and violation prone environment or a resilient, respectful and collaborative environment. Capitalizing on existing operational data sources, we describe a triangulation methodology designed to identify patient care unit-level risk in a large academic hospital and health system. Use of existing data respects the effort by employees and patients who are the sources of the information, while making productive use of organizational investments in these surveys. Through leadership accountability and local interventions, improvements in unit climate is described.

Theoretical grounding & how we operationalized latent adaptive risk

Organizational Accident Theory⁸ explains that untoward events are the result of systemic failures that predispose frontline workers to committing error. These failures include latent conditions that are often the result of decisions made by leaders without appropriate mitigation of downstream risks. Among the latent conditions are poor safety climate and poor morale that Reason suggests can predispose workers to commit unsafe acts of violation⁷. Heifetz distinguishes organizational problems as either *adaptive*, requiring a social change, or *technical*, requiring a cognitive solution⁹. With these theories as a foundation, a model of Latent Adaptive Organizational Risk was developed and used as the foundation for this study. “Latent *adaptive* organizational risk is defined as the conditions that manifest in the organizational culture, creating a work environment enabling socially oriented unsafe acts of violation” (Manuscript 1, Doctoral Dissertation, Lori A. Paine, 2017).

Methods

Based on this theoretical framework, three existing sources of data were integrated to identify signals of unit-level adaptive risk: safety culture, employee engagement, and patient experience.

We conducted this retrospective analysis to identify unit risk using data collected in 2013 from three sources at five acute care hospitals within the Johns Hopkins Health System. To identify latent adaptive risk (LAR), we triangulated unit-level indicators for the following: (1) safety culture; (2) employee engagement; and (3) patient experience (See Table 1). To examine the effect of feedback provided to senior organizational leaders about these risks, we analyzed changes in safety and teamwork climate scores between 2013 and 2015 among a sample of 312 units nested in five hospitals.

Data Sources and Measures

Safety Culture Survey

Safety culture is defined as the often unspoken beliefs, attitudes and values of an organization's membership regarding the pursuit of safety¹³. Organizational measurement of safety culture using valid and reliable instruments was highlighted as one best practice in the 1999 IOM report¹ and now required by The Joint Commission. However, the evidence linking patient outcomes to safety culture and interventions to improve it is limited³⁹. The Safety Attitudes Questionnaire (SAQ) is administered to collect frontline care provider reported perceptions of safety culture. This survey is valid, reliable, and includes six domains: safety climate, teamwork climate, stress recognition, working conditions, perceptions of local management, and perceptions of senior management⁴⁰. For this analysis, we examined the safety and teamwork domain scores as well as individual survey items focused on psychological safety (i.e., comfort and willingness to speak up and speak out) (See Table 2 for specific criteria). The safety domain measures the perceived level of strong and proactive organizational commitment to safety within a given work area or work group. The teamwork domain quantifies perceptions of the quality of collaboration between personnel within a given work area.

Safety culture assessments are conducted every 18-24 months within clinical units across the health system. Multidisciplinary clinical teams and units whose work supports clinical care are included. The survey is administered over a one-month period. Within 4-6 weeks, unit level domain and question results are returned to units with at least a 40% response rate.

Survey respondents score each item on a five-point Likert scale (1=strongly disagree; 5=strongly agree). Domain scale scores are calculated as the percent of all unit respondents with individual domain scores of greater than 4 or 5. Reports include unit specific domain and item results as well as hospital wide results for comparison. Debriefing sessions with unit teams are conducted to validate results, discuss opportunities for improvement, and develop action plans using

a process adapted from the Team Check-up Tool ⁴¹. More than 14,000 health care team members, representing teams from over 400 work areas and work groups across the health system, take part in the survey. Data for clinical units with response rates $\geq 40\%$ and represented by at least five respondents were included in this analysis. (N=356) Work areas included in this analysis had mean survey response rates of 77% in 2013 (SD = 16.4) and 74% in 2015 (SD = 16.7). Response rates did not differ significantly between the high latent adaptive risk and non-risk study group. (See Table 3)

Employee Engagement Survey

The Gallup Q12 questionnaire was used to evaluate employee engagement ⁴². An online version of the tool was used to collect responses from more than 12,000 individuals representing over 650 work groups in five hospitals across the system. Mean scores are reported by groups based on the managerial structure throughout the organization. In addition to these unit mean scores, specific questions related to employees feeling able and supported to speak up and speak out about concerns were identified and used in this analysis; as was done in the safety culture assessment. Average hospital level response rates among four hospitals for which summary statistics were available were 69.4%, (62.6%, 73.7%, SD = 0.05). Response rate data were not available for one of the five hospitals in the health system. See Appendix A2 for hospital-specific detail.

Patient Care Experience Survey

For this analysis, the Press Ganey survey was used to quantify patient perspectives of service and communication.⁴³ The patient reported experience of care outcome is gathered through completed post discharge or post encounter surveys. The Press Ganey Overall Score percentile rankings were used as risk criteria. This score is derived from responses of zero to 10 to the question “What number would you use to rate this hospital during your stay?” Zero is the worst hospital possible and 10 is the best hospital possible. Surveys are mailed to a random sample of 50% of patients with recent hospital admissions or ambulatory visits. Data are collected continuously throughout the year and reported on a quarterly basis. Patient experience data was used for quarters

1, 2 and 3 in the fiscal year corresponding with the Safety Culture and Employee Engagement collection. During the year, 66,014 patients were surveyed with 17,919 responses. The average hospital response from patients was 26.9% (20.7%, 31.5%, SD = 0.04). Detailed hospital response rates are available in Appendix A2.

Triangulation Methodology for Identifying Risky Units

“Triangulation involves using multiple data sources in an investigation to produce understanding”.⁴⁴ For the purposes of this analysis, triangulation refers to a deductive, qualitative, subject matter expert driven process. Units with data from at least two of the 3 sources (Safety Culture, Employee Engagement and Patient Experience) were included in the analysis. The process of triangulation began by identifying the operationally relevant LAR criteria for each criteria domain. Using existing evidence and expertise, subject matter experts (SMEs) for each survey defined the threshold past which they would consider a unit “risky” (Table 2). Each SME then applied the criteria to their respective dataset and identified the units at risk in that domain in each hospital.

With three separate subsets of at-risk units identified by each survey, SMEs matched units across surveys to determine which units met risk criteria in multiple datasets. The number of domains meeting the risk criteria were summed for each unit to create a LAR score between 0 and 3 (0=No Risk; 1=Low LAR; 2=Moderate LAR; 3=High LAR) (Figure 1). The frequency distribution of unit scores in these categories was LAR 0 = 339, LAR 1 = 1, LAR 2 = 11, LAR 3 = 5. (Figure 2)

To determine the face validity of the risk assessments, the director of safety discussed preliminary high risk unit results with the risk manager who confirmed concern for these units.

Intervention

A three-part intervention was applied to units identified as risky with LAR scores of 2 and 3. In the first part, safety leaders, including the senior vice president for patient safety and quality and director of patient safety for Johns Hopkins Medicine, sent a summary report to the department chairs to which the unit aligned in the academic hospitals or to the hospital president in the community hospitals where the unit was located. The report explained the concept of latent adaptive risks of an organization, the risk analysis, and the results. The safety leaders subsequently met with the department leaders individually to discuss the results, understand their perceptions, and explore improvement plans. Upon receiving feedback on results, departmental and hospital leaders were not surprised by the results for nearly all LAR positive units, acknowledging past concern in these areas. Feedback on the report from department directors and hospital presidents was generally positive and leaders welcomed having additional data to validate needed changes. Each leader committed to create an action plan for improvement.

The second part of the intervention included a variety of local unit interventions included in each action plan. Interventions in each area varied based on the unique factors associated with staff perceptions of safety, teamwork and engagement as well as patient experience. Themes of leadership and resources were among the most common areas of required intervention. Workflow and physical unit changes were also observed. Use of daily huddles and team training were cited as interventions to improve communication. (see Table 4) Leaders reported out plans and progress at a subsequent board meeting. Following interventions, preliminary results of this change analysis were reported.

The third part of the intervention involved governing board accountability. Within two months, the risky units were presented to the Johns Hopkins Medicine Board of Trustees at a Board Quality and Safety Committee meeting and the presidents and department directors presented their improvement plans.

Data Inclusion and Exclusion for Change Analysis

All units that participated in the 2013 Safety Culture Assessment (N=404) were eligible for the triangulation analysis (see Figure 2). Because of low response rates and therefore no reported data, 48 units were excluded from the change analysis. Of the remaining 356 units, 339 met none of the three risk criteria. Low LAR units were identified as meeting one or none of the criteria (n=340 units). Sixteen units were identified as high LAR units. The change analysis required comparable data across the two study years of 2013 and 2015 that excluded one LAR positive and 43 LAR negative units. The final change analysis included 312 units representing 297 LAR negative units and fifteen LAR positive units. A diverse set of positive LAR units included four inpatient units, three outpatient clinics, three diagnostic or treatment areas, two emergency departments, two labor and delivery units, and two hospital service areas.

Methods for Change Analysis

To evaluate the impact of this feedback we examined changes in patient safety culture scores between 2013 and 2015. Our primary dependent variables were teamwork and safety climate scores measured by the patient safety culture assessment using the corresponding SAQ domains. The effectiveness of the feedback intervention was evaluated by comparing unit scores for teamwork and safety climate domains before the intervention, in 2013, to scores after the intervention, in 2015. Results were stratified by binary LAR scores 0 and 1 as non-LAR and scores 2 and 3 as high LAR. Mean unit domain scores were compared using a simple t-test. Magnitude of improvement was assessed by examining units with significant improvements of ten percentage points or greater. Chi square and Fisher's exact tests were performed to determine if high LAR units differed from non-LAR units in the degree of their improvement. Multivariate linear regression was used to adjust for unit type (e.g. inpatient, outpatient, other) and unit size.

Results

Average changes in safety and teamwork climate scores of high LAR and non-LAR negative units between the two survey administrations were compared using paired samples t-tests. Between 2013 and 2015, high LAR units had significantly higher average changes in safety climate scores (mean change_{low LAR} = -0.001, mean change_{high LAR} = 0.14, $t = -3.01$, $p=0.0029$). Teamwork climate changes for high LAR units were also significantly greater than non-LAR units (mean change_{low LAR} = -0.01, mean change_{high LAR} = 0.18, $t = -4.09$, $p=0.0001$).

A chi-square test of independence was performed to examine the difference between high LAR and non-LAR units that achieved greater than or equal to 10 percentage point increase in safety and teamwork climate scores between 2013 and 2015. A significantly greater proportion of LAR positive work areas (53%) demonstrated an increase of ten percentage points or more in safety climate score compared to non-LAR work areas (26%, $\chi^2 = 5.24$, $p = 0.02$). Likewise, a significantly larger proportion of high LAR work areas (80%) showed large improvements in teamwork climate scores compared to non-LAR work areas. (22%, $\chi^2 = 25.42$, $p = <0.0001$). (Table 5.)

Multivariate linear regression was used to examine work area type (inpatient, outpatient, other) and work area staff size (continuous) as potential confounders of changes in safety and teamwork climate scores. Results did not demonstrate significant differences in the magnitude of safety climate change scores (Wald test $F = 0.09$, $p=0.91$) or teamwork climate change scores (Wald test $F = 0.59$, $p=0.55$) based on unit type. Changes in safety climate and teamwork climate were also not significantly associated with unit size (safety climate: $\beta = 0.04$, $p=0.16$) and (teamwork climate: $\beta = .03$, $p=0.22$), respectively. Using linear regression to control for baseline scores, no significant difference was seen in teamwork change scores for high LAR and non-LAR units (Wald test $F = 0.33$, $p=0.72$). Likewise, no significant difference was seen in safety change scores for high LAR and non-LAR units (Wald test $F = 0.35$, $p=0.70$).

Discussion

We used an SME-based triangulation method to identify units with employee and patient reported outcomes that suggest the presence of latent adaptive risk. The use of a multifaceted intervention consisting of feedback of these unit scores to leaders, development of an improvement plan, and accountability to a governing board, resulted in demonstrable improvement in safety and teamwork climate scores. In nearly all units, local clinical leadership was identified as a main contributor to the risk. In some cases, the unit lacked named physician leaders and these were added as part of the improvement plan; in others leaders were replaced. Staffing concerns were identified and addressed in units found to have resource challenges. Workflow changes and physical unit improvements were made in others. Daily huddles and team training were interventions in other units struggling with communication issues.

