How Is Patient Safety Achieved?

by Capella Healthcare

WHAT'S COVERED

This lesson will identify methods for achieving patient safety. Specifically, this lesson will cover:

1. Addressing Active and Latent Failures
2. Human Factors Engineering
   a. High-Reliability Design
   b. Safety Sciences
3. Analytic Methods
   a. Failure Modes and Effects Analysis (FMEA): Prospective
   b. Root Cause Analysis: Retrospective

1. Addressing Active and Latent Failures

In attempting to prevent active errors, one must consider the crucial difference between slips and mistakes as the solutions to these two errors are very different. Slips represent failures that occur when we perform activities we do reflexively and cause a lapse in concentration. These slips, or lapses, often occur in the face of competing sensory or emotional distractions, fatigue, or stress. Mistakes, by contrast, are due to incorrect choices, and more often represent a lack of experience, insufficient training, or negligence.

Mitigating the risk of slips requires attention to the designs of protocols, devices, and work environments, with strategies such as these:

- using checklists to ensure key steps are followed
- implementing forcing functions to minimize workarounds (any task or activity that forces you to take action and produce a result, i.e., a barcode must be scanned (forcing function) to extract medication from a cart)
- removing unnecessary variation in processes and design of key devices
- eliminating distractions from areas such as those where medication preparation takes place to allow for intense concentration
- implementing other design techniques

Reducing the likelihood of honest mistakes, on the other hand, relies on more training or supervision because people make mistakes because of poor decision making, lack of skill, or perpetual deficits.

HINT

When an individual repeatedly makes mistakes, an organization should consult the Just Culture Algorithm from the Safety Culture course for ways to manage this behavior.

Addressing latent failures often requires an in-depth analysis of an organization. Such an analysis should lead to a concerted effort to revise how systems of care work, how protocols are designed, and how individuals interact with the system. Specific solutions vary widely depending on the type of latent error, the severity of the error, and the availability of resources to address the issue. Stronger actions, such as standardizing technology, human factors-based engineering fixes, changing culture, system integration, and team coordination strategies require more time; however, evidence suggests this approach is more sustainable and effective and reduces cost over time.

2. Human Factors Engineering

2a. High-Reliability Design

High reliability design comes from complexity theory, which contends that open interacting systems (systems that interact with its environment) will produce some level of chaos or inherently unpredictable events. High-reliability designs are resilient in the face of unpredictable events.
Patient safety designs can fall into two categories:

1. Those involving routine care that varies little and can be best managed with protocols that allow for only minor variance
2. Those that involve unique situations that require in-the-moment innovation and perhaps significant deviation from the protocol.

Examples of high reliability design include these:

- Six Sigma approach, which is used to improve different levels of reliability, known as sigma levels, by using simple and better processes.
- Lean approach, which focuses on reducing waste in the system and adding value to the customer.
- Human factors engineering, which looks at the human interactions related to the system and optimizes overall performance.

HINT

In the "Quality and Performance Improvement" course we will spend more time on Lean and Six Sigma. For this module, we will focus on human factors engineering.

Systems thinking is integral to human factors engineering. In human factors engineering, each layer of a system and its interconnected components are considered in designing to support human strengths and compensate for limitations. Human factors engineering is a discipline concerned with the understanding of interactions among humans and other elements of a system. It applies theory, principles, data, and methods to designs in order to optimize human well-being and overall system performance.

Human factors engineers are focused on enhancing the safety and usability of a medical device to improve the care delivery process or organizational structure (e.g., the supply chain management, hospital throughput). They seek to understand the numerous factors that affect system performance, including tasks, technologies,

and physical environment, and then redesign the systems to improve patient safety and team performance. Frontline staff are the main players in working with the engineers in the redesign and testing the system.

The table below lists strategies used to redesign processes for high reliability and improved safety (The Joint Commission, 2015).

Human Factors Engineering Strategies	
Most Reliable	• Forcing functions or physical stops that prevent incorrect actions (such as regulators that are incompatible among disparate gases) • Computerized automation (such as procedural stops incorporated into smart infusion pumps that do not allow a medication to be infused at rates that are too high or low) • Human-machine redundancy (such as the redundant task of visually checking medications and then scanning medication bar codes so that a computer can check the medications as well)
Somewhat Reliable	• Checklists for high-risk procedures (such as inserting a central line) • Forced pause in a process to recheck details and steps (for example, time-out to prevent wrong-site surgery) • Reminders (for example, clinical decision support in electronic medical records that reminds a physician of a patient's allergy when prescribing penicillin) • Standardization of equipment and supplies across the organization • Planned error-recovery opportunities in which providers build time in the process to self-check or double-check another person's work (such as requiring two nurses to separately calculate chemotherapy doses or continuous heparin infusion rates)
Least Reliable	• Education and training • Rules, policies, and procedures

Human factors (HF) experts make it easier for the widest range of healthcare professionals to perform at their best while caring for patients. The goal of good human factor design is to accommodate all users in the system. This means that the design process should anticipate the needs of a novice accomplished well-rested, calm clinician as well as those of a fatigued, inexperienced one. The human factor experts use evidence-based guidelines and principles to design ways to make it easier to do things such as order medications, hand off information, chart medications and orders electronically, or move patients.

