

# Job stress management and ergonomic intervention for work-related upper extremity symptoms

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Received 7 October 2003; received in revised form 24 May 2004; accepted 26 May 2004

## Abstract

In practice the secondary prevention of work-related upper extremity (WRUE) symptoms generally targets biomechanical risk factors. Psychosocial risk factors have also been shown to play an important role in the development of WRUE symptom severity and future disability. The addition of a stress management component to biomechanically focused interventions may result in greater improvements in WRUE symptoms and functional limitations than intervening in the biomechanical risk factors alone. Seventy office workers with WRUE symptoms were randomly assigned to an ergonomics intervention group (assessment and modification of work station and stretching exercises) or a combined ergonomic and job stress intervention group (ergonomic intervention plus two 1-h workshops on the identification and management of workplace stress). Baseline, 3- and 12-month follow-up measures of observed ergonomic risks and self-reported ergonomic risks, job stress, pain, symptoms, functional limitation, and general physical and mental health were obtained from all participants. While both groups experienced significant decreases in pain, symptoms, and functional limitation from baseline to three months with improvements continuing to 12 months post baseline, no significant differences between groups were observed for any outcome measures. Findings indicate that the additional two-session job stress management component did not significantly enhance the short- or long-term improvements brought about by the ergonomic intervention alone.

Published by Elsevier Ltd.

**Keywords:** Ergonomic intervention; Stress management; Upper extremity symptoms; Function

## 1. Introduction

Work-related upper extremity (WRUE) symptoms can include pain, tenderness, swelling, numbness, and loss of function in the fingers, hands, forearms,

shoulders, upper back, and neck (National Research Council and the Institute of Medicine, 2001). The exact etiology of these symptoms/disorders is currently unclear, however, research indicates that this problem is multi-factorial in development and therefore likely to be complicated in terms of prevention and treatment (National Research Council and the Institute of Medicine, 2001; Devereaux et al., 2002).

Zwerling and colleagues (1997) reviewed the literature on the design, conduct and evaluation of occupational

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injury prevention interventions. They found that although the randomized controlled trial has been the standard of proof in medical and behavioral intervention studies for the last half-century, very few have actually been conducted in the field of occupational injury prevention. In their discussion of the most important methodological problems, they recognize that most companies will not “stand still” while waiting for an experimental intervention to work. They suggest that when companies take such a proactive approach to reducing occupational injuries, randomized trials may be the strongest way to truly evaluate the effectiveness of a specific intervention. The observable effect must be able to “rise above the noise” created by all the other efforts that may affect the injury problem (Zwerling et al., 1997).

In their discussion of quasi-experimental studies, the same authors address the measurement difficulties, particularly in the prevention of musculoskeletal disorders that threaten the validity of intervention research. For example, the long latency period of many occupational musculoskeletal disorders may mean that the intervention may need to be in place for years to demonstrate an impact. Another challenge is worker compliance with recommendations (Zwerling et al., 1997). It is well known in the literature that changes in knowledge and skills do not necessarily change behavior. In addition, Zwerling and colleagues (1997) emphasize the importance of defining appropriate outcome variables in the area of musculoskeletal disorders that are reliable and valid.

Investigations into the etiology of WRUE symptoms have identified three categories of risk factors for these problems: biomechanical exposures, psychosocial stressors, and individual risk factors (Bongers et al., 2002). Biomechanical exposures include factors such as poorly designed workplaces and biomechanical exposures such as repetitive motion, high forces, and deviations from neutral body alignments (National Research Council and the Institute of Medicine, 2001). Psychosocial stressors at work include factors such as high-perceived workplace stress, low-perceived social support, low-perceived job control, and time pressure (Bongers et al., 2002; Huang et al., 2003). Individual factors include gender (female), age, negative stress reactions—especially stomach reactions, and unsatisfactory leisure time and/or additional domestic workload (Bergqvist et al., 1995; Fredriksson et al. 1999).

Much of the intervention research on WRUE symptoms and disorders has focused on modifying one or the other of these categories of risk factors, with most of the studies modifying either biomechanical exposures or psychosocial stress in the workplace (Lincoln et al., 2000; Piligan et al., 2000). Lincoln and colleagues (2000) examined interventions for the primary prevention of work-related upper extremity disorders. This systematic

review included 24 total studies with asymptomatic workers that involved engineering controls (i.e., keyboard/mouse redesign), administrative controls (i.e., splint-wearing, training, exercise), or “multiple component” (i.e., redesign, training, and task rotation, etc.) interventions to determine which, if any, interventions were most effective. The most promising evidence was that the multi-component interventions in the review were correlated with a decrease in the incidence of WRUE disorders, including carpal tunnel syndrome, tendonitis, epicondylitis, and other conditions. The authors conclude that these multiple component interventions “may represent the best opportunity to reduce risk” (Lincoln et al., 2000) in primary prevention (asymptomatic workers) and perhaps may be equally or more relevant for secondary prevention (symptomatic workers) efforts in office workers. Piligan and colleagues (2000) conducted a review of the evaluation and management of a number of chronic WRUE disorders. In general, these authors recommend “conservative” treatment of these disorders, especially in the early symptomatic stages, using workplace evaluations for risk factors followed by modifications and rest to reduce inciting or aggravating positions and/or movements (Piligan et al., 2000).

The literature and work in applied settings suggest that the most common approach to the secondary prevention of WRUE symptoms and disorders at the workplace involves ergonomic interventions that modify the person’s workplace exposures to biomechanical risk factors for these symptoms/disorders. According to Piligan and colleagues (2000), the goals of this type of intervention are to (1) reduce awkward positions, (2) minimize the need to use excess force, (3) reduce highly repetitive movement, (4) reduce the period of time spent in one position, and (5) ensure sufficient rest/recovery periods.

Studies have also examined the impact of job stress on WRUE symptoms and developed secondary prevention interventions to target these psychosocial risk factors. Pransky and colleagues (2002) conducted a systematic review of interventions for WRUE disorder that included job stress reduction. This review expanded on existing reviews that examined stress management interventions designed to reduce workplace stress in general to apply the findings to WRUE disorders interventions and symptomatic outcomes (Murphy, 1996). The findings of this review suggested that while interventions to date directed at workplace-level changes had *minimal* effect on stress levels and WRUE disorder outcomes, there was some evidence to indicate that individual-focused stress management interventions did improve self-reported stress and upper extremity symptoms, especially when combined with other elements, such as ergonomic training and interventions (Pransky et al., 2002).

Faucett and colleagues (2002) conducted a randomized controlled trial of two types of worker training

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