These findings are consistent with West's research³⁵ demonstrating the correlation between risky units and patient outcomes. Vincent also reports that significant improvements in safety will require integrating data sources and measures of risk into formal safety structures³³. It is also consistent with recent research findings that strong management practices are associated with improved outcomes, yet such practices are not widely employed²⁶.

There were a number of technical and operational challenges in conducting this work, including different cycle times for the surveys that rendered some data old at the time of analysis. We also faced difficulty matching units across datasets, as each survey was designed with slightly different unit structures. Yet this problem could be overcome with standardization of unit identifiers. We also learned that the time and resources required of SMEs to manually identify risky units is considerable and requires leadership support of their time to conduct this analysis.

We recognize limitations to our study. First, the psychometrics of each survey vary making the validity and reliability of the overall methodology elusive. Nevertheless, the list of risky units had high face validity with leaders. Second, variation in response rates by survey limited the statistical

tests we could perform, which could bias our results. Third, the methods used to identify risky units could lead to misclassification of some units. Still, the risk manager and senior leaders validated the risky units. Fourth, department and hospital leaders may have implemented other interventions that contributed to the improvement. Likewise, broader health system and hospital interventions may have been responsible for the improvement. Still, the overall health system and hospital improved much less. Fifth, we did not account for changes in unit characteristics and composition over time. Sixth, we cannot establish a causal relationship between our intervention and results with our study design. Further, LAR selection criteria of the study design likely led to a validity threat, as evidenced by a regression to the mean in the change score analysis. Seventh, our study was conducted at an academic health system with a mature safety governance and management structure and culture. This may limit the generalizability of our results to other health care delivery settings.

Nevertheless, our results have important practice implications. This approach is informed by theory and demonstrates a practical, low burden method for identifying and mitigating latent risks in organizations. Reason suggests that poor safety culture and morale are preconditions of unsafe acts of violation ⁷. A process such as that described in this paper offers a mechanism to proactively identify areas within an organization that are prone to violations that may cause patient harm. Mitigating patient safety risks in these units may require more adaptive than technical intervention^{10,12}.

A key finding of this study was the importance of and need for strong leadership and management. Leaders in this study expressed gratitude for being provided data that provided them additional evidence to support difficult and necessary unit leadership changes. Clinical leaders often find it difficult to hold their clinical leaders accountable for performance because they have a dual role as colleague and boss. High level (i.e., governing board) accountability for the adaptive and technical risks in an organization helps support high reliability leadership practices.

For leaders to be confident about the organization's health and vulnerabilities, they must have quantitative and qualitative, technical and adaptive, hard and soft data ⁴⁵. While this may not be a familiar or comfortable approach, this diverse set of data will provide the most comprehensive picture of the organizational reality. If a health care leader seeks to organize for high reliability, the information they gather and use for strategic planning and tactical management must include intrinsic wisdom of present and emerging sources of risk. While most health care organizations collect such data, few methods have been proposed for synthesizing that is valuable and reportable to their governing boards.

Conclusions

As health care works toward high reliability, leaders must enhance their ability to proactively identify risks at the provider, unit, and organizational levels. In this paper, we described a novel method to identify risky units in hospitals and a practical management intervention. Most of the risk reduction efforts involved changes in management (Table 4). Broad application of this approach can improve safety culture in health care. Further research is needed to evaluate the association between improved culture and clinical outcomes, as well as the presence of latent adaptive risk and unsafe acts of violation by frontline care providers. Other areas of exploration include validation of the criteria used to define risk and identification of additional data sources that may be relevant for identifying adaptive risks.

Tables & Figures

Table 1. Survey Domains and Items

Indicator	Survey Variable	Survey Items
Safety Culture Assessment by care providers	Safety Climate domain score (%)	<ol style="list-style-type: none"> 1. I would feel safe being treated here as a patient. 2. Medical errors are handled appropriately in this work setting. 3. I know the proper channels to direct questions regarding patient safety in this work setting. 4. I receive appropriate feedback about my performance 5. In this work setting, it is difficult to discuss errors. (reverse scored) 6. I am encouraged by others in this work setting to report any patient safety concerns I may have. 7. The culture in this work setting makes it easy to learn from the errors of others. <p>Additional question included in the pilot subject matter expert (SME) high risk criteria</p> <ol style="list-style-type: none"> 8. Problem personnel are dealt with constructively by our executive management.
	Teamwork climate domain score (%)	<ol style="list-style-type: none"> 1. My input is well received in this work setting. 2. In this work setting, it is difficult to speak up if I perceive a problem with patient care. (reverse scored) 3. Disagreements in this work setting are resolved appropriately (i.e., not who is right, but what is best for the patient). 4. I have the support I need from others in this work setting to care for patients. 5. It is easy for personnel here to ask questions when there is something that they do not understand. 6. People in this work setting work together as a well-coordinated team.
Employee Engagement	Gallup Q12 Grand Mean Score	<p>Q01. I know what is expected of me at work.</p> <p>Q02. I have the materials and equipment I need to do my work right.</p> <p>Q03. At work, I have the opportunity to do what I do best every day.</p>

	(Mean on 1-5 scale)	<p>Q04. In the last seven days, I have received recognition or praise for doing good work.</p> <p>Q05. My supervisor, or someone at work, seems to care about me as a person.</p> <p>Q06. There is someone at work who encourages my development.</p> <p>Q07. At work, my opinions seem to count.</p> <p>Q08. The mission or purpose of my organization makes me feel my job is important.</p> <p>Q09. My fellow employees are committed to doing quality work.</p> <p>Q10. I have a best friend at work.</p> <p>Q11. In the last six months, someone at work has talked to me about my progress.</p> <p>Q12. This last year, I have had opportunities at work to learn and grow.</p> <p>Additional engagement items included in the SME method:</p> <p>R01. At work, I am treated with respect.</p> <p>R04. I feel free to express my thoughts, feelings and disagreements to my supervisor.</p> <p>R05. I can approach management with suggestions and criticisms.</p> <p>HC04. I would recommend Johns Hopkins to my friends and family for care.</p>
Patient Experience	Press Ganey Overall Score	Using any number from 0 to 10, where 0 is the worst hospital possible and 10 is the best hospital possible, what number would you use to rate this hospital during your stay?

Table 2. Criteria for Identifying Latent Adaptive Risk Using 2013 Operational Data.

Patient Safety Culture
<p><u>High Risk:</u></p> <ul style="list-style-type: none"> • In the lowest decile of the hospital distribution in Teamwork <u>and</u> Safety Climate domains • Insufficient response rate (<40% or <5 respondents) • In the lowest decile for the entity distribution in any Speak-up questions <ul style="list-style-type: none"> ○ In this work setting, it is difficult to speak up if I perceive a problem with patient care ○ I would feel safe being treated here as a patient ○ It is difficult to discuss errors ○ I am encouraged by others in this work setting to report any patient safety concerns ○ Problem personnel are dealt with constructively by our executive management.
Employee Engagement
<p><u>High Risk:</u></p> <ul style="list-style-type: none"> • In the lower 25th percentile of Grand Mean Score (GMS) of Gallup Health care database <u>plus \geq 4 of the following:</u> <ul style="list-style-type: none"> ○ At or below the 10th percentile of GMS (3.49) ○ Decreasing score from 2012 to 2013 ○ At or below the 25th percentile for Q07, opinions count ○ At or below the 25th percentile for Q09, coworkers committed to quality ○ At or below the 25th percentile for R01 (At work, I am treated with respect) ○ At or below the 25th percentile for R04 (I feel free to express my thoughts, feelings and disagreements to my supervisor) ○ At or below the 25th percentile for R05 (I can approach management with suggestions and criticisms) ○ At or below the 25th percentile for HC04 (I would recommend Johns Hopkins to my friends and family for care)

Patient Experience

High Risk:

- Press Ganey standard overall score
 - At or below the 30th percentile of the Press Ganey benchmarking database for the current survey period
 - Above the 30th percentile but show a flat or declining trend from the previous survey administration

Table 3: Hospital and Unit Survey Characteristics for Change Analysis

Hospital	Total beds	Teaching Status	Total returned	Total administered	2013 Units	2013 Unit Size Mean (SD) min, max	Unit Safety Survey 2013 Response Rate Mean (SD) min, max	2015 Units	2015 Unit Size Mean (SD) min, max	Unit Safety Survey 2015 Response Rate Mean (SD) min, max
Hospital 1	284	Non-teaching	837	1217	39	31.2 (17.4) 6, 82	72.2 (13.3) 41.7, 100	41	29.7 (18.3) 7, 87	73.8 (16.9) 41.7, 100
Hospital 2	527	Teaching	1652	2401	86	27.9 (23.5) 5, 134	75.2 (18.1) 40, 100	76	27.5 (21) 5, 107	73.1 (18.7) 40, 100
Hospital 3	1192	Teaching	6130	8445	165	51.2 (48.8) 7, 322	78.6 (16.7) 40.2, 100	187	50.6 (47.2) 6, 263	72 (17) 40, 100
Hospital 4	236	Non-Teaching	826	997	26	38.3 (21.7) 7, 89	85.6 (12.5) 63.9, 100	37	31.7 (23.2) 6, 87	78.8 (14.4) 45.5, 100
Hospital 5	318	Non-Teaching	727	1051	40	26.3 (16.1) 5, 64	73.4 (14) 44.9, 100	41	27.8 (14.5) 10, 69	79.7 (11) 50, 100
Total	2557		10172	14111	356	39.6 (38.07) 5, 322	76.98 (16.4) 40, 100	382	39.5 (37.47) 5, 263	73.9 (16.74) 40, 100
Units included in this analysis*:										
2013 High LAR					16	39.1 (30.59)	71.86 (17.92)	15	46.26 (35.06)	69.25 (15.87)
2013 non-LAR					340	39.6 (38.42)	77.2 (16.32)	297	40.57 (36.7)	75.09 (16.15)
p-value						p = 0.956	p = 0.2016		p = 0.5576	p = 0.1728

*Units included in this analysis had teamwork and safety climate data in both 2013 & 2015, 5 or more respondents and >/=40% response rate

Table 4: Description of Local Interventions

Leadership	<ul style="list-style-type: none"> • Replaced clinical leadership • Changed unit management • Restructured reporting relationships • Appointed additional leaders
Resources	<ul style="list-style-type: none"> • Added clinical resources (e.g. specialty nurse, pharmacists, pain team) • Appointed safety resource • Added clerical support
Training/Education	<ul style="list-style-type: none"> • Implemented TeamSTEPPs • Provided monthly educational time for staff • Invited nurses to M&M
Facilities/Technology	<ul style="list-style-type: none"> • Made physical plant improvements (renovation, relocation) • Implemented personal safety devices
Processes	<ul style="list-style-type: none"> • Applied Lean Process Improvement • Implemented huddles

Table 5: Safety and Teamwork Climate Change Analysis by Latent Adaptive Risk (LAR)

Mean Change 2013 to 2015	High LAR Mean (SD) 95% SI	Non-LAR Mean (SD) 95% SI	t-test
Safety Climate	0.1401 (0.163) 0.498, 0.2304	-0.001 (0.178) -0.021, 0.019	p = < 0.003
Teamwork Climate	0.186 (0.159) 0.974, 0.274	-0.013 (0.185) -0.034, 0.007	p = < 0.0001
Positive Change (>/= 10 percentage points) 2013 to 2015	High LAR Frequency %	Non-LAR Frequency %	<i>p</i>
Safety Climate	8 (53.33%)	78 (26.26%)	0.04
Teamwork Climate	12 (80.00%)	66 (22.22%)	<0.0001

Figure 1: Triangulation Analysis Using Subject Matter Experts (SMEs)

