

The Key to Reducing Medical Error is Better Attention to Human Factors in Healthcare Systems

Recently, a nurse in Nashville was criminally charged and convicted of reckless homicide after a medical error in which the wrong medication was administered leading to the death of the patient. There is a long history of blaming the individual when errors occur. This however does nothing to fix the systemic problems that underlie medical error which must be addressed in order to improve patient safety. Punishment of a nurse who has good intentions for the care of their patient, but failed to perform due to a myriad of work system deficiencies, is not an avenue to safer medical practices. Between 22,000 and 25,000 cases of medical error result in preventable deaths each year in the US. Tragedies like these can be significantly avoided or reduced by using Human Factors science in the design of healthcare technologies and work systems.

Often accidents are caused by technology design flaws that do not take human capabilities and limitations into account. Bad design encourages errors; good design prevents them. Compounding technology shortcomings, many healthcare professionals must routinely cope with long hours and staffing shortages that result in over-work, the routine need for shortcuts, stress, fatigue, and inadequate organizational support, making errors far more likely.

Solving these systematic challenges is the goal of Human Factors, which *applies scientific research on human abilities, characteristics, and limitations to the design of equipment, jobs, systems and operational environments in order to promote safe and effective human performance*. Its goal is to support the ability of people to perform their jobs safely and efficiently. Based on scientifically derived data on how people perform, and methods for improving their performance through improved system design, Human Factors science has been used for decades to both reduce the frequency of human error and to mitigate the impact of errors that might occur.

Human error is reduced when organizations work to continuously improve safety through the use of user-friendly technologies, and through safe work practices and policies. The science of Human Factors has much to contribute in situations such as this. By engaging proactively in the design of a system, the field of human factors has the methods, tools and data to create safer systems *by design*. We work to understand when people are performing outside of their capabilities and use this knowledge to better design the workplace to address and mitigate human limitations. For example, a recent study demonstrated significantly faster and easier medication retrieval when medication drawers are organized based on Human Factors principles. Another effort redesigned an automated drug infusion pump to reduce the likelihood of common user errors successfully enhancing patient safety.

Studies have shown an increase in administering the wrong drug when automatic drug dispensers are used, such as was the case for the nurse in Nashville. The need for frequent or multiple overrides to deal with programming shortcomings contributes to increases the likelihood that errors will be made. Clearly, improvements in the design of automatic drug delivery systems are needed.

Decades of research in Human Factors has shown that most errors, regardless of professional field, result from flawed systems, not reckless human operators. In order to make these systems safer, it is essential that those working in the system feel comfortable in reporting on circumstances that create opportunity for error through safety reporting systems.

Error and dangerous condition reporting is a universally accepted process across most high-risk industries, including aviation and nuclear power. These high-risk work settings value the reporting of hazards and errors because they help safety experts design out error-inducing situations, and design systems to mitigate the impact where error remains likely. In the recent patient death, criminalizing the

error of the nurse, rather than acting to fix the system that created the error, is only likely to negatively impact the safety of healthcare patients throughout the U.S. by making healthcare providers less likely to admit to the problems they are experiencing. And it unfairly emphasizes the errors of the healthcare provider, who is generally only the last in the chain of many errors that include poorly designed technologies and physical environments, and inadequate organizational working practices.

We encourage healthcare leaders throughout the country to continue to further incorporate human factors concepts into their operations and patient safety efforts to design better systems and avoid negative patient outcomes. Hospitals, medical device companies, healthcare organizations and professional groups must work together with Human Factors experts to improve the safety of healthcare operations through evidence-based solutions to avoid the tragedies caused by unintentional medical error. Healthcare cannot afford to drive out its most important resource, our healthcare providers.