ORGANIZING FOR HIGH RELIABILITY IN ARMY MEDICINE: AN ASSESSMENT OF BARRIERS TO FACILITATORS FOR IMPLEMENTATION

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Dedication

This dissertation is dedicated to my beautiful wife, Emily, and our two children—Anna and Andrew

“But the fruit of the Spirit is love, joy, peace, longsuffering, gentleness, goodness, faith, meekness, temperance: against such there is no law.”
-Galatians 5:22-23
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ABSTRACT

ORGANIZING FOR HIGH RELIABILITY IN ARMY MEDICINE: AN ASSESSMENT OF BARRIERS TO FACILITATORS FOR IMPLEMENTATION

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In response to an ongoing patient safety dilemma within healthcare organizations, many healthcare organizations have shifted their focus towards high reliability science. Research in this field of study has focused on high risk industries, such as aviation, nuclear power, and aircraft carriers, which have obtained low rates of error despite operating in a complex work environment where errors would normally occur. Experts studying these high reliability organizations suggests that highly reliable performance can be achieved by mindfully organizing to achieve collective mindfulness—a collective behavioral capability to discover and correct preventable errors and adapt to unexpected events. Their theory suggests there are five processes (or principles) required to produce a collective state of such mindfulness: Preoccupation with Failure, Reluctance to Simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise. These socio-cognitive processes result in the participants mindfully looking for errors, discussing ways to learn from errors (updating), and drawing upon and deferring to each other’s expertise when needed.

While the theory and principles seem relatively straightforward, it is often hard to implement them in healthcare organizations. In fact, there are few studies that have
shown this way of organizing for high reliability in order to improve preventable errors in healthcare in a significant way. This is primarily because the principles are theoretical and often hard to operationalize and implement in practice. To date there is little research on this subject.

This study will have a significant impact on the way the Army Medical Department and the Military Health System organizes for high reliability. It is currently unknown how the Army has implemented these strategies and if there are any barriers/facilitators to implementation. If this can be codified, the organization could develop strategies to improve the implementation efforts. This would likely reduce patient safety errors to zero, which is the goal of the high reliability strategies. This would also contribute to the literature on high reliability in healthcare, where many organizations are struggling to implement these strategies.
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CHAPTER 1: INTRODUCTION

Almost 18 years have passed since the Institute of Medicine estimated there were up to 98,000 deaths per year from preventable medical errors (IOM, 1999). This iconic report shed some much needed light on this issue and created a national movement to improve the quality of health care and decrease preventable errors (Kohn, Corrigan, and Donaldson, 2000; Pronovost, Miller, and Wachter, 2006; Shekelle, Pronovost, Wachter, Taylor, Dy, et al., 2011). However, despite a tremendous amount of effort to prioritize this issue and reorganize healthcare delivery to be safer, preventable errors still persist today. In fact, recent estimates suggest there are more than 400,000 preventable medical errors per year (James, 2013).

In response to this ongoing dilemma, many healthcare organizations have shifted their focus toward high reliability science. Research in high reliability theory has focused on high risk industries, such as aviation, nuclear power, and aircraft carriers, which have obtained low rates of error despite operating in a complex work environment where errors would normally occur. Experts studying these high reliability organizations suggest that highly reliable performance can be achieved through a collective mindfulness—a collective behavioral capability to discover and correct preventable errors and adapt to unexpected events (Weick, Sutcliffe, and Obstfeld, 2008; Weick and Sutcliffe, 2015). Their theory suggests there are five processes (or principles) required to produce a collective state of such mindfulness: Preoccupation with Failure, Reluctance to Simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise. These socio-cognitive processes result in the participants mindfully looking for
errors, discussing ways to learn from errors (updating), and drawing upon and deferring to each other’s expertise when needed.

Although the theory and principles of high reliability seem relatively straightforward, it is often hard to implement them in healthcare organizations. In fact, few studies have shown that this way of organizing for high reliability has improved preventable errors in healthcare in a significant way (Chassin and Loeb, 2013). This is primarily because the principles are theoretical and are often hard to operationalize and implement in practice. For example, the first principle of preoccupation with failure suggests that individuals and team members should be actively looking for deviations from what is expected, reporting the issues, and learning from these experiences. These actions are both social (team interaction and communication) and psychological (seeing, recognizing, and enactment) in nature, which would likely require a more complex intervention to achieve successful implementation. Additionally, it may be difficult to generalize the intervention in other clinical settings. To date, there is little research on this subject.

To complicate matters, The Joint Commission also tried to develop their own way of organizing a strategy to achieve high reliability in healthcare. This more recent paradigm shift was primarily due to the impracticality and theoretical nature of the high reliability principles (Chassin & Loeb, 2013). Their more simplified framework suggests there are three imperatives that an organization must undertake, which include 14 measurable components, to reduce preventable harm and achieve high reliability.
performance (Chassin & Loeb, 2011, 2013). These imperatives are centered on
organizing to create the conditions for success: (1) the leadership’s commitment to the
ultimate goal of zero patient harm, (2) the incorporation of all the principles and practices
of a safety culture throughout the organization, and (3) the widespread adoption and
deployment of the most effective process improvement tools and methods. The authors of
this more practical framework suggest that this way of organizing is a journey and should be measured in stages of readiness and progress toward high reliability.

As with the High Reliability Theory, several possible issues are associated with the current strategy adopted by Army Medicine. For example, although the authors indicate they followed the principles of high reliability science, there is no clear link between the three imperatives from Chassin and Loeb (2013) and the principles of high reliability from Weick and Sutcliffe (2015). Additionally, the three imperatives and 14 measurable components were not empirically derived—the authors indicate they were developed from their knowledge of healthcare organizations and iterative testing with hospital leaders (Chassin and Loeb, 2013, p. 459.). Furthermore, there are no studies that have assessed this framework to determine the validity and effectiveness of it (this is specifically mentioned by the authors in their conclusion). Despite all of these issues, this framework is widely accepted and adopted as the standard within the healthcare industry, which is likely due to the highly regarded status of The Joint Commission.

It is clear that there are issues related to these two ways of organizing to achieve high reliability. As discussed, there is little research to determine which of the practices
are successfully being implemented and whether any of them actually help achieve high reliability in healthcare. A better understanding of these factors would help improve efforts to achieve zero preventable patient harm which is one purpose for this study. This is reflected in my proposal research questions.

**Statement of Purpose and Research Questions**

The purpose of this study was to assess the two high reliability frameworks to determine the barriers to facilitators for implementation. This involves determining what it takes to make an organization highly reliable in the first place and what it takes to successfully implement these strategies. To do this, it is important to follow the imperatives of Chassin and Loeb (2013) while improving the collective mindfulness through Weick and Sutcliffe’s five Principles (2015). This assessment will also address the barriers and facilitators involved in implementing these two High Reliability Organization (HRO) Strategies.

This study will determine how health care teams organize for High Reliability using two strategies to achieve High Reliability. These two strategies, and the corresponding framework between the imperatives and principles, are not well-connected. This study will provide insights into the determinants of success for implementing the HRO strategies. For this study, I assesses site-specific strategies for implementing High Reliability as well as identifying barriers and facilitators created through the HRO strategy. To do this, I looked specifically at what happens when a strategy targeting High Reliability is disseminated and implemented within the clinical
setting in a health care framework. In addition, this was the perfect opportunity to assess these parameters using the health care organizations that constitute the Army Medical Department (AMEDD) and Army Medicine.

To address the purpose of this study, I have constructed the following research questions:

1. How do the health care teams in the operating room organize for High Reliability using the HRO principles and imperatives?
2. What are the barriers and facilitators involved in the successful implementation of the HRO principles and imperatives?

Implementing High Reliability in Army Medicine

The organization under investigation is Army Medicine. The Army healthcare enterprise is one of the largest health care networks in the world, including world-renowned hospitals, clinics, and health care facilities that use the latest technologies and practices available. The AMEDD strives to provide a high quality, safe, and consistent patient experience in support of the Total Army. Army Medicine carries out its healthcare mission across 80 medical treatment facilities with over $11 billion in funding through multiple resource appropriations in support of the overall mission in serving over 3.8 million beneficiaries.

Research within this organization is opportune for several reasons. First, the timing is impeccable, as over the last two years, the AMEDD has embarked on a High Reliability journey. This was sparked by two preventable patient deaths at an Army
hospital and the subsequent 90-day review of the Military Health System (MHS). This report suggested the organization should take action to improve access, quality, patient safety, transparency, and patient engagement. As a result, the Department of Defense adopted the high reliability organization strategies and disseminated the changes throughout the services. In addition, the AMEDD has adopted and implemented both the five principles and the three imperatives of high reliability. This provides an opportunity to study the implementation of both strategies in one setting.

This study is designed to identify the current strategies for implementing HRO and any barriers and facilitators that factor into implementing an HRO Strategy. To answer the research questions, I am proposing a study within Army Medicine between January 2017 and June 2017. Using semi-structured interviews and observational research, I identified barriers and facilitators and the resulting behaviors involved in implementation of the HRO strategy. Using field-site visits and semi-structured interviews, the intent is to perform a rigorous assessment of the barriers and facilitators for implementing High Reliability within Army Medicine.

**Organization of Dissertation**

In this chapter, I have provided an overview of High Reliability, the High Reliability Organization and the context within Army Medicine. Within these concepts, I have also discussed the principles and imperatives that support and characterize High Reliability. In addition, my purpose for this study is to identify the current strategies for implementing HRO and any barriers and facilitators that factor into implementing an HRO Strategy. In Chapter 2, I discuss the current research on High Reliability and the
proposed theoretical frameworks I will use to guide the research study. Chapter 3

describes the research design and methods that I used to address my research questions.

In Chapters 4, 5, and 6, I present and discuss my research findings.
CHAPTER 2: LITERATURE REVIEW: HIGH RELIABILITY

In this chapter, I discuss the current research on High Reliability (HR), including High Reliability Theory (HRT), the High Reliability Organization (HRO), and the proposed research frameworks I used to guide this research study. I first provide a general overview of HR and the principles and imperatives of HR, which includes the HR effectiveness literature and Weick’s concept of Sense-making, which is the socio-cognitive aspect of the five principles making up collective Mindfulness (Weick, Sutcliffe, and Obstfeld, 2008). I then identify the gaps within this current body of research. I then describe how I can use the Consolidated Framework for Implementation Research (Damschroder, Aron, Keith, Kirsh, Alexander, and Lowery, 2009) to analyze the factors that can influence the implementation of the HRO Strategy.

An overview of High Reliability Theory and the HRO

The phenomenon of HR and the HRO first took root in the 1980s and continues to inspire research and application within the framework of socio-technical organizations and systems across the globe (Laporte, Rochlin, & Roberts, 1987). Ever since the launch of the High Reliability Organizations Project at Berkeley in the mid-eighties, there has been ongoing debate over the HRO category of organizations. The group of researchers at the University of Berkeley led by Laporte in 1983 examined aircraft carriers, the Federal Aviation Commissions Air Traffic Control System, and nuclear power operations. As shown in the literature, these organizations have several similarities. First, they operate in unforgiving social and political environments. Second, their technologies are risky and
present potential for error. Third, the scale of possible consequences from errors or mistakes precludes learning through experimentation. Finally, to avoid failures, these organizations use complex processes to manage complex technologies and complex work. (Laporte et al., 1983).

HRT later focused on a subset of high-risk organizations that mindfully take a variety of extraordinary steps in pursuit of error-free performance. This organizationally-focused approach helped advance the research on high reliability as well as coin the term we know as High Reliability organizations (HRO). Some of the necessary but not sufficient conditions from Karl Weick’s literature that HRT emphasized are a strategic prioritization of safety, careful attention to design procedures, a limited degree of trial-and-error learning, redundancy, decentralized decision-making, continuous training often through stimulation, and strong cultures that create a broad vigilance for and responsiveness to potential accidents (LaPorte & Consolini, 1991; LaPorte, 1994).

Furthermore, effective HROs involve complex adaptive systems that combine orderly processes of cognition with variations in routine activities to sense and manage complex ill-structured contingencies. HROs are distinctive because of their efforts to organize in ways that increase the quality of attention across the organization, thereby enhancing people’s alertness and awareness to details so that they can detect subtle ways in which context varies and calls for contingent responding to help prevent errors.

This construct was elaborated and refined as mindful organizing in Weick and Sutcliffe’s book, *Managing the Unexpected*, which is currently in the 3rd edition (2015).
Mindful organizing requires that leaders and organizational members pay close attention to shaping the social and relational infrastructure of the organization. This establishes a set of interrelated organizing processes and practices that jointly contribute to the system. These are known as the Principles of High Reliability, and they include Preoccupation with Failure, Reluctance to Simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise (Weick and Sutcliffe, 2015). Mindfulness requires a person to track small failures, resist oversimplification, remain sensitive to the operations in practice, maintain the capability for resilience, and take advantage of changes in who has expertise. Mindfulness is an essential ingredient for HRO implementation (Weick, Sutcliffe, and Obstfeld, 2008).

Weick and Sutcliffe (2015) view HRO as a way of organizing to achieve high reliability. It is not simply mindfulness or enactment they describe; rather, it is collective mindfulness and collective enactment. Mindfulness is a mental orientation in which the person continually evaluates the environment, as opposed to mindlessness, in which a simple assessment leads to choosing a plan that is continued until the plan runs its course. Mindfulness is a state of active, open attention on the present. When a person is mindful, their thoughts and feelings are observed from a distance, without judging these thoughts and feelings as good or bad (Psychology Today, n.d.). Mindfulness involves living in the moment and awakening to experience (Psychology Today, n.d.). Mindfulness focuses on the thought process behind identifying errors or close calls in order to identify lessons learned through careful analysis of the situation. It then strives to implement strategies to strengthen protocols and proactively reduce failure.
Cognitive Processes and Mindfulness

For a system to remain reliable, it must somehow handle unforeseen situations in ways that forestall unintended consequences. The idea that routines are the source of reliability discounts the fact that variation and stability factor in as well, making it more difficult to understand the mechanism of reliable performance under trying conditions. Woods (1998, p. 132.) describes cognition in complex systems, as cited in Perrin (1995, p. 156), as “[To be] opportunistic and flexible in order to detect and to adapt to events which require revision of situation assessment and plans. Problem solvers need to revise their understanding of the situation, their evidence collection and evaluation tactics, or their response strategy when new events are detected and evaluated.”

By separating the variation and stability folded into routines and assigning the variation to routines and the stability to processes of cognition, people stop treating stable patterns of activity as the source of reliable outcomes. Instead, reliable outcomes now become the result of stable processes of cognition directed at varying processes of production that uncover and correct unintended consequences.

Unexpected events require revisions of assessments, plans, and tactics, but this revision is possible only because processes of understanding evidence collection detection, evaluation, and revising themselves remain stable in the face of new events. These stable cognitive processes do the detecting, the variable patterns of activity which are the source of reliable outcomes. Instead, reliable outcomes now become the result of
stable processes of cognition directed at varying processes of production that uncover and correct unintended consequences.

Assessments are done sporadically, which does not align with mindfulness. Efficient organizations often experience errors when they look for the same expectations in the face of changing events. As a result, these changes in events go undetected because people are rushed, distracted, careless, or ignorant. Variable cognition fails to detect faults in machinery, substandard materials, or declining compliance, and these oversights lead to unintended consequences. Thus, to understand how organizations organize for high reliability, we need to specify what is done repeatedly—in our case, this is a cognitive process—and what varies—in our case, this is routinized activity manifest in performance.

Each time a routine is re-enacted, it unfolds in a slightly different way, a point made by March and Olsen (1989, p. 38), Feldman (1989, p. 130) and Nelson and Winter (1982). In an unknowable, unpredictable world, ongoing mutual readjustment is constant, and it is this adaptive activity that generates potential information about capability, vulnerability, and the environment (e.g., Landau & Chisholm, 1995, p. 70). Information is then lost unless there is continuous mindful awareness of these variations.

Mindfulness is as much about the quality of attention as it is about the conservation of attention. It is as much about what people do with what they notice as it is about the activity of noticing itself. Mindfulness involves interpretive work directed at
weak signals (Vaughan, 1986), differentiation of received wisdom, and reframing, all of which can enlarge what is known about what was noticed.

Mindfulness in HROs is distinctive because it is closely related to the repertoire of action capabilities (Westrum, 1988). Mindfulness is related to seeing and interpreting the environment and the repertoire of action being related to range of responses (Weick, Sutcliffe, and Obstfeld, 2008). The central idea is found in Westrum’s (1988, p8.) discussion of “the ecology of thought.” Westrum argues that organizations that are willing to see those hazards and think about them, which develops the recognition and action.