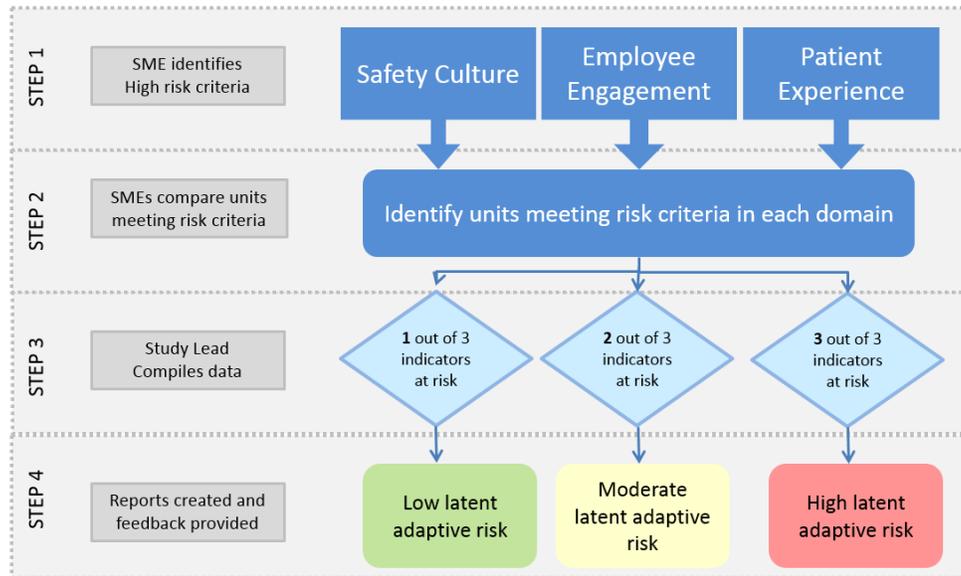
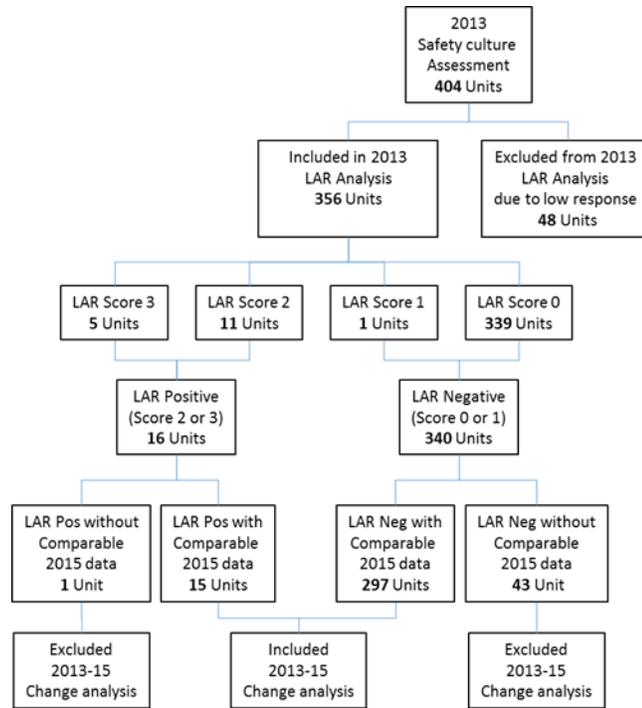


Figure 2: Inclusion Criteria for Change Analysis



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APPENDIX A2: Employee Engagement and Patient Experience Survey
 Characteristics and Response by Hospital: For Triangulation Analysis

	Employee Engagement 2013				Patient Experience FY2013		
	# workgroups	Total N	Total Responses	Response Rate	Total patients surveyed	Total responses	Response Rate
Hospital 1	66	1717	1261	73.4%	12036	2914	24.2%
Hospital 2	148	3398	2503	73.7%	13139	2720	20.1%
Hospital 3	351	10276	6958	67.7%	14628	4613	31.5%
Hospital 4	Data unavailable				11801	3460	29.3%
Hospital 5	63	1733	1085	62.6%	14410	4212	29.2%
Total:	628	17124	11807		66014	17919	
	Mean RR 69.4%, SD 0.046, Range 62.6, 73.7				Mean RR 26.9%, SD 0.04, Range 20.7, 31.5		

Manuscript Three: Latent Risk Assessment Tool for Health Care Leaders

Abstract

Summary: Demonstrable improvements in quality of care and patient safety have been limited to efforts focused on provider practice and frontline care processes. Little attention has been paid to understanding the role leadership decisions play in creating risk within a health care system. This paper describes a framework and tool designed to assess the risk of such decisions and identify appropriate mitigation strategies prior to implementation of a change.

Methods: Building on Reason's construct of latent organizational failure and the concept of Latent Organizational Risk outlined in manuscript one, a tool was created to guide health care leaders through a process of inquiry that reveals potential risks of financial or strategic decisions before they manifest. Through a process of engaging key stakeholders who are involved in and impacted by a change, potential for technical and cultural risks are explored, mitigated and monitored.

Discussion: Health care leaders who use this tool reported that it prompted effective proactive consideration of downstream risks. They value the tool's utility in a variety of situations and its adaptability to existing organizational planning processes.

Conclusion: To make continued progress in eliminating preventable harm, health care leaders must develop habits of intellectual wariness. Seeking to identify risk created at all levels of the organization is a critical leadership practice. The use of instruments like the Latent Risk Assessment tool may enable health care leaders to recognize potential risk and act to mitigate it before harm occurs.

Background

In the fifteen years since the Institute of Medicine released the report, *To Err Is Human*, only marginal improvements in safety have been achieved^{1,46,47}. Improvement efforts have focused

primarily on the point of direct care delivery, including: standardizing work (e.g., checklists with evidence-based practices to prevent bloodstream infections and improve surgical care) ^{48,49}; establishing an infrastructure and governance to organize improvement efforts ⁵⁰⁻⁵²; and instituting regulatory standards focused on care delivery such as The Joint Commission National Patient Safety Goals ⁵³. In contrast, capabilities to identify and assess activities or decisions made at the higher echelons of health care organizations that could create risk for patient harm are less developed.

There are many ways in which leadership decisions can introduce risks. One example is the decision to implement a new electronic medical record system or other health information technology without assessing the risks, only to find out afterwards that poor usability caused errors in decision making that lead to patient harm, and that ineffective integration into workflows created delays in care delivery and work arounds⁵⁴. Other examples of decisions with far reaching consequences include: setting staffing levels; changing rules for supervision; creating incentives and reward systems; and creating an environment that discourages discussion of mistakes and errors with senior leaders and board members.

High-reliability science, which studies how organizations in high-risk industries, such as nuclear power, sustain high levels of safety, points to the importance of leadership in creating the vision, strategy, and culture for safety ⁵⁵. High reliability organizations (HROs) practice a healthy preoccupation with failure by creating intelligent wariness. Wariness is characterized by paying attention to details, detecting anomalies, understanding sequences, and imagining the consequences of failure and the potential causes ¹⁸. As health care strives to emulate the leadership of high reliability industries, leaders and managers need new approaches to identify and mitigate risks. Historically, our health care system was not structured to measure safety as an intended outcome, ultimately leaving employees to be the final defense against a flawed system, too often relying on individual heroism, which is neither a reliable nor sustainable strategy to improve safety. Unlike HROs, health care has also failed to systematically address hazardous behaviors that compromise psychological safety ⁵⁶.

Leaders in HROs embrace preoccupation with failure as a strategy by creating structures and a culture that actively discusses mistakes they do not want to make, and mindfully reflects on the actual mishaps and near misses in order to learn from them. Staff in HROs also seek to proactively identify risks so as to avoid future mistake.

Proactive assessment of risk is not new to health care. The Joint Commission leadership Standard LD.04.04.05 requires one proactive risk assessment of a high-risk process at least every eighteen months⁵⁷. These analyses typically focus on identifying potential *active* failures at the sharp end of process implementation – after decisions and investments have been made. At this point, the organization has committed to the new or changing process and the risk assessment is focused on safe implementation. While these tools are very useful in the formal assessment of risks in care processes, they miss the risk created by decisions, often called latent risks.

Latent organizational risks are created at the blunt end when management decisions are being made and do not thoroughly account for potential unintended consequences. These consequences may not manifest until frontline workers interface with the organizational conditions that increase the risk of failure or patient harm. Resource constraints resulting from financial pressures places strain on health care providers and creates patient safety risk. Nurse staffing patterns and medical trainees work hours have been associated with higher mortality and poor outcomes⁵⁸⁻⁶⁰. While incenting performance has been effective in driving outcomes in some key areas such as CLABSI, patient experience, and surgical site infection, doing so has required health care leaders to shift fixed resources from other areas to focus on these imperatives^{46,61-63}. Health care leaders are frequently challenged with decisions like these where resources are limited, particularly in the context of overall rising health care costs⁶². The Latent Risk Assessment tool offers a structured set of questions leaders can use to anticipate the downstream effects of their decisions.

Organizational leaders and managers in health care lack concrete tools to assess the latent failures created by their strategic and financial decisions that may introduce risk into their care

delivery systems. To remedy this state of affairs, we developed a novel approach to identify and mitigate risk at the blunt end of the system. This approach provides a means to evaluate the impact of leadership and management decisions on the complex systems of care delivery, and aims to anticipate the sharp-end consequences that may result. Health care leaders today frequently face difficult decisions and tradeoffs. Specific tools to proactively assess the consequences of these decisions are needed to continue making progress in patient safety arena.

Tool Development

During the Johns Hopkins Medicine annual strategic planning process in 2015, leaders and scientists from the Johns Hopkins Armstrong Institute for Patient Safety and Quality sought to develop strategies to encourage leadership habits similar to those commonly found in HROs. Based on Reason's theory of latent organizational failure²¹ and the conceptual framework of Latent Organizational Risk (Doctoral dissertation, Lori A. Paine, 2017), The Latent Organizational Risk Assessment Tool was designed to guide leaders to proactively assess potential risks that may be created by theirs or another leader's organizational decisions. The tool was used by leaders across the organization to demonstrate their adoption of this high reliability leadership practice. The tool and risk assessment process is not intended to challenge the leader's actual decisions, rather it is designed to facilitate intelligent wariness at the executive level, enabling decision makers to better discern possible latent risks, and to identify appropriate mitigating and monitoring strategies. Inquiry rather than advocacy is central to this activity. Rather than assume that their position or seniority enables them to have all the answer, leaders must ask more questions. As a result, humility can lead to a better understanding of the situations leaders face. Likewise, it may facilitate a more mindful consideration of distal implications resulting from of their strategic and financial decisions²².

Tool Description

This 2-part tool was designed to be used by different types of health care leaders involved in strategic decision-making. For example, Chief Executive Officers and Chief Operating Officers could

use this tool when making decisions about clinical services or facility designs; Chief Financial Officers could use it when difficult budget decisions may impact clinical resources; Department or unit managers could use the tool when making staffing decisions and Human Resources leaders could use it before implementing policy changes; and Chief Information Officers could use it when choosing information technology tools, such as launching a new electronic health record.

The tool starts with some preliminary work and prompts the user to describe the decision, the planned change, and the intended goal of the change (Figure 1). The user is also asked to consider all stakeholders that may be involved or in some way affected by the change, including anyone who will have some incentive to achieve the goal, and to describe how they will be involved in the risk assessment. The latent risk assessment tool is laid out as a 3-column table (Figure 2) and has a list of potential latent organizational failures to consider, separated into technical (e.g., workload) and cultural (e.g., patient safety culture) characteristics. Each area of failure has probing questions to prompt users to consider potential latent risks that could cause failures at the sharp end of care delivery. The column headed “Response” is where users document the identified risks, how they plan to monitor the risks of their decision, and what they can do to mitigate the risks.

The tool offers specific questions leaders can ask when making decisions and implementing strategic or operational changes. Answers to the series of prompts included in the tool may reveal potential latent risks that could create favorable conditions for error at the sharp end of care delivery.

How To Use the Latent Risk Assessment Tool

A latent risk assessment is initiated when a leader or leadership team has a critical decision to make that could cause latent failures with potential to worsen the quality of work systems or processes, and could lead to patient harm. This tool should be used as part of the strategic and change planning process and could be re-visited over time as part of a project management cycle. Leaders use the tool to thoroughly assess how the change(s) made from their decision will impact the organization. They begin with the preliminary work (Figure 1) of describing the decision and

planned action, which in the hypothetical case provided (Appendix A3) is whether to implement an across-the-hospital 2% cut in labor expenses to adjust for an unexpected shortfall in financial revenues and penalties from pay-for-performance programs. The goal of this change is to achieve financial stability for the hospital. Identifying who will be effected by the cut in labor expenses and who might be incented by achievement of this goal is a critical step. To answer the questions in the tool, leaders cascade the change from their decision point, consider the impact at every level of the organization (upstream and downstream), and ensure that those closest to the bedside have a voice. The reduction in staff could compromise the safety and quality of patient care and could increase preventable harm or complications, which may in turn increase the costs of care. Thus, the leaders determine that clinical and nonclinical employees, along with patients and families, are the primary stakeholders of the change. Moreover, referring hospitals and physicians may be impacted by this change if, for example, staffing capacity prevents the acceptance of a patient transfer. Because department leaders have personally been offered incentives to meet the revenue and budget targets by deciding where to cut labor expenses, they are also identified as important stakeholders in the risk assessment to ensure they hear other points of view and make informed decisions.

