The Role of Ergonomics in Preventing and Reducing the Burden of Musculoskeletal Conditions

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Proceedings of the Human Factors and Ergonomics Society Annual Meeting 2006 50: 1264
DOI: 10.1177/154193120605001301

THE ROLE OF ERGONOMICS IN PREVENTING AND REDUCING THE BURDEN OF MUSCULOSKELETAL CONDITIONS

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Five important developments this decade can clarify and promote the role of ergonomics in preventing and reducing the burden of musculoskeletal disorders: 1) worldwide acceptance of this decade as the bone and joint decade, 2) changing demographics and 3) change in worker-workplace relationships, 4) research advancements in the laboratory and in the workplace including prospective studies, 5) publication of revised ISO 6385 (2004) [1].

INTRODUCTION

While there has been a strong tradition within the human factors and ergonomics to see ourselves as essential to the overall well-being and performance of human endeavors, there has not been widespread popular knowledge of the breadth and depth of the profession. This has been particularly true with respect to our role in primary, secondary and tertiary prevention of work-related musculoskeletal disorders. There are at least five important developments in this decade that can improve the awareness of our potential in this area: 1) worldwide acceptance of this decade as the bone and joint decade, 2) changing demographics and 3) change in worker-workplace relationships, 4) research advancements in the laboratory and in the workplace including prospective studies, 5) publication of revised ISO 6385 (2004).

CONSIDERATIONS

Bone and Joint Decade

We are in the bone and joint decade which is intended to focus attention on the global burden of musculoskeletal conditions, particularly osteoarthritis, rheumatoid arthritis, osteoporosis, spinal disorders, and severe limb trauma. This is an initiative by the World Health Organization, United Nations and 750 professional societies around the world, and adopted by many nations including the US. In his 2002 national bone and joint decade proclamation, US President George W Bush *"envisions a series of international initiatives among physicians, health professionals, patients, and communities, working together to raise awareness about musculoskeletal disorders and promoting research and development into therapies, **preventative measures**, and cures for these disorders. Advances in the prevention, diagnosis, treatment, and research of musculoskeletal conditions will greatly enhance the quality of life of our aging population" (Bush 2002).* A worldwide effort is underway to better identify mechanisms and effective primary, secondary and tertiary prevention measures. However, as pointed out by Woolf and Åkesson (2001), while the burden is huge, it is not really reflected in national health priorities in Europe or the US where musculoskeletal impairment ranks first in chronic impairment, noting that work-related musculoskeletal disorders were responsible for 11 million lost work days in the UK in 1995. Certainly not all musculoskeletal disorders are caused or even aggravated by work activities. There is strong evidence from randomized controlled trials that ergonomics plays a critical role in successfully returning workers with back and upper limb disorders to work (secondary, tertiary prevention). We must take advantage of the decade focus to research and demonstrate the role of ergonomics in primary prevention. In many respects this

requires both laboratory and field research, and developing and testing interventions using robust study designs, randomizing where we can, but at least having comparable comparison groups. Examples of improved intervention study designs have come from the work of Straker et al (2004) where randomization of Australian companies into using participatory ergonomics approaches and those who had no such training, showed a clear increase in the ability to implement ergonomics improvements. We are also learning more about why ergonomics related interventions don't work, such as the RCT by Gerr (2005) among computer users showing no change in symptoms due to the non-adjustability of workstations.

Changing Demographics

The North American and European populations are aging rapidly and are becoming more obese. Approximately 30% of US adults are obese and well over 50% are overweight. This challenges traditional views of design for at least reaching, seeing and fitting. It requires us to design to maximize the workability of older workers which will probably also benefit younger workers. The European Agency for Safety and Health at Work identified physical inactivity at work as the number one priority in the new and emerging physical risk category. Examples included prolonged sitting at the workplace, on business trips or while using automated systems. The second priority was addressing the combined effect of psychosocial and physical load factors on the development of WMSDs. This was based on the opinions of 137 researchers from Europe and the US (European Agency for Safety and Health at Work, 2005). The role of low level static loading may be identified as a major risk factor for WMSD development. The US population is also increasingly of Hispanic and Asian descent that increases the richness of our cultural diversity and challenges our traditional design and organizational culture of our workplaces.

Worker-Workplace Relationships

We are experiencing rapid changes in worker-workplace relationships where transience rather than permanence is becoming the norm. This in turn shifts work-life balance into increasing conflict as boundaries between work and family/community are blurred. More and more, we find ourselves becoming one-dimensional in our interactions, rarely seeing, hearing, smelling or touching other people simultaneously. This requires rethinking how we can rapidly identify and fix potential hazards in the design stage and address them, allowing for maximum flexibility and/or transient hardware/software obsolescence. Actual sustained human-to human contact at work is being replaced be email and the internet. It is critical that we identify optimum work organization that enhances psychosocial and physical health.

Research Advances

In the animal laboratory, we are identifying tissue mechanisms that increase risk of soft tissue musculoskeletal disorders. We are identifying interaction between load frequency and duration on tendon, nerve, joint and bone in humans and other animals. This has direct implications for refining our approach to loading in the workplace. These findings can be tested at a grosser level in the workplace laboratory through detailed exposure and health assessment on an individual basis. In the US, this has been advanced by the collaborations taking place between research groups in the NIOSH sponsored WMSD research consortium, currently consisting of eleven research groups involved in epidemiological studies. The possibility of sound meta-analyses is in the near future.

International Standards

Finally, ergonomists can use the precepts of the revised ISO 6385 [1] to bring the knowledge, resources, and challenges identified above into an integrated approach to the design of work systems where ergonomists cooperate with others involved, taking into account the "human, the social, and the technical requirements in a balanced manner during the design process."

One of the most important concepts in the updated ISO 6385:2004 standard is the explicit recognition of the importance of worker participation in the design of work systems in section 3.1: *"In work system design, a participatory approach is essential in order to avoid sub-optimal solutions, because the experience of workers provides an indispensable knowledge base. The design process shall therefore, wherever possible, involve workers in all stages."* Additionally, in concert with the European Agency for Health and Safety at Work findings, the revised ISO 6385 notes the need to a) provide for the application of an appropriate variety of skills, capabilities and activities, b) to provide people with appropriate degree of autonomy in deciding priority, pace and procedure, and c) avoid working alone without opportunities for the worker for social and functional contacts (section 3.6.2). Also the ISO standard recognizes the importance of using both objective and subjective assessments to determine the conditions of work, noting that the worker should be able to influence the work environment climate and that social, cultural and ethnic factors may influence the acceptability of work and work organization (section 3.6.4). Maximizing worker input, increasing variability, recognizing the social and cultural context in which work takes place, can also have profound effects on our ability to reduce the burden of musculoskeletal disorders in the workplace.

CONCLUSION

This is indeed an exciting time to bring together ergonomics and organizational psychology, laboratory and field researchers, business, labor and government to take advantage of the Bone and Joint Decade to reduce work-related musculoskeletal disorders in a rapidly changing society.

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