



Course: To Err is Human

Topic: Why applying human factors is important for patient safety

Summary



The study of human factors examines the relationship between human beings and the systems with which they interact, and focuses on improving efficiency, productivity, creativity and job satisfaction, with the goal of minimizing errors.

What does "human factors" mean?

Human factors apply wherever humans work. Human factors acknowledges the universal nature of human fallibility. The traditional approach to human error might be called the "perfectibility" model, which assumes that if health-care workers care enough, work hard enough, and are well trained, errors will be avoided. Our experience, and that of international experts, tells us that this attitude is counter-productive and simply untrue.

What does the study of human factors involve?

Human factors is a discipline that seeks to optimize the relationship between technology and humans, applying information about human behaviour, abilities, limitations, and other characteristics to the design of tools, machines, systems, tasks, jobs and environments for effective, productive, safe and comfortable human use.

Why is the issue of human factors in health care important?

Human factors issues are major contributors to adverse events in health care. In health care, human factors can have serious and sometimes fatal consequences. However, the health-care system can be made safer by recognising the potential for error, and by developing systems and strategies to learn from mistakes, so as to minimize their occurrence and effects.

Is it possible to manage human factors?

Yes, management of human factors involves the application of proactive techniques aimed at minimizing and learning from errors or near misses. A work culture that encourages the reporting of adverse events in health care allows the health-care system and patient safety to improve.

Are there examples from other industries relating to human factors?

Aviation is a good example of an industry which has embraced the study of human factors as an approach to improving safety. Since the mid-1980s, aviation has accepted human fallibility as inevitable. Rather than demanding constant perfection that is not sustainable and publicly punishing error, this industry has designed systems to minimize the impact of human error. The aviation safety record is a testament to this approach—despite an average of 10 million take-offs and landings annually, there have been fewer than 10 fatal crashes worldwide a year in commercial aviation since 1965, and many of these occurred in developing countries.

Human factors or ergonomics: terms used to describe the interrelationship between individuals at work, their equipment and tools, and the environment in which they live and work.

Application of human factors knowledge

- Human factors experts believe that mistakes can be reduced by focusing on health-care providers and studying how they interact with and as part of their environments.
- In health care, human factors engineering can help understand how people perform under different circumstances so that systems, processes and products can be designed to enhance safety and performance.



- In today's complex and fast-moving health-care environments, human factors principles can help to ensure that, for example, safe prescribing and dispensing practices are used; members of health-care teams communicate well; information is effectively shared between health-care professionals and patients.
- Industries such as aviation, manufacturing and the military have successfully applied knowledge of human factors to improve systems and services.
- Human-factors research shows that what is important is not the number of tasks that need to be completed, but the nature of those tasks. A professional may be able to explain the steps in a simple procedure to a student while he/she is performing that procedure, but in a complicated case, he/she may not be able to do so, while concentrating on the task at hand.

Workplace improvements to fit human capabilities and limitations

Human factors experts use evidence-based guidelines and principles to design ways to make it easier to safely and efficiently complete tasks such as:

- prescribing and dispensing medications
- handing-off (handing-over) information
- physically moving patients around
- charting medications and other orders electronically
- preparing medications.

These tasks require design solutions that include software (computer order entry systems and programmes to support dispensing), hardware (IV pumps), tools (scalpels, syringes, patient beds) and the appropriate physical layout of work areas, including proper lighting.

The study of human factors

The workplace needs to be designed and organized to minimize the likelihood and the impact of errors. While human fallibility cannot be eliminated, it can be moderated to limit risks.

- Human factors engineering incorporates human-machine interactions (including equipment design) as well as human-human interactions, such as communication, teamwork and organizational culture:
 - **Human-machine interactions:** Advanced technologies used in health care have increased the relevance of human factors in errors because the potential for harm is great, when technology and health-care devices are mishandled.
 - **Human-human interactions:** Tired health-care professionals are more prone to memory lapses and mistakes, because fatigue can impair performance.
 - **Human-human interactions:** Knowledge of human factors allows better understanding of the impact of fatigue, stress, poor communication, disruption and inadequate knowledge and skills on health professionals. It helps to understand predisposing characteristics that may be associated with adverse events and errors.

Strengths and weaknesses

Human beings are not machines. Compared to machines:

- humans are unpredictable and unreliable, with a limited ability to process information
- humans are creative, self-aware, imaginative and flexible in their thinking.

Health-care professionals are good at compensating for some of the complex and unclear design of some aspects of the workplace (e.g. equipment, physical layout) because the human brain is:

- very powerful
- very flexible
- good at finding shortcuts (fast)
- good at filtering information



- good at making sense of things

But also distractible, which is a strength and a weakness. Distractibility:

- helps humans notice when something unusual is happening. Humans are good at recognizing and responding to situations rapidly and adapting to new situations and new information.
- predisposes humans to error.

- The fact that humans can misperceive situations, despite the best of intentions, is one of the main reasons that decisions and actions can be flawed such that "silly" mistakes are made.
- These are important reminders that making errors is not so much bad as it is inevitable.
- One definition of human error is 'human nature', with error being the downside of having a brain.
- James Reason described error as the failure of a planned action to achieve its intended outcome or the difference between what was actually done and what should have been done.

The relationship between human factors and patient safety

- **Situations that increase the likelihood of error**
 - unfamiliarity with the task (especially if combined with lack of supervision)
 - inexperience
 - shortage of time
 - inadequate checking
 - poorly designed procedures
 - poor human-equipment interface
- **Individual factors that predispose to error**
 - Limited memory capacity
 - Further reduced by: fatigue, stress, hunger, illness, language or cultural factors, hazardous attitudes.

Sleep deprivation of 24 hours has a performance effect equivalent to blood alcohol content of 0.1%

The acronym **IM SAFE** (illness, medication, stress, alcohol, fatigue, emotion) that was developed in the aviation industry is useful as a self-assessment technique to determine whether a health-care professional is fit for work.

Putting knowledge of human factors into practice

- Apply human factors thinking to your work environment
- Avoid reliance on memory
- Make things visible
- Review and simplify processes
- Standardize common processes and procedures
- Routinely use checklists
- Decrease reliance on vigilance

Lessons from the study of human factors in other industries are relevant to patient safety in all health-care environments. This includes understanding the interactions and interrelationships between humans and the tools and equipment they use. Understanding the inevitability of error and the range of human capabilities and responses in any given situation is essential to knowing how the application of human-factors principles can improve health care.