Before finalizing their decision, the leadership team meets with the stakeholders to solicit their input in completing the Latent Risk Assessment Tool. The body of the tool (Figure 2) guides the assessment team through questions designed to surface potential conditions in which a latent failure may occur that could lead to either technical or adaptive cultural risks. While not all questions are relevant to the ultimate decision, the team is encouraged to consider each one. A completed sample tool (Appendix A3) describes the answers given by the team for the technical and cultural components of the organization in which latent failures could occur if staffing were reduced. Individual units or clinical service areas (e.g., operating suite) were the object of discussion for the assessment.

The planned cut in labor is also discussed with leaders, managers and staff from several units that previously expressed concern about their staffing resources to gain their perspective on the

impact this decision could have on quality of care and patient safety. Each latent risk condition is explained in detail and plans are made for specific mitigation and monitoring strategies. An overall summary of the assessment should include a communication plan and risk monitoring plan.

Results and Lessons

Senior leaders from across a large academic health system who participated reflect that use of this tool has led them to think differently about their decisions and the impact those decisions have made downstream. We learned that adaptability of the tool has been essential to its successful implementation. Some leaders have modified it by incorporating the questions into their existing project management tools and charters. For example, one organization modified their standard A3 project management template, which is used for all major initiatives, to include a section devoted to risks and mitigation strategies. Other leaders selected specific questions about workload for use by committees charged with reviewing vacancies and hiring requests by managers. The tool is flexible and could be applied to a variety of issues and scopes. For example, it could be used for a very specific issue a unit manager is facing about reducing nursing hours per patient day, for a department decision to reduce the number of surgical beds, or for a hospital-wide decision to implement an across the board budget cut.

Summary and Next Steps

Once senior leadership used the Latent Risk Assessment tool, they were quick to recognize the importance of proactively assessing for patient safety risk when making key decisions. The tool offered a structured and tangible way to look at a decision they needed to make, and help convene stakeholders affected by the potential changes to jointly assess latent failures and develop solutions. These solutions may vary, ranging from monitoring for specific risks after the change is implemented, to mitigating risks before implementation, or to possibly changing the decision entirely.

While the tool was originally intended for senior leaders as part of strategic planning and change management processes, it can be broadly applied. Future adaptations of the tool should include a process to assess technology, equipment, and device acquisition.

Figures & Tables

Figure 1. Johns Hopkins Medicine Latent Risk Assessment Tool (Part 1)

Strategic Objective: For leaders to assess for safety risks associated with financial and strategic decisions.

This tool is intended to guide leaders through a process to proactively assess for latent risk and plan mitigation strategies.

1. Describe the decision and planned change.
2. What goal is this change intended to achieve?
3. Is achievement of this goal being incentivized? If so, for whom?
4. Who are the stakeholders of this change (upstream, downstream, at the point of care)?
5. How will stakeholders be involved in this risk assessment?
6. Complete Latent Risk Assessment Tool below. (See Figure 2).

Figure 2. Johns Hopkins Medicine Latent Risk Assessment Tool (Part 2)

Latent Organizational Failures	Questions leaders should ask:	Response
<i>Technical Considerations</i>		
Workload	<ol style="list-style-type: none"> 1. Has there been an assessment of workload to determine if allocated staffing will be sufficient to maintain the standard of care? 2. Are production pressures created that may force staff to cut corners? 	
Knowledge, Skills, and Ability	<ol style="list-style-type: none"> 1. Are staff sufficiently trained to use the new equipment, processes, or workflow? How do you know? 2. Does staff have the necessary information, skills, and other resources? 	
Interface design	<ol style="list-style-type: none"> 1. Has there been a human factors analysis of the user interface, tools, environment, or processes? 2. Do the knowledge, skills, and abilities of the staff match the work required of them? 	
Supervision or Instruction	<ol style="list-style-type: none"> 1. How will supervisory roles (education, auditing, and management) be affected? 	
Stress in the Environment	<ol style="list-style-type: none"> 1. Have there been other stressors introduced into the work environment that may affect the decisions? 2. Are there competing priorities that may cause confusion and stress? 	
Resilience and Mental State	<ol style="list-style-type: none"> 1. Is there or will there be an increase in fatigue? Or boredom? 2. Do staff schedules allow for adequate sleep to avoid fatigue? 	
Change Management	<ol style="list-style-type: none"> 1. Have change management strategies been employed to facilitate new work or workflow? 	

<i>Cultural Considerations</i>		
Patient Safety Culture	<ol style="list-style-type: none"> 1. Do recent culture scores for any areas suggest resilience? 2. What aspects of culture (e.g., safety, teamwork, speaking up/speaking out) have been considered in the implementation plan for this decision? 	
Staff Morale	<ol style="list-style-type: none"> 1. What are the employee engagement scores for the areas affected by this decision? 2. Are people empowered to speak up with respect to the decision? 3. Is there trust and respect among coworkers on the units potentially affected by the decision? 	
Beliefs about Bad Outcomes	<ol style="list-style-type: none"> 1. Have you asked what could go wrong as a result of this decision? 2. Do the outcomes of this decision explicitly include measuring the impact on patient safety? 	
Violation-condoning Norms	<ol style="list-style-type: none"> 1. Are work-around actions prevalent in the area affected by this decision? 2. Will work-around actions be incentivized by this decision? 	
Hazardous Attitudes	<ol style="list-style-type: none"> 1. Is there encouragement or tolerance of risk-taking behavior? 2. Is there a perceived license to bend the rules? 	
Meaning or Ambiguity of Rules	<ol style="list-style-type: none"> 1. Are the policies and protocols to accommodate this decision clearly articulated? 2. How will roles and responsibilities be affected? 	

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APPENDIX A3: Case Example of Latent Risk Assessment

Scenario: The hospital must reduce labor costs through a reduction in work force.

TECHNICAL CONSIDERATIONS
Workload
<p><i>Q1. Has there been an assessment of workload to determine if allocated staffing will be sufficient to maintain the standard of care?</i></p> <p>An assessment will be conducted and only units identified above their newly allocated staffing benchmark will be considered sufficient to maintain the standard of care. In units below the benchmark, we will consider other expense reducing options. Prior to relying on benchmarks for this decision, consideration will be given to the accuracy of those benchmarks. To ensure our benchmarks are accurate, we will conduct focus groups with unit managers to understand any nuances for staffing that may not be reflected in our benchmarks.</p>
<p><i>Q2. Are production pressures created that may force staff to cut corners?</i></p> <p>In procedure areas (e.g., operating suites) where patient volumes will remain high, risk for unsafe practices will be assessed by unit leadership before any reduction in work force or hiring freezes to minimize the possibility of units adopting unsafe practices to meet the ongoing demand.</p>
Knowledge, Skills and Ability
<p><i>Q1. Are staff sufficiently trained to use the new equipment, processes or workflow? How do you know?</i></p> <p>Not Applicable</p>
<p><i>Q2. Does staff have the necessary information, skills, and other resources?</i></p> <p>Before any positions responsible for training staff or providing a clinical resource (e.g., leadership/management, clinical supervision) are cut, we will consider staff mix and years of experience on the unit. Units with a larger proportion of inexperienced staff (less than 2 years of experience) will maintain clinical resource positions.</p>
Interface Design
<p><i>Q1. Has there been a human factors analysis of the user interface, tools, environment, or processes?</i></p> <p>Not Applicable</p>
<p><i>Q2. Do the knowledge, skills, and abilities of the staff match the work required of them?</i></p> <p>Not Applicable</p>

Supervision or Instruction
<p><i>Q1. How will supervisory roles (education, auditing, and management) be affected?</i></p> <p>Supervisory positions will remain filled during this time.</p>
Stress in the Environment
<p><i>Q1. Have there been other stressors introduced into the work environment that may affect the decisions?</i></p> <p>Recent implementation of barcode technology for medication administration as well as implementation of a new electronic health record has increased stress as staff adapt to new workflow. This is a specific area of concern because work-arounds may emerge if staffing is lower.</p>
<p><i>Q2. Are there competing priorities that may cause confusion and stress?</i></p> <p>There is institutional priority being placed on improvement of patient experience scores on all units. Some staff express concern that a reduction in staffing will compromise efforts to satisfy patient expectations. Patient experience scores and comments will be closely monitored. Leadership rounds will be a strategy to detect and address staff and patient concerns early.</p>
Resilience and Mental State
<p><i>Q1. Is there or will there be an increase in fatigue? Or boredom?</i></p> <p>If volumes surge and overtime is used, fatigue may become an issue in some areas.</p>
<p><i>Q2. Do staff schedules allow for adequate sleep to avoid fatigue?</i></p> <p>Most units use 8 or 10 hour shifts. In some limited areas, extended shifts are used to cover emergencies. Use of 12 hour shifts is limited to high-needs areas.</p>
Change Management
<p><i>Q1. Have change management strategies been employed to facilitate new work or workflow?</i></p> <p>Reallocation of staffing may result in shifting or redefinition of roles and organizational management relationships. Town hall meetings will be held for staff to meet with leadership and discuss concerns about new workflow and need to minimize disruptions. Managers will create structures to ensure they provide voice to all stakeholders involved in the change. Managers will communicate why the change is necessary, demonstrate that they are mindful of the risks, and have on going risk monitoring and mitigation strategies in place.</p>
CULTURAL CONSIDERATIONS
Patient Safety Culture
<p><i>Q1. Do recent culture scores for any areas suggest resilience?</i></p> <p>Culture survey results about perceived sufficiency of staff will be reviewed. For units scoring low in this area, closer consideration will be given to any reduction in staff.</p>

<p><i>Q2. What aspects of culture (e.g., safety, teamwork, speaking up/speaking out) have been considered in the implementation plan for this decision?</i></p> <p>Teamwork culture is an aspect of culture that may assist in making staffing reductions. Where there is poor teamwork climate, there is a perception of increased workload. Where teamwork is strong, there may be creative ways to address workload in the setting of work reduction. In areas where there is poor teamwork, reductions in staffing may be further corrosive or less tolerated.</p>
<p>Staff Morale</p>
<p><i>Q1. What are the employee engagement scores for any areas affected by this decision?</i></p> <p>Recent employee engagement scores will be used to determine which units may be better able to tolerate reduction in staff. In addition, areas with poor morale will need more in-depth risk assessment because reductions in staff are likely to exacerbate morale problems. This may include the organizational development department to assist in understanding underlying morale issues that may compromise quality care delivery.</p>
<p><i>Q2. Are people empowered to speak up with respect to the decision?</i></p> <p>Town Hall meetings are used to encourage employees to speak up. Those sessions will be used to actively solicit feedback on the impact of these reductions on patient care.</p>
<p><i>Q3. Is there trust and respect among coworkers on the units potentially affected by the decision?</i></p> <p>Teamwork climate will be assessed using culture survey data. Local assessment of risk will evaluate the level of trust on and between affected care areas. Interventions will focus on improving teamwork and respectful interactions.</p>
<p>Beliefs about Bad Outcomes</p>
<p><i>Q1. Have you asked what could go wrong as a result of this decision?</i></p> <p>Meetings with unit managers are being held to further understand the potential consequences of this decision including patient safety.</p>
<p><i>Q2. Do the outcomes of this decision explicitly include measuring the impact on patient safety?</i></p> <p>Executive leaders will monitor metrics of quality and safety to ensure that these areas are not compromised.</p>
<p>Violation-condoning Norms</p>
<p><i>Q1. Are work-around actions prevalent in the area affected by this decision?</i></p> <p>As mentioned above, implementation of bar code medication administration and electronic health record implementation coincides with this cost reduction plan which could lead to work-arounds. In addition, work-arounds may increase as seasonal fluctuations in staffing occur.</p>

