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1. REPORT DATE (DD-MM-YYYY) 1 Dec 2019		2. REPORT TYPE Technical Report-Final Report		3. DATES COVERED (From - To) 1 June 2018 - 1 Dec 2019	
4. TITLE AND SUBTITLE High reliability and continuous process improvement in the U.S. Air Force Medical Service				5a. CONTRACT NUMBER In-House	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Kohsin, Beth Y. Andrus, John R. Phipps, Helen Schroeder, Paul J. Nichols, Jaime E.				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) USAF Air Force Medical Readiness Agency (AFMRA) 3515 South General McMullen, Suite 153				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S) 2019-0859	
12. DISTRIBUTION/AVAILABILITY STATEMENT DISTRIBUTION A-Approved for Public Release					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT Direct connections and effective communication between operational staff and leaders are crucial to highly reliable healthcare organizations. This requires linking those served, those that directly serve (frontline staff) and leaders at all levels through a deliberate process to identify challenges and solve problems together. In the present case report, we present an overview of the U.S. Air Force Medical Service (AFMS) Continuous Process Improvement (CPI) Management System and discuss its contribution to high reliability within the Air Force. A descriptive synthesis was conducted on relevant studies and guidance documents. The results focus on three principle elements of the CPI Management System: leader standard work, visual controls, and daily accountability. Finally, we discuss the strengths and limitations, as well as the future of the AFMS CPI Management System. We conclude that the CPI Management System is a vital component to achieving high reliability, or Trusted Care, in the AFMS.					
15. SUBJECT TERMS Continuous process improvement; organizational reliability; military health system; high reliability, trusted care					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 26	19a. NAME OF RESPONSIBLE PERSON Ms. Beth Kohsin
a. REPORT U	b. ABSTRACT U	c. THIS PAGE U			19b. TELEPHONE NUMBER (Include area code) 210-292-9590

Running Head: CPI IN THE U.S. AIR FORCE MEDICAL SERVICE

High reliability and continuous process improvement in the U.S. Air Force Medical Service

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Disclaimer: The views expressed in this paper do not necessarily reflect the views of the United States Government, United States Air Force, United States Transportation Command or Booz Allen Hamilton.

Acknowledgements: We would like to acknowledge the men and women of the United States Air Force Medical Service (AFMS) and the customers they serve.

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Abstract

Direct connections and effective communication between operational staff and leaders are crucial to highly reliable healthcare organizations. This requires linking those served, those that directly serve (frontline staff) and leaders at all levels through a deliberate process to identify challenges and solve problems together. In the present case report, we present an overview of the U.S. Air Force Medical Service (AFMS) Continuous Process Improvement (CPI) Management System and discuss its contribution to high reliability within the Air Force. A descriptive synthesis was conducted on relevant studies and guidance documents. The results focus on three principle elements of the CPI Management System: leader standard work, visual controls, and daily accountability. Finally, we discuss the strengths and limitations, as well as the future of the AFMS CPI Management System. We conclude that the CPI Management System is a vital component to achieving high reliability, or Trusted Care, in the AFMS.

Subject Terms

Continuous process improvement; organizational reliability; military health system; high reliability, trusted care

Introduction

The U.S. Air Force Medical Service (AFMS) is the branch of the military health system (MHS) that provides healthcare and services to the men and women of the Air Force and their families at 76 clinics and hospitals around the world with a workforce of 43,000 personnel. One of the key functions of the AFMS is to ensure reliable communication between members of the workforce, including frontline staff and leaders. In the civilian sector, continuous process improvement (CPI) management is one approach to organizing and facilitating the flow of information within highly reliable organizations. Can CPI be used to structure communication and connect people in the AFMS? The aim of this case report is to examine the impetus, goals, and design of the AFMS CPI Management System. The case report is designed to assess the strategy of the AFMS CPI Management System while highlighting strengths and limitations to inform leading practices across the MHS and other healthcare systems.

The AFMS (and more broadly the MHS) is on a journey to become a highly reliable organization (HRO). HROs are “organizations that have the potential for catastrophic failure yet engage in nearly error-free performance” (Christianson, Sutcliffe, Miller, & Iwashyna, 2011, p. 314). These organizations conduct consistent and sustainable low-error operations based on informed, high-quality decision making and controls. They confront and actively prepare for problems as they: (1) focus on the potential for failure, (2) avoid simplifying problems, (3) maintain situational awareness of operations, (4) prepare to cope with unforeseen problems, and (5) consult with experts when the need arises (Weick, Sutcliffe, & Obsterfeld, 1999; Weick & Sutcliffe, 2005).