My examination of the literature on HROs suggests that the combination of stable cognitive processes and variations in action patterns enables the more successful HROs to manage unexpected events effectively (Weick, Sutcliffe, and Obstfeld, 2008). This is then fostered by an apparent ongoing focus on failure, simplification, current operations, resilience, and underspecified structures, referred to as mindfulness. Mindfulness is less about decision making, which is the traditional focus of organizational theory and accident prevention, and more about inquiry and interpretation grounded in capabilities for action. Furthermore, mindfulness in HROs is not activated solely by novelty, but rather it is a persistent mindset that admits the possibility that any “familiar” event is known imperfectly and is capable of novelty. This ongoing wariness is expressed in active, continuous revisiting and revision of assumptions, rather than in hesitant action.
Weick and Sutcliffe’s Five Principles of High Reliability

Weick and Sutcliffe provide the most compelling depiction of how HROs stay safe through the five principles (2015). They describe an environment of collective mindfulness in which all workers look for, and report, small problems or unsafe conditions before they pose a substantial risk to the organization and when they are easy to fix (Weick & Sutcliffe, 2015). These organizations rarely, if ever, have significant accidents. They prize the identification of errors and close calls for the lessons they can extract from a careful analysis of what occurred before these events.

Weick and Sutcliffe (2015) developed principles that support the process of organizing for high reliability. These principles generate a collective mindfulness, which enables the capability of discovering and managing unexpected events, which leads to high reliability. Figure 1 lays out this process of organizing for high reliability based on Weick and Sutcliffe’s five principles (Weick, Sutcliffe, and Obstfeld, 2008). I then explain these five principles in detail.

Figure 1. Five Principles of High Reliability (Weick, Sutcliffe, and Obstfeld, 2008)
The first principle is **preoccupation with failure** (Weick and Sutcliffe, 2015). This proactive state of mindfulness gives HROs much of their distinctive quality. To be preoccupied with failure, therefore, is to make do with less than ideal learning conditions and convert them into grounds for improvement. Most organizations tend to localize failure, which reduces the opportunity to learn and recognize the failure when it happens again. On the contrary, effective HROs tend to generalize errors and create a culture of openness. By creating a culture of openness, people are more willing to report and discuss errors and to work toward correcting them. Therefore, one means to learn, even though trial and error is limited, is by broadening the set of errors that are available from which to learn and by instituting practices that encourage people to report all of those errors that are detected.

The next principle is the **reluctance to simplify interpretations**. Simplifications, such as over-generalizing a list of steps, are potentially dangerous for HROs because they limit both the precautions people take and the number of undesired consequences they envision. Simplifications increase the likelihood of eventual surprise. Organizations socialize people to ignore the same steps in a process things. In contrast, HROs are distinctive because they make fewer assumptions and socialize people to notice more (Xiao, Milgram, & Doyle, 1997). HROs are distinguished not just by their diverse views but also by the mechanisms they institutionalize to manage disagreements among those who hold these diverse views. One such mechanism is redundancy, which involves cross checks, doubts that precautions are sufficient, and wariness about claimed levels of competence.
Next, individuals must maintain **sensitivity to operations**. The concept is similar to the notion of situational awareness, which is defined as “the perception of the elements in the environment within a volume of time and space (Endsley, 1997, p. 270).” LaPorte (1988) suggests, “the effort and intensity of purpose required to build what we sometimes characterize as the ‘bubble’, the state of cognitive integration and collective mind that allows the integration of tightly-coupled interactive complexity as a dynamic operational process, is enormous (p224).” If someone has this heightened level of situational awareness at all times in HROs, then catastrophic failures are forestalled by large numbers of ongoing small adjustments that prevent errors from accumulating (Wildavsky, 1991). When people have the bubble, ongoing action occurs simultaneous with attention, and people act thinkingly with wisdom and heed (Meacham, 1983; Weick, 1993a, 1998). Sensitivity to operations reduces the incidence of automation surprises and shortens the period of inaction. The issue of awareness of production pressure and its effects on judgment and performance is crucial, because many organizations have raised production pressure and overload through downsizing. Having the bubble, when achieved, is typically a shared accomplishment, and bubbles of varying focus and range may coexist in a high-functioning HRO.

The following two principles are related to the reaction after the events have happened. The first is focused on **commitment to resilience**. Most HROs engage in their own form of operations when they stumble onto problems far from informed rescuers, uncommitted resources, and expertise, and have no choice but to respond to the unexpected in real-time. This principle focuses on the word “management,” because it
emphasizes the fact that people deal with surprises both by anticipating them to avoid them in advance and by using resilience to respond to them as they occur. Focus on the equally important word “management” because it makes clear that people deal with surprises, not only by anticipation that weeds them out in advance, but also by resilience that responds to them as they occur. Resilience refers to the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back (Weick, Sutcliffe, and Obstfeld, 2015). Resilience is not only about bouncing back from errors, it is also about coping with surprises in the moment (Rochlin, 1989). This form of resilience materializes when events occur outside of normal operational boundaries, and knowledgeable people self-organize into ad hoc networks to provide expert problem solving. These networks, which have no formal status, dissolve as soon as normalcy returns. Bourier (1996) describes these structures as “informal latent networks activated only in the face of uncertainties and rapidly developing contingencies as a supplement to the normal patterns of formal hierarchy and compliance with strict roles (p.105).” Here, Effective HROs also have the capability to recombine actions already in their repertoire into novel combinations. As Wildavsky makes clear, this is the ultimate form of resilience: “Improvement in overall capability, i.e., a generalized capacity to investigate, to learn, and to act, without knowing in advance what one will be called to act upon, is a vital protection against unexpected hazards” (Wildavsky, 1991, p. 70). HROs, unlike most organizations, are simultaneously able to both believe and doubt their past experience (Weick, 1969, ).
The last principle is deference to expertise (Weick and Sutcliffe, 2015). This includes deference downward to lower ranking members of the organization. Expertise defers from the expert from its relational knowledge with greater emphasis on an assembly of knowledge, experience, learning, and intuition. Credibility, a necessary component of expertise, is the mutual recognition of skill levels and legitimacy. For example, in the case of an injury scene, the first person that enters a scene is the actual expert for recognizing the scene itself. They may not be the expert for treating the injury. However, they have first-hand knowledge of what they found, the condition of the injured person when they first entered the scene, and any other pertinent information that may be important to an actual health care provider. The credibility of an expert, to include the first person entering a scene, is important, because the legitimacy of an account is factored into a response. If an expert’s account is questioned or rescinded, this will delay the response.

**Chassin and Loeb’s Three High Reliability Imperatives**

Chassin and Loeb (2013) explored three major changes that health care organizations would have to undertake to make substantial progress toward high reliability: (1) the leadership’s commitment to the ultimate goal of zero patient harm, (2) the incorporation of all the principles and practices of a safety culture throughout the organization, and (3) the widespread adoption and deployment of the most effective process improvement tools and methods. Figure 2 illustrates the three major changes or domains that create an environment to organize for high reliability.
Figure 2. Three Imperatives of High Reliability (Chassin and Loeb, 2013)

Within these three domains created by Chassin and Loeb (2013), there are 14 components that support and lead to high reliability organizing. These components are heavily focused on organizational theory, rather than the individual, and rely on organizational level performance for creating substantive change. Figure 3 illustrates these components under the corresponding domain.
Leadership commitment requires the aligned agreement of the governing body, typically a board of trustees or directors, senior management, and physician and nurse leaders. This imperative asserts that leadership commitment is essential for achieving zero harm. The goal of zero harm also is important, because one of the most salient
characteristics of high-reliability organizations is that they are not satisfied with whatever their current level of safety might be. They always are looking for ways to improve it, and this can only be done through leadership commitment. The board must be part of the leadership’s commitment to eventually achieve zero patient harm and to elevate quality and patient safety to the organization’s highest strategic goal (Chassin and Loeb, 2013).

Since 2009, The Joint Commission has required the leadership of all health care organizations that it accredits to “create and maintain a culture of safety” (The Joint Commission, 2008a). Safety Culture refers to a culture of safety that fully supports high reliability and has three central attributes: trust, report, and improve (Reason & Hobbs, 2003). Workers exhibit enough trust in their peers and the organization’s management that they routinely recognize and report errors and unsafe conditions without any adverse actions taken against them. There is a shared understanding that management appreciates such a report in the interest of improving patient safety. When all three of these components of a safety culture (trust, report, and improve) are working well, they reinforce one another and produce a stable organizational culture that sustains high reliability.

Maintaining trust also requires the organization to hold employees accountable for adhering to safety protocols and procedures. HROs establish clear, equitable, and transparent processes for recognizing and separating the small, blameless errors that all people make every day from unsafe or reckless actions that are blameworthy.
Understanding how and why blameless errors occur is part of the learning process that HROs employ to maintain their exemplary safety records.

Chassin and Loeb (2013) recommend that HROs should proactively assess the strength and resilience of their safety systems and the organizational defenses that prevent errors from propagating and leading to harm. For example, they suggest that today’s hospitals often function in a reactive mode, investigating incidents in which patients have already been harmed, conducting root cause analyses, and instituting corrective action plans to prevent future occurrences. They suggest using these (error) evaluations to developing proactive systems of safety. They also suggest measuring progress toward establishing all these elements (Chassin and Loeb, 2013).

Quality improvement tools such as Lean, Six Sigma, and change management constitute the most effective way for health care to dramatically enhance its capacity to create nearly perfect safety processes (DelliFraine, Langabeer, & Nembhard, 2010; DuPree et al., 2009). More specifically, Lean is a set of tools and a philosophy of employee-empowered improvement that identifies and removes wasted effort from processes without compromising the quality of the outcome. Six Sigma tools focus on improving the outcomes of a process by radically reducing the frequency with which defective products or outcomes occur. Change management, on the other hand, is a systematic approach that prepares an organization to accept, implement, and sustain the improved processes that result from the application of Lean and Six Sigma tools. These three tools are called robust process improvement, or RPI (Chassin and Loeb, 2013).
They suggest this combination of methods is a much more potent set of tools than healthcare currently uses to address safety and quality problems.

**Limitations to Research**

There are few studies of HROs in healthcare, because achieving zero preventable harm is difficult. No studies have directly assessed how the individual’s beliefs and behaviors align with strategies to achieve High Reliability, whether the five principles or the three imperatives. Also, few studies have used a theoretically-based approach to develop a better understanding of the barriers and facilitators involved with implementing an HRO strategy. Research in the field of implementation science often uses socio-cognitive and psychological theories to assess factors affecting implementation efforts (Damschroder et al., 2009).

This study will assess barriers and facilitators in order to understand and address the factors impacting the implementation of the HRO frameworks. If this type of assessment is performed, a theoretical-based implementation strategy could be tailored to meet the needs of the HRO Strategy in changing behaviors, which would likely lead to implementation success and favorably impact High reliability outcomes. Thus, a theoretically-based assessment of implementation efforts would improve our understanding of the multiple factors that can influence the behaviors of the healthcare professionals within the HRO engagements setting. With this in mind, I now transition to discuss the innovative way to study barriers and facilitators of implementation of an evidence-based practice in support of Army Medicine’s HRO Strategy.
An Innovative Way to Study Barriers and Facilitators of Implementation

Implementation science is the study of methods to promote the integration of research findings and evidence into healthcare policy and practice (NIH, 2015). This field of research seeks to understand the behavior of healthcare professionals in the sustainable adoption and routine use of evidence-based innovations. Over the past decade, a plethora of implementation theories have been developed to promote implementation effectiveness. This body of work has produced a vast array of theories with overlapping constructs, making it difficult to determine which theory or framework to use. Consequently, a theoretical framework was developed in an effort to consolidate this vast array of constructs and theories. The Consolidated Framework for Implementation Research (CFIR) was established in 2009 to assess implementation efforts on organizations (Damschroder et al., 2009).

The CFIR was developed with the intent of consolidating the constructs related to Implementation Science (Damschroder et al., 2009). As such, it primarily focuses on organizational and social factors affecting implementation and provides a unique lens to assess implementation efforts. This framework provides taxonomies and menus of constructs to draw upon for assessing barriers and facilitators for implementation (Brehaut & Eva, 2012). In essence, the framework was primarily developed for qualitative analyses to promote theory development and verification about what works where and why across multiple contexts.
The theories reviewed for the framework were related to dissemination, innovation, organizational change, implementation, knowledge translation, and research uptake. In total, 19 implementation theories were considered for influencing implementation and potential for operationalization. The resultant menu of constructs consists of 39 operationally defined constructs organized into five domains.

The CFIR is composed of five major domains (see Table 1): intervention characteristics, outer setting, inner setting, characteristics of the individual involved, and the process of implementation. Eight constructs are identified related to intervention; some examples of this include evidence strength and quality. There are four constructs related to outer setting; examples include patient needs and resources. There are 12 constructs related to inner setting; examples include culture and leadership engagement. There are five constructs related to the individual, such as knowledge of the intervention. And finally, five constructs are related to the process of implementation domain.

Since its development, the CFIR has been used in a variety of empirical studies. It has helped with formative evaluations of implementation efforts (English et al., 2011; Damschroder & Lowery, 2013) and guided mixed-methods assessments of implementation strategies (Powell et al., 2013). The majority of the studies have been qualitative in nature, in which the CFIR taxonomy has been used to inform the development of the interview guides and coding frameworks. In line with this, Damschroder and Lowery (2013) recently provided a step-by-step guide for how to apply a theory-based framework using qualitative data. Of note, however, research groups, such as the Seattle Implementation Research Collaborative, have attempted to map
quantitative measures to the constructs and domains of the CFIR in an effort to improve the development and use of CFIR-based instruments (Martinez, Lewis, & Weiner, 2014).

The most obvious strengths to the CFIR are its comprehensiveness and systems approach to studying implementation. The CFIR is heavily focused on the intervention and the social context the individuals (e.g., inner setting) and organizations (e.g., outer setting) are embedded within. It also assesses the process of implementation, focusing on both the active change process as well as the individuals who promote the implementation efforts (e.g., local champions, external change agents).

Table 1. Domains and Constructs for the CFIR

<table>
<thead>
<tr>
<th>Domain</th>
<th>Constructs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intervention Characteristics</td>
<td>Intervention Source, Evidence Strength and Quality, Relative Advantage, Adaptability, Trialability, Complexity, Design Quality and Packaging, and Cost</td>
</tr>
<tr>
<td>Outer Setting</td>
<td>Patient Needs and Resources, Cosmopolitanism, Peer Pressure, External Policies &amp; Incentives</td>
</tr>
<tr>
<td>Inner Setting</td>
<td>Structural Characteristics, Networks and Communications, Culture, Implementation Climate (Tension for Change, Compatibility, Relative Priority, Organizational Incentives and Rewards, Goals and Feedback, Learning Climate), and Readiness for Implementation (Leadership Engagement, Available Resources, Access to Knowledge and Information)</td>
</tr>
<tr>
<td>Characteristics of Individuals</td>
<td>Knowledge and Beliefs, Self-efficacy, Individual Stage of Change, Individual Identification with Organization, and Other Personal Attributes</td>
</tr>
<tr>
<td>Process</td>
<td>Planning, Engaging (Opinion Leaders, Formally Appointed Internal Implementation Leaders, Champions, and External Change Agents), Executing, and Reflecting and Evaluating</td>
</tr>
</tbody>
</table>

There are also several weaknesses to this framework. There are a lot of constructs to be assessed (39), which may be problematic in qualitative research. Additionally, the framework and current methods make it difficult to assess the individual-level attitudes,
beliefs, and intentions toward the behavior. For example, this framework is mostly used with qualitative work, and the constructs provide a thorough assessment of the interviewee’s perceptions related to the innovation and factors in the environment. However, the domain “Characteristics of the individual” only provides a general assessment of a person’s knowledge and beliefs, self-efficacy, stages of change, and organizational identity. It’s not only difficult to measure these constructs, but a small sample could bias the results considerably. Also, although the framework provides a general description of each construct, there are several that are underdeveloped and ambiguous. This makes it difficult to maintain reliability when coding (e.g., concepts may overlap with multiple domains and constructs).

Figure 4 illustrates the framework for assessing the two high reliability strategies under study, in which Weick and Sutcliffe’s principles of high reliability (2015) are held in parallel with Chassin and Loeb’s imperatives (2013). The highlight to this illustration are the levels of influence that each of these strategies align with, which range from the individual level up to the external environment. We have already described how Weik and Sutcliffe’s principles toward collective mindfulness connect at an individual and group/clinic level. There are also components of Chassin and Loeb’s imperatives that align at the individual and group/clinic level. However, the three imperatives have a much broader capacity to impact the entire organization at the hospital level. Therefore, based on the literature, this assessment will identify those components within the principles and imperatives that may serve as barriers in order to identify facilitators to organize for high reliability at multiple levels.
The figure 4 illustration aligns the CFIR domains with High Reliability strategies and Levels of Influence, which also aligns nicely at the individual level all the way to the outer setting. Therefore, the CFIR is an appropriate vehicle for assessing the two strategies across the areas of influence.

