

Expert panel survey among occupational health and safety professionals in Denmark for prevention and handling of musculoskeletal disorders at workplaces



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ABSTRACT

Occupational health and safety (OHS) professionals have a key role in supporting the health and work ability of employees, including preventing and handling musculoskeletal disorders (MSDs) at workplaces. MSDs are the leading cause of work disability, productivity loss and sickness absence in Europe. This may be due to limited consensus on use of effective OHS practices as facilitation of evidence-based practices increases quality of provided services. This study explored consensus of OHS professionals' practices and examined OHS professionals' request for development of evidence-based guidelines for prevention and handling of MSDs at workplaces. This was done by 1) field observations and interviews with OHS professionals working with ergonomics or MSDs at workplaces, 2) development and pilot testing of a panel survey, 3) a three-round expert panel survey and 4) workshop with OHS stakeholders within the OHS organisations in Denmark. The findings indicate limited consensus of OHS practices and a request for development of practice- and evidence-based guidelines for prevention and handling of work-related MSDs in Denmark. The study also presents an end user involving process for increased uptake and implementation of guidelines.

1. Introduction

Musculoskeletal disorders (MSDs) represent a considerable economic burden and are the leading cause of work disability, productivity loss and sickness absence in Europe (Bevan, 2015). MSDs accounts for at least half of all absence from work among European workers (Cammarato, 2007). It is estimated that the total cost of lost productivity attributable to MSDs among people in the working age in EU are up to 2% of the gross domestic product (Cammarato, 2007). Prevention and handling of MSDs should therefore be of high priority.

Occupational health and safety (OHS) professionals have a key role in supporting the health and work ability of employees. The OHS professionals' tasks have the goal of describing, analysing, monitoring, controlling, curing, and preventing illnesses and hazards related to work. Depending on the country and context, OHS may be considered a parallel service provider to the public and private health care sectors (Halonen, 2017). In some Western countries, including Denmark, the effectiveness of OHS activities has been questioned (Andersen, 2018). However, a recent systematic review indicated that OHS activities such

as the introduction and enforcement of legislation and workplace inspections are effective in reducing injuries and improving compliance with OHS regulation, and it is therefore recommended to strengthen and improve these OHS activities for improving safety and health at workplaces (Andersen, 2018). Nevertheless, the review also found a major research gap with respect to the effect of OHS regulation targeting psychosocial work environment and MSDs (Andersen, 2018).

Danish OHS professionals perform several different tasks and activities in the organizations, including operational, systematizing and processual tasks (Uhrenholdt Madsen et al., 2019). The Danish OHS professionals are therefore characterized by multidisciplinary with professional backgrounds in social, technical, natural and health fields (Uhrenholdt Madsen et al., 2019). This results in a heterogeneous group of Danish OHS professionals with diversity in approaches and methods (Uhrenholdt Madsen et al., 2019). Consequently, despite general recognition of the importance of evidence-based practice (Hulshof and Hoenen, 2007; Hasle et al., 2015), there is a variation in services provided by OHS professionals for solving the same challenges. Through the authors' work with continued education of OHS professionals

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facilitated by the Danish Association of Occupational Health and Safety Consultants (the trade association for occupational health and safety professionals in Denmark) and annual conferences for work environment, a general request among OHS professionals for evidence-based guidelines to recognise the most effective and fitting services has become apparent. Facilitating the translation of evidence-based knowledge and methods into systematic OHS practices will improve the quality of the services provided (Kwak, 2017). The need of evidence-based systematic OHS practices is not only apparent among OHS professionals, but also among employers of customer companies as they fund the services (Good Practice in Occupational Health Services: A Contribution to Workplace Health, 2002).

One way to improve translation of evidence-based knowledge into OHS practice is by encouraging participation of end-users in the research process. By creating and sharing evidence-based knowledge that is meaningful for practitioners, the uptake of guidelines will likely increase (Carpenter, 2012; Bumbarger and Campbell, 2012). That is why we initiated a research project with the aim of developing guidelines targeting OHS professionals for prevention and handling of MSDs at workplaces based on both evidence and best practice and involved OHS professionals in the process of deciding the scope of the guidelines.

The aim of this study was therefore to 1) identify OHS activities for prevention of work-related MSDs and solutions used to solve these, 2) investigate OHS professionals' consensus for which solutions to choose for specific OHS challenges, and 3) examine for which OHS activities OHS professionals requested practice- and evidence-based guidelines for preventing and handling MSDs at workplaces.

2. Methods

In this study, a process was conducted to identify and examine consensus of OHS practices related to MSDs and to explore the need for developing guidelines for preventing and handling MSDs at workplaces. This process consisted of 1) field observations and interviews with OHS professionals working with ergonomics or MSDs at work, 2) development and pilot testing of survey, 3) a three-round expert panel survey (a modified Delphi-survey) and 4) workshop with central stakeholders.