In a highly reliable healthcare system, all entities within the organization (support personnel, technicians, nurses, doctors, and leaders) work cooperatively to identify and eliminate

errors and develop strategies for mitigating potential future problems so they can deliver quality care and services to patients and other customers. Chassin and Loeb (2011) proposed three requirements for achieving high reliability in healthcare: (1) forging a commitment to high reliability among leadership, (2) prioritizing safety, and (3) instituting process improvement practices within the organization. Regarding the first requirement, Chassin and Loeb (2011) posited that leaders of healthcare organizations demonstrate a commitment when they incorporate high reliability into the organizational mission statement, develop measurable goals, and maintain awareness of what is happening in the organization. Regarding the second requirement, frontline staff should feel safe reporting errors and problems, and assured that their concerns will be addressed by management. For example, a nurse should feel that reporting an error made by a colleague will not lead to confrontations or being ostracized by the team and, moreover, that their concern will be addressed by their superiors. Finally, regarding the third requirement, Chassin and Loeb (2011) recommended putting in place methods that ensure timely and effective communication between members of the organization about inefficiencies in the system to improve the delivery of healthcare. Examples of these methods include: identifying and measuring the causes of inefficiencies and developing measurable solutions to fix problems. The important point is high reliability requires the active participation of all personnel at all levels of an organization.

CPI as a Component of Trusted Care in the AFMS

The term “Trusted Care” is short for “Trusted Care, Anywhere”, which refers to the availability of care provided by the AFMS (Office of the Air Force Surgeon General, 2015). The genesis of the Trusted Care concept can be traced to the 2014 review of the Military Health System (MHS) (U.S. Department of Defense, 2014). The review identified three key areas of

operation that required improvement: patient safety, transparency of information, and the creation of a data center to measure quality and performance. After performing a gap analysis and consulting with experts and leaders in the healthcare community, the Trusted Care concept was established. The goal of Trusted Care is to facilitate the AFMS' journey towards high reliability. Part of this plan involved the development of four domains of change and nine guiding principles (Figure 1). Whereas *domains* are states of operation, *principles* are values that influence behaviors and guide how members of the organization think about and perform their work.

In the Trusted Care system, principles are guided by the domains of change. One of the critical principles of Trusted Care is “Zero Harm”, which is a commitment by all members of the AFMS to prioritize the risks and benefits of actions and decisions (Office of the Air Force Surgeon General, 2015). The two principles that guide the CPI domain of change are:

1. Focus on Frontline Operations and the People who do the Work; and
2. Every Airman, Every Day, a Problem Solver.

Importantly, these two CPI principles establish a foundation to support the seven other Trusted Care guiding principles.

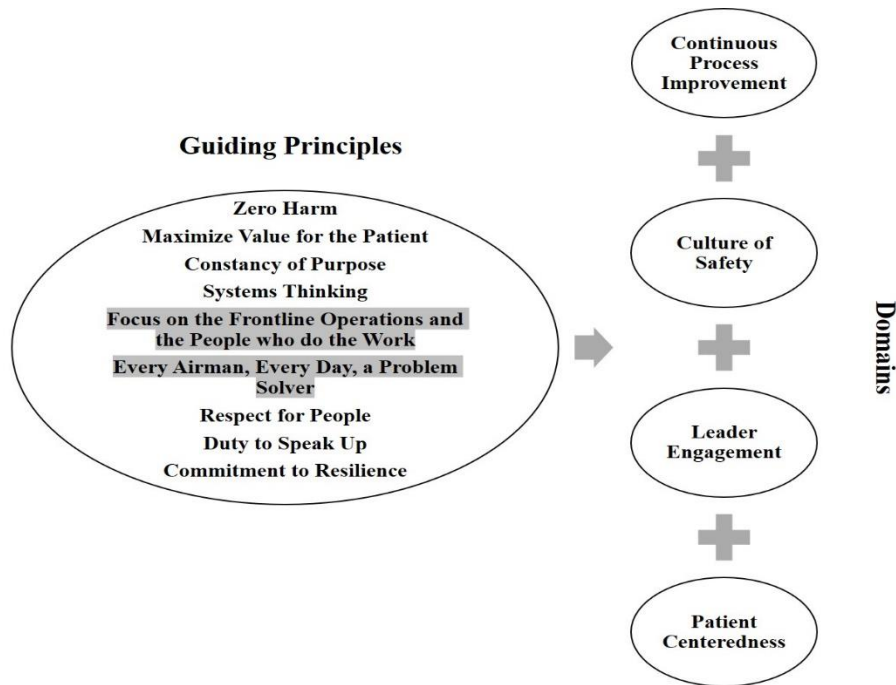


Figure 1. Trusted Care Domains and Guiding Principles.

Establishing direct connections and communication between frontline staff and leaders is essential because frontline staff spend more time interacting with patients and other customers. This makes them most qualified to point out shortcomings and potential problems in the delivery of care and services. To most effectively work together, leaders supports their frontline staff by visiting operations, observing daily huddles, and actively listen to better understand processes, interactions, and eliminate barriers. Frontline staff strive to understand the context and process by which they deliver services, while at the same time observe and report problems and inefficiencies. In this system of interactions, frontline staff are encouraged and able to fix issues within their control, and elevate issues or barriers requiring leader assistance.