<p><i>Q2. Will work-around actions be incentivized by this decisions?</i></p> <p>In areas with productivity pressures, it may be perceived that working faster is more important than following safety protocols. Managers will be reminded to communicate the leadership's commitment to safety and that safety always comes first.</p>
<p>Hazardous Attitudes</p>
<p><i>Q1. Is there encouragement or tolerance of risk-taking behavior?</i></p> <p>Senior leadership will carefully praise accomplishment of financial goal achievement, while keeping safety a priority and not incentivizing risk-taking behavior.</p>
<p><i>Q2. Is there a perceived license to bend the rules?</i></p> <p>Not Applicable</p>
<p>Meaning or Ambiguity of Rules</p>
<p><i>Q1. Are the policies and protocols to accommodate this decision clearly articulated?</i></p> <p>Relevant policies related to this effort include chain of command and staffing management, both of which will be reviewed with managers for compliance in the setting of potential staffing reductions.</p>
<p><i>Q2. How will roles and responsibilities be affected?</i></p> <p>If staffing changes require a change in role and responsibilities, managers will clearly communicate these changes to the entire team.</p>

CURRICULUM VITAE
The Johns Hopkins University School of Medicine
April 5, 2017

Lori A. Paine, DrPH, MS, BSN, RN

DEMOGRAPHIC AND PERSONAL INFORMATION:

Current Appointments

- 1994 - present Adjunct Faculty, The Johns Hopkins University, School of Nursing, Baltimore, MD
- 2009 - present Guest Lecturer, The Johns Hopkins University, School of Medicine, Baltimore, MD
- 2011 - present Associate Faculty, The Johns Hopkins University, Bloomberg School of Public Health, Baltimore, MD

Personal Data

The Johns Hopkins Hospital
1800 Orleans Street
Carnegie 667
Baltimore, MD 21287
Tel: 410-955-2919
Fax: 410-955-0705
Email: lapaine@jhmi.edu
Email 2: lori.paine@gmail.com

Education

- 1985 Associate Degree, Applied Science (A.A.S), Nursing, Genesee Community College, Batavia, NY
- 1988 Bachelor of Science, Nursing (B.S.N.), Nazareth College of Rochester, Rochester, NY
- 1994 Master of Science (M.S.), Applied Behavioral Science, The Johns Hopkins University School Continuing Studies, Baltimore, MD
- 1994 Change Management Fellowship, The Johns Hopkins University, School of Continuing Studies, Baltimore, MD (Primary mentors: Edith Seashore, Charles Seashore, Michael Broom)
- 2014 - present Doctor of Public Health (Dr.P.H.) Candidate, Department of Health Policy and Management, The Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD. Expected graduation: May 2017. (Primary mentors: Peter Pronovost, Sallie Weaver)

Training

2008	Lean sigma training. The Johns Hopkins Center for Innovation in Quality Patient Care, Baltimore, Maryland
2010	IDEO Training, 2010, The Johns Hopkins Center for Innovation in Quality Patient Care, Baltimore, Maryland.
2011	LTD Longitudinal Program in Curriculum Development: Part 1, Johns Hopkins Faculty Development Program, Johns Hopkins Bayview Medical Center, Baltimore, Maryland
2011 - 2012	LTD Longitudinal Program in Curriculum Development: Part 2, Johns Hopkins Faculty Development Program, Facilitated Work In Progress
2012	Johns Hopkins Medicine Faculty Leadership Development Program, Johns Hopkins Bayview Medical Center, Baltimore, MD.
2015	Friday Night in the ER Facilitator Certification Training. November 2015, Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality, Baltimore Maryland.

Professional Experience

1985 - 1986	Nurse Clinician, Medical Renal Unit, St. Mary's Hospital, Rochester, NY
1986 - 1988	Nurse Clinician, Postpartum/GYN Surgery Unit, St. Mary's Hospital, Rochester, NY
1988 - 1990	Clinical Nurse, Labor and Delivery, The Johns Hopkins Hospital, Baltimore, MD
1990 - 1994	Senior Clinical Nurse, Labor and Delivery, The Johns Hopkins Hospital, Baltimore, MD
1994 - 1995	Acting Nurse Manager, Labor and Delivery, Fetal Assessment Center and Obstetrical Ultrasound, The Johns Hopkins Hospital, Baltimore, MD
1995 - 1997	Patient Care Delivery Model Implementation Coordinator, The Johns Hopkins Hospital, Baltimore, MD
1997 - 1999	Senior Project Administrator, Operations, The Johns Hopkins Hospital, Baltimore, MD
1999 - 2002	Program Coordinator, Comprehensive Women's Health Program, The Johns Hopkins University, School of Medicine, Baltimore, MD
2002 - 2003	Quality & Innovation Coach, Center for Innovation in Quality Patient Care, Johns Hopkins Medicine, Baltimore, MD
2003 - 2005	Coordinator, Patient Safety, The Johns Hopkins Hospital and Johns Hopkins Medicine Center for Innovation in Quality Patient Care, The Johns Hopkins University, Baltimore, MD
2005 - 2008	Manager, Patient Safety, The Johns Hopkins Hospital and Johns Hopkins Medicine Center for Innovation in Quality Patient Care, The Johns Hopkins University, Baltimore, MD
2008 - present	Director, Patient Safety, The Johns Hopkins Hospital and Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality, The Johns Hopkins University, Baltimore, MD

RESEARCH ACTIVITIES:

Publications

Peer-reviewed – original research.

1. Benedict ME, Paine LL, **Paine LA**, Brandt D. & Stallings R. The association of childhood sexual abuse with depressive symptoms during pregnancy, and selected pregnancy outcomes. *Child Abuse & Neglect* 1999; 23(7): 659-670.
2. Pronovost PJ, Morlock L, Davis RO, Cunningham T, **Paine L** & Scheulen J. Using online and offline change models to improve ICU access and revenues. *The Joint Commission Journal on Quality and Patient Safety* 2000; 26(1): 5-17.
3. Pronovost PJ, Weast B, Bishop K, **Paine L**, Griffith R, Rosenstein BJ, Kidwell RP, Haller KB, Davis R. Senior executive adopt-a-work unit: A model for safety improvement. *The Joint Commission Journal on Quality and Patient Safety* 2004; 30(2): 59-68.
4. **Paine L A**, Baker DR, Rosenstein B & Pronovost P. The Johns Hopkins Hospital: Identifying and addressing risks and safety issues. *The Joint Commission Journal on Quality and Patient Safety* 2004; 30(10): 543-550.
5. Pronovost P, Weast B, Rosenstein BJ, Sexton B, Holzmueller CG, **Paine L**, Davis R, Rubin HR. Implementing and validating a comprehensive unit-based safety program. *Journal of Patient Safety* 2005;14:33–40.
6. Pronovost PJ, King J, Holzmueller CG, Sawyer M, Bivens S, Michael M, Haig K, **Paine L**, Moore D, Davis R, Miller M. Web-based tool for the Comprehensive Unit-based Safety Program (CUSP). *The Joint Commission Journal on Quality and Patient Safety* 2006; 32(3): 119-129.
7. Dang D, Feroli ER, Gill C, **Paine L**, Shermock K, Suflita J, Walrath JM. Quest for the ideal: A redesign of the medication use system. *Journal of Nursing Care Quality* 2007; 22(1): 11-17.
8. Sexton JB, **Paine LA**, Manfuso J, Holzmueller CG, Martinez EA, Moore D, Hunt DG, Pronovost PJ. A check-up for safety culture in “my patient care area”. *The Joint Commission Journal on Quality and Patient Safety* 2008; 33(11): 699-703.
9. Pronovost PJ, RosensteinBJ, **Paine L**, Miller MR, Haller K, Davis R, Demski R, Garrett MR. Paying the piper: investing in infrastructure for patient safety. *The Joint Commission Journal on Quality and Patient Safety* 2007; 34(6): 342-348.
10. Timmel J, Kent PS, Holzmueller CG, **Paine L**, Schulick RD & Pronovost PJ. (2010). Impact of the comprehensive unit-based safety program (CUSP) on safety culture in a surgical inpatient unit. *The Joint Commission Journal on Quality and Patient Safety* 2010; 36(6): 252-260.
11. **Paine LA**, Rosenstein BJ, Sexton JB, Kent P, Holzmueller CG & Pronovost PJ. Assessing and improving safety culture throughout an academic medical centre: A prospective cohort study. *Quality and Safety in Health Care* 2010; 19(6): 547-554.
12. **Paine LA**, Rosenstein BJ, Sexton JB, Kent P, Holzmueller CG & Pronovost PJ. (2011). Republished paper: Assessing and improving safety culture throughout an academic medical centre: A prospective cohort study. *Postgraduate Medical Journal*, 87(1028), 428-435.
13. Edrees HH, **Paine LA**, Feroli ER & Wu AW. Health care workers as second victims of medical errors. *Pol Arch Med Wewn* 2011; 121(4): 101-108.

14. Aboumatar HJ, Thompson D, Wu A, Dawson P, Colbert J, Marsteller J, Kent P, Lubomski LH, **Paine L**, Pronovost P. Development and evaluation of a 3-day patient safety curriculum to advance knowledge, self-efficacy and system thinking among medical students. *BMJ Quality & Safety* 2012; 21(5): 416-422.
15. Aboumatar HJ, Thompson DT, Wu A, Dawson P, Colbert J, Marsteller J, Kent P, Lubomski LH, **Paine L**, Pronovost P. Republished: Development and evaluation of a 3-day patient safety curriculum to advance knowledge, self-efficacy and system thinking among medical students. *Postgraduate Medical Journal* 2012; 88(1043): 545-551.
16. Daugherty EL, **Paine LA**, Maragakis LL, Sexton JB & Rand CS. Safety culture and hand hygiene: Linking attitudes to behavior. *Infection Control & Hospital Epidemiology* 2012; 33(12): 1280-1282.
17. Marks CM, Kasda E, **Paine L** & Wu AW. That was a close call': Endorsing a broad definition of near misses in health care. *The Joint Commission Journal on Quality and Patient Safety* 2013; 39(10): 475-479.
18. Peterson S, Taylor R, Sawyer M, Nagy P, **Paine L**, Berenholtz S, Miller R, Petty B. The power of involving house staff in quality improvement: An interdisciplinary house staff-driven vaccination initiative. *American Journal of Medical Quality: The Official Journal of the American College of Medical Quality* 2015; 30(4): 323-327.
19. Pronovost PJ, Holzmueller CG, Molello NE, **Paine L**, Winner L, Marsteller JA, Berenholtz SM, Aboumatar HJ, Demski R, Armstrong CM. The Armstrong Institute: An academic institute for patient safety and quality improvement, research, training, and practice. *Academic Medicine: Journal of the Association of American Medical Colleges* 2015; 90(10): 1331-1339.
20. Daugherty Biddison EL, **Paine L**, Murakami P, Herzke C & Weaver SJ. Associations between safety culture and employee engagement over time: A retrospective analysis. *BMJ Quality & Safety* 2016; 25(1): 31-37.
21. Sutcliffe KM, **Paine L** & Pronovost PJ. Re-examining high reliability: Actively organising for safety. *BMJ Quality & Safety* 2016 Mar 21; [Epub ahead of print]
22. Arbaje AI, Werner NE, Kasda EM, Wu AW, Locke CF, Aboumatar H, **Paine LA**, Leff B, Davis RO, Bonyasai R. (2016). Learning from lawsuits: Using malpractice claims data to develop care transitions planning tools. *Journal of Patient Safety*, 2016 Jun 10. [Epub ahead of print]
23. Mathews SC, Demski R, Hooper JE, Biddison LD, Berry SA, Petty BG, Chen AR, Hill PM, Miller MR, Witter FR, Allen L, Wick EC, Stierer TS, **Paine L**, Puttgen HA, Tamargo RJ, Pronovost PJ. A model for the departmental quality management infrastructure within an academic health system. *Academic Medicine: Journal of the Association of American Medical Colleges* 2016 Sep 6. [Epub ahead of print]

Peer-reviewed – not original research.

1. Paine LA & Millman A. Sealing the cracks, not falling through: Using handoffs to improve patient care. *Frontiers of Health Services Management* 2009; 25(3): 33.

Book Chapters, Monographs.