2.1. Identification and recruitment of participants

A purposive sampling strategy was used to recruit participants to each stage of the study. In collaboration with The Danish Association of Occupational Health and Safety Consultants, we identified and recruited OHS professionals for the field observations and interviews, pilot test and expert panel survey. For the field observations and interviews, we aimed to recruit OHS professionals who were highly experienced (approximately more than 10 years of experience as an OHS professional). For both the three-round expert panel survey and the pilot test of this, we aimed to recruit OHS professionals with varying experience to have the insight from both newly trained and very experienced OHS professionals. We also aimed to include OHS professionals from both consultancy businesses in the private sector and council-run organizations as well as both internally and externally working OHS professionals. Finally, a group of central stakeholders within OHS organizations in Denmark (union representatives and OHS leaders/consultants from large, Danish companies) were identified based on previously having participated in stakeholder groups or their occupational position. The group of stakeholders functioned as a non-scientific reference group throughout the project.

2.2. Field observations and interviews

In order to gain information about the work carried out by OHS professionals working with preventing and handling MSDs at the workplaces, field observations were carried out preliminary to the development of the questions for the pilot survey and first survey-round.

One researcher (MJS) followed two different OHS professionals and observed their work (e.g. education in patient transfer, instructions in office ergonomics, and lecture in work environment) (in total four workplace visits). After the observation, an individual semi-structured interview with the OHS professional was carried out. In addition to this, three other OHS professionals not being observed were also interviewed by two of the researchers (CNR and MJS) and three representatives from different workplaces, who had been promoted at a national conference for work environment for their outstanding initiatives to prevent work-related MSDs, were interviewed (by MJS). The interviews with OHS professionals concerned information about the OHS process and the role as an OHS professional, MSD challenges at workplaces (type, frequency, and differences between occupational sectors), and their perceived view of need for guidelines for OHS and MSDs at the workplace. The interviews with workplace representatives focused on experiences with OHS professionals, and prevention and handling work-related MSDs at work.

2.3. Development and pilot-testing of survey

Information from the observations and interviews were used to draft a questionnaire for the first round of the expert panel survey. To test the questionnaire, we performed one interview with one highly experienced OHS professional who was given the draft to answer and review. MJS and CNR revised the questionnaire according to the feedback. To further test the understanding and the content of the questionnaires and the feasibility of the procedures for sending out the questionnaire, a pilot version of the survey was sent to four OHS professionals of whom three participated. Short telephone interviews with each of the responders were performed to get feedback on both question phrasing and procedures to create the final version of the first round of the expert panel survey and drafts for the second and third round.

2.4. Expert panel surveys

The three-round expert panel survey was conducted as a modified Delphi survey. The Delphi method is a structured process for gaining consensus among a diverse group of stakeholders or experts without needing to physically attend meetings (Ryan, 2001). Unlike a traditional Delphi process, we did not inform the panel about the responses from the previous round, and each round can be considered a separate survey, but we used the information from each round to develop the questions for the next round.

The panel survey questions are presented in Table 1. An email was sent to the OHS professionals with a unique link to the survey through an online survey tool (SurveyXact, Ramboll Management Consulting, Aarhus, Denmark). The OHS professionals were asked to complete each round of the survey within a 3-week period. Each survey took on average 10–15 min to complete. Reminders were emailed to non-completers after 2 weeks.

2.4.1. Round 1

The aim of round one was to collect overall information about OHS practices concerning MSDs at the workplaces. The survey consisted of two parts. First, demographic information was collected (e.g. age, sex, education, seniority and occupation (private or public sector, internal or external consultancy)). Second, the survey contained three open-ended questions concerning OHS activities and ways to handle OHS activities in the MSD-related work (Table 1). The qualitative entries were analysed as described in section 2.6. The themes emerging from this analysis was used to create the round two-survey.

2.4.2. Round 2

The aim of round two was to quantitatively assess frequency of OHS activities and solutions that were derived from round one, and to examine consensus among OHS professionals regarding which solutions

Table 1
Overview of part two questions in the three-round expert panel survey.