Essential to improving the reliability of an organization is the development of a robust system for detecting and removing errors and inefficiencies, facilitating connections, and promoting trust between staff and leaders. To best accomplish this, the AFMS developed and implemented a CPI Management System to create an environment “where all members of the

organization work together on an ongoing basis strengthening processes and reducing errors to improve overall performance for the customer” (Fryer, Antony, & Douglas, 2007). A daily CPI approach brings incremental changes to a system. Taken together these small changes lead to fewer errors and thus higher reliability of the organization. There are several advantages to this approach: small changes are (1) easier to implement, (2) easier for staff to comprehend and learn, and (3) over time, more likely to result in successful large changes to an organization. Studies have shown that CPI systems are effective at promoting change in healthcare settings, including increased safety, quality, and customer satisfaction (Barnas, 2011).

Implementing CPI systems into an established healthcare organization and enterprise can be challenging. It is natural that some staff resist change in their daily routine (Campbell, 2016). Therefore, it is critical that managers and leaders establish a thoughtful plan to ensure the smooth implementation of a robust CPI system by addressing the “people side” of change, not just the technical process and systems aspect. Modifications to existing systems in large organizations require a deliberate “change management” approach. Kotter (2002; cited in Campbell, 2008) proposed that successful change management entails connecting employees to the concepts of the change. For example, implementing CPI entails using a logical approach to help both staff and leaders embrace the concept of a CPI system and then developing strategies to ensure they regularly participate in the CPI process.

The AFMS benefits from the CPI Management System because it supports leaders’ ability to execute missions, lead others, manage resources, and improve unit readiness. It does this by connecting leaders with frontline staff to identify and eliminate unsafe practices, and promote innovative ideas and communication between and among staff. In addition, the CPI

Management System is versatile to the extent that it can be implemented in a variety of settings, including clinical, support and administrative settings.

Methods and Results

As mentioned previously, the goal of this case report is to examine the impetus, goals, and design of the AFMS CPI Management System. Using a combination of broad keywords and subject headings/indexing terms, we searched PubMed and authoritative guidance sources (e.g., Air Force e-publishing) for relevant literature since 1999. We also examined abstracts from relevant scientific meetings and consulted experts in the field for further studies. References were included in this case report if they investigated or provided guidelines for how the AFMS meets the expectations for an HRO and CPI. In this case report, the CPI Management System is the intervention with the AFMS and its beneficiaries, customers and stakeholders as the population, and the comparator is the standard definition of what constitutes a CPI Management System. Results were reported qualitatively to include a descriptive synthesis of the findings from the included studies and guidance documents. To facilitate appropriate comparisons, references were first grouped according to whether they were research-oriented or authoritative guidance. Other stratifications (e.g., civilian vs. military) were also considered.

For this paper we considered two models of CPI that inspired the CPI Management System component of the Trusted Care approach: The Shingo model and the Lean Management model. The Shingo Model for Operational Excellence (1989) provides a framework for CPI based on five dynamic principles and supporting concepts (Table 1). In theory, adherence to these principles and concepts should facilitate an organization-wide understanding of goals and expectations by eliminating redundancies and uncertainty among staff and leadership.

Table 1. The five principles and supporting concepts of CPI in the Shingo Model (Shingo, 1989).

Principle	Supporting concept
Focus on process	Identify problems in the process
Embrace scientific thinking	Encourage a common understanding among team members about improvement
Flow and pull value	Identify ways to reduce the time to create a product and eliminate unnecessary roadblocks to delivery
Assure quality at the source	Identify and eliminate root causes or inefficiencies in the process
Seek perfection	Persistent monitoring for inefficiencies and potential problems

Mann (2009) proposed an interdependent tripartite approach to management (i.e., Lean Management) that emphasized a structured approach to achieving process and focus. The first component of this approach is leader standard work, which encompasses routine daily activities (e.g., observing processes and consulting performance metrics). The second component, visual controls, refers to the tools that facilitate awareness about activities in the system, such as charts. Finally, the third component, daily accountability, entails structured meetings that concentrate on current issues and emerging concerns. The net result of this approach is “partial redundancy upward through the chain of command” (Mann, 2009, p. 22).

Creating AFMS Problem Solvers with the Three Principle Elements of CPI

From our research, we created a melded approach tailored to the AFMS that includes leader standard work, visual controls, and daily accountability (collectively referred to as “daily management of operations”). Here we provide descriptions of these three critical elements of

the CPI Management System and examine their contribution to the Trusted Care approach to high reliability.

Leader Standard Work

Leader Standard Work is defined as predictable, repeatable, and standard activities (Mann, 2009) that move an organization closer to CPI. In the AFMS, leaders are responsible for determining and scheduling leader standard work, such as huddling and rounding, that regularly focuses on frontline operations, issues, and the people doing the work. These frequent face-to-face interactions allow leaders to better understand frontline operations, recognize system and process deviations, create a work environment of trust and connectedness, and coach CPI. Furthermore, leaders who follow through on expected standard work demonstrate integrity and build trust and connectedness. Their behavior helps create a just culture where leaders see the system as the problem and not the people.