Figure 4. High Reliability Strategies and CFIR Domains Mapped to the Levels of Influence
CHAPTER 3: METHOD TO COLLECT DATA

In this chapter, I describe the methods that I used to address questions derived from this study. I begin with the rationale for my research design with background on the Military Healthcare System (MHS) and what prompted attention to High Reliability, followed by a discussion of the specific sites and research sample. I conclude by providing a detailed description of my qualitative approach and analysis, which includes observational research, semi-structured interviews, and an assessment of findings.

The purpose of this qualitative study is to gain a better understanding of High Reliability in Healthcare and provide insights into the determinants of success for implementing strategies to achieve High Reliability. Through a careful examination of the multiple levels of factors that can influence implementation, it is my intent to provide a detailed characterization of the barriers and facilitators of implementing strategies to achieve High Reliability. To do this, I look specifically at what happens when a High Reliability strategy is implemented within the Military Health System. My research questions as restated from Chapter 1 are as follows:

1. How do the health care teams organize for High Reliability using the HRO principles and imperatives?

2. What are the barriers and facilitators involved in the successful implementation of the HRO principles and imperatives?

The purpose statement and research questions place emphasis on understanding and characterizing social interactions and contextual factors that shape and influence behavior.
for participants who are relied upon for high reliability outcomes. This assessment requires an understanding of the background on the Military Healthcare System and what prompted attention to the High Reliability Organization. This also implies a need to study the structures and processes used for implementation. I therefore designed this study as a qualitative assessment together with qualitative data using participant observation, semi-structured interviews, and survey assessments. These methods were chosen for several reasons.

First, the most appropriate research design for studying the organization and processes was inductively with qualitative data. Through participant observations and semi-structured interviews, I achieved a better understanding and characterization of the social interactions between the different participants relied upon for high reliability practices. In addition, these methods enabled me to gather rich data on knowledge and awareness in the clinical settings. This was useful in understanding how knowledge supports awareness in organizing for high reliability.

The interview protocol included as Appendix A was used in the interview process for participants in order to collect data. These semi-structured interviews were also used to gather context-sensitive qualitative data in the different areas of the hospital. These interviews were conducted with a purposeful sampling of key informants at multiple locations in order to obtain a deeper understanding of the context and social interactions (e.g., leader engagement) from a variety of perspectives. In situations where face-to-face interviews were untimely or not possible, phone interviews were exercised as necessary.
After the data was collected, I used a qualitative comparative analysis to better understand and further characterize the individual, organizational, and environmental factors impacting the uptake and use of the strategy. The data was used to codify and develop themes around the data collected. During the study, we had enough participants across Army Medicine to effectively meet the goals of the study.

**Setting: The Military Health System**

The MHS is a global, comprehensive, integrated system that includes combat medical services, health readiness futures, a health care delivery system, public health activities, medical education and training, and medical research and development. The fundamental mission of the MHS, providing medical support to military operations, is different from that of any other health system in the United States. The operational aspects of the MHS are divided among the three Military Departments (Army; Navy, to include Marine Corps; and Air Force), with each Service and the Defense Health Agency controlling and operating their own medical centers, hospitals, and clinics worldwide.

As one of the largest health care providers in the United States, the MHS combines resources from both direct and purchased care components, facilitating ready access to health care for 9.6 million beneficiaries, including Service members, retirees, and their eligible family members. In Fiscal Year 2013, based on the timing of the MHS Review, the direct care component of military treatment facilities (MTFs) consisted of 56 hospitals, 361 ambulatory care clinics, and 249 dental clinics, operating worldwide and employing 60,389 civilians and 86,051 military personnel. The purchased care component, which is used when care cannot be provided within the military system,
includes civilian network hospitals and providers operated through TRICARE regional contracts.

Like every large health care system, the MHS is constantly responding and adapting to changing demographics, shifting policies, evolving standards for access and quality, advances in science and medicine, complex payment and cost considerations, rapidly evolving communications and information technology capabilities, and fluid patient expectations. In addition, the MHS reformed its governance structure in October 2013. All health care systems, including the MHS, are expected to engage in systematic performance reviews designed to assess new developments and to measurably improve the delivery of health care services and the health status of the population served. These factors combined warranted an assessment of the general state of care in the MHS in order to determine where improvement is possible.

**Military Health System Review**

Due to growing concerns over access to care, quality of care, and patient safety within the military health system (MHS), the Secretary of Defense ordered a comprehensive review of the MHS on May 28, 2014. The intent of this review was to assess these three critical issues and any recommendations moving forward. The review was specifically directed to assess whether: 1) access to medical care in the MHS meets defined access standards; 2) the quality of health care in the MHS meets or exceeds defined benchmarks; and 3) the MHS has created a culture of safety with effective processes for ensuring safe and reliable care of beneficiaries.
This review in 2014 was the first time the MHS took an enterprise view of this scope in these areas. Based on information analyzed during the review, the review members concluded that the MHS provided good quality of care that is safe and timely and is comparable to that found in the civilian sector. However, it was decided that the MHS demonstrated wide performance variability, with some areas better than civilian counterparts and other areas below national benchmarks.

Together, the review’s results and the professional inputs from six external experts indicated clear opportunities to improve health care delivery. The major recommendations from the report were directed at system enhancements to address areas of concern and to drive change and foster creation of a high reliability health system. At the time of the study, it was suggested that the MHS governance could support performance improvement with better analytics, greater clarity in policy, and aligned training and education programs. However, improving outcomes is about decreasing performance variance at the individual facility level, which requires consistent leadership vigilance, with the goal of making the MHS a top-tier health care system.

The findings and recommendations from the report provided an approach for improving the performance of the MHS. The foundation for improving performance in the MHS rested on combining the concepts of an integrated health care system with those of high reliability organizations. The MHS was charged to continue to mature as an integrated health system, improving alignment among the Services and between the direct care and purchased care components and placing particular emphasis on improving transparency related to access, quality of care, and patient safety. This assessment was
designed to help determine whether the principles and imperatives of a high reliability organization were being operationalized effectively.

**The Army Response to the MHS Study**

Since the MHS Review, Army Medicine adopted the following three change imperatives as Lines of Effort in the AMEDD HRO Strategy: Leadership Commitment to achieve zero preventable patient harm; Culture of Safety; and Robust Process Improvement. They also adopted the five HRO principles, which include Preoccupation with Failure, Reluctance to Simplify, Sensitivity to Operations, Commitment to Resilience, and Deference to Expertise. The AMEDD HRO program was aligned with that of the MHS and those of the U.S. Navy and U.S. Air Force. It was fully aligned with strategic efforts, which include the Army Force 2025 and the AMEDD 2020 Campaigns.

Since the MHS Review of 2014, the Army Medical Command HRO Strategy Map was developed and executed. The Office of the Surgeon General (OTSG) executed the following initiatives that align the HRO: The Surgeon General (TSG) led HRO strategic summits at each Regional Health Command/Medical Command; all Medical Quality, Safety, and HRO elements of the headquarters staff aligned into a single unit and assigned a general officer to lead it; revised command leader-level structure for health readiness platforms, which now includes Deputy Commander for Quality and Safety; focus review of leading/lagging metrics and outliers within Medical Treatment Facilities with improvements in access to care, quality of care, and patient satisfaction; introduction to Mortality, Infection Prevention, and Perinatal Care metrics in Medical Treatment Facility/Health Readiness Platform (MTF/HRP) and Regional performance reviews. It is
important to note that the focus of these changes were based on the High Reliability imperatives and were not directed at the individual and team level to improve collective mindfulness.

Access to Care metrics are a recurring topic monitored and reported monthly during Regional Analysis Discussion and Review sessions with the Deputy Surgeon General and Regional Health Commands. HRO concepts are also incorporated as Safety Stories in the weekly Commander’s Update Brief.

Beginning with the leadership summits, other quality efforts taken were the development and finalization of the MHS Resource Guide, Engagement Strategies for Executive and Physician Leaders, and the creation of a Performance for Improvement (P4I) dashboard with over 30 metrics related to quality, safety and patient satisfaction, which is readily available to leaders and staff. Finally, enhanced usage of secure messaging was enabled to improve communication between patients and clinicians, and a 24/7 Nurse Advise Line was adopted and expected to improve access to care.

In 2016, the HRO participated in the stand-up of a MEDCOM Quality and Safety Center intended to improve the ability to share methodology and lessons learned across the MEDCOM. It was also intended to establish transparency of quality and safety metrics by enabling public display on health.mil, Tricare.mil and MTF home pages. These are all available to the public, beneficiaries, MHS personnel and leaders. However, to date, none of this information has been shared across the MHS. The focus has been on organizational change at the highest levels and has not been effectively implemented and operationalized as the lower levels.
In 2016, the MEDCOM also partnered with the Joint Commission Center for Transforming Healthcare to pilot a self-assessment tool (Oro 2.0) that gauges the HRO maturity of the leadership of the bedded, inpatient Army MTFs. The MTFs develop action plans to which they are held accountable to advance. To date, self-assessments and site visits have been conducted at Brook Army Medical Center (BAMC), Madigen Army Medical Center (MAMC), Tripler Army Medical Center (TAMC), Carl R. Darnall Army Medical Center (CRDAMC), Womack Army Medical Center (WAMC, Landstuhl Regional Medical Center (LRMC) and William Beaumont Army Medical Center (WBAMC). The intent was to assess four facilities per year for the next five years. Lessons from these self-assessments are shared across the MEDCOM. However, these assessments are only checking on the three imperatives from Chassin and Loeb and have nothing to do with the High Reliability principles.

Army Medicine is an active participant in the Defense Health Agency-led Learning Organization Integrated Product Team designed to advance the MHS and the Services as a collective Learning Organization along the continued journey of high reliability. The Leadership Engagement Toolkit and the Institute of Healthcare Improvement (IHI) Strategic Partnership, which includes collaboratives, patient safety courses, and quality conferences, are two examples of opportunities promoted throughout the MHS.

**Answering the Research Questions**

To answer the research questions, I conducted a study within Army Medicine in which preparation started in January 2017 and the assessment ended in September 2017.
Using participant observations and semi-structured interviews, I was able to assess different behaviors that result from the HRO Strategy as well as the barriers and facilitators involved in implementing the HRO strategy. Using observations and semi-structured interviews, a rigorous assessment was conducted into the barriers and facilitators for implementing this strategy within Army Medicine.

This quality improvement assessment was conducted at four Army Medical Treatment Facilities across the 207 facilities within the continental United States. The first visit was in February, 2017, and the final visit was in May, 2017.

**Subjects**

The primary focus area within the hospital was the operating room and the clinical staff that work in this area. This included surgeons, anesthesiologists, nurses, techs, and OR managers. The secondary focus area was the quality management department (Quality Manager, Patient Safety Manager, Performance Improvement) and the executive leadership of the organization (Deputy Commander for Quality and Safety, Deputy Commander for Nursing, Deputy Commander for Clinical Services, Command Sergeant Major, and the Commander).

The individuals could refuse to participate. The interview guide included a standard message before the interview which stated that the person can choose not to participate, stop at any time, and/or not answer questions. For the observational research, we briefed the clinical staff and informed them that we are conducting research and that they could choose not to participate (same message as the interviews). The research was not intended to disrupt the flow of work or the normal behavior in the workplace. We
also spoke with the leadership team/managers about the study before the field research began so that they were aware of the research and would agree to the visit. The organization had an opportunity to refuse if they chose.

This study was conducted during the daytime at the hospitals. The interviews and observations were conducted during the normal duty day. The study primarily focused on the staff of the operating rooms and the clinical staff they work with.

Observational research methods were used to observe the staff’s behaviors before, during, and after their surgical cases. The focus was on behaviors supporting the high reliability principles. During the observations in the operating room, there were interactions that took place with operating room staff based on opportunities that developed before and after cases. These interactions in no way interfered with surgical cases or the progress of duties. The questions that were asked were based on observations and not necessarily included on the interview guide.

Semi-structured interviews were also conducted with the operating room staff to assess their competencies toward high reliability as well as their attitudes and beliefs toward the intervention. These interviews also included key informants from the operating room, quality management, and the hospital’s leadership team to assess barriers and facilitators in the context of the workplace.

High Reliability Strategies for Operating Room Assessment

High reliability is concerned with obtaining low rates of error despite operating in a complex work environment where errors would normally occur. Therefore, this study focused on implementation of the high reliability strategies within the operating rooms.
Questions were specifically focused on organizing for high-risk outcomes related to unintended retained foreign objects (URFO) and wrong site surgery (WSS). These are two of the most common sentinel events in the Military Health System. This study focused on four hospitals to see how they have implemented the high reliability strategies (or other methods) to achieve zero patient harm.

**Data Collection and Processing**

The two primary investigators collected the data using observational assessments and semi-structured interviews. Semi-structured interviews were used outside of the operating room. The CFIR was used to inform the development of the semi-structured interview guide in which there were 37 constructs being assessed (see Appendix A for the CFIR and interview questions used for each site). The questions for each construct were developed from a previously validated CFIR interview guide (Damschroeder & Lowery, 2013). For all interviews, the questions were kept open-ended in nature, and respondents were probed for elaboration to facilitate the narrative. Open narrations were encouraged to allow respondents to address information they thought was important. The semi-structured interviews were recorded using a digital recording device, and the recordings were transcribed through a professional transcription service. The transcripts were de-identified when received back from the transcription service. The transcripts and field notes were then coded using both NVivo qualitative software and manual procedures. Only the team members had access to the documents.

The first set of questions asked about the respondent’s role within the organization. The next set of questions assessed the respondent’s knowledge and
perceptions of the HRO intervention along with the process of implementation within their organization. This also included the difficulty and success of implementation. The next set of questions focused on knowledge of any evidence behind the implementation of High Reliability, the relative advantage of implementation, as well as any knowledge of alternative practices that may serve better. The next set of questions focused on potential factors of influence from the inner and outer setting, followed by questions that focused on characteristics of the individual and what the person’s knowledge and beliefs are regarding the intervention. This also included the individual’s beliefs in their own capabilities regarding HRO implementation and any perceptions on organizational commitment and how the intervention fits into the organization. The last few items specifically targeted process, including planning, engaging, executing, and evaluation practices. These questions also assessed whether there were any champions or external change agents involved in the intervention.

The participant interviews typically lasted one hour, and support staff interviews, including interviews conducted during observations, ranged from 10 to 45 minutes. For analysis, interviews were recorded, professionally transcribed verbatim, and checked for accuracy as described previously. The 17 interviews produced 341 pages of transcripts for review.

Observational research methods and interviews were conducted in the operating rooms. These specific assessments were focused on the hospital’s high reliability strategies for URFO and WSS. For example, the questions assessed what types of risks they were looking for during the procedure (specific to URFO and WSS), how they
organized to get additional staff in the event of an emergency, and how they formally communicated to maintain situational awareness. These interviews were not allowed to be recorded due to the sensitive nature of the operating room environment. The field notes were reviewed by the team after each visit, and summary documents were developed.

**Number of Subjects**

There were 17 semi-structured interviews conducted between the four medical treatment facilities. The research team also talked with approximately 30 additional staff members in the operating rooms during the observational research. Table 2 depicts the interviews for each facility by role. Note: Interview indicates a semi-structured interview, whereas Notes indicates interview and observational research.
Table 2. Interviews by Role for each Hospital

<table>
<thead>
<tr>
<th>Role</th>
<th>101</th>
<th>102</th>
<th>103</th>
<th>104</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commander</td>
<td>Interview</td>
<td>Cancelled interview x 3</td>
<td>Interview</td>
<td>Interview</td>
</tr>
<tr>
<td>Deputy for Medical Services</td>
<td>Interview</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>Deputy for Quality and Safety</td>
<td>Interview</td>
<td>Interview</td>
<td>Cancelled</td>
<td>Interview</td>
</tr>
<tr>
<td>Quality Manager or Patient Safety Manager (HRO)</td>
<td>Interview</td>
<td>Interview</td>
<td>Interview</td>
<td>Interview</td>
</tr>
<tr>
<td>Chief, OR RN (PeriOp)</td>
<td>Interview</td>
<td>Interview</td>
<td>Interview</td>
<td>Interview</td>
</tr>
<tr>
<td>Chief, Anesthesia</td>
<td>Interview</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>OR Observations</td>
<td>Notes</td>
<td>Interview</td>
<td>Notes</td>
<td>Notes</td>
</tr>
<tr>
<td>Surgeon</td>
<td>Notes</td>
<td>Notes</td>
<td>Notes</td>
<td>Notes</td>
</tr>
<tr>
<td>OR Nurse</td>
<td>Notes</td>
<td>Notes</td>
<td>Notes</td>
<td>Notes</td>
</tr>
<tr>
<td>OR Tech</td>
<td>Notes</td>
<td>Notes</td>
<td>Notes</td>
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<tr>
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<td>Notes</td>
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<td>Size</td>
<td>Medium</td>
<td>X-Large</td>
<td>Large</td>
<td>Small</td>
</tr>
<tr>
<td># Operating Rooms</td>
<td>8 OR</td>
<td>28 OR</td>
<td>18 OR</td>
<td>3 OR</td>
</tr>
</tbody>
</table>

**Primary Data Analysis, Qualitative Data Coding, and Case Memos**

The data was analyzed by the two primary investigators. The CFIR constructs were used to guide the coding analysis, and any new information was coded accordingly. The two person assessment team independently analyzed and coded the transcripts. A team meeting was conducted to discuss the coding analysis, and all discrepancies in the coding process were resolved.

