

A HEALTH PROMOTION PROGRAM AT THE WORKPLACE FOR CONSTRUCTION WORKERS: A FEASIBILITY EVALUATION WITHIN A RANDOMIZED CONTROLLED TRIAL

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Aims

To promote the work ability of construction workers, a health promotion program (HPP) focusing on their individual capacities as well as the work environment was developed. This program was developed using the Intervention Mapping approach and is evaluated by means of both a process and an effect evaluation. The current study focuses on the process evaluation and aims to describe (1) the reach of the program, (2) the initial expectations and satisfaction and (3) the intention to implement the intervention program in the future.

Methods

The process evaluation was carried out within a RCT on the effectiveness of a HPP for construction workers. The intervention consists of three components: (1) an individual visit of a physical therapist to lower the physical workload, (2) a Rest-Break tool to improve the balance between work and recovery, and (3) an empowerment training to increase the influence at the worksite. Data were collected from the employees and their supervisors by means of questionnaires. In addition to this, data was collected from all stakeholders by means of interviews and group discussions in order to conduct a more in-depth investigation of the working mechanisms of the intervention.

Results

From the more than 150 companies which were approached, the top management of five construction companies committed themselves to participate. Supervisors as well as employees were satisfied with the overall concept of the multidimensional intervention program (7 (median) on a ten-point scale ranging from 1-10). Employees and supervisors mostly appreciated the physical component (i.e. physical therapist intervention at the worksite), and the empowerment component of the program. The participating employers expressed positive intentions to further implement the intervention program in the future. This abstract contains only preliminary results of the questionnaires. More results are available in June 2010.

Conclusions

The present study took a participative approach (Intervention Mapping) and showed that this had a positive effect on the feasibility of the resulting intervention program. In developing the actual content of the intervention and the intervention strategy, much attention was paid to the needs of the target group, the way in which they could be motivated to participate, as well as to practical issues of them being able to take part in such a program whilst at work at building sites. The preliminary results of the process evaluation indicate that we have reached these goals. The HPP thus seems promising for future implementation.

AN INTERVENTION FOR OVERHEAD DRILLING TO REDUCE UPPER EXTREMITY MUSCULOSKELETAL RISK FACTORS

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Aims

One of the most physically demanding tasks that commercial construction workers perform is overhead drilling holes into concrete or metal ceilings. The job involves standing on a ladder or in a scissor lift, holding a 2-4 kg drill overhead with one hand, and pushing it upward with high force for 1-2 minutes while drilling a hole in the ceiling. Hundreds of these holes can be drilled during a day for hanging pipes, electrical trays and sheet metal ducts.

Methods

This 5 year project involved developing and testing six different drilling interventions which were designed to reduce the hand force and non-neutral shoulder postures associate with overhead drilling. Each design change was supported by participatory feedback from construction workers. This paper presents the evaluation of the final design.

During their regular overhead drilling, 23 commercial construction workers used the usual method and the intervention design - each for 3 hours – order randomized. Afterwards, subjects rated fatigue in 5 body regions and usability on 12 items. The work was videotaped for productivity (N=19) and inclinometers were used to measure shoulder posture and head inclination (N=16). Hand forces during drilling were measured for three subjects.

Results

The intervention device was rated superior to the usual method on the usability measures of drilling/vibration, stability, and feel/handling. Perceived fatigue ratings were significantly lower in all 5 body regions for the intervention device compared with the usual method. There was no significant difference in total time per hole between the usual method and the intervention device ($p = 0.61$). The shoulder was flexed or abducted to over 60 degrees for 40% of the time while drilling with the usual method compared with 21% with the intervention ($p = 0.007$). The percentage of time that the head was in extension of more than 0 degrees was greater for the usual method than the intervention ($p = 0.005$). The mean applied hand force during drilling with the usual method was 245 (+/-11) N, and 26.3 (+/-3.3) N for the intervention.

Conclusions

An intervention device, compared to the usual method for overhead drilling, was associated with reduced upper extremity fatigue. This improvement was supported by reductions in the objective risk factors of applied force and percent time in non-neutral shoulder posture. Repeated field-testing by experienced construction workers and their feedback on design was vital to the development of this new intervention device.

IMPACT OF ERGONOMIC MEASURES ON PRODUCTIVITY, TASK DEMANDS AND WORKLOAD - EXAMPLES OF TWO CONSTRUCTION JOBS

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Aims

To evaluate the impact of ergonomic measures on productivity, tasks demands and workload among pavers and among gypsum masons.

Methods

A within-subjects controlled field study was performed to compare the effects of working with newly developed ergonomic measures to those of working with conventional working methods during the course of a full working day among pavers (n=8) and among gypsum masons (n=10). The outcome measures were productivity, duration and frequency of tasks and activities, energetic workload in terms of percentage heart rate reserve (%HRR), and cumulative spinal load (gypsum masons) or local discomfort and preferences (pavers).

For pavers a trolley was developed to reduce knee straining activities through increasing the rest periods while sitting. For gypsum masons adjustments in work organization and tools were made to reduce back straining activities through optimizing carrying distances and working height.

Results

The use of a paver's trolley does not have an effect on productivity, nor on work demands and workload compared to working without a paver's trolley. Despite that, six of the eight pavers indicated that given suitable circumstances they want to use the paver's trolley.

The use of adjustments in work organization and tools among gypsum masons had no effect on productivity, total work time, duration of tasks, nor on duration of carrying, nor on the energetic or biomechanical workload during the course of a working day. Only during the finishing task, the duration and frequency of working below knee level decreased statistically significant by 4 minutes and 71 times, respectively.

Conclusions

No relevant preventive effects of the use of newly developed ergonomic measures on tasks demands and workload were found among pavers and among gypsum masons. The limited impact of the tested ergonomic measures argues for other measures to reduce the risk of work-related musculoskeletal complaints. These controlled feasibility studies underline the importance of assessing the effects of seemingly effective ergonomic measures at work sites before launching diffusion activities to implement such measures.