Leader standard work was developed so that communication, prioritization, resolution of problems and information flow seamlessly through the organizational tiers (Figure 2). The AFMS CPI Management System is designed to strengthen organizational connectedness and promote trust through all echelons of the organization. It employs methods that facilitate bidirectional communication channels at the seams and establishes standards for identifying, communicating, and resolving safety concerns, process frustrations, and waste throughout the organization. Note that within each tier there are lateral seams not represented in the model, such as between different squadrons within the empowering leader layer. Leaders need to consistently reinforce their efforts to connect, communicate and collaborate both within and laterally across the organization.

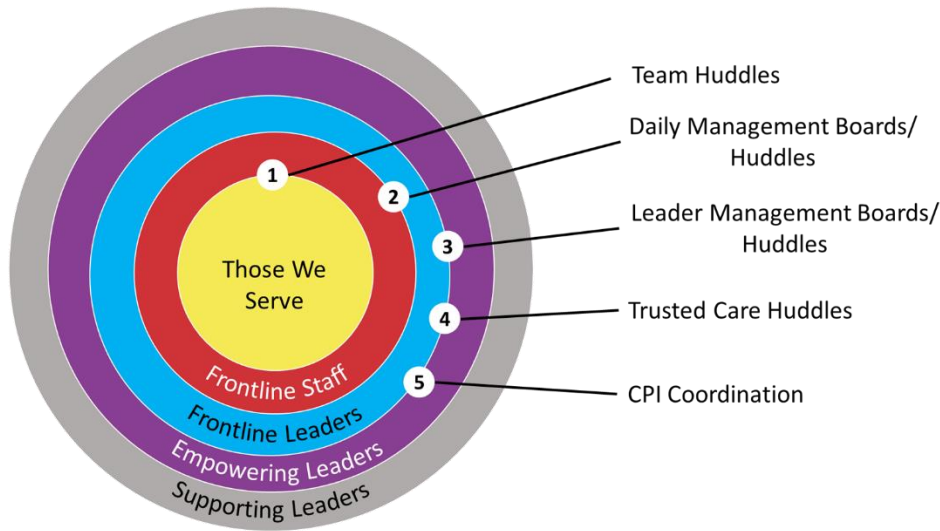


Figure 2. Model of Tiers and Seams.

There are similarities and differences between the AFMS and Mann’s (2009) approach to leader standard work. Whereas Mann’s (2009) approach was designed with civilian organizations in mind, the AFMS approach is tailored to the organizational structure and needs of the Air Force. Some examples of differences between the AFMS CPI Management System and Mann’s (2009) conceptualization of Leader Standard Work are leader observation of and interaction in frontline huddles (performance tracking), communicate across tiers and seams (partial redundancy), and elevate concerns and accomplishments (trust building). Nevertheless, the AFMS approach could be adopted for application in other organizational settings. For example, tiered-based research hospitals might benefit from this (or a similar) approach.

Visual Controls

Over the last decade, the concept of visual controls (or “visual management”; Tezel, Koskela, & Tzortzopoulos, 2009) received increased academic consideration (Tezel, et al., 2009; Kurpjuweit, Reinerth, Schmidt, & Wagner, 2018), including the development of theories about visual controls (Beynon-Davies & Lederman, 2017; Koskela, Tezel, & Tzortzopoulos, 2018).

Tezel et al. (2009) identified nine functions of visual controls (Table 2). The key is that they facilitate immediate comprehension about an organization or system. Tezel, Koskela, and Tzortzopoulos (2016) constructed a taxonomy of different types of visual controls and provided a comparison and contrast of each type. One way visual controls facilitate comprehension is by capturing lower-level perceptual processes and engaging higher-level cognitive processes (e.g., capturing tangible properties of the modality of communication and getting the audience to think about the contents of the communication medium; Beynon-Davies & Lederman, 2017). Building on this theory, Koskela et al. (2018) proposed three ways visual controls improve comprehension: (1) they elicit quick decision-making strategies, (2) they consistently work, and (3) they enable the audience to think about performing an action. This is because they support situational awareness about an operational environment and propagate a common reference among team members (Koskela et al., 2018). However, it should be noted that one shortcoming of these theories is they fail to address practical external impediments to the success of visual controls, such as lack of interest by members of a team or simply the inability to support the implementation of visual controls (Kurzjuweit et al., 2018).

Table 2. Functions of visual controls (Tezel et al., 2009).