Transcripts were imported into NVivo Version 10 and coded using the CFIR framework. A coding guide was used to review and validate transcript data against the
constructs. The coding effort was then reviewed and verified against the transcript data. NVivo reports of the aggregate responses were used to develop case summary memos, which were organized by CFIR domain.

![Workflow for Case Analysis](image)

**Figure 5. Workflow for Case Analysis**

**Rating of the CFIR Constructs for Barriers and Facilitators Analysis**

Each of the CFIR constructs was provided a rating. This helped to systematically summarize the code and display the information in a matrix in order to perform a comparison across the constructs (Ragin, 2009). The rating criteria developed by Damshroder and Lowery (2013) were used to guide assignments of the ratings (see Table 3). The ratings reflect the valence and strength of each construct. For valence, a positive rating suggests the construct had a positive influence on the organization or was facilitating implementation efforts, whereas a negative rating indicated the construct had a negative influence or was impeding the implementation efforts. The rating assessment was as follows: +2 or -2 for explicit examples of how the construct manifested in the practice; +1 or -1 for general comments about the construct; 0 for neutral statements. No rating indicated there was no data collected. When the ratings were completed for all four sites, the rating for each construct was compared across the four sites to help ensure consistent application of ratings.
Table 3. Criteria Used to Assign the Rating to Constructs

<table>
<thead>
<tr>
<th>Rating</th>
<th>Criteria*</th>
</tr>
</thead>
<tbody>
<tr>
<td>+2</td>
<td>The construct is a positive influence in the organization, a facilitating influence in work processes, and/or a facilitating influence in implementation efforts. The interviewee(s) described explicit examples of how the key or all aspects of a construct manifests itself in a positive way.</td>
</tr>
<tr>
<td>+1</td>
<td>The construct is a positive influence in the organization, a facilitating influence in work processes, and/or a facilitating influence in implementation efforts. The interviewee(s) made general statements about the construct manifesting in a positive way but without concrete examples.</td>
</tr>
<tr>
<td>0</td>
<td>A construct has neutral influence if it appears to have neutral effect or is only mentioned generically without valence or there is no evidence of positive or negative influence.</td>
</tr>
<tr>
<td>-1</td>
<td>The construct is a negative influence in the organization, an impeding influence in work processes, and/or an impeding influence in implementation efforts. The interviewee(s) made general statements about the construct manifesting in a negative way but without concrete examples.</td>
</tr>
<tr>
<td>-2</td>
<td>The construct is a negative influence in the organization, an impeding influence in work processes, and/or an impeding influence in implementation efforts. The interviewee(s) described explicit examples of how the key or all aspects of a construct manifests itself in a negative way.</td>
</tr>
</tbody>
</table>

*Adapted from Damschroder and Lowery (2013)

Within the qualitative comparative analyses, I sought to identify differences between strong and weak distinguishing factors in the form of barriers and facilitators for implementation practices. A summary matrix was created to facilitate the comparative analysis. The matrix listed the ratings for each CFIR construct by site, which allowed for analyzing patterns or trends across the four locations. Since there were no sites that were organizing for High Reliability, the sites were not grouped or compared against one another for comparisons regarding implementation effectiveness. However, the constructs that were assessed at each site were analyzed for strong and weak distinguishing barriers that may be preventing implementation effectiveness, and in some cases there was more than one site with similar ratings for distinguishing barriers for implementation. This
helped to identify distinguishing patterns between strong and weak barriers for implementation practices.

In line with the research from Damshroder and Lowery (2013), the constructs were categorized in the following manner: not distinguishing between strong and weak factors in the form of barriers and facilitators for implementation practices, and strongly and weakly distinguishing barriers for implementation practices. The assignment was a judgment based on the spread and pattern between the strong and weak distinguishing barriers and facilitators for implementation practices based on the four sites. For example, if more than one site rated as a -2 with strongly distinguishing barriers, the construct was determined to be strongly distinguishing. If a site only had one -2, it was rated as weakly distinguishing. If there was any variation from this, it was assessed into the other categories.
CHAPTER 4: CURRENT PRACTICES FOR HRO IMPLEMENTATION
WITHIN ARMY MEDICINE

In this chapter, I focus on the practices currently in place to organize for High Reliability based on the existing strategy and use of HRO principles and imperatives. This is achieved by identifying the knowledge of the interventions as well as the practices exercised at each of the four sites included in the study. Each site is described independently as 101 through 104. I then provide a comprehensive description of those practices found, including practices that are expected to achieve high reliability but were non-existent across the four hospitals. This helps provide the groundwork for identifying the barriers and facilitators for implementing high reliability, which will be addressed in Chapter 5. The qualitative work in this chapter was conducted to answer the following research question:

1. How do the health care teams organize for High Reliability using the HRO principles and imperatives?

Site 101

Patient safety seemed to be a priority topic in this hospital. However, there was no clear strategy or method to efficiently organize for High Reliability. The organization has accepted the HRO concept as a result of MEDCOM pushing the program down through MEDCOM Quality and Safety channels. Senior leaders and Quality and Safety Professionals within the organization explained that much of their learning has taken
place as a result of senior leader training and HRO Summits, which did not provide sufficient knowledge, experience, or application to organize for High Reliability.

Since there was no clear strategy, there was a mix of knowledge of what any existing strategy actually means. Most participants were aware that there are three imperatives, although they were unable to state each one, and participants had little knowledge of how the imperatives are exercised in their facility. There was one account that a leadership walk around took place every Thursday and that the group was mainly comprised of Deputies [HRO Officer, Site 101]. Since these walk around events took place every Thursday, the activity was mainly characterized as predictive and that actual patient safety protocols may be prepared in response to these scheduled activities [Deputy for Quality and Safety, Site 101]. Otherwise, there was a general understanding that leaders are, and need to be, engaged and that achieving patient safety outcomes is a shared interest (culture of safety).

It was also generally understood that the organization needs to be prepared to respond to change (Robust Process Improvement). Even though these elements were regarded as part of the organizational culture, the actual knowledge of the three imperatives adopted from The Joint Commission and Army Medicine are not well known. In addition, participants had much more limited knowledge of the five principles of High Reliability and what these principles mean.

Most participants in the operating room provided examples of practices used to ensure patient safety (culture of safety). These practices included TeamSTEPPS, time
outs, huddles, team meetings, the Deputy Leadership rounds, texting, and other meetings. TeamSTEPPS is an evidence-based set of teamwork tools, aimed at improving communication and teamwork skills among health care professionals (Agency for Healthcare Research and Quality, 2017). One account mentioned that informal communications is the norm, particularly the use of texting. There were also multiple accounts that mentioned that the majority of leadership engagements as well communications go through the Deputy channels. There were no mentions that the leadership engagement strategies were useful. There were also multiple accounts that the voice of the Commander is limited. The Commander does not attend the daily morning report, and gaining access to the Commander is difficult.

As for the specific high risk focus areas, the staff explained several ways they organized to prevent preventable errors. To prevent WSS, a timeout was conducted by the OR team. The process started with the surgeons when they marked the site prior to the surgery with the patient. This helped to validate the site and procedure with the patient. The staff then conducted the timeouts before the procedure. This is where they verified the procedure and site with the marked information. They completed the timeout checklist, and the staff all validated the information (right patient, right site, right procedure) before they proceeded, which created the collective mindfulness. This process was documented in the electronic health record (by the OR RN) as well as the Anesthesiologist’s clinical notes. Again, these process steps helped to force mindfulness throughout the process.
The URFO procedures were well organized, and there was a little variation based on the risk of the procedure. The staff met as a team before each procedure to discuss the case and the risks as well as validate that they had all the equipment. Depending on the case, the staff may have met with each other a few days before to validate that all the risks and concerns were addressed. Before they started the case, the operating room technicians counted all the equipment. They specifically wrote down the counts for the higher risks items, such as needles, surgical sponges, clamps, and knife blades. Again, these higher risk items were double counted by a second person, typically the operating room nurse. This counting procedure was done at two other intervals: before they closed the abdominal area and after they completed the case. If there were any concerns, the staff felt they could all tell the professionals to stop and double check for missing supplies. If the counts were off or if there were any concerns, the staff would use radiology X-rays to verify if any materials were left in the body cavity.

The one unique practice at this site was the use of radio-frequency identification (RFID) technology to track surgical sponges. This required the hospital to purchase surgical supplies with the embedded RFID technology. This allowed the team to “wand” the patient after the procedure as a second validation measure to ensure there were no retained objects (the wand would make an audio sound if it detected an object with the RFID). After the wand procedure was complete, the confirmation number was added to the electronic health record. This procedure likely increased their mindfulness and helped reduce the chance of miscounting and/or oversimplification of concerns. Additionally, this RFID strategy was developed by the surgeons themselves, which is why it was
widely accepted as the standard of practice. In fact, this hospital had over three years without a URFO, so the staff was very aware of this innovation.

As for their responsiveness to an emergent condition, most of the staff explained they had a plan of action where they could quickly call a backup person in the operating room area to provide assistance (deference to expertise). For example, the OR nurse and anesthesiologist could use the Vocera system (secure telephone communications) to call the float OR nurse. The only position in the room that didn’t have this coverage was the surgeon. They would rely on the on-call provider, who was typically in the clinical area of the hospital. When asked about this, the surgeons stated they would either talk with the other surgeons prior to the procedure or ask them to assist if they thought the case was riskier. They also explained they didn’t rehearse their procedures for emergent conditions (commitment to resilience). The approach seemed to assume there would be no emergent needs during the operation.

Site 102

Patient safety was mentioned as a priority topic for this hospital. However, as with site 101, there was no clear strategy or method across the organization to efficiently organize for high reliability. Therefore, High Reliability did not seem to be the focus or priority. There was very little knowledge in regard to where the HRO concept originated. However, the participants believed that it came from the DHA and MEDCOM through MEDCOM Operations Channels, versus MEDCOM Quality and Safety Channels
mentioned from Site 101. HRO is viewed as another priority requirement in the mix of other efforts with no means of supporting it.

One finding from site 102 is that some practitioners had previous experience from other locations that were regarded as favorable, and they used those experiences to make comparisons. This was particularly helpful in providing some contextual insights into how HRO strategy and potential quality improvements may be challenging based on size considerations. In this instance, site 102 is a larger medical treatment facility than many other medical facilities. As an example, instances were shared where patient safety awards were given at previous assignment locations, and the same is not taking place at site 102. There were suggestions that it may be easier to implement portions of the intervention at smaller sites than it is at larger sites.

In terms of operationalizing HRO, one comment indicated that patient safety efforts should work in parallel with everything else. Hence, high reliability should fit as an overlay with everything else going on. However, the size of the organization matters, and large organizations make implementation challenging. The following quote references how High Reliability should fit. However, the size of this particular organization makes it challenging.

“Site 102 is just huge. I will tell you this works much better if you’ve got a smaller organization. When you have an organization this size (site 102), it’s just very—the physical layout here being huge, it just becomes problematic [HRO Officer, Site 102].”

Most of the interviews for this site took place on the Clinical and Quality and Safety function side of the organization. They attributed much of their learning and awareness to
the MEDCOM Summits and previous experience. However, there was no mention of High Reliability being a Joint Commission or an industry initiative. The majority of comments indicated that this was an internal MEDCOM initiative. Participants appeared more knowledgeable about the three imperatives and believed the imperatives were a good starting point. There were also comments made about Lean and Six Sigma being used as a process improvement measure.

In general, there was very little knowledge of HRO due to a belief that there is a lack of material about the topic. In regard to LSS and HRO, participants did not find that the Lean Healthcare summit prepared participants to carry out their roles and responsibilities in regard to HRO. Therefore, one cannot successfully follow the strategies in the organization and learning climate is viewed as challenging. One account mentioned that they would like to see a command definition of HRO.

Because the internal organization is not being fed what it needs to implement High Reliability, participants indicated an interest in having an outside team come in and help teach it. There was no knowledge of where people are getting trained for this strategy. Most participants referenced the huge size of the hospital in regard to the challenges with training and implementing High Reliability. In addition, there are competing priorities with other training and tasks viewed as priority efforts which create obstacles for creating an HRO training focus. This then impacts the ability to send an effective strategic message regarding the importance of patient safety and high reliability.
This current approach to patient safety and High Reliability also then creates a challenge with achieving standardization, as evidenced by this quote from one participant:

“One of the very challenging things, and this is really one of my candid moments. In the operating room, it's very hard to get people to color, to get change implemented, because you have four distinct professions in there that have their own philosophy, their own objectives, their own whatever they're working for. And, sometimes it's hard to get everybody to follow [Chief of PeriOp Services, Site 102].”

In terms of process, there were no references to any champions in the High Reliability effort, nor are there any change agents from the outside that are positioned to advance the current high reliability efforts. There were accounts that referred to the fact that it’s hard to make changes even when it makes sense to do so. Here is a quote referring to this dilemma:

“So it’s challenging. It’s challenging to make changes. It’s challenging even though there’s evidence behind it. Even though it's for patient safety and quality improvement. Even though we’re not inventing it. We didn’t just come up with this. It is, you know, standard of care in many places, many respected institutions and places where I’ve trained, that’s how things are done and there’s a reason for it. And so implementing what seems like something that only benefits our patients has been quite a challenge [HRO Officer, Site 102].”

The participants provided examples of practices used to ensure patient safety. Much of it was centered on TeamSTEPPS. The general opinion is that HRO is going to take time. There were also multiple accounts that the voice of the Commander is limited and not engaged. Meetings are set up and get pushed back until they fall off the calendar.

There is one person tied to HRO, and the ability to implement is in question.

Others noted that the program came down with no support, and there are other priorities and no funding. It appears to be a stand-alone program with no clear strategy. It
is evident that the imperatives are known but not operationalized. Therefore, under a similar landscape as site 101, based on limited implementation of the imperatives and very little recognition of the principles, there is very little attention to operationalizing the principles of High Reliability.

As for the specific high risk focus areas, the strategies were similar. To prevent WSS, the staff followed the same process as described by site 101. It started with site prep and marking, the staff validating it during the timeout, filling out the timeout checklist, and documenting it in the health records. The URFO procedures were organized similarly, and they varied them based on the risk of the procedure. This included the use of the RFID technology (although it appeared to be forgotten and not a normal part of the process). This site also described using debriefs at the end of the procedure to capture the learning points, which appeared to be unique.

The plan to respond to an emergent condition was also very similar to the previous sites. For example, most of the staff explained that they could quickly call a backup person in the operating room. Again, the only position in the room that didn’t have this coverage was the surgeon. They would rely on the on-call provider, who was typically in the clinical area of the hospital. When asked about this, the nurses said, “they are doctors…they don’t need backup.” They also explained they didn’t rehearse their procedures for emergent conditions. The approach seemed to assume there would be no emergent needs during the surgery.
There was an emergent condition that arose during this time in the operating room. The less-experienced surgeon was closing, and the patient started bleeding uncontrollably and was not planned for in terms of a contingency. The surgeon asked the nurse to call the on-call provider. The OR nurse dialed the pager number on the phone, and the on-call surgeon called about 10 minutes later. Through a brief conversation, the surgeon determined they couldn’t help because they didn’t have the right experience. The surgeon then told the nurse to call a specific provider’s beeper. In total, it took approximately 30 minutes to get the provider into the room. None of this situation was discussed during the debriefing at the end of the surgery. When asked why they didn’t discuss what caused the inadvertent bleeding, the surgeon stated that the physician performance was discussed behind closed doors due to professional courtesy. Additionally, she stated the on-call process was problematic because they were short on staff and they had to cover the clinic. This further exposed the vulnerabilities associated with patient safety risks within this facility.