	Question no. 1	Question no. 2	Question no. 3
Round 1	Describe various OHS activities related to MSDs at the workplaces that you have worked with	Describe different methods you use or ways you handle OHS activities related to MSDs in your work	Describe briefly what kind of requests you typically have received from companies related to MSDs at the workplaces
Round 2	How often do you as an OHS professional handle the following OHS activities related to MSDs at the workplaces? -Patient handling -Lifting -Push/pull -Screen work -Sedentary work -Awkward postures -Repetitive work -Carrying -Mental well-being (related to MSD)	How often do you use the following solutions to OHS activities related to MSDs in your work as an OHS professional? -Physical training and health promotion -Work postures and working technique -Technical assistive devices and protective equipment -Design of the workplace -Teaching and education -Risk assessment -Organizational and/or psychosocial efforts -Other things	Enter a priority order from 'very frequently' (1) to 'very rarely' (7) for how often you use the following solutions in your work as an OHS professional to handle the following OHS activities; patient handling, Lifting, Push/pull, Screen work, Sedentary work, Awkward postures, Repetitive work, Carrying, Mental well-being. Solutions: -Physical training and health promotion -Work postures and working technique -Technical assistive devices and protective equipment -Design of the workplace -Teaching and education -Risk assessment -Organizational and/or psychosocial efforts
	Responses: [1 = always, 2 = often, 3 = sometimes, 4 = rarely, 5 = never/almost never.]	Responses: [1 = always, 2 = often, 3 = sometimes, 4 = rarely, 5 = never/almost never.]	
Round 3	To what extent do you think that evidence-based knowledge is missing for the following OHS activities related to MSDs? -Screen work -Awkward postures -Lifting -Sedentary work -Carrying -Push/pull -Repetitive work -Mental well-being related to MSD -Patient handling	To what extent do you think there is a need of developing practice and evidence-based guidelines for the following OHS activities related to MSDs? -Screen work -Awkward postures -Lifting -Sedentary work -Carrying -Push/pull -Repetitive work -Mental well-being related to MSD -Patient handling	Are there any other OHS activities you think it is important to develop practice and evidence-based guidelines for?
	Responses: [1 = to a great extent, 2 = greatly, 3 = somewhat, 4 = to a low degree 5 = to a very low degree.]	Responses: [1 = to a great extent, 2 = greatly, 3 = somewhat, 4 = to a low degree 5 = to a very low degree.]	

Table 2
Demographic details of OHS professionals participating in three-round expert panel survey.

	N	%	Mean	Standard deviation
Sex (n = 33)				
Women	20	60.6		
Men	13	39.4		
Age (n = 33)				
20–29	0	0		
30–39	4	12.1		
40–49	13	39.4		
50–59	12	36.4		
60–69	4	12.1		
Educational background (n = 33)				
Physiotherapist	16	48.5		
Occupational therapist	13	39.4		
Other	4	12.1		
Seniority as an OHS professional (in years) (n = 33)				
0–1	1	3.0		
> 1–5	3	9.1		
> 5–10	9	27.3		
> 10–20	9	37.3		
> 20	11	33.3		
Total years			15.9	10.0
Seniority at current workplace (in years) (n = 33)				
0–1	5	15.2		
> 1–5	13	39.4		
> 5–10	6	18.2		
> 10–20	7	21.2		
> 20	2	6.1		
Total years			7.8	8.4
Private/public company (n = 33)				
Private company	22	66.7		
Public company	11	33.3		
Internal/external consultant (n = 33)				
Internal	11	33.3		
External	22	66.7		
Geographical location of work (not exclusive) (n = 33)				
Capital Region of Denmark	14	37.8		
Region Zealand	6	16.2		
Region of Southern Denmark	10	27.0		
Central Denmark Region	10	27.0		
North Denmark Region	3	8.1		

to choose for different OHS activities. The survey consisted of two parts. Part one was the demographic questions, which were only available for those not having answered the round one-survey. In part two, the OHS professionals were asked to quantitatively rate how often they were handling different OHS activities (i.e. patient handling, lifting, push/pull, screen work, sedentary work, awkward postures, repetitive work, carrying and mental well-being) related to MSDs at the workplaces. Next, the OHS professionals were asked to quantitatively rate how often they were using different solutions (i.e. physical training and health promotion, work postures and working technique, technical assistive devices and protective equipment, design of the workplace, teaching and education, risk assessment, organizational and/or psychosocial efforts, other things) to OHS activities related to MSDs in their work. The participants were asked to rate their answers on a 5-point Likert scale from 'always' to 'never/almost never'. Lastly, the OHS professionals were asked to prioritize the solutions (listed above) according to the OHS activities (listed above) from 1 to 7, with 1 being the most frequently used solution to an OHS activity and 7 being the least used solution to an OHS activity.

2.4.3. Round 3

The aim of the third round was to gain information about the OHS professionals' views on the need to develop guidelines for the different OHS activities related to MSDs at the workplaces. Furthermore, an aim of this round was to be able to determine which OHS activities the

guidelines should encompass. No a priori cut point for determining consensus was chosen as the expert panel survey was only one part of the first phase of deciding the scope of the guidelines. The OHS professionals were asked to rate to which extent the thought research-based knowledge was missing, and to which extent they requested practice- and evidence-based guidelines. Answer options for both questions were a 5-point Likert scale from 'to a great extent' to 'to a very low degree'. Lastly, an open-ended question gave the OHS professionals to suggest other OHS activities for which they thought it would be important to develop guidelines.

