KEY POINT SUMMARY

OBJECTIVES

The main objective of this article is to understand the different human factors tools and their applications to improving healthcare safety and quality. The author has listed different HF tools and their usability in reducing human errors and improving medication safety.

Applying Human Factors in Improving Medication-Use Safety

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Key Concepts/Context

In this descriptive study the author summarizes the highlights of an interactive conference on human factors (HF) and t applications to improve medication safety. The author describes the various human factors concepts and tools and their applications in reducing human errors, thus improving medication safety.

Methods

A multidisciplinary planning committee, consisting of a physician, nurse, and pharmacist with experience in HF tools and techniques in risk management was formed to plan an education program and establish action plans to reduce human error in patient care delivery. In a one-day meeting, the gap was identified between what was known and what needs to be known. This conference allowed experts in HF to interact with healthcare professionals to explore ways of improving the safety of the medication-use process.

Findings

The article lists different HF tools that can be applied in healthcare settings to improve medication safety. They are as follows:

Root Cause Analysis: In root cause analysis, an event is reviewed by a panel of experts to determine the conditions in which a person was working when a mistake was made. All of the weaknesses (latent failures) in the system and decisions (active failures) that were made are identified.

Failure Mode Effect and Criticality Analysis: Another way HF can improve medication-use safety is with failure mode effect and criticality analysis (FMECA). This is a 12-step process, which begins by appointing a multidisciplinary team with expert knowledge of a particular process. The process is then analyzed to determine

DESIGN IMPLICATIONS

HF tools should be used as a tool to investigate accidents, errors not resulting in accidents, complaints, the number of times users require help, documentation processes, and general user satisfaction with a process or product. HF experts can help identify and improve complex, high-risk procedures and technologies and assist in solving problems with the medication-use system.

the points at which failure may occur (failure modes). Each failure mode is analyzed and scored by evaluating the likelihood of detecting the failure, seriousness of the outcome if the failure is not detected, and likelihood of detecting the error. Failures ranked as most critical are those that are least likely to be detected and prevented and will produce a critical outcome if not detected.

Usability Testing: Usability testing can prospectively evaluate technologies and procedures. In usability testing, a group of four to five people use a device or procedure with which they are not familiar. One person is identified as the end user, who talks aloud as he/she works. Another person serves as the director, reminding the end user to think aloud and leading the team in the evaluation. The other persons act as observers and record the end user's words, actions, and nonverbal cues (e.g., facial expressions). Problems discovered in using the device or procedure are identified, and the group makes recommendations for its redesign.

Heuristic evaluation: Heuristic evaluation is a checklist approach to evaluating procedures, software, and devices.

Examples of healthcare organizations using Human Factors concepts and tools to improve medication safety:

- Mayo Clinic has developed a usability laboratory to evaluate medical software and has plans to expand the scope of the program to evaluate medical devices.
- The emergency department at Overlook Hospital in the Atlantic Health System has developed a partnership with a Human Factors faculty. Together they have created a patient-safety simulation laboratory with which they have explored the impact of ambient noise on patient safety.
- The Department of Veterans Affairs (VA) has used HF to improve medication-use safety through a program that requires the initial and ongoing training of patient-safety specialists at each VA medical center.
- The Food and Drug Administration is adding more specifics to HF requirements and guidance for medical device manufacturers. This includes publications, such as Do It by Design, which provides detailed steps for companies wanting to incorporate HF into their design process.
- Standard-setting organizations, such as the American National Standards Institute and Association for the Advancement of Medical Instrumentation are increasing their focus on using HF to evaluate medical devices (ANSI/AAMI HE48) and medical software (ISO-9241)

Limitations

HF it is not a panacea for all problems -related to medication-use safety. There are many work environments in which HF tools and concepts cannot be used. Some of the reasons include a culture of fear in the workplace, a lack of concern about process improvement and patient safety, financial pressure placed on healthcare

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providers to reduce costs, a lack of senior leadership supporting clinical quality improvement, and tension and lack of teamwork among disciplines. Also, because of the high degree of variation within the medication-use process, including the involvement of multiple disciplines and a lack of standardization, conventional application of HF within healthcare set-tings has been difficult.