Human factor approaches have been used for decades in complex, high-risk fields such as aviation and nuclear power. Its use was limited in healthcare until the Institute of Medicine report in 1999, “To Err is Human: Building a Safer Healthcare System.” Despite the raised awareness, these approaches are not widely adopted, and further work is needed to integrate human factor methods and tools into efforts to improve healthcare across the continuum.

See the table below for examples of human factors and systems engineering (HF/SE) approaches to improving patient safety (Carayon, Wooldridge, Hose, Salwei, Benneyan, 2018).

Safety issue	HF/SE approach	Example

Patient safety events and near misses	HF classification frameworks and methods for analyzing system factors that contribute to the events and near misses	Human Factors Analysis and Classification System (HFACS) (note 21)
Medication safety	Human-centered design of medication processes, such as prescription and administration	HF design principles and HF methods for safer design of order-prescribing interfaces (note 16) and code cart medication drawer (note 25)
Healthcare-associated infection	Analysis of system factors that contribute to the infections	Identification of work-system barriers and facilitators to adherence to contact isolation for patients with suspected or confirmed Clostridium difficile infection (note 17)
Patient falls	HF design of work systems for reducing inpatient falls	Human-centered design of fall prevention toolkit (note 19)
Patient identification	Human-centered design of identification armband	HF design of armband for improving patient identification by reducing number of visual scans required (note 20)
Patient safety in primary care	Work system analysis for patient safety	Efforts to counteract the "information chaos" experienced by primary care physicians that can lead to patient safety events (note 30)
Patient safety in home care	HF/SE analysis of medical devices and information technologies used in the home	Analysis of usability and system integration of hemodialysis technology (note 32) and infusion pump (note 33); HF design of consumer health information technologies for home use (note 31)
Patient safety in care transitions	Process analysis of transitions between hospital and home (note 37)	Description of transition process and safety vulnerabilities over multiple phases of care, especially for older adults (note 36)

REFLECT

Consider how you can apply human factors thinking to your work environment.

2b. Safety Sciences

Safety science refers to the methods by which safety knowledge is acquired and applied to high-reliability designs. The objective is to design systems that are almost fail-safe or ensure flawless execution. The ideal goal is to create a process or system where the operator is unable to perform it incorrectly. If this is not possible, we create defenses in the system that act as barriers to prevent harm to the patient.
Patient safety draws on a range of disciplines, such as human error, human physiology, psychology, and sociology. Systems analysis and improvement come from engineering and management. Safety uses controlled experiments, scientific methods, and human factors engineering that is built on human performance, anatomy, physics, mathematics, and physiology. It draws from any discipline that is appropriate to what we are studying or analyzing in patient safety.

3. Analytic Methods

3a. Failure Modes and Effects Analysis (FMEA): Prospective

This prospective method is used to anticipate and prevent adverse events. FMEA is an engineering approach, usually used in the design of a new product, to identify potential failures with the system and adjust the design to mitigate the failures. FMEA is used to look at every aspect of the system and determine if there is a potential failure in the programming, functioning, or implementation procedure. In healthcare, this method is used to evaluate either a current high-risk process or a new process or service before it goes live. The Joint Commission requires a hospital to conduct an FMEA at least once in the accreditation cycle.

3b. Root Cause Analysis: Retrospective

The analysis of an adverse event that has occurred is called a Root Cause Analysis (RCA). The goal of this retrospective method is to identify active and latent failures that align to cause the event. The Swiss Cheese Model is often used in the initial investigation of the event. In general, it looks at the underlying conditions of a situation that contributed to the event. The premise is that most events are the end result of multiple system failures, therefore the RCA process involves reviewing data and interviews to identify and understand all contributing causes and redesign the system to be safer. This will be discussed in more detail in the "Risk Management" Module.

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Support

If you are struggling with a concept or terminology in the course, you may contact **RiskManagementSupport@capella.edu** for assistance.

If you are having technical issues, please contact **learningcoach@sophia.org**.