1. Benedict MI, Paine LL, Paine LA. Long Term Effects of Sexual Abuse in Childhood on Psychosocial Functioning in Pregnancy and Pregnancy Outcome, Final Report to the Agency of Children and Families, Administration of Children, Youth, and Families, National Center on Child Abuse and Neglect (90-CA-1448), DHHS, Rockville, MD, December 31, 1994.
2. Pronovost PJ, Marsteller JA, Wu AW, Holzmueller CG, Thompson DA, Lubomski LH, Paine LA, Hobson DB, Sawyer MD, Wyskiel RM, Aboumatar H, Needham DM, Goeschel CA, Winters BD, Pham JC, Sapirstein, A, Romig M, Mendez-Tellez PA, Gurses AP, Rosen MA, Weaver SJ, Austin JM, Latif A, Berenholtz SM. Advancing the science of patient safety and quality improvement to the next level. In: Battles JB, Cleeman JI, Kahn KK, and Weinberg DA, editors. *Advances in the Prevention and Control of Health Care-Associated Infections*. Rockville (MD): Agency for Healthcare Research and Quality (US); June, 2014.

Other Publications:

Proceedings Reports

1. Khunlertkit A, Paine L, editors. *A Human Factors Approach for Root Cause Analysis: A Case of Duplicate Medical Record Number*. Human Factors and Ergonomics Society (Healthcare TG); 2015; Baltimore, MD: HFES Healthcare.

Methods and Techniques

1. Paine L. Culture of safety. *ADVANCE for Nurses: Serving RNs in Areas of Maryland, Washington, DC & Virginia* 2004; 6(21): 16.
2. Paine L & Sawyer M. On the CUSP: How to implement a comprehensive unit-based safety program. *American Nurse Today* 2014; 9(3): Retrieved online at: <https://www.americannursetoday.com/on-the-cusp-how-to-implement-a-comprehensive-unit-based-safety-program/>

Media Releases or Interviews

1. Subject Matter Expert for the Urban Health Radio Program on “Patient Safety” with Paula Kent and Cheri Wilson aired March 10, 2011 in Baltimore, MD.
2. Extensively quoted in: Geller ES, Johnson D 2007 *The Anatomy of Medical Error: Preventing Harm with People-based Patient Safety*. Virginia Beach, VA: Coastal Training Technologies Corporation.
3. Acknowledged and quoted in: *The Joint Commission: Getting the Board on Board: What Your Board Needs to Know About Quality and Patient Safety*. Oakbrook Terrace, IL: Joint Commission Resources, 2007.

Other Media (Videos, Websites, Blogs, Social Media, etc.)

1. Paine L. How The Flint Water Crisis Is A Cautionary Tale. Johns Hopkin Medicine Armstrong Institute Blog. 2016. Web. 3 Jan. 2017.
<https://armstronginstitute.blogs.hopkinsmedicine.org/2016/06/23/how-the-flint-water-crisis-is-a-cautionary-tale-for-health-care/>

Extramural Funding:

1991 - 1993	Title: “Long Term Effects of Sexual Abuse in Childhood on Psychological Functioning in Pregnancy and Pregnancy Outcome ID Number: 90-CA-1448 Sponsor: DHHS Office on Childhood Abuse and Neglect Total Direct Costs: \$149,999 PI: Mary E. Benedict, MSW, DrPH, Johns Hopkins School of Hygiene and Public Health Role: Clinical Data Collection Coordinator
2008 – 2009	Title: “National Patient Safety Improvement Project, On the CUSP: STOP BSP” Sponsor: Agency for Healthcare Research and Quality PI: Peter Pronovost, MD; The Johns Hopkins University Quality and Safety Research Group Role: Consultant
2011 – 2012	Title: “Effective Enterprise-wide Care Transitions at Discharge” ID Number: 1R21HS019519-01 Sponsor: Agency for Healthcare Research and Quality Total Direct Costs: \$232,718.00 PI: Richard O. Davis, PhD, Johns Hopkins Medicine Role: Co-Investigator

CLINICAL ACTIVITIES

Clinical Licensure

1988 - Present	Registered Nurse, Maryland (R100333)
1985 - 1989	Registered Nurse, New York (R381629)

Clinical (Service) Responsibilities

1985 - 1986	Nurse Clinician, Medical Renal Unit, St. Mary’s Hospital, Rochester, NY
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1986 - 1988	Nurse Clinician, Postpartum/GYN Surgery Unit, St. Mary's Hospital, Rochester, NY
1988 - 1990	Clinical Nurse, Labor and Delivery, The Johns Hopkins Hospital, Baltimore, MD
1990 - 1994	Senior Clinical Nurse, Labor and Delivery, The Johns Hopkins Hospital, Baltimore, MD
1994 - 1995	Acting Nurse Manager, Labor and Delivery, Fetal Assessment Center and Obstetrical Ultrasound, The Johns Hopkins Hospital, Baltimore, MD
1995 - 1997	Patient Care Delivery Model Implementation Coordinator, The Johns Hopkins Hospital, Baltimore, MD
1999 - 2002	Program Coordinator, Comprehensive Women's Health Program, The Johns Hopkins University, School of Medicine, Baltimore, MD

EDUCATIONAL ACTIVITIES

Classroom instruction

1994 - present	Adjunct Faculty, The Johns Hopkins University School of Nursing, Baltimore, MD
1995	Faculty Intern, Fellows in Change Management, The Johns Hopkins University, School of Continuing Studies, Baltimore, Maryland
2009 - present	Guest Lecturer, TIME Patient Safety Course The Johns Hopkins University School of Medicine, Baltimore, MD; Topics include: Defect Investigation, Error Reporting, and Case Studies.
2011 - present	Associate Faculty, The Johns Hopkins Bloomberg School of Public Health, Department of Health Policy and Management
Jan 2011	Emerging Trends in Patient Safety and Culture. Johns Hopkins University School of Nursing DNP Course 10.804, Baltimore, Maryland.
Sep 2012	Culture Matters, Fuld Fellow Cohort I, Johns Hopkins University School of Nursing, Baltimore, Maryland
Oct 2015	Creating a Culture of Patient Safety in Healthcare: The Journey to High Reliability, Fuld Lecture, Johns Hopkins University School of Nursing, Baltimore, Maryland.
Fall 2015	Guest Lecture, University at Buffalo, State University of New York, School of Nursing, NGC 634 Organizational and Leadership Concepts in Health Care, Organizational and Systems Leadership for Quality Improvement and Systems Thinking; Topics include: Nursing Theory, Change Management, Team Development, Role Transition, Patient Safety
Mar 2016	Creating a Culture of Patient Safety in Healthcare: The Journey to High Reliability, Fuld Lecture, Johns Hopkins University School of Nursing, Baltimore, Maryland.
Jul 2016	Creating a Culture of Patient Safety in Healthcare: The Journey to High Reliability. Fuld Lecture, Johns Hopkins University School of Nursing, Baltimore, Maryland.

Clinical Instruction

2005 - 2014	Fuld Scholarship Program Preceptor, Johns Hopkins University School of Nursing, Baltimore, Maryland
2006 - 2008	Towson University Nursing Program, Towson, Maryland
2009 - 2011	Preceptor: Masters of Science in Nursing, Johns Hopkins University School of Nursing, Baltimore, Maryland
2011	Associate Faculty - Field Placement Preceptor, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
2012	Practicum Preceptor, Walden University School of Nursing, Minneapolis, Minnesota
2016	Preceptor, Drexel University - Advanced Role / Nurse Practitioner MSN Programs, Philadelphia, Pennsylvania

Workshops/Seminars

JHMI/Regional

2010 - 2014	The Comprehensive Unit-based Safety Program 2-day workshop, up to four times per year, The Armstrong Institute for Patient Safety and Quality
2013 - present	Patient Safety Certificate Program, 5-day, biannually, The Armstrong Institute for Patient Safety and Quality
2014 - present	Applications of CUSP, 1-day workshop, biannually, The Armstrong Institute for Patient Safety and Quality

Mentoring

Dec 2007	Preliminary Doctoral Oral Examiner/Committee Member: Lilly D. Engineer, DrPH, Health Policy and Management, Bloomberg School of Public Health, "Determining the Influence of Hospital Characteristics, Market Conditions, and Financial Performance on Clinical Quality in a Sample of U.S. Rural Hospitals."
Mar 2008	Dissertation Reader: Lilly D. Engineer, DrPH, Health Policy and Management Johns Hopkins Bloomberg School of Public Health, "Determining the Influence of Hospital Characteristics, Market Conditions, and Financial Performance on Clinical Quality in a Sample of U.S. Rural Hospitals".

SYSTEM INNOVATION AND QUALITY IMPROVEMENT ACTIVITIES

Efforts within Johns Hopkins Medical Institutions

1990 - 1994	Developed and delivered Innovative Neonatal Resuscitation Program for RNs and MDs at The Johns Hopkins Hospital, Baltimore, MD
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- 1995 - 1997 As Patient Care Delivery Model Implementation Coordinator at The Johns Hopkins Hospital, Baltimore, Maryland:
- Coordinated the design and implementation of the reengineered Patient Care Delivery Model in 60 patient care units.
 - Created “STELLAR Program - Success Through Employee Learning Linkages, and Resources”, a program to assist displaced nursing technicians find alternative career options and skills to qualify for new positions.
- 1997 - 1999 As Senior Project Administrator – Operations, The Johns Hopkins Health System:
- Projects included: Referring Physician Satisfaction targeted at referring physician relations; Alert Status initiative to reduce fly-by hours while increasing capacity; implementation of the United Way Campaign
- 1999 - 2002 As Program Coordinator, Comprehensive Women’s Health Program, The Johns Hopkins University, Department of Gynecology and Obstetrics, Baltimore, Maryland
- Planned and developed a comprehensive, multidisciplinary approach to Women’s Health Programs based upon results of a far-reaching survey designed to capture the health care needs of women employees and faculty on the Johns Hopkins Medicine campus
- 2002 - 2003 As Quality & Innovation Coach, Center for Innovation in Quality Patient Care, Johns Hopkins Medicine, Baltimore, Maryland:
- Coached improvement teams on methods of improvement, data collection and analysis
 - Provided support for quality improvement activities of clinical departments and work units
- 2003 - Present Various Leadership Roles, The Johns Hopkins Hospital and Johns Hopkins Medicine Armstrong Institute for Patient Safety and Quality, Baltimore, Maryland, Including:
- Lead strategic planning process for Patient Safety
 - Support and facilitate Johns Hopkins Hospital Patient Safety Committee and activities
 - Support System-wide patient safety efforts (Event reporting and Safety Culture Assessment Across All JH Affiliates)
 - Created a health system infrastructure for implementation and operation of an enterprise solution for event reporting
 - Manage hospital event reporting system and review process
 - Identify event trends and interventions to promote safety
 - Coordinate organizational safety culture assessment and data analysis
 - Design and deliver Patient Safety Practitioner course
 - Coordinate the Comprehensive Unit-based Safety Program (CUSP) / Executive rounds
 - Oversee the development and delivery of CUSP training programs for internal and external audiences

- Manage Health Information Technology Safety Program
- Oversee Human Factors Engineering program development
- Developed an employee recognition program for Patient Safety

Program Building/Leadership

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|----------------|---|
| 2008 - present | Developed initial program design and participated in curriculum design, and now have administrative oversight of the Armstrong Institute Patient Safety and Quality Leadership Program, a 9-month multidisciplinary, health system, quality and safety training program that develops future leaders in quality and patient safety that has trained 88 scholars to date |
| 2010 - 2014 | Development Team for The Comprehensive Unit-based Safety Program 2-day workshop curriculum, target audience patient safety professions and health care leaders, delivered four times per year, The Armstrong Institute for Patient Safety and Quality |
| 2012 - present | Founder and administrative oversight of the Armstrong Institute Patient Safety Fellowship/Leadership Academy |
| 2013 - present | Developed initial curriculum and now have administrative oversight of a 5-day Patient Safety Certificate Program offered by The Armstrong Institute for Patient Safety and Quality target audience patient safety professions and health care leaders |
| 2013 | Co-Leader, Johns Hopkins Hospital “Resilience In Stressful Events (RISE)” - peer support team for Hopkins employees and faculty. |

