Scand J Work Environ Health 2009;35(5):321–324

Improving work ability in construction workers – let's get to work

In 1948, the World Health Organization (WHO) defined health as a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity. The WHO reaffirmed this view in the Ottawa Charter for Health Promotion in 1986, which stated that health is " ... a resource for everyday life, not the objective of living. Health is a positive concept emphasizing social and personal resources, as well as physical capacities". Work is an important contributor to health and quality of life.

Longer life expectancies and lower birth rates over the past decades have increased the ratio of dependent and retired individuals to employed workers in developed countries. Over the next 30 years, the ability of the small post-1968 birth cohort to support a very large baby boomer retiree population will severely test the economy and social insurance systems that are in place. In 2005, there were 24 individuals over age 65 for each 100 individuals aged 20–64 years in Organization for Economic Cooperation and Development (OECD) countries; this number is projected to double by 2050, and even exceed 70 in some European countries. The shortage of younger workers and excess of retirees have led many countries to seek ways to increase work participation at older ages. And, as workers realize they will live much longer than used to be the case, many seek to find ways to stay in the workforce longer.

The Work Ability Index (WAI) was developed in the early 1980s to identify factors that would sustain work as employees age. The questionnaire is now available in 26 languages and is commonly used in research worldwide. Work ability is a measure of the balance between work and personal resources, and older age has been associated with a reduction in both the quality of life and work ability.

In this issue of the Journal, Alavinia et al (1) present an analysis of the impact of work-related factors, lifestyle, and work ability on sickness absence among construction workers in the Netherlands. They report that older age, obesity, smoking, manual material handling, lack of job control, lung restriction, and reduced work ability at baseline examination predicted a sick leave of 2–12 weeks duration in the subsequent 14 months with similar risk factors for sickness absence over 12 weeks. When all factors were included in a multivariate model, obesity, smoking, manual materials handling, and lack of job control remained important risk factors. Two aspects of the WAI were also significant predictors: (i) the presence of sickness absence in the 12 months prior to the baseline examination and (ii) experienced limitations due to health problems. High mental and physical demands at work are known to be determinants of WAI (2) so it is notable that this study found that both physical demands and work ability were independently predictive of sickness absence.

Construction workers stop working at an earlier age than other workers in a range of countries (3–5). Physical work load is an important determinant of work ability among construction workers (6), and work ability is highly predictive of disability among all workers and among construction workers specifically (6–8). Burdorf et al (9) estimated that a construction worker age 45–54 years with a low WAI score and severe low back pain has a 40-fold increased probability of disability retirement compared to a construction worker without those risk factors. Since prolonged episodes of sickness absence are predictive of disability retirement (10, 11), the study by Alavinia et al suggests that reducing obesity, smoking, manual materials handling, and improving job control and work ability can keep construction workers successfully employed.

How can we accomplish this? We can implement rehabilitation programs for the injured worker, ergonomic programs to reduce musculoskeletal disorders (MSD), and comprehensive health promotion programs for construction workers. Success in each of these areas requires both understanding how the

construction industry differs from other industries, and taking advantage of its special characteristics. The industry values field innovation, and respects the skills and autonomy of the craft worker. These factors, in combination with a very dynamic physical work environment, require the participation of workers, trade unions, and contractors in the development of solutions to improve work ability.

We know from research in other industries that job accommodation reduces disability, and that vocationally oriented multi-disciplinary rehabilitation programs reduce sickness absence and delay retirement (12, 13). An intervention program for construction workers in the Netherlands demonstrated that such programs are both feasible and effective in this industry (14). A recent study from the US (15) found that construction roofers who had received job accommodation for a MSD or medical condition had an odds ratio of 0.24 for retiring compared to workers with a similar medical status but without accommodation. Some form of job accommodation was offered to over 30% of the workers in the study. Many of the accommodations were relatively simple, such as allowing more time to accomplish a task or changing the work schedule.

So we know that much can be done, even in the construction industry. There are, however, many barriers to taking action on an industry-wide scale. Construction job sites are, by definition, temporary and mobile, and in many countries construction employment is not permanent. The absence of steady job sites and employment relationships discourages job accommodation; the employer is more likely to hire a new worker than accommodate an injured one. Therefore, more information on the effectiveness and cost-benefit of job accommodation in construction is needed.

Reducing the physical demands on all workers in construction is essential. Success will require changing the culture of construction, developing new task-specific ergonomic innovations and promoting participatory ergonomics programs for this industry. There are particular characteristics of the construction industry that challenge the application of ergonomic principles. The construction work environment changes as a project moves through various stages of construction. Workers move to new work locations frequently as projects are of relatively short duration. In addition, the majority of construction work occurs on the ground and at ceiling levels, placing workers in awkward postures for the majority of their work. In the US, most workers must supply their own hand tools. The dynamic nature of the construction process and project dependent employment limits the employer's incentive to prevent chronic conditions in workers. Workers may be hesitant to complain about work tasks or conditions for fear of losing their job.