2.5. Workshop with stakeholders

After the three-round expert panel survey, a workshop with nine central stakeholders within OHS organizations in Denmark was arranged. Results from the surveys were presented and discussed. The stakeholders gave their opinion about which OHS activities the guidelines should encompass. Based on survey results and a criterion of not developing sector specific guidelines, the stakeholders and researchers in the project group came to an agreement on prioritised OHS activities by verbal consensus.

2.6. Data analysis

All qualitative data and open comment text gathered during the expert panel survey were analysed using a thematic analysis approach (Braun and Clarke, 2006). NVivo 11 (QSR International, 2015) was used for coding and analysis of the qualitative data. Data were analysed independently by one of the researchers (MJS) to develop and refine the emerging themes. This was then verified with one of the other researchers (CNR). Quantitative data gathered from the expert panels was entered into IBM SPSS Statistics for Windows (Version 22; IBM Corp., Armonk, NY, USA) for analysis. On completion of survey round two and three, percentages for individual items were analysed. Criteria used to define and determine consensus in a Delphi study is subject to interpretation, with studies reporting variations, dependent on the sample numbers and aim of the research (Hasson et al., 2000; Keeney et al., 2006). In the current study, no a priori cut point for quantitatively determining consensus was set. Instead, we presented the results at a workshop with central stakeholders during which verbal consensus was reached.

3. Results

3.1. Demographics of the OHS professionals

Demographics for the OHS professionals included in the three-round expert panel survey is presented in Table 2. Of the 37 OHS professionals invited to take part in the survey, 33 participated in at least one round of the survey (40% men; 60% women). The majority was between 40 and 49 years (39%). The OHS professionals geographically represented all five regions in Denmark. The majority had an educational background as either a physiotherapist (49%) or an occupational therapist (39%). On average, the OHS professionals had 16 years of OHS experience (range 0–37 years) and had worked eight years (range 0–31 years) at their current workplace. Most of the included OHS professionals worked in the private sector (67%) and the majority were employed as external consultants working with OHS at workplaces where they were not employed (67%).

3.2. Round 1 of the expert panel survey

Of the 33 OHS professionals, 25 (76%) answered the three open-ended questions in the first round. By analysing the answers from question number one thematically, nine themes related to OHS activities related to handling or preventing MSDs at the workplaces (i.e.

Table 3
Taxonomy of identified OHS activities for prevention or handling of MSDs based on qualitative data from first round of expert panel survey.

OHS activities	
Patient handling	How to prevent or handle MSDs for patient handling, e.g.: <ul style="list-style-type: none"> ● Ergonomics for manual patient handling ● Instruction in use of assistive devices for patient handling ● Assessment and purchase of assistive devices for patient handling
Lifting	How to prevent or handle MSDs for (heavy) lifting, e.g.: <ul style="list-style-type: none"> ● Technique instructions for manual lifting ● Instruction in use of assistive devices for lifting
Push/pull	How to prevent MSDs for push/pulling activities, e.g.: <ul style="list-style-type: none"> ● Technique instructions ● Instruction in use of assistive devices
Screen work	How to prevent or handle MSDs when working with screens (any type), e.g.: <ul style="list-style-type: none"> ● Adjustments of screens, desk, chair etc.
Sedentary work	How to prevent or handle MSDs when majority of working hours are sedentary, e.g.: <ul style="list-style-type: none"> ● Micro breaks with physical activity during working hours ● Behaviour change related to minimising sedentary behaviour during working hours and leisure time
Awkward postures	How to prevent or handle MSDs when working in awkward postures, e.g.: <ul style="list-style-type: none"> ● Mapping prevalence of awkward postures ● Minimising prevalence of awkward postures ● Technique instructions for awkward postures
Repetitive work	How to prevent or handle MSDs when doing repetitive work, e.g.: <ul style="list-style-type: none"> ● Mapping prevalence of repetitive work ● Minimising prevalence of repetitive work ● Technique instructions for repetitive work
Carrying	How to prevent or handle MSDs for carrying, e.g.: <ul style="list-style-type: none"> ● Technique instructions for manual carrying ● Instruction in use of assistive devices for carrying
Mental well-being related to MSDs	How to prevent or handle MSDs by focusing on psychosocial work environment, e.g.: <ul style="list-style-type: none"> ● Organisational and individual well-being

Table 4
Results from the question “How often do you use the following solutions to OHS activities related to MSDs in your work as an OHS professional”. Answer choices were mutually exclusive. Data is presented as %.