Function	Definition
Transparency	The ability of a production process (or its parts) to communicate with people
Discipline	Making a habit of properly maintaining correct procedures
Continuous improvement	An organization-wide process of focused and sustained incremental innovation

Job Facilitation	Conscious attempt to physically and/or mentally ease people's efforts on routine, already known tasks by offering visual aids
On-the-job training	Learning from experience or integrating working with learning
Creating shared ownership	A feeling of possessiveness and being psychologically tied to an object (material or immaterial)
Management by facts	Use of facts and data based on statistics
Simplification	Constant efforts on monitoring, processing, visualizing and distributing system-wide information for individuals and teams
Unification	Partly removing the four main boundaries (vertical, horizontal, external, and geographic), and creating empathy within an organization through effective information sharing

The aim of visual controls in the AFMS CPI Management System is to unify frontline staff, frontline leaders (immediate supervisors) and empowering (organizational-level) leaders, in identification of concerns and frustrations, problem solving, elimination of undesired waste and refinement of processes through connection and communication. The AFMS CPI Management System designed visual displays (i.e., daily management board, Figure 3 and leader management board, Figure 4) to communicate and track organizational objectives, metrics, priorities, and process improvement at various levels. Design principles of visual controls in the AFMS CPI Management System are identified in Table 3.

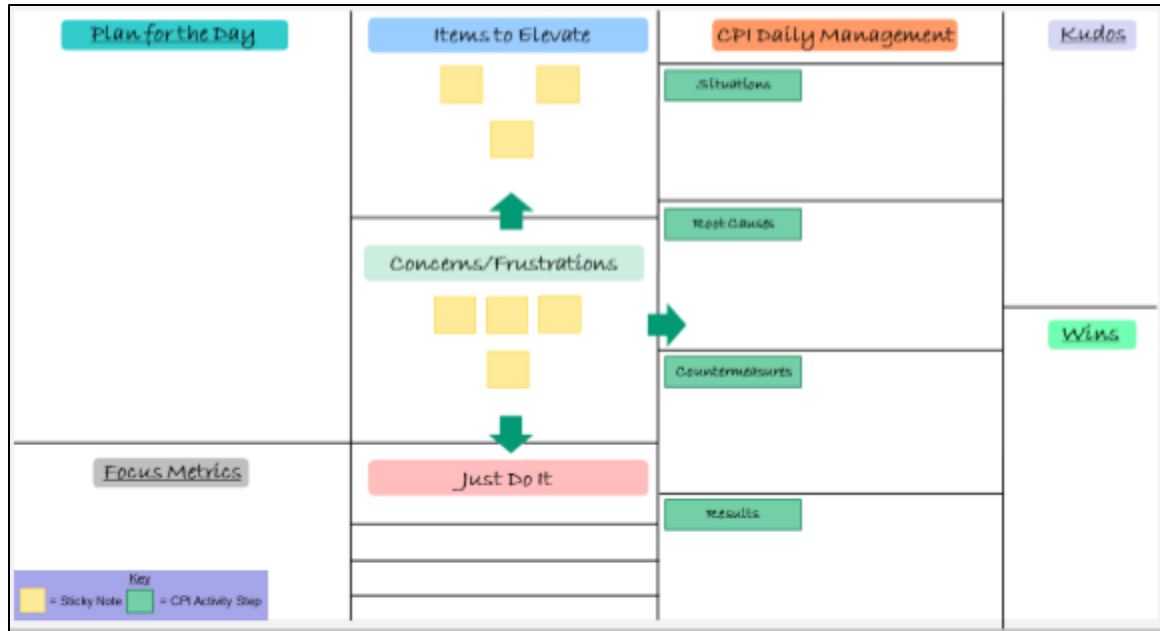


Figure 3. Example of Daily Management Board.