By understanding these challenges, researches have developed effective interventions that can reduce physical demands in construction (16–26), many of which are based on a participatory approach (19, 20, 25, 27). These interventions include reducing back stress in masons through adjusting work height, eliminating shoulder and neck strain during overhead drilling tasks with a drill support, and a variety of approaches to reduce manual materials handling. At the same time, researchers have identified important factors that facilitate or impede interventions for this industry (28–30). Interventions that are more likely to succeed have a relative advantage, are compatible with prevailing norms or practices, can be tried before being implemented, and have a readily observable impact.

Health promotion programs are needed to reduce obesity and smoking among construction workers; programs that integrate health promotion with information on occupational hazards in construction have been shown to be more effective than health promotion alone (31, 32). Occupational physicians have worked successfully with labor unions on effective health promotion/health protection programs (33–35) and helped change the social context for smoking and other risk factors for chronic disease.

Models for ergonomics, health promotion, and occupational rehabilitation will vary by country and region based on the availability of occupational medicine services; the benefits available for rehabilitation, sickness absence, and early retirement; and the nature of the employment contracts for construction workers. Now that researchers have identified factors affecting work ability among construction workers and described effective tools and approaches to these factors, the construction industry and

the occupational heath community need to increase the range and scope of programs to reduce physical demands, reduce obesity and smoking, and improve work ability. New technologies, educational materials, websites, and training workshops alone are not sufficient to improve the work environment and work ability; the industry has to use and modify the information to fit its community norms. Successful implementation of rehabilitation programs, ergonomics, and health promotion, therefore, require work with and within the community of construction. Let's get to work.

References

1. Alavinia SM, van den Berg TIJ, van Duivenbooden C, Elders LAM, Burdorf A. Impact of work-related factors, lifestyle, and work ability on sickness absence among Dutch construction workers. Scand J Work Environ Health. 2009;35(5):325–333.
2. van den Berg TI, Elders LA, de Zwart BC, Burdorf A. The effects of work-related and individual factors on the Work Ability Index: a systematic review. Occup Environ Med. 2009;66(4):211–20.
3. Brenner H, Ahern W. Sickness absence and early retirement on health grounds in the construction industry in Ireland. Occup Environ Med. 2000;57(9):615–20.
4. Arndt V, Rothenbacher D, Daniel U, Zschenderlein B, Schuberth S, Brenner H. Construction work and risk of occupational disability: a ten year follow up of 14,474 male workers. Occup Environ Med. 2005;62(8):559–66.
5. The Center for Construction Research and Training (CPWR). The construction chart book: the US construction industry and its workers. Silver Spring (MD): CPWR; 2007. p 1–120.
6. Alavinia SM, van Duivenbooden C, Burdorf A. Influence of work-related factors and individual characteristics on work ability among Dutch construction workers. Scand J Work Environ Health. 2007;33(5):351–7.
7. Kujala V, Tammelin T, Remes J, Vammavaara E, Ek E, Laitinen J. Work ability index of young employees and their sickness absence during the following year. Scand J Work Environ Health. 2006;32(1):75–84.
8. Liira J, Matikainen E, Leino-Arjas P, Malmivaara A, Mutanen P, Rytkönen H, et al. Work ability of middle-aged Finnish construction workers – a follow-up study in 1991-1995. Int J Ind Ergon. 2000;25:477–81.
9. Burdorf A, Frings-Dresen MH, van Duivenbooden C, Elders LA. Development of a decision model to identify workers at risk of long-term disability in the construction industry. Scand J Work Environ Health. 2005;31 suppl 2:31–6.
10. Lund T, Kivimäki M, Labriola M, Villadsen E, Christensen KB. Using administrative sickness absence data as a marker of future disability pension: the prospective DREAM study of Danish private sector employees. Occup Environ Med. 2008;65(1):28–31.
11. Karlsson NE, Carstensen JM, Gjesdal S, Alexanderson KA. Risk factors for disability pension in a population-based cohort of men and women on long-term sick leave in Sweden. Eur J Public Health. 2008;18(3):224–31.
12. Suoyrjö H, Oksanen T, Hinkka K, Kivimäki M, Klaukka T, Pentti J, et al. The effectiveness of vocationally oriented multidisciplinary intervention on sickness absence and early retirement among employees at risk: an observational study. Occup Environ Med. 2009;66(4):235–42.
13. Lindh M, Lurie M, Sanne H. A randomized prospective study of vocational outcome in rehabilitation of patients with non-specific musculoskeletal pain: a multidisciplinary approach to patients identified after 90 days of sick-leave. Scand J Rehabil Med. 1997;29(2):103–12.
14. de Boer AGEM, Burdorf A, van Duivenbooden C, Frings-Dresen MHW. The effect of individual counselling and education on work ability and disability pension: a prospective intervention study in the construction industry. Occup Environ Med. 2007;64:792–7.
15. Welch L, Haile E, Boden LI, Hunting KL. Musculoskeletal disorders among construction roofers—physical function and disability. Scand J Work Environ Health. 2009;35(1):56–63.
16. Jensen LK, Friche C. Effects of training to implement new working methods to reduce knee strain in floor layers: a two-year follow-up. Occup Environ Med. 2008;65(1):20–7.
17. Vink P, Miedema M, Koningsveld E, van der MH. Physical effects of new devices for bricklayers. Int J Occup Saf Ergon. 2002;8(1):71–82.
18. Vink P, Koningsveld EA, Molenbroek JF. Positive outcomes of participatory ergonomics in terms of greater comfort and higher productivity. Appl Ergon. 2006;37(4):537–46.
19. van der Molen HF, Grouwstra R, Kuijer PP, Sluiter JK, Frings-Dresen MH. Efficacy of adjusting working height and mechanizing of transport on physical work demands and local discomfort in construction work. Ergonomics. 2004;47(7):772–83.
20. van der Molen HF, Sluiter JK, Hulshof CTJ, Vink P, Fring-Dresen MHW. Effectiveness of measures and implementation strategies in reducing physical work demands due to manual handling at work. Scand J Work Environ Health. 2005;31 suppl 2:75–87.
21. Albers J, Estill C. Simple solutions: ergonomics for construction workers. 2007. Cincinnati (OH): National Institute for Occupational Safety and Health (NIOSH); 2007. NIOSH Publication, number 122, p 1–87.
22. Entzel P, Albers J, Welch L. Best practices for preventing musculoskeletal disorders in masonry: stakeholder perspectives. Appl Ergon. 2007;38(5):557–66.
23. Albers J, Estill C, MacDonald L. Identification of ergonomics interventions used to reduce musculoskeletal loading for building installation tasks. Appl Ergon. 2005;36(4):427–39.