Site 103

Patient safety seemed to be a priority topic. Accounts from Senior Leaders and Quality and Safety Professionals indicated that they first heard about High Reliability approximately 10 years ago at an MHS Conference, followed by awareness through conferences internal to MEDCOM, to include Decision Science Camps and HRO Summits. However, the participants were clear that these venues did not provide sufficient knowledge, experience, or application to organize for High Reliability. There
were clear indications that the High Reliability imperatives and principles were better understood at the senior leader level.

Unlike sites 101 and 102, the executives said they had a hospital strategy for High Reliability. Specifically, their strategy was built around TeamSTEPPS and Arbinger training. Arbinger training is focused on developing an outward mindset so that individuals are focused on mindfully building relationships and focusing on others (Arbinger Institute, 2017). This didn’t align with the AMEDD Strategies, per se. In fact, one senior executive mentioned there was no clear strategy or a clear means for understanding how to operationalize High Reliability at the AMEDD level, as evidenced by the following quote:

“So probably the biggest thing I would tell you is that I don’t believe that we [AMEDD] actually have a strategy, okay. I don’t see a synchronized effort across the enterprise to implement high reliability. We have some programs. We have some ideas and some things that we’ve done [Commander, Site 103].”

The senior executives of this organization appeared to be very engaged, even allocating resources to change the culture of the organization (e.g., Executive consultants, Organizational Development programs, strategic planning off-sites). One senior executive specifically mentioned that leadership engagement is critical and starts with Commanders [Commander, Site 103]. Also, it was interesting to learn from a subordinate perspective within the hospital that there is an impression that leadership is very tuned in to the HRO, because the Commander references good examples that apply to High Reliability and points out the principle during normal discussions [Quality Manager, Site 103].

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There were some limited accounts of knowledge acquired through reading and formal and informal training opportunities from both inside and outside Army Medicine. Participants viewed the advantage of implementing HRO as mixed, based on how it is handed down and the fact that it is not well understood. Furthermore, a general view was that implementation is difficult because of a culture that is resistant to change. In addition, there are competing priorities within this organization that create obstacles for focusing on training and the strategic messaging associated with patient safety and high reliability.

Site 103 had the most evidence of outreach to work with other organizations and receive feedback on processes. References were made to partnerships that have served purposeful when considering change in the interest of quality improvement. There were also other historical references in reaching out to other organizations, including world renowned organizations known for their processes. There were also accounts of collaborating more internally and attempting to get more internal stakeholders involved in the interest of collective process improvement within the facilities. There were, however, few specific references to collaborating on high reliability or specific preventable harm. The staff mentioned a monthly teleconference with the Directorate of High Reliability, but felt this was inadequate for advancing the program.

In regard to the knowledge and beliefs about High Reliability, it is very difficult to believe in an intervention when the strategy is not well defined and the imperatives and principles are not operationalized with the intent of achieving High Reliability. Some that
were interviewed at the senior level had a better than average knowledge of what the imperatives and principles are. However, there were some at the lower level who knew very little. One person made a comment indicating that the principles should be renamed in order to better understand what they mean [Quality Manager, Site 103]. There was another comment that indicted the person had a better understanding of the what the principle meant once the term was put into practice, as an example.

One other finding is that there were no clear champions in building High Reliability into practice. There were also no formal assessments for high risk areas and targeted strategies. The overall program was at the organizational level and focused on creating a culture of safety. Again, this is likely the result of the leadership within the organization having a better understanding of the imperatives but the staff not understanding the principles.

As for the specific high risk focus areas, the strategies were similar to the other hospitals. To prevent WSS, the staff followed the same process site prep and marking, validated the site during the timeout, filled out the timeout checklist, and documented it in the health records. The URFO procedures were varied based on the risk of the procedure. Their strategies included the use of the RFID technology, as necessary. Using RFID as the double check was not well known amongst the staff in the operating room, however.

The plan to respond to an emergent condition was also very similar. The staff had backup that could quickly respond except for the surgeon, who relied on the on-call
provider. They did explain they rehearsed procedures for emergent conditions. Specifically, they focused on the risk of fire in the operating room (e.g., the oxygen source starts on fire or an electrical cord catches fire). This known risk came from a previous incident in their operating room. Because of this, they added the fire risk assessment to their timeout checklist which is an example of building mindfulness. Additionally, they said they conducted simulation training for this type of event to assess and further develop the competencies of the staff (building recognition as well as response). This was the only known example of preoccupation with failure.

Although this organization seemed to be focused on providing safe care, there was one issue that was uncovered that drove home the point that they were not appropriately organized for high reliability. Specifically, the OR interviews uncovered a risk associated with URFOs that the staff has a general knowledge of but it turns out they weren’t looking for or addressing it. The more experienced OR nurse, who was providing senior oversight for the OR core common area, which connects the actual operating rooms, explained that the upcoming procedure had a risk for a retained foreign object because of the scope they were using. She said the plastic tip of the probe was known to have come off before, which created an URFO in a previous incident. She also stated that this type of plastic would not be accounted for during the count (as it was part of the main piece that was counted) and it would not come up on the RFID wand procedure (as it was plastic and didn’t have the chip). This risk was all explained to the two interviewers during an observation as part of this study before a procedure took place. However, this
risk wasn’t addressed with the staff as part of a prebrief in order to highlight the risk with the clinical team and staff.

When the operating room staff was subsequently asked about any known risks for URFO, they all stated they didn’t know of any outside the routine equipment counts. It was clear the staff didn’t focus their efforts on the specific risk of the case; rather, they were focused on enacting the routine for counting equipment. It was obvious that this way of organizing enforces the routine aspects of the process to reduce variation while varying the team’s cognitive abilities, which is the opposite way of organizing for high reliability (this creates routines and oversimplification vs. collective mindfulness and proactive assessment).

Site 104

Patient safety was mentioned as a priority topic for this facility. However, there was very little knowledge of an HRO strategy or where it originated. In addition, there was very little knowledge of any HRO concepts or what HRO means to the organization. Senior leadership had some knowledge of the imperatives and principles but was not able to quote the terms. There was a belief, based on very limited knowledge, that HRO brings synergy with existing programs. The general challenge viewed by those interviewed is that it is difficult to translate and operationalize these concepts within the organization.

There was some training and tools referenced, including Basic Safety Managers Course, the Leadership Engagement Tool Kit, TeamSTEPPS, and others. In fact, one participant specifically mentioned that TeamSTEPPS (team communication) and
Arbinger (mindset) were part of the high reliability strategy for this organization. These comments were mentioned as being separate from the AMEDD strategy. Outside of some of the effective tools mentioned, training in general was viewed as ineffective in terms of being able to achieve High Reliability. Some felt they would be able to execute the practices if they simply knew where to go to get the HRO information in order to perform their duties. Nevertheless, the consensus was that there was no emphasis on High Reliability, and even through there wasn’t any cost information specified, the impression was that cost is also a significant issue associated with implementation.

There is very little known about external policy or access to knowledge and information, other than some connection to The Joint Commission. There were no incentives in support of High Reliability efforts, nor was there any information provided indicating that there is any outreach outside the organization to see what other organizations are doing, whether that is for incentives or otherwise. Some of this is attributed to the organization’s inward focus. There seems to be an impression that business within Army Medicine moves with such velocity that it is difficult to prioritize a number of programs together, to include High Reliability, and then cultivate these programs into meaningful outcomes. For implementing programs, including patient safety and High Reliability, there is a general lack of understanding and patience to learn what it takes to operationalize these concepts. There were some accounts from participants indicating that MEDCOM does well with Talent Management for people to be prepared to perform duties allied with patient safety and High Reliability.
Nevertheless, despite a lot being done, the organization does not understand what they are trying to accomplish with high reliability.

As for the specific high risk focus areas, the strategies were similar to the other hospitals. In order to prevent WSS in this hospital, the staff followed the same process for site prep and marking, validated the site during the timeout, filled out the timeout checklist, and documented it in the health records. In addition, they had an electronic timeout checklist built into the display system (the checklist was displayed on the wall in the OR), which was an innovative approach. However, the staff said it was cumbersome using this technology, as it wasn’t as fast as the manual checklist. Therefore, it was not the standard approach. The staff also mentioned they had issues with providers not attending the pre-operation huddle, including the timeout. This was a clear difference from the previous hospitals.

The URFO procedures were also varied based on the risk of the procedure (i.e., the counts were more intense when the abdominal cavity was opened). However, this site did not use the RFID technology. The staff stated that they had the wand machine, but they didn’t have all of the additional supplies to use the technology. This was clearly against the policy for the staff, and mid-level and senior leadership was not aware of this deficiency. Again, this extra step helped to create the mindfulness as well as double check for possible errors.

The plan to respond to an emergent condition was also very similar to the other hospitals. The staff had backup that could quickly respond except for the surgeon, who
relied on the on-call provider (due to being short staffed for providers). They also did not rehearse any emergent issues. In addition, the staff said the providers didn’t often participate in the team huddles, which varied by profession. These indicators reinforce they were not mindfully organizing for high reliability with regards to the principles.

**Discussion**

This chapter of the dissertation was intended to provide a better understanding of the practices currently in place to organize for High Reliability within Army Medicine based on the existing strategy and use of HRO principles and imperatives. This was achieved by identifying the practices currently employed at each of the four sites included in the study. It focused on the interactions among professionals in the clinical, quality and safety, and leadership functions at each site and how existing implementation practices have influenced their behavior. It also assessed the social and environmental factors that influenced the participant’s intentions to follow an HRO strategy.

In terms of overall findings and trends between the collective sites, patient safety seems to be a priority topic. Each site seemed to use common tools and practices to influence positive patient safety outcomes, including HRO Leadership Tool kits, TeamSTEPPS, timeouts, and huddles, with some variation and mixed use between each site. In general, participants in leadership positions had more knowledge of the HRO Principles and Imperatives than participants in management and subordinate positions. This was evident even within Quality and Safety roles, and it was applicable to participants specializing in HRO implementation and providing oversight of HRO within
the organization. In a few cases, one or two of the imperatives or principles were cited. However, in most cases, the terms were not known, even though most recalled hearing about them and had a vague recollection of what they meant and what they are called.

Between the four sites, there was no clear strategy for implementing and organizing for High Reliability. There were mixed impressions of where HRO originated, with some recognition that the strategy or source came from The Joint Commission and some belief that it originated from within MEDCOM. In either case, the belief was that the strategy was pushed down from MEDCOM with no clear means to support an implementation effort. Based on the impression of how HRO was pushed down, most participants did not believe they had the knowledge and skills that it takes to implement and operationalize an HRO. There were mixed responses in regard to how participants were gaining knowledge, including HRO Training Summits, other internal and external senior leader training events, and professional reading. As a result of these limited and ineffective approaches toward implementation, most participants feel that HRO is huge and complex.

Another general view is that the Army Medicine culture is resistant to change. Participants felt there are competing priorities, bringing into question where High Reliability (patient safety) and Readiness stack up. Many feel there should not be a conflicting effort between the two. However, based on no clear strategy, lack of resources in terms of training and time, most responses indicated impressions that High Reliability is only in the top five in terms of MEDCOM priorities.
In terms of leadership engagement, there was a mix of responses that compared positive leadership engagement to some leadership engagement, as well as no leadership engagement. However, the general impression within the organizations is that leaders are not engaged like they need to be to implement high reliability. Accounts were provided that leaders in general do not walk the areas throughout the hospital in order to demonstrate command emphasis walk around, and in some cases, they did not attend key meetings such as morning reports. When leaders engage, engagement and communications are typically through the Deputy Chain, and access to Commanders is difficult. In addition, there was one account that indicated that a key leader never completed the survey from the tool kit.

In terms of outreach, there were limited accounts of safety chiefs reaching out to safety chiefs from other organizations to discuss practices. In one case, the safety chief did not know who any of other safety chiefs were from other facilities but recognized that they needed to. It was also interpreted from the responses that most of the clinicians did not rely on formal communication strategies in support of organizing for High Reliability. Outside of huddles and timeouts, communications are often informal, such as texting, and based on an existing positive team rapport. There were examples of some conflict within clinical teams in which physicians may show up late for huddles or not show up at all. In general, there was a lack of physician engagement, including having necessary backups, across the sites. For example, at one site, it took 30 minutes for a backup physician to come to the operating room to address an arterial bleed situation.
(deference to expertise). After the situation was resolved, the post-surgery debrief did not address the incident as it evolved, characterizing the bleed situation as a normal incident.

The assessment also identified practices that influence the possibilities of wrong site surgeries (WSS) and Unintentional Retained Foreign Objects (URFO). In general, there were practices exercised to mitigate the risk of wrong site surgeries. These practices included timeouts, marking the site, and appropriate documentation in the patient’s electronic health record (EHR). There was only once instance where an appropriate timeout practice was in question, which revealed that vulnerabilities can exist.

The assessment also revealed that multiple practices do exist, and were observed in practice, in order to mitigate the risk of URFOs. These practices include team instrument counts, the use of Radio Frequency Identification Devices (RFID), team briefings and debriefings, and physician engagement/backup. As mentioned previously, physician engagement was lacking, in general, and this was evident throughout the sites. The only practice that was executed particularly well throughout all of the observations was team instrument counts. This practice was conducted very clearly and with great discipline. The use of RFID is another practice which helps organize for High Reliability. The observations were mixed in terms of disciplined use of RFID. These observations ranged from clear and disciplined use, to missing some steps in a process, to no use of RFID at all.

Other practices that were observed during the observations were team briefings and debriefings. These practices mitigated the risk of URFOs as well as adverse patient safety outcomes overall. The assessment revealed mixed practices in terms of team
briefings and deb briefings. Some teams demonstrated proven use of briefings and deb briefings. However, there were some additional vulnerabilities identified during the debrief that were separate from the arterial bleed situation described earlier. There was one incident that revealed that TeamSTEPPS did not occur one morning due to a promotion ceremony taking place instead. There was another incident where an OR Nurse shared knowledge of a previous URFO that involved a plastic tip from an instrument remaining within the patient. While reviewing the process, it was observed that the OR Nurse failed to discuss the risk during the pre-brief for a surgery that was in process at the time of the observation. This revealed vulnerability in the High Reliability process and demonstrated how important these briefs can be in the spirit of patient safety.

The four hospitals were clearly focused on the HRO imperatives (Chassin and Loeb, 2013) and not the principles of high reliability (Weick and Sutcliffe, 2015). This was due to the enterprise-level focus on the imperatives and the ambiguity of the current High Reliability strategy. Furthermore, the imperatives didn’t appear to have an impact on the individuals and their (informal) high reliability efforts. For example, the staff at site 101 didn’t have leadership engagement strategies, a culture of safety, or robust process improvement in place. In spite of this, they were able to achieve high reliability for URFO and WSS.

It was clear the staff within the operating rooms didn’t understand the principles of high reliability; however, they were already organized in ways that aligned with these principles. For instance, TeamSTEPPS was used to help improve communication and shared understanding (sensitivity to operations). This initiative was deployed over a
decade prior to the HRO initiative. Additionally, they all used checklists to help guide their discussions during high-risk processes as well as double-verification procedures to validate high risk procedural counts. They had people identified to quickly back up the staff in the event of an emergency as well as scenario-based training to develop resiliency and mindfulness. Unfortunately, because the principles were not well known and operationalized, these approaches were not standardized across all organizations to achieve collective mindfulness. The next section will discuss the barriers and facilitators of this implementation in more detail.
CHAPTER 5: BARRIERS AND FACILITATORS FOR IMPLEMENTATION OF HIGH RELIABILITY

This chapter of the dissertation was intended to provide a better understanding of the barriers and facilitators of implementing High Reliability within Army Medicine. It was designed to explore the specific factors influencing each of the sites. The CFIR was used to guide the collection of qualitative data and systematically assess the factors explaining the variation in implementation experienced by the representatives sampled at each of the sites. I compared four hospitals to identify the barriers and facilitators associated with implementing the interventions. The specific research question to be addressed in this chapter is the following:

What are the barriers and facilitators involved in the successful implementation of the HRO principles and imperatives?

This chapter begins with a brief overview of the findings. I then present the specific details of the significant constructs for each of the five domains. The remaining constructs that were not significant predictors, or were not assessed, are listed in Appendix B. I also discuss the barriers and facilitators in more detail in the concluding section of the chapter.