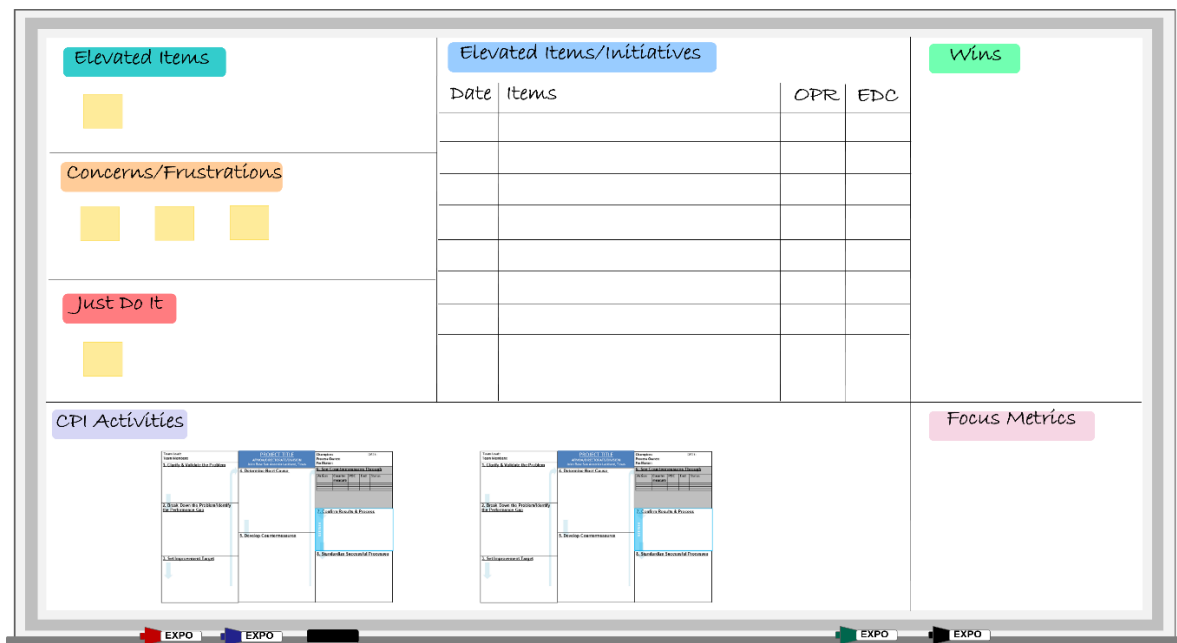


Figure 4. Example of Leader Management Board.

The boards provide the framework for daily huddles, promote accomplishments and display leading practices across organizations and clinics. Inclusion of accomplishments on the Daily Management Board deviates from Mann’s original conceptualization of visual controls,

however, was added when frontline staff and leaders recommended it to be added. The chosen design reassures members they are part of a team and their contributions positively affect the mission. It also reinforces commitment and promotes engagement in the AFMS CPI Management System to be heard and improve their work processes and environment.

Table 3. Features of AFMS CPI Visual Controls versus Other Visual Control Examples.

AFMS CPI Management System Visual Controls	Other System Visual Controls (Tezel et al., 2016)
Initiatives	Integrated
Elevated issues	Openly exposed
Mission-centric	Self-service information field
Quickly communicate	Pre-emptive
Display key process indicators (e.g., boards, charts, or scorecards)	Simple (e.g., low text and/or verbal attributes)
Engaging	Display in process elements
Leading Practices Repository	

Daily Accountability

Implementing daily huddles improves connectedness, communication, and workflow among staff. AFMS CPI Management System huddles consist of brief discussions of plans for the day, performance data on key processes, problem solving, and organizational gaps for daily team and leadership use (Table 4). Information that warrants elevation to leaders is passed on to the next tier to be discussed at leader daily huddles. Through these huddles, the AFMS CPI approach integrates all principle elements of CPI and rapidly elevates significant topics. The

expected outcomes for daily accountability through daily huddles are to: (1) focus on trends and continually add and address issues being tracked, (2) ensure accountability which is vital to the efficiency process, and (3) tie the entire process of operations—from the frontline to the empowering organizational leader level—to the organization’s overall strategy and performance goals (Harrison, 2018).

Huddles among healthcare workers provide an opportunity for team members to voice concerns, frustrations, and solutions for workplace issues at all levels. A study by Rodriguez and colleagues (2014) found that Veterans Affairs healthcare workers who participated in structured daily huddling reported significantly increased self-efficacy, teamwork (team satisfaction, team skills, knowledge, and processes), and practice climate (communication, decision-making, psychological safety, and leadership facilitation). These findings highlight the positive role of daily huddles in facilitating personal and team performance in a healthcare environment.

Through huddles, the AFMS CPI Management System established bidirectional accountability where:

1. Frontline staff are accountable to execute standard processes as designed, speak up when faced with safety concerns and process frustrations, and engage process improvement mechanisms to maximize value to those they serve.
2. Leaders are accountable to frontline staff for following through on their leader standard work; to observe and interact at daily huddles, be consistent in seeking to understand frontline work, and remove barriers at the point of service.

Table 4. Features of AFMS CPI Huddles versus Other Daily Accountability Examples.

AFMS CPI Management System	Other System Daily Accountability
Daily Accountability	(Harrison, 2018)
Huddles	Huddles
Daily plans	Trends
Tactical concerns	Accountability
Frustrations	Strategy and performance goals
Metrics and measures	Metrics
Wins and kudos	

Discussion

A central aim of the adoption of the CPI Management System across the AFMS is to introduce a deliberate approach to connect leaders and frontline staff. It provides a framework within which leaders may learn to listen, coach at the frontline and facilitate team-based problem solving. Implementation of the CPI Management System across the AFMS helps leaders at all tiers improve connectedness and communication, by demonstrating daily the dignity, respect and problem-solving skills needed to reach Zero Harm and by reinforcing high reliability principles at daily huddles. Frontline teammates are provided a judgment-free environment to bring forward inefficiencies and roadblocks to the delivery of services and healthcare, while simultaneously contributing to the discovery and implementation of solutions. As with any system, the AFMS CPI Management System has its strengths and limitations which will be the focus of future evidence-based analyses.