24. Stafford EJ, Rempel DM. Development and evaluation of a new device for overhead drilling. Prof Saf. 2007;52(11):30–5.
25. Hess JA, Hecker S, Weinstein M, Lunger M. A participatory ergonomics intervention to reduce risk factors for low-back disorders in concrete laborers. Appl Ergon. 2004;35(5):427–441.
26. Rempel D, Star D, Barr A, Gibbons B, Janowitz I. A new method for overhead drilling. Ergonomics. In press.
27. de Jong AM, van der MH, Vink P, Eikhout S, Koningsveld E. Reasons for applying innovations for scaffolding work. Int J Occup Saf Ergon. 2003;9(2):161–75.
28. van der Molen HF, Sluiter JK, Hulshof CTJ, Vink P, van Duivenbooden C, Frings-Dresen MHW. Conceptual framework for the implementation of interventions in the construction industry. Scand J Work Environ Health. 2005;31 suppl 2:96–103.
29. van der Molen HF, Sluiter JK, Hulshol CTJ, Vink P, van Duivenbooden C, Holman R, et al. Implementation of participatory ergonomics intervention in construction companies. Scand J Work Environ Health. 2005;31(3):191–204.
30. Weinstein MG, Hecker SF, Hess JA, Kincl L. A roadmap to diffuse ergonomic innovations in the construction industry: there is nothing so practical as a good theory. Int J Occup Environ Health. 2007;13(1):46–55.
31. Sorensen G, Barbeau EM, Stoddard AM, Hunt MK, Goldman R, Smith A, et al. Tools for health: the efficacy of a tailored intervention targeted for construction laborers. Cancer Causes Control. 2007;18(1):51–9.
32. Hunt MK, Lederman R, Stoddard AM, LaMontagne AD, McLellan D, Combe C, et al. Process evaluation of an integrated health promotion/occupational health model in WellWorks-2. Health Educ Behav. 2005;32(1):10–26.
33. Sorensen G, Barbeau E, Hunt MK, Emmons K. Reducing social disparities in tobacco use: a social-contextual model for reducing tobacco use among blue-collar workers. Am J Public Health. 2004;94(2):230–9.
34. Barbeau EM, McLellan D, Levenstein C, DeLaurier GF, Kelder G, Sorensen G. Reducing occupation-based disparities related to tobacco: roles for occupational health and organized labor. Am J Ind Med. 2004;46(2):170–9.
35. Barbeau EM, Goldman R, Roelofs C, Gagne J, Harden E, Conlan K, et al. A new channel for health promotion: building trade unions. Am J Health Promot. 2005;19(4):297–303.

Dr Laura S Welch
The Center for Construction Research and Training (CPWR)
8484 Georgia Ave
Silver Spring, MD 20910
USA
[E-mail: lwelch@cpwr.com]