	Always	Often	Sometimes	Rarely	Never/almost never
Physical training and health promotion					
Group-based physical training during working hours	4	40	28	12	16
Individual physical training during working hours	8	28	24	12	28
Health promotion (preventive) activities arranged by employer during working hours	0	20	24	28	28
Health promotion (preventive) activities arranged by employer outside working hours	0	4	24	24	48
Health profiling and health checks	0	12	28	16	44
Work postures and working techniques					
Group-based guidance/instruction regarding manual lifting, push/pull, etc.	4	56	20	8	12
Individual guidance/instruction regarding manual lifting, push/pull, etc.	4	48	28	8	12
Group-based guidance/instruction regarding appropriate work postures without the use of lifting, push/pull, etc.	4	60	24	8	4
Individual guidance/instruction regarding appropriate work postures without the use of lifting, push/pull, etc.	8	48	32	4	8
Technical assistive devices and protective equipment					
Group-based guidance/instruction regarding personal technical assistive devices to improve work postures and technique	4	52	24	16	4
Individual guidance/instruction regarding personal technical assistive devices to improve work postures and technique	8	56	20	4	12
Group-based guidance/instruction regarding non-personal technical assistive devices to improve work postures and technique	8	20	32	32	8
Individual guidance/instruction regarding non-personal technical assistive devices to improve work postures and technique	4	24	16	40	16
Development of new technical assistive devices	0	4	36	44	16
Design of the workplace					
Individual design of workplace	4	52	28	12	4
Non-individual design of workplace	4	40	32	12	12
Teaching and educating					
Teaching prevention of MSD and/or ergonomics (in general)	8	76	8	8	0
Educating resource persons/ambassadors	0	20	44	28	8
Campaigns	0	20	32	36	12
Risk assessment					
Risk assessment/mapping of ergonomic problems	4	68	28	0	0
Organisational and/or psychosocial initiatives					
Advice concerning habits, behaviour, culture etc.	8	44	40	4	4
Advice concerning mental conditions that may affect MSDs	0	32	32	32	4
Advice concerning organisational conditions that may affect MSDs	12	44	28	12	4

patient handling, lifting, push/pull, screen work, sedentary work, awkward postures, repetitive work, carrying, and mental well-being) emerged (Table 3). The OHS activities identified present the work tasks of the participating OHS professionals. OHS activities were either specifically requested by the workplace financing the service or suggested

by OHS professionals themselves. In addition, we identified seven overall methods or solutions to the OHS activities mentioned by the OHS professionals (i.e. physical training and health promotion, work postures and working technique, technical assistive devices and protective equipment, design of the workplace, teaching and education,

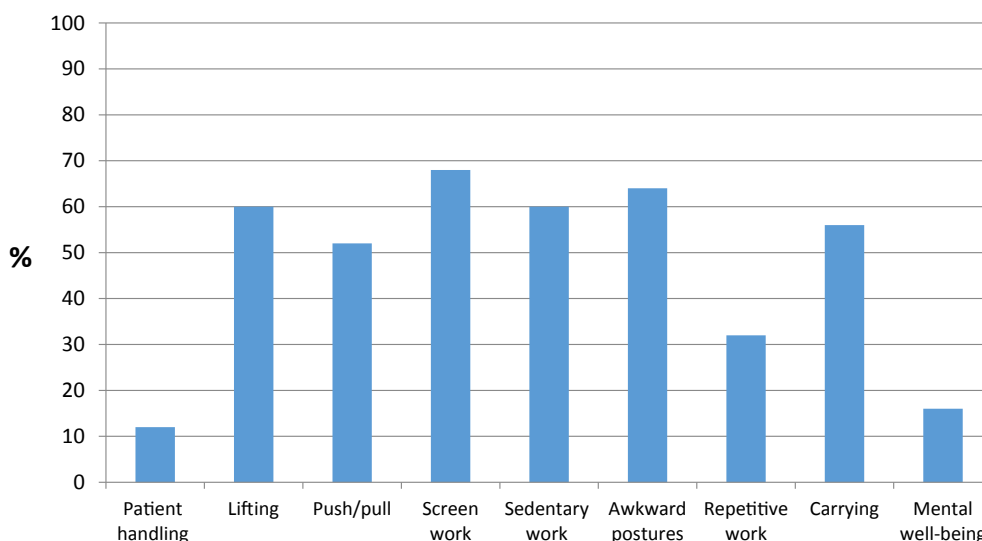


Fig. 1. Results from the question “How often do you as an OHS professional handle the following OHS activities related to MSDs at the workplaces”. The bar chart shows how many in total who replied ‘always’ or ‘often’. Answer choices were mutually exclusive. Data is presented as %.

risk assessment, and organizational and/or psychosocial initiatives). Each method or solution represented one to five sub groups as presented in Table 4. The solutions were most often not exclusive, i.e. the OHS professionals reported to be using several methods in the same process of an OHS activity.

3.3. Round 2 of the expert panel survey

Twentyfive (76%) OHS professionals responded to the second round of the survey.

3.3.1. OHS activities the OHS professionals most often encounter

The most common OHS activity for the participating OHS professionals was ‘screen work’ (68%), followed by ‘awkward postures (64%), ‘lifting’ (60%) and ‘sedentary work’ (60%) (Fig. 1). The least common OHS activities were ‘patient handling’ (12%) and ‘mental well-being’ (16%).

