



Ergonomics concerns and the impact of healthcare information technology

Alan Hedge^{a,*}, Tamara James^b, Sonja Pavlovic-Veselinovic^c

^a Department of Design and Environmental Analysis, Cornell University, Ithaca, NY 14853, USA

^b Ergonomics Division, Occupational and Environmental Safety, Duke University, Durham, NC 27710, USA

^c Faculty of Occupational Safety, University of Nis, Nis, Serbia

ARTICLE INFO

Article history:

Received 31 August 2009

Received in revised form

11 June 2010

Accepted 10 February 2011

Available online 23 March 2011

Keywords:

Healthcare information technology

Computer ergonomics

Musculoskeletal injuries

Hospital ergonomic design

Computers on wheels

Ergonomics programs

Telework

Telecommuting

ABSTRACT

The US healthcare industry is poised on the verge of a massive expansion of its information technology infrastructure. Healthcare information technology (IT) is permeating numerous areas of healthcare delivery and fundamentally changing the nature of many healthcare jobs. When a comparable expansion in HIT use occurred in the office environment in the 1980s, little attention was paid to ergonomic design principles for computer work and the consequence was an increase in work-related musculoskeletal disorders throughout the 1990s. There are already signs of similar problems among certain groups of healthcare professionals. Consequently, it is vital that when the implementation of HIT is undertaken attention is paid to computer ergonomics programs. This review presents evidence that current patterns of HIT use may pose increased risks of work-related musculoskeletal disorders. It summarizes some of the main ergonomic design principles enshrined in standards that mitigate such problems. It points to the future expansion of ergonomics programs beyond the traditional workplace and into the realms of telecommuting. Results from this review can be used to optimize the implementation of future HIT initiatives in ways that will benefit user performance while minimizing their injury risks.

Relevance to industry: This review describes the rapid proliferation of HIT applications and the importance of ergonomic considerations in mitigating injury risks and optimizing the implementation of HIT systems.

© 2011 Elsevier B.V. All rights reserved.

1. Introduction

Healthcare is a substantial and growing sector of the US economy comprising over 95,800 establishments that provide some 14.3 million jobs and account for 1 in 11 US workers (Bureau of Labor Statistics, 2010). Around one in three healthcare workers work in a hospital even though hospitals are only about 1.3% of all healthcare establishments. Three-quarters of healthcare establishments are the offices of physicians, dentists or other healthcare professionals.

Current demand for healthcare services is partly being driven by the aging of the US workforce. Almost 80 million baby boomers approaching retirement age are expected to place an increasing demand on these services in the next two decades and the anticipated increase in demand for healthcare services is projected to generate some 3.2 million new jobs by 2018, and the healthcare sector is projected to grow from around \$2.4 trillion or 17% of GDP

in 2007, to around \$4.3 trillion, or some 20% of GDP, by 2017. Along with this anticipated growth in demand, advances in medical science are dramatically improving medical diagnostics and therapeutic interventions which are prolonging the average life. At the same time, healthcare costs are rising at double the inflation rate, or some 6.9% in 2008, and consequently in the US there is considerable interest in ways to reduce healthcare costs while, at the same time, increasing access to healthcare services that can meet the projected demand. In February 2009, the US Congress passed the American Recovery and Reinvestment Act which budgets \$20 billion for investment into healthcare information technology (HIT) infrastructure and systems as a means to save on costs, reduce the incidence of medical errors and improve patient safety and the quality of healthcare.

Yet ironically, the workers in the healthcare profession are at higher risk of suffering an occupational musculoskeletal disorder (MSD) than most other workers. Nursing aides, orderlies and attendants have an MSD rate of 252 cases per 10,000 workers, which is some 7 times the national average for all occupations (Bureau of Labor Statistics, 2010).

* Corresponding author.

E-mail address: ah29@cornell.edu (A. Hedge).