Job-specific workers' health surveillance for construction workers

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Summary

Workers' health surveillance (WHS) aims at the assessment of workers' health and work ability by detecting any clinical or preclinical abnormalities. In that way, it can be verified whether the occupational exposures have any detrimental effect on the health of workers and whether the worker is fit for the job. Each WHS should be designed based on evidence and in such a way that it is relevant to the nature of the demands and health effects of the occupation of interest.

Due to the demanding nature of the sector, construction workers face high rates of occupational injuries and illnesses. Hence, a job-specific health surveillance programme for construction workers seems a necessary complementary approach in guarding the health of the workers. The aim of this thesis is to develop and evaluate a job-specific WHS for construction workers. This thesis focuses on two construction occupations as representatives for a more physically or more mentally demanding occupation: bricklayers and construction supervisors, respectively.

Hence, the objectives of this thesis are twofold:

i. To provide an evidence base of a job-specific WHS for bricklayers and construction supervisors, and
ii. To evaluate a job-specific WHS for bricklayers and construction supervisors compared to the generic WHS currently employed.

The following research questions were formulated:

1. What are the occupational demands and health effects for bricklayers and construction supervisors?
2. What is the content of the job-specific WHS for bricklayers and construction supervisors?
3. Does a job-specific WHS for construction workers lead to more workers undertaking preventive actions than the generic WHS currently employed?

1. Occupational demands and health effects

In Chapter 2, knowledge was gathered on occupational demands and health effects of two occupations in the construction industry, bricklayers and supervisors, in order to design a job-specific workers’ health surveillance (WHS) for construction workers. Evidence was found for the following demands for bricklayers: energetic load (exceeding 25% of the heart rate reserve), load on the lower back (exceeding the NIOSH-threshold value of 3.4 kN), repetitive force exertions of the upper extremities, frequent bending with trunk flexion exceeding 60 degrees and working with the arms more than 60 degrees elevated. Environmental demands include: dust and quartz exposure (exceeding the limit values of 3.0 mg/m³ and 0.05 mg/m³ respectively), vibration and noise (exceeding the limit value of 80 dBA). Bricklayers are at increased risk of lung cancer, low back pain, complaints of arms
and legs and getting injuries. Among construction supervisors long walking and standing are common physically demanding activities. Psychosocial work demands with evidence for supervisors were mental demands, workload, time pressure, working long hours and social-organizational factors. Supervisors are at increased risk of lung cancer and injuries. Based on the information that was retrieved from literature, it was concluded that job-specific demands and health effects should be incorporated in WHS for construction workers. Therefore, more detailed knowledge on demands and health effects not gathered from the literature review was considered to be useful.

As surveys were selected as research methodology to gather more knowledge on demands and health among the two occupations, the objective of the study in Chapter 3 was to examine the differences in response rates between the bricklayers and supervisors on two survey modalities: paper-and-pencil and internet-based. Total response rate in the paper-and-pencil questionnaire group (45%, 131/293) was significantly higher than in the internet questionnaire group (36%, 106/297). Among bricklayers, the response rate on the paper-and-pencil questionnaire was significantly higher than on the internet questionnaire. For construction supervisors response rates were not different in the two groups. The paper-and-pencil modality was selected for carrying out the surveys in the other studies presented in this thesis.

In Chapter 4 the psychosocial work environment, the prevalence of mental health complaints and the association between these two were assessed. Compared to the general working population, bricklayers experienced statistically significant worse job control, lower learning opportunities and lower future perspectives; supervisors experienced statistically significant higher psychological demands and higher need for recovery after work. Prevalence of self-reported mental health effects among bricklayers and supervisors, respectively, were as follows: high need for recovery after work (14%; 25%), distress (5%; 7%), depression (18%; 20%) and post-traumatic stress disorder (11%; 7%). Among both occupations, high work speed and quantity were associated with symptoms of depression (ORs 2.8-4.1). Further, among construction supervisors, low participation in decision making (OR 5.5) and low social support of the direct supervisor (OR 7.5) were associated with symptoms of depression, high work speed and quantity were associated with symptoms of distress (OR 5.6).

As in each occupation a considerable proportion of workers was positively screened for common mental disorders, there is a need for addressing these disorders in a job-specific WHS.

In Chapter 5 were assessed: 1) the impact of mental health complaints on current work ability and work ability one year later and 2) the added value of job-specific questions about work ability for detecting signs of low work ability. The sample from Chapter 4 was surveyed
by means of a follow-up questionnaire one year later. Having mental health complaints was associated with low current work ability and low work ability at follow-up (ORs 4.3-22.4), but not with a reduction in work ability one year later. Questions on job-specific work ability resulted among both occupations for more workers (15-72%) in indications of low work ability than did questions on general work ability.