3.3.2. Solutions or methods used to handling OHS activities

The most commonly used solution for handling OHS activities was ‘teaching and education’ and ‘risk assessment’, but also solutions related to ‘technical assistive devices and protective equipment’ and ‘work

postures and working techniques’ were often used. ‘Physical training and health promotion’ had the highest frequency of never/almost never being offered by OHS professionals as a solution to OHS activities (Table 4).

3.3.3. Prioritization of the most frequently used solutions to the OHS activities

The OHS professionals were using almost all solutions for all OHS activities although there was great variation between which solution to prioritise for each OHS activity (Fig. 2). However, for some OHS activities, a relative level of consensus among the OHS professionals seemed apparent, e.g. ‘physical training and health promotion’ for ‘sedentary work’ and ‘patient handling’. Overall, the most commonly used solutions were ‘risk assessment’ and ‘physical training and health promotion’.

3.4. Round 3 of the expert panel survey

In the final round of the survey, 28 (85%) OHS professionals responded.

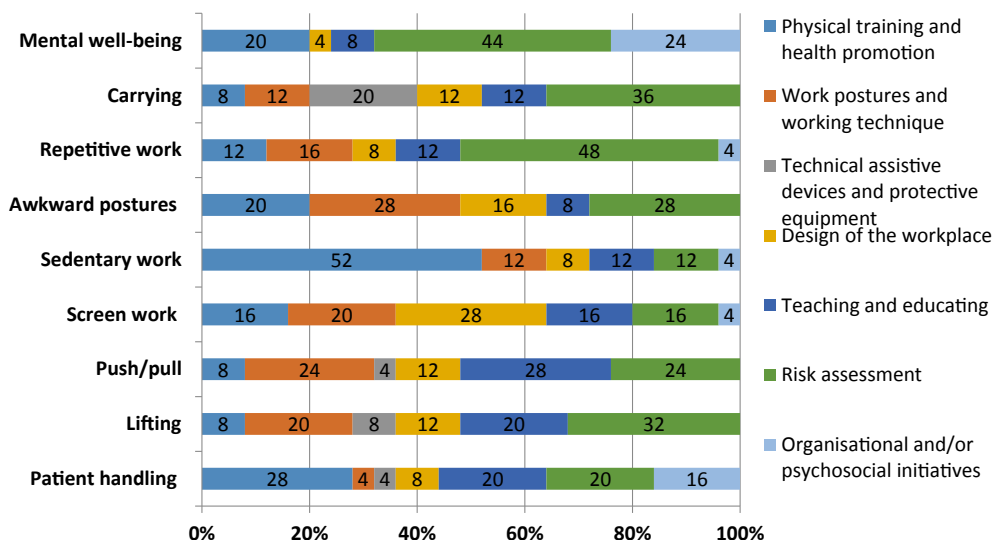


Fig. 2. Results from the question “Enter a priority order from ‘very frequently’ to ‘very rarely’ for how often you use the following solutions in your work as an OHS professional to handle the following OHS activities”. The bar chart shows how many OHS professionals who replied ‘very frequently’ for each solution. Answer choices were mutually exclusive. Data is presented as %.

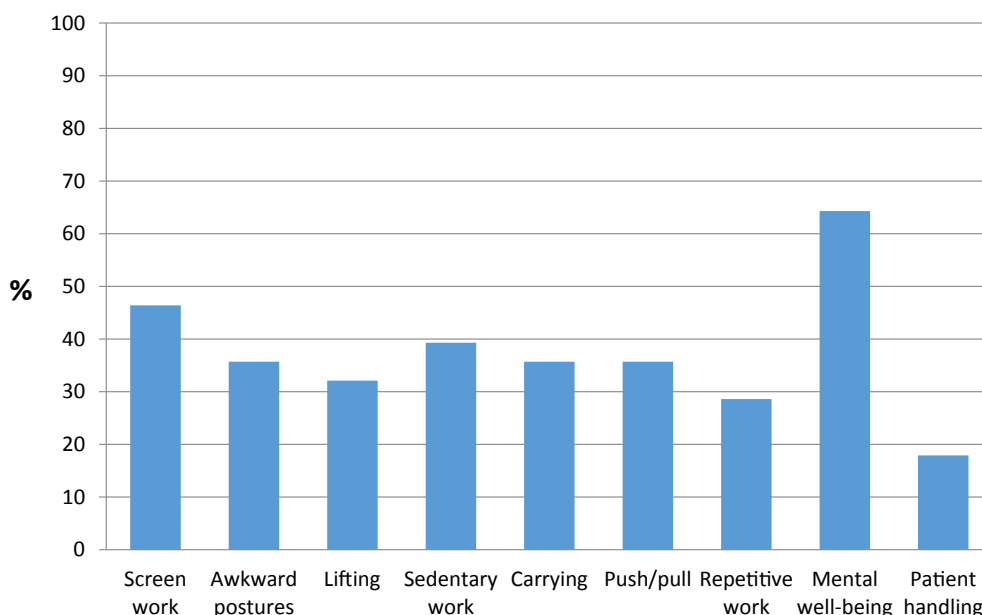


Fig. 3. Results from the question “To what extent do you think that evidence-based knowledge is missing for the following OHS activities related to MSDs”. The bar chart shows how many in total who replied ‘To a great extent’ or ‘Greatly’. Answer choices were mutually exclusive. Data is presented as %.

