Participatory intervention based on objectively measured physical risk factors for musculoskeletal disorders in the construction sector: Study protocol for a cluster randomized controlled trial.

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1. Introduction

Musculoskeletal disorders (MSD) have a multifactorial etiology and are affected by individual factors as well as psychosocial and physical factors related to the working environment (1). Physically strenuous work, i.e., heavy lifting, pulling or pushing, as well as working with bended or twisted back and handling static loads is known to increase the risk of MSD (2). In the construction sector heavy lifts combined with bending and twisting of the back (3) are an important reason for early retirement (4). Objective information about physical exposure can play an important role in the prevention of MSD. The use of wearable technology enables determination of physical workload during the working day (5,6). Participatory ergonomics, i.e., interventions that maximize the involvement of the workers in the process of identifying and correcting physical hazards at the workplace - support return to work after sickness absence due to back pain (7). It has previously been shown that the physical workload is reduced when technical aids (like lifting- or mechanic transportation devices) is included in a participatory intervention (8).

The aim of the present study is to 1) determine which work-tasks in selected job-groups of the construction sector involves the highest load of the back, and 2) investigate whether a supervised participatory intervention drawing on information from objective measurements (surface electromyography (EMG), level of activity and video) during a full working day can decrease the physical workload.

2. Methods

This project started in November 2014, and is now in the planning and recruitment phase. The study will be conducted in two phases (figure 1); in phase 1, we will determine which work-tasks in selected job-groups of the construction sector involve the highest load of the back during a normal working day. In phase 2, we will investigate whether a participatory intervention with three workshops can reduce the physical workloads during the working day in a cluster randomized controlled design.

We will recruit the study population from the construction sector across Denmark. Approximately 20 construction gangs (=80 subjects) will be recruited and randomized into an intervention group or control-group (figure 2).

We will record in situ the level of physical workload using objective measurements such as EMG, level of activity and video recordings during a working day. The equipment will be mounted under the working clothes, so it will be of minimum of discomfort for the workers. Based on these measurements we will develop a load matrix for each worker that will be the basis for the detection of which working tasks turn out to have the most excessive physical load. The working tasks with measured excessive load will be identified and selected for further inspection. The threshold for defining ‘excessive physical load’ is yet to be determined, e.g. work tasks that in several of the workers exceed 60% of maximal voluntary contraction EMG for the back muscles.

The selected video clips – i.e. those showing work tasks with excessive physical load - will be presented on a workshop for the construction workers and leaders, who together with a consultant from The Safety and Health Preventive Service Bus for the Construction Sector (Byggeriets Arbejdsmiljøbus - BamBus) will work out specific solutions aiming to reduce the physical workload. The intervention will consist of three workshops over a period of two months; 1) At baseline, an opening workshop with presentation of video clips, and development of suggestions for solutions, as well as development of a plan of action. 2) One month after workshop 1, the solutions implemented will be evaluated and adjusted if needed. 3) A follow up session including long-term planning will be conducted two months after workshop 1.
3. Findings and discussion

The results of this study will provide novel knowledge about the level of physical exposure in the construction sector. Further, the current project will enable to tailor participatory intervention involving both workers and leaders. Finally, the acquired knowledge will be beneficial for the workers, leaders and the construction sector as well as the society if the conducted intervention appears to lead to decreased risk of MSD.

Funding

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Keywords

Participatory intervention, Electromyography, Construction industry, Video, Work-related musculoskeletal disorders.

Figure 1: Flow of the study. The study started in November 2014, and is now in the recruiting face. BamBus = The Safety and Health Preventive Service Bus for the Construction Sector.
Figure 2: Cluster randomization of the study.

References