Strengths and Limitations

The CPI Management System blends principles and practices from leading lean

management models including the Shingo model (1989) and the Lean Management System (Mann, 2009). It brings leaders from various parts of the organization to frontline operations to participate in a continuous, robust and inclusive dialog about risk management. The framework of the CPI Management System incorporates high reliability and change management principles to transform interactions and facilitate cooperation between leaders and staff. One limitation that slowed down implementation is the reality of transforming leader behavior across a global network of hospitals and clinics serving 3 million patients annually. This effort also included intermediate commands and higher headquarters, including the Office of the Air Force Surgeon General. However, experience has shown that when leaders buy in, invest in training staff and follow through on leader standard work teams solve long standing concerns and improve safety, service and output.

The AFMS CPI Management System promotes ongoing development through training in CPI fundamentals. This allows for the evolution and succession of existing leaders to become more collaborative, align their initiatives to key goals, and to further prepare effective teams to leverage leading practices across the enterprise. The AFMS CPI Management System focuses on opening interactions through leader standard work, creating an environment of trust and connectedness through daily accountability, and enabling AFMS leaders to better understand frontline operations and staff. It is also used to embrace and standardize a universally accessible and comprehensive way of achieving more reliable results across the enterprise using visual controls, coaching leaders to continually improve, and implementing daily management of operations and process improvement initiatives.

The variances in size, scope, and goals of an organization drive the need for a unique approach to high reliability and CPI. Unlike existing models, the AFMS developed a unique CPI

strategy of problem solving and prioritization. It did this by both overcoming the disconnect between understanding daily operations and knowing the requirements to navigate ineffective processes and inefficiencies, bringing together frontline staff and leaders at all levels of the organization and, ultimately, the enterprise through a tiered model (Figure 2). The integrated approach to CPI was compelled by the mission of the military (readiness), the complexity of the healthcare system, and the journey to higher reliability.

Daily huddles are one of the major tools to implementing the AFMS CPI Management System and are an effective and practical approach for fostering reliability because they provide an opportunity for staff to voice concerns and potential solutions that will be heard by those with the authority to implement changes to the system (Office of the Air Force Surgeon General, 2015). Again, awareness of shortcomings and potential problems is critical to high reliability and the AFMS realizes there are limitations to daily huddles. For example, in order for huddles to operate most effectively, all members should participate; however, this has been shown to not always be the case (Rodriguez, et al., 2014). Failing to participate in daily huddles impedes situational awareness and may erode trust among team members. More importantly, leaders should commit to and be engaged in the process, for the staff to feel confident that bringing forward frustrations and challenges will bring positive results. Nevertheless, the inclusion of huddles in the daily operations of the AFMS demonstrates how practices from the private sector can be implemented into military health services as a means to communicate messages from the point of service to organizational leaders and stakeholders (e.g., headquarters).

Additional research should examine the benefits and shortcomings of the daily management board. For example, it would be helpful to examine if other modes of communication are as effective (or better) at engaging audiences and facilitating comprehension

as marker boards. New technologies, such as smart boards, could provide a more convenient and expedient way to deliver the same information as traditional marker boards. First, they eliminate confusion caused by poor penmanship. Second, because they connect to the internet, they could be used to network and broadcast with other units, which could be advantageous in large treatment facilities or situations in which units may be collaborating. However, the downside is that these tools may be less cost-effective than marker boards and subject to technical malfunctions. Regardless of the visual display used, the CPI Management System is only effective if it connects frontline staff to leaders through leader standard work, daily, and supports every team in problem solving every day.

To encourage understanding of Trusted Care, the CPI domain and associated guiding principles, a visual control training solution called " Quest for Zero" was developed (Figure 5). Expanded to include all domains, the board game provides participants with an interactive method of learning the concepts behind HROs and the methods to implement these concepts at their facilities. Other methods of introduction, education, and training on CPI and the CPI Management System include the Basic Leadership Airman Skills Training and the CPI Boot Camp. The CPI Management System was also integrated into the framework for the AFMS Joy in Work Campaign initiative that leverages the CPI guiding principle *Every Airman, Every Day, a Problem Solver* to empower frontline personnel to take charge of change efforts that will reduce their burnout and improve joy in work.



Figure 5. Quest for Zero.

Other visual control designs such as daily management boards are tailorable to unique organizational and team needs, but ultimately maintain the core features to manage both AFMS CPI daily management and problem-solving initiatives. Once ideas are generated at the board, if the process issue is outside of the local team’s control, the issue is handed to the next level leader to own the concern, engage the appropriate people to work it, and ensure the initiative stays on track and is addressed. This integration of visual controls, leader standard work, and daily accountability encourages leaders and other team members to ensure initiatives are carried all the way to conclusion.

Overall, the largest and most impactful benefits of the AFMS CPI Management System to date have been enriching the connectedness, communication and understanding through different tiers of the organization. Mechanisms to connect stakeholders is the key tenet of the AFMS CPI Management System and is instrumental in the “what’s in it for me” to staff. The further a leader is from frontline operations, the more this system has mechanisms to keep them

connected to frontline staff, patients, and customers. Connecting teams through this interface should be the focus of leaders.