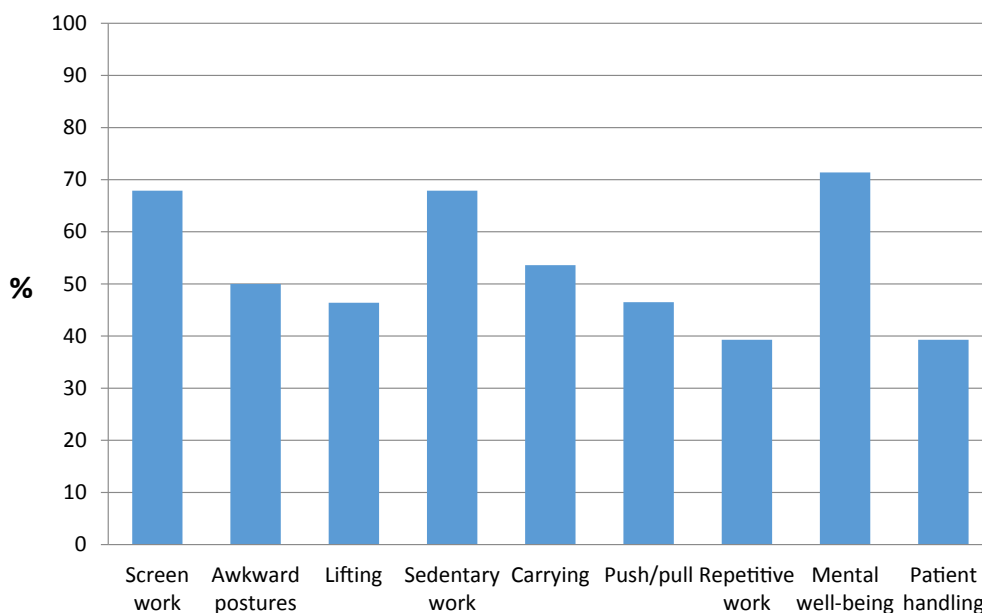


Fig. 4. Results from the question “To what extent do you think there is a need of developing practice and evidence-based guidelines for the following OHS activities related to MSD”. The bar chart shows how many in total who replied ‘To a great extent’ or ‘Greatly’. Answer choices were mutually exclusive. Data is presented as %.

3.4.1. Lack of research-based knowledge for OHS activities related to MSDs at the workplace

Most of the OHS professionals thought that evidence-based knowledge concerning the OHS activity ‘mental well-being related to MSDs’ (64%) was lacking; followed by ‘screen work’ (46%) and ‘sedentary work’ (40%) (Fig. 3). The lowest rated OHS activity was ‘patient handling’ (18%).

3.4.2. Need for developing practice and evidence-based guidelines

The OHS professionals thought there was a need for developing practice and evidence-based guidelines for all the OHS activities: ‘Mental well-being’ (71%), ‘Screen work’ (68%), ‘Sedentary work’ (68%), ‘Carrying’ (54%), ‘Awkward postures’ (50%), ‘Push/pull’ (47%), ‘Lifting’ (46%), ‘Patient handling’ (39%), and ‘Repetitive work’ (39%)

(Fig. 4). No new OHS activities were identified from the responses to the open-ended question that terminated the survey.

3.5. Workshop with stakeholders

Based on the results shown in Fig. 4, consensus among OHS professionals on which OHS activity/activities to develop guidelines for was not apparent. At a workshop with nine central stakeholders within the OHS organizations in Denmark the following five topics were prioritised to accommodate most challenges in the different sectors: 1) screen work, 2) awkward postures, 3) lifting/carrying, 4) push/pull, and 5) mental well-being related to MSDs.

4. Discussion

The aim of this paper was to describe the initial approach taken to develop a set of guidelines for preventing and handling work-related MSDs by including the end-users (OHS professionals) in the process to explore which OHS activity or activities a guideline should encompass.

Overall, the results revealed that there was great variation in OHS challenges encountered by the OHS professionals and limited consensus on OHS practices related to prevention and handling of work-related MSDs. Finally, the results showed that the OHS professionals thought there was a general lack of research-based knowledge for prevention and handling of MSDs and a need for development of a practice- and evidence-based guideline for this. However, the three-round expert panel survey did not establish consensus regarding which OHS activity/activities the guideline should encompass. Instead, verbal consensus was attained after involvement of central stakeholders.