Overview of Findings

Of the 37 CFIR constructs evaluated, 11 of the constructs rated negatively (-2 or -1), indicating they are as barriers for implementation practices. Twenty-six constructs rated mixed, and therefore, they did not rate as a barrier or facilitator. Of the 11 negative
constructs, five constructs were strongly distinguished (-2) and six constructs were weakly distinguished (-1) as barriers of implementing the high reliability strategies (See Table 4). These constructs had a negative valence across all four hospitals. There were no facilitators of implementation identified in the analysis; that is, none of the constructs had a positive valence assessed for all four hospitals.

Table 4. Ratings assigned to CFIR construct by Case

<table>
<thead>
<tr>
<th>Hospital Number</th>
<th>101</th>
<th>102</th>
<th>103</th>
<th>104</th>
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<tbody>
<tr>
<td><strong>I. Intervention Characteristics Domain</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Design Quality &amp; Packaging</td>
<td>-1</td>
<td>-1</td>
<td>-2</td>
<td>-2   **</td>
</tr>
<tr>
<td>Complexity</td>
<td>-2</td>
<td>-2</td>
<td>-1</td>
<td>-1   **</td>
</tr>
<tr>
<td><strong>II. Outer Setting Domain</strong></td>
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<tr>
<td>External Policy &amp; Incentives</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-2   *</td>
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<tr>
<td><strong>III. Inner Setting Domain</strong></td>
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<tr>
<td>Implementation Climate</td>
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</tr>
<tr>
<td>Relative Priority</td>
<td>-2</td>
<td>-2</td>
<td>-1</td>
<td>-1   **</td>
</tr>
<tr>
<td>Learning Climate</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
<td>-1   *</td>
</tr>
<tr>
<td>Readiness for Implementation</td>
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<tr>
<td>Available Resources</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-1   *</td>
</tr>
<tr>
<td>Access to Knowledge &amp; Information</td>
<td>-1</td>
<td>-2</td>
<td>-1</td>
<td>-2   **</td>
</tr>
<tr>
<td><strong>IV. Characteristics of Individuals Domain</strong></td>
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</tr>
<tr>
<td>Knowledge &amp; Beliefs about the Intervention</td>
<td>-1</td>
<td>-1</td>
<td>-2</td>
<td>-2   **</td>
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<tr>
<td><strong>V. Process</strong></td>
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<tr>
<td>Engaging</td>
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<tr>
<td>Champions</td>
<td>-1</td>
<td>-1</td>
<td>-1</td>
<td>-1   *</td>
</tr>
<tr>
<td>External Change Agents</td>
<td>-1</td>
<td>-2</td>
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<td>-1   *</td>
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<tr>
<td>Reflecting &amp; Evaluating</td>
<td>-1</td>
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</tbody>
</table>

** Construct strongly distinguishes as a barrier
* Construct weakly distinguishes as a barrier

Additionally, there were ten constructs for which evidence was mixed (positive and negative valence/strength across hospitals) and nine constructs with no apparent
influence across the practices (See Appendix B). The following sections briefly describe the constructs that were identified as the strong and weak barriers of implementing the high reliability strategies.

**Intervention Characteristics Domain**

This domain had two constructs identified as barriers to implementation.

**Design Quality and Packaging**

The construct *Design Quality and Packaging* was defined as the perceived excellence in how the intervention is assembled, bundled, and presented. This construct strongly distinguished as a barrier for implementing the intervention. None of the individuals interviewed felt that the intervention was packaged clearly or that it was easy to implement. The impression was that concepts and strategies were pushed down to the command teams without regard to any steps or considerations for how to implement it. Although there was a HRO Leadership Engagement Toolkit and training at regional leadership summits, there were no clear strategies for how to organize for high reliability within the specific workplace. Many interviewed also recalled banners and videos emphasizing the importance of high reliability. However, the interviewees failed to recognize the importance of these messages, as the documents basically restated the HRO principles and imperatives.

In addition, most interviewees associated High Reliability with the healthcare industries. They only had a vague recollection of any internal attempts to train or facilitate the intervention to the extent that it could be operationalized in a meaningful
way. Others had no idea where the high reliability strategies originated. They were familiar with the toolkit and conferences where high reliability was mentioned. However, they were not confident that they had the resources or training that they needed to carry out the strategy. One mentioned that they felt that a reference guide would be adequate for what they would need as a strategy.

“If I knew where to go for that information and just for the information on the HROs as well, I mean, I think, you know, that would be beneficial [HRO Officer, Site 101].”

*Complexity*

Complexity is the perceived difficulty in implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement. This construct was strongly distinguished as a barrier in organizing for high reliability. Multiple participants interviewed believed the high reliability was a new program and that their hospital was trying to become a High Reliability Organization, rather than achieving zero preventable harm. Because this was conceptualized this way, it was thought of as a competing priority, which made a concerted effort in achieving high reliability very difficult to accomplish.

There is also an impression from those interviewed that High Reliability is not well understood, not to mention the High Reliability strategy and how to organize for it. Those that have somewhat of an understanding of the strategy feel that the strategy is difficult to organize as a practice, and to standardize and organize under a collective mindset. Many feel it is a work in progress and a “Journey that we will never achieve,” as
described by Chassin and Loeb (2013). There was one that felt we are not approaching the strategy properly.

“So there’s a balance between getting people involved in looking at a lot of different possibilities and then picking one and going with it until such time as it either is proven not to be helpful or, you know, it is worth the organizational pain to change, right. We don’t tend to do that. We tend to just pick one, go with it for a little while, and then because we haven’t achieved success in whatever short period of time that we’ve had it, we change to another one. So I would tell you anytime you change those, I’m not particularly fond of that [Commander, Site 103].”

Other interviewees also shared that concepts and practices are not being translated and operationalized properly, which makes implementation a challenge. When this occurs, strategies are discontinued for something else. Tasks that appear huge and overwhelming continue to be huge and overwhelming regardless of a new strategy. This is important for translational science by taking theory and developing a practical application in order to understand and use it. The impression from the study is that most people thought that they were trying to achieve HRO rather than zero patient harm.

It is also important to note that the theme of this construct was closely aligned with Design quality and packaging. It appeared that the challenges with packaging the HRO intervention have an impact on the perceived complexity and the inability to operationalize the practice. For example, if an intervention is not clearly packaged for recipients, it may not be clearly understood, resulting in confusion and generating a perception of being very complex and complicated.
Outer Setting Domain

External Policy and Incentives

The construct *External Policy and Incentives* was broadly defined as strategies to spread interventions, including policies and regulations, external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting. This construct weakly distinguished as a barrier with implementation effectiveness. There was little known about any external policies in organizing for high reliability. There was one senior leader that mentioned a MEDCOM Operations Order, and a MEDCOM Operations Order never existed. The general consensus was a lack of knowledge that any external policy exists.

In terms of incentives, there was no awareness of any awards or recognition aligned with high reliability. There were numerous accounts of awards or recognitions for patient safety awareness or outcomes at the local level. This incentive clearly varied by hospital and local policy. Although it was not required, it may help to drive motivation and mindfulness of the program as well as add a level of legitimacy (this is the AMEDD strategy).

Inner Setting Domain

Implementation Climate

The construct *Implementation Climate* was defined as the absorptive capacity for change, shared receptivity of involved individuals to an intervention, and the extent to which use of that intervention will be rewarded, supported, and expected within their
organization. Within this construct, there are two sub-constructs that were distinguished as barriers of implementation. These include Relative Priority and Learning Climate.

The first is Relative Priority, which refers to an individual’s shared perception of the importance of the implementation within the organization. In general, most people interviewed believe that overarching safety and quality is non-negotiable. Most accounts did not see high reliability as the number one priority. However, they ranked it in the top five. Although most believe it has its place in the organization, they do not view it as a command priority. The responses suggest that high reliability falls under The Surgeon General’s number one priority of “Readiness.” There were multiple responses that indicated some confusion or uncertainty regarding where it ranked or whether there really needs to be a conflict between Readiness and High Reliability. For example, one participant suggested:

“And High Reliability, for me, for readiness, I look at readiness as really in that risk population stratified by risk with different demand signals (to include high reliability), you know, of what they need to accomplish that [Commander, Site 104].”

Regardless of where high reliability ranks within Army Medicine in terms of priority, most comments suggest that it is not a high priority. In fact, the following quote indicates they have no idea where it ranks:

"I think this just kind of gets pushed to the backburner." [There are] competing training requirements across the board...her (TSG’s) top priority? No offense to her. But I don’t know. I’m at a loss for words for where we’re at, to say the least [HRO Officer, Site 102].”

Other comments indicated that there is an impression that implementing high reliability was very important. However, it was viewed as another thing that’s a priority,
but with no support. Again, this was common because the strategy was conceptualized as achieving High Reliability Organization rather than zero preventable harm. The typical message is that leadership wants the organization to do something, but there is no funding or personnel to support the effort. Many feel they are relied upon to get it done, but there are no personnel to support it, and other than the message to do it, there’s nothing that goes with it. For those who are relied upon to champion the initiative, they are pulled in multiple directions in support of other efforts.

There are those that feel that organizational priorities are quite challenging to navigate, as indicated from the following quote:

“....and other leadership lines sort of saying, okay, we support you guys, let’s do this. But we don’t have any funding. We, you know, we don’t have anything else other than, sure, sounds like a good plan, give it a try. And we’re still in the trial pilot period [laughter] six months later [laughter]. So it’s challenging. It’s challenging to make changes. It’s challenging even though there’s evidence behind it…even though it’s for patient safety and quality improvement [HRO Officer, Site 101].”

The remaining sub-construct under Implementation Climate is Learning Climate. Learning Climate is a climate in which leaders express their own fallibility and need for team members’ assistance and input. Secondly, team members feel that they are essential, valued, and knowledgeable partners in the change process. Also, individuals feel psychologically safe to try new methods, and there is sufficient time and space for reflective thinking and evaluation.

Overall, most of the participants mentioned that they either didn’t have any knowledge of where the existing HRO strategy came from or that it was pushed down from the higher command without any input. Consistent with other constructs,
participants did not feel they have adequate knowledge or that they are equipped to implement the intervention. In addition, some participants mentioned that they don’t have access to other organizations to learn about their outcomes, such as sentinel events, including those outside of the military.

Most participants indicated their organization had process and quality improvement activities in which to discuss and learn about ways to improve. There were accounts of methodologies used to improve performance, such as Lean Six Sigma, which is used as the method for managing quality improvement and performance improvement. This aligned with Chassin and Loeb’s (2013) imperative for Robust Process Improvement. However, there is a concern that leadership is only concerned about outcomes, and learning is often isolated. Additionally, the three areas of focus for the RPI imperative are Lean, Six Sigma, and Change Management and they were not closely followed. The general impression is that there is room for improvement. There were some participants who believe that the staff needs to be more vigilant and have a desire to improve. One interviewee stated:

“I think they (staff) have no choice (in how to respond to patient safety). I mean, we can continue to do status quo, but that’s not going to get us where we need to be. And, you know, you can’t continue to do things the way you have been doing things. You’re never going to get where you need to go [Surgeon, Site 102].”

Readiness for Implementation

Readiness for Implementation was defined as tangible and immediate indicators of organizational commitment to its decision to implement an
intervention. There were two sub-constructs related to implementation climate. Of the two, the second sub-construct, Access to Knowledge and Information, was strongly distinguished as a barrier of implementation. The sub-construct Available Resources was weakly distinguished as a barrier of implementation.

Access to Knowledge and Information refers to the ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks. During this assessment, there were no accounts in which a participant believed they had adequate access to knowledge and information. Most did not believe they were provided with an actual strategy to achieve high reliability. Some indicated that they were exposed to high reliability through video training, and others indicated they conducted their own research on the high reliability literature. The following is an account from a Q&S professional researching the high reliability concept on their own:

“So I did some research on it and tried to look it up and find out about it. And when I looked it up, what I found was safety and quality. And so I’m like, Oh, I can do that, I think. I had an overview, but the more detail about it and the maturity models and things like that and where this was going I had to get later and delve into it [Anesthesiologist, Site 101].”

Several participants also said they attended monthly/quarterly telephone conference calls that were hosted by the High Reliability Directorate. Whereas some thought these sessions were beneficial for answering questions, most felt they didn’t collaborate with other participants and learn from each other’s activities. Additionally, several participants stated they were not communicating with peers and cohorts in order to compare efforts and practices. One executive stated the following:

“I’m going to claim stupidity here. I don’t know who the other DCQSs are throughout the rest of the organization and the enterprise as a whole. And
that’s something I need to get done if I’m going to remain in this position [Deputy for Quality and Safety, Site 102].”

The other sub-construct under Readiness for Implementation was Available Resources, which was weakly distinguished as a barrier for implementation. Available resources refers to the level of resources that are dedicated for implementation and ongoing operations. This includes funding, training at the senior executive level, education, physical space, and time. The only resources were the Leadership Engagement Toolkit, which was not meant for individuals. There was no formal training for High Reliability at the lowest levels. Most of the participants interviewed weren’t knowledgeable of any cost factors to know of any budget implications tied to HRO implementation. Most believed that this is a program handed down from MEDCOM, but MEDCOM was not providing the support. It seemed to be the opinion that the HRO implementation was another priority effort, but with no support. As these new efforts come down from higher commands, the higher commands don’t seem to take any part of the mission to accomplish the effort. The general opinion across organizations is that a mission is handed down, but nothing is done to support the mission. In terms of HRO implementation, one interviewee mentioned that some programs outside of HRO, which were not generating a return on investment, were going to be eliminated, and the funding would shift to HRO [Commander, Site 103]. The individual had no knowledge of funding ever being shifted to HRO.

Another resource issue involves training. Outside of the undisclosed direct cost factor of funding the training in order to provide the necessary competencies for HRO implementation, there is an indirect impact of taking a workforce out of its normal duty
environment to learn and apply the HRO strategy. This involves hundreds of workforce members per organization.

**Characteristics of Individuals Domain**

*Knowledge and beliefs about the intervention*

*Knowledge and Beliefs about the Intervention* was defined as individuals’ attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention. In an effort to not duplicate the already existing information in the other domains, this analysis focused primarily on the senior leader perspective versus a clinical champion. This construct strongly distinguished a barrier for implementation practices.

One senior leader didn’t even believe they had a strategy [Commander, Site 103]. This was supported with comments that there isn’t a synchronized effort across the enterprise to implement high reliability. Although there are some programs, some ideas, and some patient safety efforts being done, there really isn’t an evident High Reliability strategy.

On the clinical leadership side, there was one account that indicated a belief that HRO terminology is more managerial in nature and not applicable to clinical thinking, as evidenced by the following quote:

“I guess I don’t call it high reliability because I don’t think, you know, my sort of line of work and the terminology I use is more, you know, sort of not managerial, but more direct patient care and so I use more of the terminology of quality improvement patient safety and standard of care and that sort of criteria world [Commander, Site 104].”
Process Domain

Although none of the staff really fully understood the principles and imperatives, they did vary in their approach to implementation. Two of the hospitals had plans to achieve high reliability through TeamSTEPPS and Arbinger training. None of them had targeted specific risk areas, and they didn’t organize the principles in creating a collective mindfulness for achieving High reliability. The three constructs under this domain were weakly distinguishing as barriers.

Engaging

The construct Engaging was defined as attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modeling, training, and other similar activities. There were five roles listed under this construct. Of the five, the Champion sub-construct weakly distinguished as a barrier for implementation practices.

Champions

The Champion was defined as individuals who dedicate themselves to supporting, marketing, and driving through an implementation and overcoming indifference or resistance that the intervention may provoke in an organization. In this study, there was no evidence of any champions associated with the high reliability intervention. However, facilitators across the enterprise had been helpful in transferring knowledge. In other instances, senior leaders were given credit for leading the initiatives with a strong voice in the spirit of patient safety. This was aligned with the leadership engagement strategies
from the imperatives, however, and not aligned with local-level champions to help develop the local strategies.

**External Change Agents**

External Change Agents are individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction. This sub-construct was also weakly distinguished as a barrier in implementation practices. Although there were Joint Commission representatives and coordinators mentioned, there were no internal representatives mentioned that formally influence or facilitate intervention decisions in a desirable direction. Several sites mentioned attending monthly teleconferences with the High Reliability Directorate, but they felt they were not adequate for facilitating their implementation efforts.

**Reflecting and Evaluating**

The construct *Reflecting and Evaluating* was defined as quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience. This sub-construct weakly distinguished a barrier in implementation practices. During the course of the interviews, there was no evidence of tracking metrics for high reliability. Although a lot of data is tracked for a myriad of purposes, there is no data tracked solely for high reliability implementation. For example, even though WSS and URFO are known high-risk preventable outcomes, none of the hospitals associated them with high reliability.
Discussion

The combination and strength of all 11 barriers together is significant and suggests that they are related and the main reason why implementation is unsuccessful. In fact, in some cases, weakly distinguished barriers were only differentiated based on the context of the interview response, in which general comments are sometimes difficult to differentiate from concrete examples.

