

Ergonomics in Healthcare and Patient Safety

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Introduction

Safety issues of hospitals and healthcare environments are complex and rarely caused by a factor or element of a work system [1]. Patient safety is a key component of quality in the hospital and healthcare industry and is considered as the first and the most essential one [2]. There are large volumes of evidences on patient safety or its absence in the health organizations, patients and their families, and health care professionals.

Improving safety and patient care of the healthcare environment require system-wide actions on a broad range of fronts to identify and manage actual and potential risks to patient safety, and develop and apply long-term solutions and prevention programs. This involves holistic approaches such as actions in performance improvement, environmental safety, risk assessment, and management including hospital infection controls, occupational safety and health, safe use of medicines, safety equipment, safe clinical practice, safer and healthier environment of care, and continual training.

Despite improvements in healthcare intervention, the incidence of hospital and healthcare industry constitutes a major contributor to the global burden of disease, and a concern for patient safety [3]. As a matter of fact improving the safety of patient care is now a core issue to health care systems throughout the worlds [3]. Patient safety leaders have called for increasing the involvement of ergonomics and human factors in helping to characterize system factors that contribute to patient safety and to inform system design interventions. Accordingly, awareness of the importance of ergonomics and human factors in medication and patient safety domains has significantly increased. As a result, patient safety has been one of the challenging topics in the recent research areas of ergonomics and human factors. Hence, new knowledge and information leading to improve healthcare and patient safety intimately require to develop higher quality of health care.

Ergonomics in Hospital and Healthcare Industry

In the hospitals and healthcare environments, ergonomics and human factors are an accepted part of the patient care settings and overall safety and health concerns. For example, devices such as adjustable hospital beds are accepted and expected as standard equipment. A growth in obesity patients, staffing shortages, and an aging healthcare workforce has increased matters regarding accidents and injuries associated with patient transport [4].

A number of ergonomics and human factors approaches have been proposed to describe more comprehensive systems of patient safety and injury prevention such as the systems approach proposed by Vincent and colleagues [5] and the systems engineering initiative for patient safety model of work system and patient safety proposed by Carayon and colleagues [6]. Recently, ergonomics research in the patient safety has focused on 'system resilience' [7] or 'the ability of

systems to anticipate and adapt to the potential for surprise and failure' [8]. Because not all errors may be prevented, ergonomists have developed models to understand how errors can be detected, corrected, mitigated, and dealt with by operators [9].

Ergonomics is also recognized as a key discipline to help reduce or mitigate medication errors to improve the design and implementation of Health Information Technology (HIT) [10], and to eliminate hazards that contribute to patient falls [11]. The main aim of ergonomics-based system design is to improve wellbeing for clinicians and patient satisfactions and overall system performance that include patient safety [12]. Hence, patient care activities should not only reduce and mitigate medical errors and improve patient safety, but also improve human wellbeing, such as job satisfaction, motivation and technology acceptance [13]. In this sense, ergonomics-based research for patient safety is not only about increasing knowledge; it is also about translating knowledge into practice. Understanding why mistakes are made and tackling poor designs and procedures is a crucial key to improving patient safety and healthcare injury prevention [14]. It also would be important to bridge the levels of research with dissemination, adoption at policy, practice, and management for effective control of health care and patient safety.

Future Challenges

Hospital and healthcare organizations continue to effort to design, implement and use medical devices and HIT in order to not only improve patient safety but also to anticipate 'unintended consequences' of the devices and technologies [15]. Although much progress has been made on defining the design processes that can produce ergonomically designed devices and technologies, this information is limited in its use by designers and manufacturers of medical devices and HIT for multiple reasons, including lack of ergonomics and human factors knowledge and time pressures [16].

Ergonomics and human factors have helped to improve poor designs and provided insights into how our behaviour is impacted by our environments amongst other critical safety issues. Various ergonomics and human factors methods can be used to anticipate some of the potential failures and problems related to the implementation and use of a medical device or HIT [17]. Ergonomic and human factors research should continue to produce information on the principles and methods necessary for safe and effective implementation of technology in complex healthcare systems and patient safety. There are more hospital practitioners of ergonomic principles and methods in the healthcare settings who can be advocates for providers by evaluating and identifying technologies, workflows and environments. Ergonomic and human factors researchers need to take a leadership role to generate and disseminate knowledge that can be integrated into the design processes of medical devices and healthcare information technologies.

Even after all of the difficult challenges of design and implementation of technologies, ergonomics and human factors problems may continue to arise whilst the technologies are actually being used [18]. How do healthcare workers adapt to technologies and how do they adapt technologies to their own work systems [19]? These would be important concerns for health care and patient safety that raise ergonomics and human factors research issues. Hence, it is considered that the future seems to remain with researchers in using more advanced ergonomics and human factors concepts to create the path to find greater systemic solutions to the challenges in the healthcare and patient safety.

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