ORGANIZATIONAL ACTIVITIES

Institutional Administrative Appointments

- | | |
|----------------|---|
| 1990 - 1994 | Leader, Johns Hopkins Hospital Collaborative Practice and Patient Satisfaction Committees, Labor and Delivery |
| 1995 - 1997 | Co-Chair, Johns Hopkins Hospital Redesign and Service Placement Workgroup of the Johns Hopkins Operations Reengineering Project |
| 2003 - present | Member, Johns Hopkins Hospital Patient Safety Committee |
| 2003 - present | Member, Johns Hopkins Hospital Quality Improvement Council |
| 2004 - present | Member, Johns Hopkins Hospital Hopkins Event Action Team (HEAT) |
| 2005 - present | Member, Johns Hopkins Hospital MERIT Medication Error Reduction Improvement Team |
| 2007 - present | Member, Johns Hopkins Hospital Sentinel Event Group |
| 2007 - present | Member, Johns Hopkins Hospital Risk Management Committee |
| 2007 - present | Member, Johns Hopkins Hospital Board of Trustees Quality Improvement Council |
| 2007 - present | Member, Johns Hopkins Hospital Continuity of Care Committee |
| 2008 - present | Chair, Johns Hopkins Hospital Patient Identification Taskforce |
| 2008 - present | Chair, Johns Hopkins Hospital Transport Taskforce |

2008 - present	Member, Johns Hopkins Hospital Quality and Safety Journal Club
2009 - present	Member, Johns Hopkins Hospital Regulatory Compliance Committee
2009 - present	Member, Johns Hopkins Hospital MRI Safety Committee
2011 - present	Member, Johns Hopkins Medicine Patient Safety and Quality Planning Committee
2011 - present	Leader, Patient Safety Component, Johns Hopkins Medicine, Patient Safety and Quality Planning Committee
2011 - present	Armstrong Institute Representative at Johns Hopkins Medical Institutions Affiliate Patient Safety and Quality Forums
2011 - 2015	Member, Johns Hopkins Hospital Patient and Family Advisory Council
2011 - present	Member, Johns Hopkins Medicine Executive Quality, Safety and Service Council
2011 - present	Member, Armstrong Institute Clinical Operations Group
2011 - present	Member, Johns Hopkins Hospital Proactive Risk Assessment Group
2011 - present	Member, Johns Hopkins Hospital Resilience In Stressful Events (RISE) Team
2012 - present	Founding Member, Johns Hopkins Hospital Leadership Cabinet for the Housestaff Patient Safety and Quality Committee
2012 - present	Member, Johns Hopkins Hospital Housestaff Patient Safety and Quality Committee
2012 - present	Member, Armstrong Institute Educational Development Council (formerly Learning and Development Group)
2012 - 2013	Member, Johns Hopkins Hospital Professionalism in Practice
2013 - present	Member, Johns Hopkins Medicine Culture Coordinating Council
2013 – 2016	Member, Johns Hopkins Medicine Epic Patient ID workgroup
2013 – present	Member, Johns Hopkins Medicine Provider Behavior Research Group
2014 - present	Member, Johns Hopkins Medicine Health IT Safety Committee
2015 – present	Member, Johns Hopkins Medicine Faculty/Provider Oversight Executive Committee
2015 - present	Member, Johns Hopkins Medicine HERO Group
2016 – present	Member, Johns Hopkins Medicine Health IT SWAT committee
2016 – present	Co-leader, Johns Hopkins Health System, Workplace Violence Workgroup

Editorial Activities

2006 - 2015	Member, Advisory Board for “OnGuard”, an internal JH Health System newsletter for patient safety
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Advisory Committees, Review Groups/Study Sections:

2007 - present	Member, MCIC Vermont Patient Safety Committee Member
2007 - present	Member, Maryland Patient Safety Center Patient Safety Officers Forum
2008 - present	Common Formats Expert Panel Member, National Quality Forum, Agency for Healthcare Research and Quality
2008 - present	Expert Panel Member, Agency for Healthcare Research and Quality Common Format Group

2008 - 2011	University Healthsystem (UHC) Consortium Patient Safety Net Steering Committee
2010	University Healthsystem (UHC) Consortium, CIRQLS Steering Committee
2011 - 2014	UHC Performance Improvement and Comparative Data Operations Committee
2014 - present	Member, ECRI Institute Partnership for Health Information Technology Safety
2014 - present	Member, MCIC Vermont Risk Reduction Awards Program Committee

Professional Societies:

1987 - 1998	Association of Women's Health, Obstetric, and Neonatal Nurses (formerly known as: Nurse's Association of the American College of Obstetricians and Gynecologists), Member
1993 - 1995	Organization Development Network, Member
1991 - 1993	National Perinatal Association, Member

Conference Organizer:

2010 - present	Administrative oversight of planning, organizing and delivery of the Annual Johns Hopkins Medicine Patient Safety Summit
2010	Inaugural Chair, Annual Johns Hopkins Medicine Patient Safety Summit Planning Committee

Consultantships

2009 - 2010	Rochester General Hospital, Rochester, NY <ul style="list-style-type: none"> • Patient Safety Program development • CUSP program development • Safety culture measurement and improvement
2010	Aintree Hospital, Liverpool, England <ul style="list-style-type: none"> • Patient Safety Assessment
2013	Albert Einstein Hospital, Sao Paulo, Brazil <ul style="list-style-type: none"> • Patient Safety Assessment
2014	Member, Alleghany Health Network Consultation Team
2014 - 2015	Member, Massachusetts General Hospital/Armstrong Institute Commonwealth Project on Peer-to-Peer Assessment
2016	Northern Hospital, Melbourne, Victoria, Australia <ul style="list-style-type: none"> • Patient Safety Assessment

RECOGNITION

Awards/Honors

1985	Phi Theta Kappa Honor Society
1988	Sigma Theta Tau Honor Society

- 2015 Marilyn Bergner Award in Health Services Research, Johns Hopkins Bloomberg School of Public Health
- 2015 "Top 4 Conference Paper" award for paper presented at the 2015 International Society for Communication Science and Medicine Conference. Montecatini, Italy; June 2015. **Paine LA**, Daugherty Biddison EL, Leslie M, et al. Using patient safety climate, employee engagement, and patient satisfaction to identify unit risk: a novel approach to adaptive organizational risk assessment.

Invited Talks

JHMI/Regional

- Nov 2012 Keeping Patients Safe, A Women's Journey, Baltimore, Maryland. Invited Speaker.
- Oct 2014 Journey to High Reliability, Neurosciences and Psychiatry Safety Begins With Me: Courageous Conversations. The Johns Hopkins Hospital, Baltimore, Maryland. Invited Speaker.
- Jan 2015 Event Tracking and Improving Patient Safety. Transforming Health Systems for Accountable Care for Health Care Executives and Managers. Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. Invited Speaker.
- Jan 2016 Event Tracking and Improving Patient Safety, Transforming Health Systems for Population Health Management. Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. Invited Speaker.
- Jan 2017 Event Reporting, High Reliability, and Health IT Safety. Leading Transformation for Value-Based Health Care Executive Education Program. Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland. Invited Speaker.
- Apr 2017 Latent Organizational Risk. Medical Quality 2017. American College of Medical Quality, Washington, DC. Invited Speaker.

National

- Sep 2010 Culture Matters, Alvarado Hospital, San Diego, CA. Invited Speaker.
- Mar 2015 Safe and Just Culture, Kentucky Hospital Associate 2015 Annual Quality Conference. Louisville, Kentucky. Invited Speaker.
- Mar 2015 Learning from Defects, Kentucky Institute for Patient Safety and Quality Annual Meeting. Louisville, Kentucky. Invited Speaker.
- Jun 2015 Leading to High Reliability: A Cultural Transformation, Indiana Patient Safety Summit: United in Safety. Indiana Hospital Association and Indiana Patient Safety Center. Indianapolis, Indiana. Invited Speaker.

International

- Jun 2011 Culture Matters: Measuring and Improving Culture of Safety, Tawam Hospital Patient Safety Conference, Al Ain, Abu Dhabi, UAE. Invited Speaker.
- Apr 2014 Patient Safety, 1st International Seminar on Clinical Excellence and Patient Safety. Idcsalud, Fundacion Jimenez Diaz, Madrid. Invited Speaker.

OTHER PROFESSIONAL ACCOMPLISHMENTS

Posters

JHMI/Regional

- Mar 2006 Krumm, S, Mock V, Szymanski G, Olsen M, Hoofring L, Paine L, Taylor K, Slavney, P, Fetting J, Blackledge C, Peterson R. It's Time to Stop Ignoring Delirium: An Innovative Screening Initiative for the Early Detection and Treatment of Delirium in Oncology Patients. Second Annual Maryland Patient Safety Conference. Baltimore, Maryland.
- Mar 2006 Paine L, Blackledge, C. Measuring Safety Culture. Second Annual Maryland Patient Safety Conference. Baltimore, Maryland.
- Oct 2006 Paine L, Manfuso J, On Guard: A Newsletter to Facilitate Organizational Learning about Patient Safety, University HealthSystem Consortium 2006 Quality and Safety Fall Forum, Baltimore, Maryland. (3rd place recognition for the "Reaching the Destination Award")
- Mar 2007 Brown SG, Paine LA, Wilson CC, Petty BG, Self-Reported Hand-off Event Analysis: Efforts Towards Standardization of the Hand-off Process, Third Annual Maryland Patient Safety Conference, Baltimore, Maryland.
- Mar 2007 Paine L, Manfuso J, On Guard: A Newsletter to Facilitate Organizational Learning about Patient Safety, National Patient Safety Foundation Congress, Washington, DC
- May 2007 Brown SG, Paine LA, Wilson CC, Petty BG, Self-Reported Hand-off Event Analysis: Efforts Towards Standardization of the Hand-off Process, National Patient Safety Foundation Congress, Washington, DC
- May 2007 Doyle D, Paine L, Wilson, C, Hopkins Event Action Team: Closing the Loop on Voluntary Event Reporting and Sharing Lessons Learned, National Patient Safety Foundation Congress, Washington, DC
- May 2007 Paine L, Manfuso J, On Guard: A Newsletter to Facilitate Organizational Learning about Patient Safety, Third Annual Maryland Patient Safety Conference, Baltimore, Maryland.
- Mar 2007 Doyle D, Paine L, Wilson, C, Hopkins Event Action Team: Closing the Loop on Voluntary Event Reporting and Sharing Lessons Learned, , Third Annual Maryland Patient Safety Conference, Baltimore, Maryland.
- Apr 2009 Kent P, Walrath JM, Feroli ER, Paine L, Taylor L, Pronovost P, Patient Safety Lecture Series, Maryland Patient Safety Center Conference, Baltimore, MD

- Apr 2009 Kent P, Timmel J, Schulick RD, Paine L, Pronovost P, Weinberg 4C CUSP: Cohorting, Multidisciplinary Rounds, and Daily Goals, Maryland Patient Safety Center Conference, Baltimore, MD
- Apr 2009 Paine L, Measuring and Creating a Culture of Safety. Maryland Patient Safety Center Conference, Baltimore, MD
- May 2009 Kent P, Timmel J, Schulick RD, Paine L, Pronovost P. Cohorting, Multidisciplinary Rounds, and Daily Goals: Weinberg 4C CUSP, National Patient Safety Foundation Congress, Washington, DC.
- Jun 2012 Neufeld N, Evans A, Berenholtz S, Sawyer M, Paine L, Miller R, Nagy P, Resident Physician Engagement in Quality and Patient Safety: Process of Building a Novel Institutional System for Train Residents in Quality Improvement, 3rd Annual Johns Hopkins Medicine Patient Safety Summit, Baltimore, MD.
- Jun 2012 Rosen MA, Weaver SJ, Marsteller J, Gurses A, Paine LA, Kasda E, Pronovost PJ, Learning from Communication Failures: A Practical Tool for Applying the Science of Teamwork. 3rd Annual Johns Hopkins Medicine Patient Safety Summit, Baltimore, MD.
- Jun 2012 Weaver S, Paine L, Sawyer M, Kent P, Pronovost P, A Cross-sectional Analysis Comparing Safety Culture Profile Characteristics in CUSP vs. Non-CUSP Work Areas, 3rd Annual Johns Hopkins Medicine Patient Safety Summit, Baltimore, MD.
- April 2015 Khunlertkit A, Paine L. A Human Factors Approach for Root Cause Analysis: A Case of Duplicate Medical Record Number. 2015 International Symposium on Human Factors and Ergonomics in Health Care: Improving the Outcomes. Baltimore, Maryland.