The general conclusions generated from these findings is that sites were unable to implement the intervention due to unclear and ineffective packaging and delivery of the intervention, complexity and lack of understanding to implement, no clear external policy or incentives, and no clear priority and support for implementation. This makes such a practice difficult to standardize and operationalize as an enterprise. Many feel the intervention was pushed down from the higher command with expectations to implement concepts and strategies without regard to any steps or considerations for how to implement them. One senior leader mentioned a MEDCOM Operations Order, and a MEDCOM Operations Order never existed. The general consensus was a lack of knowledge that any external policy exists. In terms of incentives, there was no awareness of any awards or recognition aligned with high reliability.

There were numerous accounts of awards or recognitions for patient safety awareness or outcomes at the local level. This incentive clearly varied by hospital and local policy. When vital programs such as HRO are implemented, participants need to feel as if they are part of the program. Therefore, awards and recognitions need to be directly a part of the HRO implementation and not just associated with patient safety.
Due to a lack of understanding regarding the strategy, participants were not confident that they had the resources or training that they needed to implement the intervention. The impression is that Army Medicine believes that implementing high reliability is very important. However, the message of high priority without the resources to support it is conflicting. For those who are relied upon to champion the initiative, they are pulled in multiple directions in support of other efforts. As a result, participants are aware of the message but more clearly see the immediate indicators reflecting a lack of organizational commitment to its decision to implement High Reliability.

Along with the negative indicators regarding organizational commitment, there is a poor network of Quality and Safety professionals who are actually comparing practices and generating dialog amongst peers in order to learn from one another. This lack of networking and conversation amongst peers further stagnates an already fragile learning climate. Overall, participants embrace any strategy that supports patient safety. However, the majority of the participants have a negative attitude about implementing this intervention. The general consensus is that as new programs are instituted, such as HRO, these new efforts come down without taking any part of the existing mission away in order to accomplish the new effort.

Finally, the existing HRO strategy involves no quantitative or qualitative feedback about the progress and quality of implementation. Although WSS and URFO’s are identified and reported, there is no evaluation of how the imperatives and principles are currently implemented. There is no recognition of how to organize and operationalize for HRO other than reporting specific patient safety outcomes. Although a lot of data is
tracked for a myriad of purposes, there is no data tracked solely for high reliability implementation.
CHAPTER 6: CONCLUSIONS

In this dissertation, I have reported on a qualitative study of the barriers and facilitators to implementation of high reliability within Army Medicine. I conducted this study for quality improvement purposes. This involved four site visits and an assessment of current practices for implementing HRO followed by an assessment to determine the barriers and facilitators of implementation. I conducted field site visits, which included observational studies and interviews with key members of the organization to assess and explain the barriers and facilitators of the implementation efforts at each site. By assessing the observation and interview data against the CFIR constructs, I was able to compare the barriers and facilitators, as well as the distinguishing strengths or weaknesses of the barrier and facilitator ratings, in order to assess trends and relationships against the constructs impacting high reliability implementation.

Through this extensive assessment, I have demonstrated significant barriers to implementation for high reliability, which if effectively addressed or mitigated, will enable teams to organize for HRO in a purposeful way. Knowing and understanding these barriers is the first step in creating evidence-based strategies that will facilitate implementation. In this final chapter, I review and synthesize my contributions. Then I discuss the implications of my work. I conclude with a discussion of limitations and possibilities for future research.

Contributions

The primary contribution of this research is the characterization of the multiple levels of factors influencing implementation of High Reliability as well as the practices
that are in place that align with the high reliability principles and imperatives. When an organization attempts to implement both strategies, the imperatives are more effectively implemented since they are easier to understand. Leaders have a general understanding of leadership commitment and the organization understands the importance of having a culture of safety and having an effective process in place in dealing with change. The challenge resides in combing an effort that involves both the imperatives and principles. The principles are more difficult to implement since they are viewed as complex. Therefore, they are more difficult to organize at the individual and team level. They are not as well understood and are the more challenging to implement into practice. Therefore, despite the attempts by some organizations to combine the principles and imperatives into a strategy, there is no good connection between the two.

The research questions and findings from this study help to fill this gap of knowledge for both researchers, policymakers, as well as practitioners. This may also help to shape policy as the Joint Commission imperatives are often followed, but don’t have any clear connection to the mindfulness. This study also employed the CFIR and implementation science methods to study this implementation effort, which has not been done before. This offers guidance to researchers, policymakers, and practitioners in understanding how these factors can impact healthcare. In this section, I review and synthesize the main findings and conclusions of Chapters 4 and 5.

In chapter 4, I focused on the practices currently in place to organize for High Reliability based on the existing strategy and use of HRO principles and imperatives.
Through this process, I was able to identify the practices exercised at each of the four sites included in the study. I was able to assess the interactions among professionals in the clinical, quality and safety, and leadership functions at each site and how existing implementation practices have influenced their behavior. I was also able to assess the social and environmental factors that influenced the participant intentions to follow an HRO strategy. I then provided a comprehensive description of those practices found, including practices that are expected but non-existent, throughout the enterprise. This provided the groundwork for identifying the barriers that exist today.

In an effort to achieve desired patient safety goals, I showed where the organizations use common tools and practices within the enterprise to influence positive outcomes. These include HRO Leadership Tool kits, TeamSTEPPS, timeouts, and huddles, with some variation and mixed use between each site. In general, I’ve shown that participants in leadership positions had more knowledge of the HRO Principles and Imperatives than participants in management and subordinate positions. This was evident even within Quality and Safety roles, and it was applicable to participants specializing in HRO implementation and those providing oversight of HRO within the organization.

Across the sites, I found that there is no clear strategy for implementing and organizing for High Reliability. There were mixed impressions of where HRO came from, with some recognition that the strategy or source came from The Joint Commission and some belief that it originated from within MEDCOM. In either case, the belief was that the strategy was pushed down from MEDCOM with no clear means to support an
implementation effort. In general, the workforce does not have the knowledge and skills that it takes to implement and operationalize an HRO.

I have also shown that participants view the Army Medicine culture as resistant to change. Implementation is further challenged when there are competing priorities with no clear idea of how the priorities stack up in regard to “Readiness,” the TSG’s number one priority. Many feel there should not be a conflicting effort between the two. However, based on no clear strategy and lack of resources in terms of training and time, the impression is that High Reliability is only in the top five in terms of priorities.

In terms of leadership engagement, leaders are not engaged like they need to be in order to implement high reliability. Leaders in general are not involved in operationalizing the intended strategy. They do not make rounds to clinical locations and visit with staff in order to emphasize the importance of high reliability in the hospital setting. In some cases, they do not attend key meetings such as morning reports where key messages can be communicated and reinforced throughout the organization. In cases when leaders are engaged, engagement and communications are typically through the Deputy Chain, where access to Commanders is difficult.

In terms of outreach, safety chiefs are not well connected with other safety chiefs from other organizations, but in most cases, they recognize that they need to be. Poor communication is also prevalent. Many physicians do not participate in team briefings and de-briefs. Outside of huddles and timeouts, communications are often informal, such as texting, and based on an existing positive team rapport. In general, there was a lack of physician engagement, including having necessary back-ups, across the sites. For
example, at one site there was an emergency condition in which it took 30 minutes for a backup physician to come to the operating room to address an arterial bleed situation (deference to expertise). After the situation was resolved, the post-surgery debrief did not address the incident as it evolved, attributing the bleed situation as a normal incident.

I have also identified some practices that influence the possibilities of wrong site surgeries (WSS) and Unintentional Retained Foreign Objects (URFO). In general, there were practices exercised to mitigate the risk of wrong site surgeries. These practices included timeouts, marking the site, and appropriate documentation in the patient’s electronic health record (EHR). The assessment also revealed that multiple practices do exist, and were observed in practice, to mitigate the risk of URFOs. These practices include team instrument counts, the use of Radio Frequency Identification Devices (RFID), team briefings and debriefings, and physician engagement/backup. The only practice that was executed particularly well throughout all of the observations was team instrument counts. This practice was conducted very clearly and with great discipline.

The use of RFID is another practice that I observed that helps organize for High Reliability. The observations were mixed in terms of disciplined use of RFID. These observations ranged from clear and disciplined use, to missing some steps in the process, to no use of RFID at all.

I also revealed some environmental factors affecting communications (deb Briefs) and impacting implementation efforts. The first was participants’ beliefs that revealing errors comes with repercussions. Specifically, participants believe there is risk of
repercussions if they share experiences such as near misses or other flawed patient safety encounters.

In Chapter 5, I provided an assessment of the barriers and facilitators of implementation within Army Medicine. I focused on the interactions among participants from different sites within Army Medicine who function around the patient safety practice and how constructs from the CFIR influenced their behavior. I also assessed the social and environmental factors that influenced the participants’ intentions to organize for high reliability.

As a result of the assessment, I demonstrated how the barriers identified are interrelated and the main reason why implementation is unsuccessful. I’ve shown that the sites are unable to implement the intervention due to unclear and ineffective packaging and delivery of the intervention, complexity and lack of understanding to implement, no clear external policy or incentives, and no clear priority and support for implementation. This makes such a practice difficult to standardize and operationalize as an enterprise. I have highlighted the general impression from the workforce that the intervention was pushed down from the higher command with expectations to implement concepts and strategies without regard to any steps or considerations for how to implement them. There was one senior leader that mentioned a MEDCOM Operations Order, and a MEDCOM Operations Order never existed. The general consensus is a lack of knowledge that any external policy exists. In terms of incentives, I have shown where there is no knowledge of any awards or recognition aligned with high reliability. There were numerous accounts of awards or recognitions for patient safety awareness or
outcomes at the local level. This incentive clearly varied by hospital and local policy. When vital programs such as HRO are implemented, participants need to feel as if they are part of the program. Therefore, awards and recognitions need to be directly part of HRO implementation and not just associated with patient safety.

I have also identified that workforce members are not confident that they’ve had the resources or training that they need to implement the HRO. Army Medicine believes that implementing high reliability is very important. However, the high priority tasks without the resources are conflicting. In addition, those leading the implementation effort are pulled in multiple directions in support of other efforts. As a result, participants are aware of the message but more clearly see the immediate indicators reflecting a lack of organizational commitment to its decision to implement High Reliability.

Along with the negative indicators regarding organizational commitment, there is a poor network of Quality and Safety professionals who are actually comparing practices and generating dialog amongst peers in order to learn from one another. This lack of networking and conversation amongst peers further stagnates an already fragile learning climate.

Finally, I have described an existing HRO strategy that involves no quantitative or qualitative feedback about the progress and quality of implementation. Although WSS and URFO’s are identified and reported, there is no evaluation of how the imperatives and principles are currently implemented. There is no recognition of how to organize and operationalize for HRO other than reporting specific patient safety outcomes.
Implications

The findings from this study lead to a number of implications for policy, research, and practice. In identifying the barriers in implementation, facilitators can also be identified and instituted in order to implement and organize for High Reliability. Organizations can also better respond to the social and environmental factors that influence individuals and team intentions to organize for high reliability.

By identifying those practices that enable high reliability, effective policy can be instituted that creates high reliability environments of practice which can be standardized. This policy can reinforce those standards, such as of achieving zero patient harm, by focusing on specific risks or potential harmful events and avoiding those harmful events. This involves a focus on specific outcomes of interest rather than general outcomes such as achieving zero patient harm. We then organize those practices to avoid adverse outcomes. By organizing this way, individuals and team are more likely to achieve desired outcomes. For example, if practitioners focus on specific tasks in order to prevent URFOs instead of focusing on general approaches to achieve high reliability, then the specific practices create a better chance of achieving high reliability through the specific practices. These responses will generate positive learning experiences which can be cultivated throughout the organizations. In addition, through policy making we can incentivize behavior such as using tools to achieve high reliability. We can incentivize the use of evidence-based practices, such as RFID technology, to generate desired behaviors and targeted specifically at achieving desired outcomes.
In regard to research, I’ve shown how to combine two fields of study using the CFIR to demonstrate why a high reliability strategy is not working. In this instance, no one has studied high reliability using the CFIR to try to understand the barriers and facilitators for implementation. Therefore, this was an innovative way of using implementation science to study a strategy. This approach may be used by other researchers to see what happens in similar situations, or in different settings, or where different risks apply, within a high reliability setting.

In regard to practice, the ultimate goal of the HRO is zero patient harm. Achieving zero is created through a collective mindfulness at the individual and team levels and developing a culture of safety throughout the organizations. Through a combination of operationalizing the imperatives and the principles, patient safety starts with the top level leader as well as the individual on the front line. Achieving zero patient harm requires organizing High Reliability principles and implementing practices that work at the lowest level based on the commitment and priority at the highest level. The High Reliability imperatives help create a culture of safety. However, the imperatives do not work on their own, and they don’t work without a clear strategy and purpose for success from the top of the organization all the way down to the individual level. This is why Karl Weick would say the imperatives are necessary but not sufficient. Hence, the imperatives of leadership engagement, creating a culture of safety, and exercising robust process improvement must be driven by the high reliability principles and a culture of safety that lives throughout the organization.
Under a clear strategy where High Reliability is nested along with the top priority effort, every individual in the organization needs to understand their role for achieving zero patient harm. This requires a clear strategic message that is communicated throughout the entire organization and packaged in such a way that it is clearly understood at the individual level. The information that is disseminated needs to be more than simply communicating theory, but needs to be communicated in terms of putting tasks into practice at the individual level. For example, if the packaging and dissemination is in the form of putting out articles or videos, then the possibilities exist that the intended learning may not take place. Messages may be confusing and not well understood. As a result, the key learning points may not be clear and may be missed. However, if the packaging is released in the form of practical messages or learning experiences that reinforce desired behaviors and outcomes, and these learning pathways are clearly connected, then the packaging has a much greater chance of achieving desired outcomes.

The second logical piece is how to develop competencies. Competency development at the individual and team level needs to focus on the tasks or activities required to apply the knowledge. This requires creating a pathway of learning, from basic cognitive skills to more advanced application, such as that from Bloom’s Taxonomy (Anderson et al., 2001). By creating effective pathways for learning HRO principles, complex tasks can be facilitated and transitioned into operational functions. In terms of competency development, packaging will help develop cognitive competencies at the
lower levels; however, experiential learning and scenario based training is important for achieve the right competencies at the application level (creating the mindfulness).

Third, it is important to develop a formal implementation plan with tasks and goals, being mindful of the barriers and facilitators identified from the CFIR (Damschroder et al, 2009). For example, program management functions will help develop the tasks and framework to closely manage. Additionally, champions can help to implement the plans by socializing the change, which would likely influence behavioral intentions (Ajzen, 1985). Selecting a specific patient area of focus (with regards to patient harm) and operationalizing the strategy to the lowest level of each organization would help create a common understanding of the goals and likely shape positive attitudes about the change. The intent is to shape positive attitudes of the change, reinforce expectations through social interactions, and remove barriers (Ajzen, 1985).

As for the practical nature, policies need to be more closely nested in external industry best practices, rather than implementing numerous frameworks. This creates a standardized, overarching set of practices to be instituted and operationalized at the lower levels. This not only reduces variation throughout the enterprise, but it creates more efficient healthcare practices across organizations. In order to fully operationalize High Reliability, participants need to feel that they are part of the High Reliability process. Success needs to be reinforced, celebrated, and meaningful throughout the MHS. Feedback loops of communication across teams, to include outside the organization, needs to be strongly encouraged and participatory in nature. Communicating with other organizations helps to build benchmarking opportunities and good ideas that lead to
adoption can be incentivized in order to promote fruitful engagements with other organizations. Innovation needs to be part of the core culture, encouraging new ideas and practices each and every day. In cases where improvements are implemented as a result of networking successes, these outcomes should be rewarded as well.

Inspiring trust needs to be another core element in creating a culture of safety. The workforce needs to believe that transparency is truly a part of favorable patient safety outcomes. Therefore, near misses, and any exposure to failure, needs to be embraced as constructive opportunities for progress. Appropriate resourcing is necessary in order to support all areas of training, personnel, and time to operationalize High Reliability.

Lastly, High Reliability outcomes require performance reporting and need to be measured and rewarded for oversight and quality improvement purposes. In addition to WSS and URFO incident rates, High Reliability measures, based on the imperatives and principles, need to be instituted as a meaningful and prioritized component of the strategic mission and Army Medicine’s Campaign Plan.