Conclusion

The aim of the AFMS CPI Management System is to support and connect frontline staff to leaders through the concept of daily management of operations. Further, coordination with frontline staff allows for the identification, management, and improvement of key work processes and desired outcomes. If used as designed, the CPI Management System will strengthen connectedness between different tiers of a healthcare system and can be used to evaluate the performance of its leadership. As a long-term goal, it is recommended that the AFMS CPI Management System identify and monitor process, and outcome measures and metrics related to this daily management approach. Monitoring evidence related to AFMS CPI Management System implementation and critically comparing it to evidence on healthcare outcomes and customer experience are essential to inform the future effectiveness and impact the system.

References

- Agency for Healthcare Research and Quality (AHRQ). Culture of Safety. Retrieved from <https://psnet.ahrq.gov/primers/primer/5/safety-culture#>.
- Beynon-Davies, P. & Lederman, R. (2017). Making sense of visual management through affordance theory. *Production, Planning, and Control*, 28(2), 142-157.
- Campbell, C.M. (2016). Trusted care in the Air Force Medical Service: practical recommendations for transformation (DTIC Publication No. AD1037093). Fort Belvoir, VA: Defense Technical Information Center.
- Campbell, R.J. (2008). Change management in health care. *Health Care Manager*, 27(1), 23-39.
- Chassin, M.R. & Loeb, J.M. (2011). The ongoing quality improvement journey: next stop, high reliability. *Health Affairs*, 30(4), 559-568.
- Christianson, M.K., Sutcliffe, K.M., Miller, M.A., & Iwashyna, T.J. (2011). Becoming a high reliability organization. *Critical Care*, 15(6), 314-318.
- Department of Defense (DoD). (2014). Military Health System Review. Retrieved from <https://health.mil/Military-Health-Topics/Access-Cost-Quality-and-Safety/MHS-Review>.
- Fryer, K.J., Antony, J., & Douglas, A. (2007). Critical success factors of continuous improvement in the public sector: A literature review and some key finding. *The TMQ Magazine*, 19(5), 497-517.
- Harrison, M. (2018, November 29). How a U.S. health care system uses 15-minute huddles to keep 23 hospitals aligned. *Harvard Business Review*, 11. Retrieved from <https://hbr.org/2018/11/how-a-u-s-health-care-system-uses-15-minute-huddles-to-keep-23-hospitals-aligned>.
- Koskela, L., Tezel, A., & Tzortzopoulos, P. (2018). Why visual management? In V.A. Gonzalez

- (Ed) *Proceedings of the 26th Annual Conference of the International Group for Lean Construction* (pp.250-260). Chennai, India: International Group for Lean Construction.
- Kotter, J. & Cohen, D. (2002). *The Heart of Change: Real Life Stories of How People Change their Organization*. Boston, MA: Harvard Business School Press.
- Kurpjuweit, S., Reinerth, D., Schmidt, C., & Wagner, S. (2018). Implementing visual management for continuous process improvement: barriers, success factors, and best practices. *International Journal of Production Research*, 1-5.
- Mann, D. (2009). The missing link: lean leadership. *Frontiers of Health Services Management*, 26(1), 15-26.
- Office of the Air Force Surgeon General. (2015, October). *Trusted Care Concept of Operations (CONOPS)*.
- ProSci. (2019). *An introduction to change management guide*. Retrieved from <https://cdn2.hubspot.net/hubfs/367443/2.downloads/content-guides/An-Introduction-Guide-to-Change-Management-guide.pdf>.
- Rodriguez, H., Meredith, L., Hamilton, A., Yano, E., & Rubenstein, L. (2014). Huddle up!: The adoption and use of structured team communication for VA medical home implementation. *Healthcare Management Review*, 40(4), 286-299.
- Shingo, S. (1989). *A Study of the Toyota Production System from an Industrial Engineering Viewpoint*. New York, NY: Productivity press.
- Tezel, A., Koskela, L., & Tzortzopoulos, P. (2009). The functions of visual management. In *Proceedings of the International Research Symposium*. Salford, U.K. Retrieved from <http://usir.salford.ac.uk/10883>.

- Tezel, A., Koskela, L., & Tzortzopoulos, P. (2016). Visual management in production management: A literature synthesis. *Journal of Manufacturing Technology Management*, 27(6), 766-799.
- U.S. Department of Defense (2014). Military Health System Review. Available from https://archive.defense.gov/pubs/140930_MHS_Review_Final_Report_Main_Body.pdf.com.
- Weick, K.E., Sufcliffe, K.M., & Obsterfeld, D. (1999). Organizing for high reliability: Processes of collective mindfulness. In R.S. Sutton & B.M. Straw (Eds). *Research in Organizational Behavior, Volume 1* (pp.81-123). Stanford: Jai Press.
- Weick, K. & Sutcliffe, K. (2005, February). Managing the unexpected. Jacksonville, FL. Retrieved from <http://www.high-reliability.org>.