National

- May 2006 Blackledge C, Paine L, Sexton JB, Pronovost P, Perceptions of Operating Room Teamwork by Physicians and Nurses: Teamwork in the Eye of the Beholder., National Patient Safety Congress, San Francisco, California
- May 2006 Paine L, Moore D, Sexton JB, Assessing The Culture of Safety at Johns Hopkins Hospital using the Short Form of the Safety Attitudes Questionnaire., National Patient Safety Congress, San Francisco, California.
- Oct 2007 Dawson P, Paine L, Doyle D, Wilson C. Building a Safer Patient Care Environment: Using Data to Empower the Team, National Magnet Conference, Atlanta, Georgia.
- Sep 2008 Doyle D and Paine LA. System Pressure: Hospital Volume and Adverse Event Reporting. University HealthSystem Consortium Annual Conference, Scottsdale, AZ.
- Jun 2011 Aboumatar H, Thompson D, Wu A, Dawson P, Colbert J, Marsteller, Kent P, Lubomski L, Paine L, Pronovost P, The Patient Safety Intersession: Three days of Learning to Educate and Empower Medical Students, AAMC Integrating Quality Meeting, Chicago, IL.

May 2014

Kasda E, Paine L. Do You Know What Events Are Trending In Your Organization? National Patient Safety Foundation Congress, Orlando FL.

International

- Apr 2007 Brown SG, Paine LA, Wilson CC, Petty BG, Self-Reported Hand-off Event Analysis: Efforts Towards Standardization of the Hand-off Process., Society of General Internal Medicine (SGIM) Annual Meeting, Toronto, ON, Canada
- Jun 2015 Kasda EM, Paine LA. The impact of staff perceptions of safety on event reporting. 2015 International Society for Communication Science and Medicine Conference, Montecatini, Italy.
- Jun 2015 Khunlertkit A, Paine L. Using human factors methods to improve EMR design for an effective communication. 2015 International Society for Communication Science and Medicine Conference, Montecatini, Italy.

Oral/Podium Presentations

JHMI/Regional

- Oct 1990 Prenatal and Infancy Stage of Human Development. Introduction to Human Behavior University of Maryland, Baltimore, Maryland.
- 1990 Professional Practice Model in Obstetrics, 1990. Memorial Hospital, Easton, Maryland.
- Sep 1992 Implementing a Neonatal Resuscitation Program. NAACOG Maryland Section Fall Conference, Annapolis, Maryland.
- Oct 1993 Impact of Childhood Sexual Abuse on Pregnancy and Pregnancy Outcome. The Johns Hopkins Hospital Department of GYN/OB Nursing Family Violence Conference, Baltimore, Maryland.
- Nov 1994 The Influence of the Clinical Nurse Expert on Professional Practice. Johns Hopkins University School of Nursing/The Johns Hopkins Hospital Department of GYN/OB Nursing Conference Clinical Expertise at the Bedside, Baltimore, Maryland
- Apr 1997 Putting the 'P' into Accountability, April 1997, Nursing Leadership Forum, Johns Hopkins Hospital, Baltimore, Maryland
- Jun 1997 Riding the Roller Coaster of Change, Johns Hopkins Nurses' Alumni Association: Where Do Nurses Fit? The Changing Health Care Market, Baltimore, Maryland
- Oct 2003 Planning for Safer Care: A Case Study at Johns Hopkins Hospital. Practical Approaches to Quality in Patient Care: A Tools and Solutions Symposium. Johns Hopkins Center for Innovation in Quality Patient Care. Baltimore, MD
- May 2004 Science of Safety, Johns Hopkins Wilmer Nursing Conference. Baltimore, Maryland
- Feb 2005 Science of Safety, Safety Academy. Johns Hopkins Institute for Nursing, Baltimore, Maryland.
- May 2005 Science of Safety, Maryland Association for Health Care Quality. Annapolis, Maryland.
- Aug 2005 Guideline presentation, dissemination and use (panel), Workshop on Developing Evidence-based Guidelines. US Cochrane Center, Johns

Hopkins School of Medicine, Cystic Fibrosis Foundation. Columbia, Maryland.

Sep 2005 Science of Safety. Singapore Nursing Leadership Teleconference. Johns Hopkins Institute for Nursing, Baltimore, Maryland.

Nov 2005 Patient Safety Begins with Me, Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland

Oct 2006 Patient Safety Begins with Me, Johns Hopkins Hospital Neurosciences and Psychiatry Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland

Oct 2006 Team Approach to PSN Review: A Look at HIIT and HEAT, Presented with Sue Sanford-Ring from University of Wisconsin, October 2006. Patient Safety Net User's Group Meeting. University HealthSystem Consortium 2006 Quality and Safety Fall Forum, Baltimore, Maryland

Nov 2006 Science of Safety and Comprehensive Unit-Based Safety Program, Johns Hopkins Medicine International Symposium - Innovation and Excellence: Strategies for Global Health Care Leaders, Baltimore, Maryland

May 2007 Science of Patient Safety, The South Eastern ECMO Conference, Baltimore, Maryland

Oct 2007 Emerging Trends in Patient Safety, Business of Nursing, Johns Hopkins University School of Nursing, Baltimore, Maryland

Oct 2007 Patient Safety Begins with Me, Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland

Oct 2008 Emerging Trends in Patient Safety, Business of Nursing, Johns Hopkins University School of Nursing, Baltimore, Maryland

Dec 2008 Patient Safety Begins with Me, Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland

Apr 2009 Add Patients, Change Everything, Maryland Patient Safety Center Conference, Baltimore, MD

Aug 2009 Comprehensive Unit-Based Safety Program. Johns Hopkins Center for Innovation in Quality Patient Care Webinar, Baltimore, MD

Oct 2009 Emerging Trends in Patient Safety, Business of Nursing, Johns Hopkins University School of Nursing, Baltimore, Maryland.

Nov 2009 Emerging Trends in Patient Safety. Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland

Oct 2010 Emerging Trends in Patient Safety, presented with Eboni Clarke RN, MS. AORN Baltimore Chapter Meeting, The Johns Hopkins Hospital, Baltimore, Maryland

Oct 2010 Emerging Trends in Patient Safety. Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland

Jun 2011 Aboumatar H, Thompson D, Wu A, Dawson P, Colbert J, Marsteller, Kent P, Lubomski L, Paine L, Pronovost P, The Patient Safety

- Intersession: Three days of Learning to Educate and Empower Medical Students, Johns Hopkins University School of Medicine: Genes to Society Faculty Retreat, Baltimore, MD.
- Jun 2011 Introduction to Just Culture, presented with Ambra King, PharmD. Johns Hopkins Medicine 2nd Annual Patient Safety Summit, Johns Hopkins Medical Institutions, Baltimore, Maryland
- Oct 2011 Emerging Trends in Patient Safety, Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland
- Aug 2012 The Science of Improving Patient Safety, Good Samaritan Hospital Grand Rounds, Baltimore, Maryland
- Oct 2012 Emerging Trends in Patient Safety, Johns Hopkins Hospital Neurosciences and Psychiatry Department Patient Safety Workshop, Johns Hopkins Hospital, Baltimore, Maryland
- Apr 2013 Culture Matters. Fuld Fellow Cohort II, Johns Hopkins University School of Nursing, Baltimore, Maryland
- Apr 2013 Dropping Out, Surviving, or Thriving? Peer Support Can Make the Difference, presented with Cheryl Connors. 9th Annual Patient Safety Conference, Maryland Patient Safety Center, Baltimore, Maryland.
- Sep 2013 Achieving Excellence in Patient Safety: Getting Beyond Minimum Acceptable Standards Through Structured Peer-to-Peer Review. Armstrong Institute for Patient Safety and Quality Forum on Emerging Topics in Patient Safety, Baltimore, Maryland.
- Jun 2014 Analysis of Patient ID Events at Johns Hopkins Hospital. Armstrong Institute for Patient Safety and Quality 5th Annual Patient Safety Summit Johns Hopkins School of Medicine, Baltimore, Maryland.
- Jun 2014 Organizational Culture: Safe, Just and Highly Reliable. 31st Annual Wilmer Nursing Conference, Johns Hopkins School of Medicine, Baltimore, Maryland.
- Feb 2016 Proactive Identification & Mitigation of Risk: a Model for Organizing and Leading Clinical Operations., Johns Hopkins Medicine Armstrong Institute for Patient Safety & Quality High Reliability Health Care Summit 2016, Baltimore, Maryland.

National

- 1993 Childhood Sexual Abuse: Impact on Women as Caregivers and Clients. Partners in Perinatal Health Conference, Marlborough, Massachusetts.
- Oct 1993 Shared Governance: A Model for Nurse Managers and Staff. AWHONN District 1 Conference, Laconia, New Hampshire.
- Mar 2004 Building a Safer Care Environment: A Case Study, Annual Congress on Healthcare Leadership. American College of Healthcare Executives, Chicago, Illinois.
- Jul 2004 AHA Quest for Quality Award Finalists Presentations, American Hospital Association Leadership Summit. San Diego, California.
- Oct 2007 Collaborating with Patients and Families: The Process and the Outcomes, Presented with Pat Sodomka from Medical College of Georgia and Cezanne Garcia from University of Washington,

- University HealthSystem Consortium 2007 Quality and Safety Fall Forum, Palm Desert, CA.
- Oct 2009 Engaging Patients and Families as Part of the Healthcare Team: Consumers Advancing Patient Safety (CAPS), Presented with Jim Padilla, JD. UHC Patient Safety Net and Clinical Practice Advancement Center Patient Safety Organization User Group Meeting, Atlanta, Georgia
- Oct 2009 Comprehensive Unit-Based Safety Program: Cohorting, Multidisciplinary Rounds, and Daily Goals, Presented with Paula Kent, RN, MSN, MBA and Joanne Timmel, RN, BSN, UHC Quality and Safety Fall Forum, Atlanta, Georgia.
- Oct 2009 Patient Safety: The Nurse's Role. Panel Discussion, Pennsylvania State Nurses Association Summit 2009, DeSales University, Center Valley, Pennsylvania.
- Sep 2011 Improving Culture and Patient Safety: The Comprehensive Unit-based Safety Program (CUSP), Solution Services Corporation Risk Management Retreat, Charlottesville, Virginia

International

- Mar 2009 Assessing and improving safety culture in a large academic medical center, International Forum on Quality and Safety in Health Care, Institute for Healthcare Improvement and British Medical Journal, Berlin, Germany
- Feb 2013 The Science of Patient Safety, Albert Einstein Hospital Patient Safety Grand Rounds, Albert Einstein Hospital, Sao Paulo, Brazil
- Jun 2015 Paine LA, Daugherty Biddison EL, Leslie M, et al. Using patient safety climate, employee engagement, and patient satisfaction to identify unit risk: a novel approach to adaptive organizational risk assessment. Paper presented at the 2015 International Society for Communication Science and Medicine Conference. Montecatini, Italy; **Winner of "Top 4 Conference Paper" award.
- Jul 2015 Interdisciplinary Patient Safety Certificate Program Prepares Health Professionals to be Effective Patient Safety Champions, as part of Symposium: Building Capacity for Nurse Leadership in Effective Patient Safety and Quality Improvement Initiatives: Multi-Level, Local to Global Strategies presented with Cheryl Dennison-Himmelfarb, Kelly Gleason, Melinda Sawyer. 26th International Nursing Research Congress, Sigma Theta Tau International, San Juan, Puerto Rico
- Jun 2016 Using Event Reports to Design Safer Systems and Improve Patient Safety. RL Palooza '16. Toronto, Ontario, Canada. Presented with Eileen Kasda.
- Jul 2016 Using Event Reports to Design Safer Systems and Improve Patient Safety, Patient Safety Congress & Awards, Manchester, England. Presented with Eileen Kasda.

Community Services

Roland Park Elementary Middle School, Baltimore, Maryland

2009 School Family Council – Elected Special Needs Representative
2014 - 2016 Middle School Softball Team Parent Manager

Downtown Baltimore Child Care, Baltimore, Maryland

2008 - 2013 Board Member, Downtown
2009 Program and Personnel Committee Chair
2009 - 2010 Board President-elect
2010 - 2012 Board President
2012 - 2013 Past-President

Charles Village Recreation League, Baltimore, Maryland

2010 - 2011 Board Member
2006 - 2010 Soccer coach

Planned Parenthood, Batavia, New York

1985 - 1987 Advisory Board Member
1985 - 1987 Volunteer Committee
1986 Volunteer Committee Chairperson
1984 - 1987 Clinic Assistant

Community Service Preparation

July 2014 Role of the Board Essentials. Business Volunteers Maryland, Baltimore,
Maryland