This research also provides implications for studying and implementing organizational change within similar settings. I first identified the barriers and facilitators of implementation using the CFIR. I developed a CFIR-based instrument to measure the determinants of behavior and used this data to assess participant beliefs and intentions against the CFIR constructs. The next step is to design changes, which can aid in developing interventions and subsequent implementation strategies to address the specific barriers and facilitators of behavioral intention (Fishbein & Ajzen, 1975; Michie, Van Stralen, & West, 2011). This systematic approach would likely improve the uptake and
routine use of the High Reliability intervention within the MHS. This innovative method will also advance the field of Implementation Science (Skolarus & Sales, 2015).

**Limitations and Future Work**

There were several limitations to the qualitative study. First, none of the sites were organizing for High Reliability. Therefore, assessing the barriers that were preventing the practice of implementation was a limiting option for study. In the event there were sites which were effectively implementing a strategy based on the imperatives and principles, individual sites could be grouped and compared for levels of effectiveness. In addition, even though the sample size was meaningful and relevant, based on size and type of facility, the sample was small for the comparative assessment, limiting the generalizability of the findings. At each site, the interview group was small in some cases and did not assess the full range of roles within the organization. Thus, these factors should be considered for future study.

Furthermore, the nature of qualitative methods involves an inherent level of subjectivity in data collection and analysis. The findings drawn from this assessment would have been strengthened by triangulation with an additional reviewer. Several procedures were included in this analysis to ensure a high level of internal validity in findings when drawing conclusions from the qualitative data. However, future research would benefit from quantitative validation.

And finally, this project was conducted within the MHS and may not apply to some industry environments. The findings may not be generalizable to other types of healthcare interventions outside of the MHS.
Appendix A (Interview Guide)

I. INTRODUCTION

Hello, my name is [name of interviewer]. Introduce self and other team members in the room.

Introduce the project

- The purpose of this research is to evaluate the implementation of the Military Health System’s high reliability strategies that are targeted at high-risk patient safety events (unintended retained foreign objects and wrong site surgery) in the operating room. Today’s interview will focus on your experience with implementing these strategies in order to get a better understanding of your attitudes and beliefs about this innovation. Some of the questions will focus more specifically on your perceptions of your clinic and/or hospital in order to get a better understanding of the context of your workplace.
- This research has been deemed exempt by the Institutional Review Board at the Army Medical Department Center and School.
- We will be recording today’s conversation so we can transcribe and analyze the data. Your name will be kept confidential, and your answers will remain anonymous. You don’t have to answer all the questions if you don’t feel like you need to. Please stop me at any time.
- You can also choose to not participate in this research if you don’t want to. Please let me know if you don’t want to participate.

Do you have any questions for me? [Answer any questions]

Do you want to participate in this research?

Are you ready to begin? I’m going to start recording now.

I am going to ask you a series of open ended questions. I want to hear your thoughts so please do not hesitate to share whatever you believe might be related to any of the topics. Please keep in mind that there are no right or wrong answers. You know your own context best, and we just want to understand your experiences.
First, I would like to ask you a few questions to help me understand your role in your hospital.

<table>
<thead>
<tr>
<th>CFIR CONCEPT</th>
<th>QUESTIONS</th>
<th>PROBES</th>
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<tbody>
<tr>
<td>First, I would like to ask you a few questions to help me understand your role in your hospital.</td>
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<tr>
<td>What is your title?</td>
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<td>What are your main responsibilities?</td>
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<td>To whom do you report?</td>
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<td>How is your time allocated?</td>
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<tr>
<td>IVa. Characteristics of Individual (Knowledge of the intervention)</td>
<td>Could you explain what you know about the Military Health System’s High Reliability Organization (HRO) strategies?</td>
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<td></td>
<td>Could you explain what you know about the principles of high reliability?</td>
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<td></td>
<td>Could you explain what you know about the high reliability imperatives?</td>
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<td>Ia. Intervention Source</td>
<td>Who developed these HRO strategies? What is your opinion of this group/individual?</td>
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<td></td>
<td>Why are the high reliability strategies being implemented in your hospital?</td>
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<td>Ig. Intervention Characteristics (Design Quality and Packaging)</td>
<td>How did you first hear about these HRO strategies?</td>
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<td></td>
<td>How were the HRO strategies communicated to you?</td>
<td>● When did you find out about the five principles or the three imperatives?</td>
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</table>
| | What kinds of information and materials have been made available to you? | ● Hospital meeting
● Slides from |
| IIId | External policies and incentives | What kind of policies, regulations, or guidelines influenced the decision to implement the high reliability strategies?  
Were there any financial incentives to implement this? | IRIS or other Radar measures? |
| Iib. | Evidence strength & quality | What kind of information or evidence were you made aware of to show whether these HRO strategies were appropriate?  
To what degree did this evidence influence your opinion of the HRO strategies before it was implemented? | Information from your own experience, knowledge of high reliability science, published literature, or other sources?  
From co-workers?  
From supervisors? |
| Iic. | Relative Advantage | Is there another intervention that people would rather implement to achieve high reliability? Can you describe that intervention and why people would prefer it? | RFID technology? |
| IIIId3. | Relative Priority | What is the priority of getting the high reliability strategies implemented relative to other initiatives that are happening now?  
How important do you think it is to implement the high reliability strategies relative to other priorities? | Example: RFID or checklists |
| IIIe3. | Access to Knowledge and Information | What kind of training was planned for you? For colleagues?  
Do you feel the training prepared you to carry out the roles and responsibilities expected of you for high reliability? Can you explain? |  |
<p>| IVb. | Self-Efficacy | How prepared are you to follow the high reliability strategies? |  |</p>
<table>
<thead>
<tr>
<th>IVc. Individual stage of Change</th>
<th>How confident are you that you will be able to successfully follow the high reliability strategies in the workplace?</th>
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</thead>
<tbody>
<tr>
<td>Intentions</td>
<td>Do you intend to follow the high reliability strategies?</td>
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<tr>
<td>IVe. Motivation</td>
<td>What motivates you to follow the high reliability strategies? How?</td>
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</tbody>
</table>

### Specific Information Related to Implementation (Planning Process)

<table>
<thead>
<tr>
<th>Va. Plan</th>
<th>Did you formulate a plan for how you were going to implement the HRO strategies?</th>
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<tbody>
<tr>
<td></td>
<td>How have you been involved in getting these new HRO strategies implemented within your clinical area?</td>
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<td></td>
<td>With whom did you work?</td>
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<tr>
<td></td>
<td>● Formal or informal planning</td>
</tr>
<tr>
<td>IIId1. Tension for change</td>
<td>Do/did you see a need for this type of strategy to achieve high reliability? Why or why not?</td>
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<td></td>
<td>Did you focus on any particular outcomes? Which ones?</td>
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<td></td>
<td>Were other physicians reluctant to implement these HRO strategies?</td>
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<td></td>
<td>● Any problems with physicians in the practice (don’t want to follow strategies; don’t care about high reliability)?</td>
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<tr>
<td>Vb4. External Change Agents</td>
<td>Did someone (or a team) outside your organization help you implement the high reliability strategies? If so, who?</td>
</tr>
<tr>
<td></td>
<td>Regional staff, HRO staff, DHA</td>
</tr>
<tr>
<td>IIIe1. Leadership engagement</td>
<td>What level of involvement did the clinical leaders at your facility have with the new HRO strategies? Who was involved and how?</td>
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<tr>
<td></td>
<td>● What kind of support do they give you?</td>
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<tr>
<td>Ie. Trialability</td>
<td>Did you pilot the intervention before you implemented it? What did the pilot look like? Is this something you would normally do here?</td>
</tr>
<tr>
<td>IIIId2. Compatibility</td>
<td>How well do the AMEDD HRO strategies fit with existing work processes and practices in your setting? Did the intervention replace or compliment a current program or process? In what ways?</td>
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<tr>
<td></td>
<td>● Other high reliability strategies</td>
</tr>
<tr>
<td>Id. Adaptability</td>
<td>Did you need to make changes or alterations to the high reliability strategies so they would work effectively in your setting?</td>
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</tr>
<tr>
<td>IIIa. Structural Characteristics</td>
<td>Did the infrastructure of your organization (social architecture, age, maturity, size, or physical layout) affect the implementation of the high reliability strategies? If so, what kinds of infrastructure changes were needed to accommodate the intervention?</td>
</tr>
<tr>
<td>1h. Costs</td>
<td>Were there any costs associated with implementing the high reliability strategies?</td>
</tr>
<tr>
<td>IIIb. Networks &amp; communication</td>
<td>If you had a problem with these HRO strategies, how would you communicate it with your leadership? Who would you talk with?</td>
</tr>
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</table>

### Specific Information Related to Implementation (Engagement and Information)

<table>
<thead>
<tr>
<th>Vb. Engaging (Key Stakeholders)</th>
<th>How did (do) you communicate the HRO strategies to the other providers? To the clinical support staff?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vb. Engaging (Key Stakeholders) or Ig. Design Quality and Packaging</td>
<td>What info did you use to communicate the new HRO strategies to your staff? What is your communication or education strategy for getting the word out about the intervention?</td>
</tr>
<tr>
<td>Vb/c. Engaging (champions, formally appointed leaders)</td>
<td>Who do think is involved in the HRO strategies within your section/department/hospital? What formal positions do you have to support the HRO strategies?</td>
</tr>
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</table>

Financial costs for training; time away from clinic
| Vd. Reflecting & evaluating | What kind of information (general) do you collect for high reliability?  
What measures do you track?  
Do you develop specific goals related to the HRO strategies? (e.g., zero preventable harm, retained foreign objects)  
Do you use the patient safety report or the P4I data to look at your hospital’s performance? | ● Have you seen data reports?  
● If data are reported, what happens in response? |
|---|---|---|
| If. Complexity | And now, summing up your experience with the new HRO strategies thus far:  
On a scale of 0-10, how difficult has it been to implement the HRO strategies? Why? | 0 is easy (no difficulties)  
à 10 (extremely difficult; it couldn’t get any more difficult) |
| Vc. Executing | On a scale of 0-10, how successful do you think your section/department/hospital has been with the implementation? Why? | 0 is complete failure and 10 is I can’t imagine how it could be any more successful. |

**High Reliability Principles Crosswalk with URFO/WSS (Fidelity)**

| Standardized approach or individual preference | In your section/department/hospital, is there a standardized approach to detecting and preventing URFO and WSS?  
Could you please explain your approach?  
How did you develop this standard processes/structure?  
Who was involved? | ● Do you sit down as a team to establish the structure and process? |
<table>
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<tbody>
<tr>
<td>Preoccupation with Failure</td>
<td>Please describe your process for detecting patient safety errors for retained foreign objects and/or wrong site surgery?</td>
<td>● How do you check for retained foreign objects?</td>
</tr>
<tr>
<td>Reluctance to Simplify</td>
<td>How do you have a protocol for verifying or double checking information with regards to URFO and wrong site surgery? How do you do this? How do make sure this is happening?</td>
<td>Technology? ● Are there specific areas you double check?</td>
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<td>------------------------</td>
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<td>---------------------------------------------------</td>
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<tr>
<td>Sensitivity to Operations</td>
<td>How do you maintain situational awareness with your team during an operation? How about situational awareness for URFO and WSS? Do you use TeamSTEPPS? Who is involved with your team huddle?</td>
<td>Formal structure for communication? ●</td>
</tr>
<tr>
<td>Commitment to Resilience</td>
<td>If there was an error made with regards to URFO, how would you respond to the problem? Have you practiced this response before? What is the highest risk patient safety error? Have you practiced your response to this? Please provide an example.</td>
<td>Do you role play issues or have experiential learning events? ●</td>
</tr>
<tr>
<td>Deference to Expertise</td>
<td>Do you know who to call if there is an emergency issue? Have you ever practiced this? Who would you notify? Which kinds of issues can you handle on your own? Do you train your staff to handle patient safety issues until help can arrive?</td>
<td>Standard response to issues in OR? ●</td>
</tr>
<tr>
<td>IIIe1. Leadership engagement</td>
<td>Do your leaders talk with you about patient safety concerns related to URFO or WSS? Who is involved in this engagement? Does this influence you to be more mindful of errors and safety? Does this influence you to work more closely with your team? Please explain.</td>
<td>What kind of support do they give you? Specific example. ●</td>
</tr>
<tr>
<td>IIa. patient needs &amp; resources</td>
<td>Are there any patient-level factors that would impact your ability to follow the protocols for retained foreign objects? Wrong site surgery? How well do you think the high reliability interventions will meet the needs of the individuals served by your organization?</td>
<td>• Overweight patients?</td>
</tr>
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<tr>
<td>Vb6. Engagement (intervention participants)</td>
<td>How will you or your colleagues communicate to the people that are served by your organization (community) about the high reliability? Will they participate in this implementation?</td>
<td>• Any connection to other AMEDD hospitals?</td>
</tr>
<tr>
<td>IIb. Cosmopolitanism</td>
<td>What kind of information exchange do you have with others outside your setting, either related to the intervention, or more generally about your profession?</td>
<td>• Any connection to the local hospitals?</td>
</tr>
<tr>
<td>IIb. Cosmopolitanism</td>
<td>What hospitals do you normally work with in your community? Do they employ high reliability strategies?</td>
<td>• Any connection to the local hospitals?</td>
</tr>
<tr>
<td>IIc. Peer Pressure</td>
<td>Can you tell me what you know about any other organizations that have implemented the intervention or other similar programs? Do you collaborate with them or is your relationship competitive?</td>
<td>• Any competitor in the DoD region that you have worked with?</td>
</tr>
<tr>
<td>IIIe1. Leadership engagement</td>
<td>What level of involvement do your leaders have with normal operations? How do they engage you? Do other clinic leaders get involved in normal operations (DCQS, DCCS, DCN)? Do they work together to support you? Do you feel they are too involved or not involved enough? Why? What about administrative leaders? DCA and Commander?</td>
<td>• What kind of support do they give you? Specific example.</td>
</tr>
<tr>
<td>3c. Culture</td>
<td>How would you describe the culture of your organization? Do you think your organization's culture (general beliefs, values, assumptions that people embrace) affected the implementation of the high reliability strategies? Have you or anyone around you ever reported a patient safety error? How was this received by your leadership? How did they handle the problem?</td>
<td>Trust</td>
</tr>
<tr>
<td>IIIb. Networks &amp; communication</td>
<td>Who is the most influential person in your practice (physician, RN, admin)? How do they influence others? What are they saying about the high reliability strategies?</td>
<td>● Who is influential and why?</td>
</tr>
<tr>
<td>IIIb. Networks &amp; communication</td>
<td>How do you normally share information in your practice? Who attends the meetings? What meeting agendas has the new HRO strategies been on or been a topic of discussion?</td>
<td>● Do you have meetings? How often (Monthly, weekly, adhoc)? ● Surgeons, support staff, admin?</td>
</tr>
<tr>
<td>IIId5. Goals/feedback</td>
<td>Do you develop goals in your work area? Does the implementation of high reliability align with these goals? Do you track performance measures for your work area? Do you have a formal ways to evaluate the employees? What does this look like?</td>
<td>Example: Financial, quality, or productivity Does this include the physicians?</td>
</tr>
<tr>
<td>IIId4. Organizational Incentives and Rewards</td>
<td>Do you provide incentives or awards? How about for HRO performance? To what extent do you think your supervisor will consider</td>
<td>Does this include the physicians?</td>
</tr>
</tbody>
</table>
| IIId6. Learning Climate | Do you have Quality Improvement projects in your practice? What types of activities?  
What type of change philosophy do you employ (PDSA, LSS)?  
To what extent do you feel like you can try new things to improve your work processes?  
Do you feel like you have the time and energy to think about ways to improve things?  
Does the staff learn from each other?  
Formal programs for improvement?  
--- | --- |
| IIle2. Available Resources | What resources are dedicated for implementation and ongoing operations (including money, training, education, physical space, and time)?  
Do you have any issues with not having resources for implementing the HRO strategies?  
● How do you track the amount of time per person?  
--- | --- |
| General questions (organizational identity and feedback) | Changes to MHS strategy | If you could change anything about the MHS HRO Strategies, what would it be?  
What would you want to see from the Surgeon General? Defense Health Agency?  
--- |
| | IVd. Individual Identification with the organization | What are your thoughts of your organization? Why did you join?  
Do you feel your contribution (individual or clinic) has made a difference to the hospital?  
Do you feel that you are recognized for your contributions to the hospital?  
Would you recommend this hospital to other professionals who are looking for employment?  
--- |
| | Final Thoughts? | If you could change anything in your organization, what would you change?  
Any other final thoughts?  
--- | --- |
## Appendix B: Summary Ratings, CFIR Matrix

<table>
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<th>Hospital Number</th>
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<td>Needs &amp; Resources of Those Served by the Organization</td>
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** Construct strongly distinguishes as a barrier or facilitator
* Construct weakly distinguishes as a barrier or facilitator
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