As work-related musculoskeletal disorders (MSDs) are an important cause of functional impairments and disability among both bricklayers and supervisors, the prevalence of symptoms of MSDs, the work-relatedness of the symptoms and the problems experienced during work were surveyed in Chapter 6. The prevalence of MSDs among 267 bricklayers and 232 supervisors was 67% and 57%, respectively. Complaints of the back, knee and shoulder/upper arm were the most prevalent among both occupations (15-42%). Irrespective of the body region, most of the bricklayers (81%) and half of the supervisors (48%) reported that their complaints were work-related. Complaints of the back and elbow were the most often reported among the bricklayers during work, whereas lower arm/wrist and upper leg complaints were the most often reported among the supervisors. In both occupations, a majority of the bricklayers (55-72%) and a substantial number of supervisors (42-58%) perceived several occupational physical tasks and activities as causes or aggravating factors for their MSD. Recurrent complaints at follow-up were reported by both bricklayers (47% of the complaints) and supervisors (31% of the complaints). Participants in both occupations report that mainly back (for 22-38% of the workers) and knee complaints (for 26-40% of the workers) result in additional problems during work, at the time of follow-up. Based on the results, workplace intervention measures aimed at occupational physical tasks and activities seem justified for both occupations.

2. Content of the job-specific WHS

The job-specific WHS consists of modules assessing both physical and psychological requirements (musculoskeletal system, safety (vision, perception of sound, psychological vigilance and working at heights), hazardous substances (skin, lungs), health in relation to work (cardiometabolic health) and work ability). The selected measurement instruments are chosen based on their appropriateness to measure the workers’ abilities and health requirements. They include a questionnaire and biometrical tests, and physical performance tests that measure physical functional abilities. Furthermore, the job-specific WHS provides occupational physicians with a protocol (professional guidance) to increase the worker-behavioural effectiveness of their counselling and to stimulate job-specific preventive actions. The instruments to assess work ability, i.e. questions and physical performance tests, differ between the occupations. Furthermore, the guidance for the physician was attuned to the occupation in the intervention protocol (Chapter 7).
3. Does a job-specific WHS for construction workers lead to more workers undertaking preventive actions than the generic WHS currently employed?

Actively searching for musculoskeletal complaints and reduced physical work ability can be seen as a key element in a job-specific workers’ health surveillance programme for construction workers. The aims of the multiple-case study presented in Chapter 8 were 1) to explore the added value of physical performance tests in such a programme among bricklayers and supervisors and 2) to assess if and how these tests facilitate the recommendation of job-specific preventive actions in addition to information gathered by questionnaires. Based on a qualitative analysis of the job-specific WHS of two bricklayers and two construction supervisors, we found that the information gathered during the physical performance tests supplemented the information from the questionnaire. Furthermore, the tests seemed of added value in the assessment of musculoskeletal complaints and reduced physical work ability and in observing working posture and working technique. Therefore, standardised physical performance tests, based on a simulation of relevant job activities, are of added value in evaluating and gathering knowledge about construction workers’ individual physical work ability.

The aim of the study presented in Chapter 9 was to evaluate the process of starting a job-specific WHS in occupational health care for construction workers. At three widespread departments of one occupational health service throughout the Netherlands, 899 bricklayers and supervisors were invited for the job-specific WHS (intervention). Reach (attendance rate) was 9%, fidelity (protocol adherence) was 67%, the intervention dose delivered by the OP was 92% (provision of written recommendations) and 63% (provision of follow-up appointments), and the intervention dose received by the worker was 68% (remembrance of recommendations directly after WHS) and 49% (remembrance of recommendations three months after WHS). The total programme implementation was 58%. The increase in the workers’ knowledge about their health status and work ability was substantial, and the workers’ satisfaction with the intervention was good. The perceived effect of the advised preventive actions on health status was sufficient. The results indicated that the programme implementation was acceptable. Low reach, limited protocol adherence and modest engagement of the workers with the preventive recommendations were the most prominent aspects that influenced the intervention process.

In Chapter 10 workers’ preventive actions and occupational physician’s (OPs) recommendations following job-specific WHS were compared to the currently used generic WHS. Three months after attending the WHS, the proportion of workers who reported taking preventive actions was statistically significantly higher in the intervention group (80%, 44/55) than in the control group (67%, 80/121). In the intervention group, 73% of the workers undertook job-specific actions versus 59% in the control group. In the intervention
group, the OPs provided a statistically significantly higher proportion of workers with written recommendations (82%, 63/77, versus 57%, 69/121) and job-specific recommendations (77% versus 33%) compared to the OPs in the control group. The intervention group reported larger increases in knowledge of health and work ability than the control group.

**Chapter 11**, the general discussion, started with presenting the main findings in the light of the study objectives and research questions, followed by an interpretation of the findings and issues concerning the research context. Recommendations for future researchers and implications for practice were addressed in this chapter. The general conclusion of research question one was that among both bricklayers and supervisors physical, psychosocial and safety demands need to be considered in job-specific WHS. However, as these demands vary in type, duration, frequency and intensity among the occupations, the content of job-specific WHS needs to be attuned to the occupation. Regarding adverse health effects it was found that many of these concern both bricklayers and supervisors. Therefore, a substantial number of instruments selected for the job-specific WHS are the same for both occupations. The job-specific information on occupational demands and health effects was used to design self-formulated questions on job-specific work limitations, decreased work ability and the physical performance tests. The overall conclusion of the second and third research question regarding the content and evaluation of the job-specific WHS is that it aided OPs in providing workers with recommendations and workers in undertaking (job-specific) preventive actions, compared to the currently employed, generic WHS. For researchers, the next step would be to assess the quality of the recommendations and actions and evaluate the longitudinal effects of health surveillance throughout the career of construction workers. An important general recommendation for practice is that a job-specific approach is of added value in optimising health surveillance for construction workers and an improved WHS for workers in other construction occupations should be explored, for example by an evidence-based modular approach of WHS.