4.1. Large variation in OHS challenges encountered by the OHS professionals

Overall we found that there was a great variation in OHS challenges related to MSDs at the workplaces that the OHS professionals most often encounter, with some OHS challenges (activities) occurring to a lesser extent, e.g. 'patient handling' (12%) and 'mental well-being' (16%). OHS professionals in Denmark are characterised by heterogeneity and diversity related to biographies and educational accreditations (Uhrenholdt Madsen et al., 2019), and the identified OHS activities reflect the participating OHS professionals' daily work tasks and the sectors and workplaces they work within. The findings also reveal the large variety of OHS challenges that each OHS professional must handle. This points to a need for versatility and comprehensive knowledge and skills among OHS professionals to determine effective initiatives for OHS challenges.

4.2. Limited consensus on OHS practices related to prevention and handling of MSDs at the workplaces

We also found a large variation in the priority of the solutions used by the OHS professionals to solve the nine identified main OHS challenges related to MSDs at the workplace. This finding may reflect: 1) that there is a need for more education/training in effective initiatives for prevention and handling of work-related MSDs, 2) that each OHS problem requires more than one solution, 3) that the solution is highly dependent on the OHS professional and/or 4) that the solution is highly dependent on the specific sector. The first point reflects that there is currently no official training or education in OHS available at either the bachelor or a master level in Denmark (Uhrenholdt Madsen et al., 2019). The second point may reflect a need for multi-faceted interventions for handling the complexity of work-related MSDs (van der Beek, 2017), or that each solution is related to a specific sector. The third point reflects the differences in the background and education of the OHS professionals and the fourth point might reflect the industry and organisational reality (Uhrenholdt Madsen et al., 2019; Pryor, 2019; Seim et al., 2016). In addition, these findings of the variation in the priority of the solutions used by the OHS professionals reveals a gap in the quality of advice being given to some workplaces. This can be confirmed in other studies (Pryor, 2019; Pam Pryor, 2019). This endorses the need for development of guidelines related to specific OHS challenges.

4.3. Knowledge base for developing guidelines

This study provides an important knowledge base of both need and content before we develop guidelines for preventing and handling work-related MSDs. A common problem observed with guidelines is that they often suffer from shortcomings in the development process,

including a lack of transparency of the development groups' methodologies, and overall failure to use rigorous methodologies in the development (Scott and Guyatt, 2011). In this study, we have been transparent in the process of gathering the information needed to explore and reach consensus on OHS practices related to work-related MSDs and explore the need of developing guidelines for preventing and handling MSDs at workplaces and have described our methods in a rigorous way. A significant evidence base underpins the key role of participation of end-users to support uptake when users are involved in the design of solutions to address issues related to their work (Burgess-Limerick, 2018; Hignett et al., 2005). Thus, our study having the end-users involved in the initial development process is an important prerequisite to improve the use of guideline and succeed in preventing and handling MSDs at the workplaces.

4.4. Methodological aspects

A major strength of the study is the involvement of end-users with a primary focus on OHS professionals but also those financing the OHS services. In addition, the paper's detailed description of the methodologies used in the study will contribute to the publications in this field. The majority of data is gathered directly from a diverse group of 33 OHS professionals participating in the expert panel survey. A first challenge concerns the representativeness of those recruited for this survey. The OHS professionals were purposively recruited and thus the results probably reflect their personal views, experiences, practices, sectors and education more than a general opinion. However, in one case, with the question in round three "To what extent do you think there is a need of developing practice and evidence-based guidelines for the following OHS activities related to MSDs?", we do not know whether the OHS professionals requested the guidelines themselves specifically or expressed a general need on behalf of their colleagues. Our sampling strategy may also have resulted in an expert panel representing a selective and motivated group of OHS professionals and results must be interpreted with this in mind. Unfortunately, we were not able to compare our population to other OHS professionals as these data do not exist. A challenge related to the participating OHS professionals, is the comprehensiveness – or lack of – of the qualitative data from the first round of the survey, which formed the subsequent rounds. Only OHS practices mentioned in the survey ended up as possible topics for the guideline. Because of that, the final taxonomies of OHS activities and solutions were not exhaustive or comparable. Furthermore, despite our efforts to describe and exemplify each theme when assessing these quantitatively in round two and three, each OHS professional may have had an individual understanding of what each topic entailed independently from other OHS professionals. We do not know in detail what each OHS professional think all topics cover. Another challenge is the language barrier embedded in this study as we have translated the responds from Danish to English without validating every single term used as labels for the identified OHS activities and solutions. A last challenge concerns the small sample size and response rate in the survey, ranging from 76 to 85%. However, we used the stakeholder group to validate our findings and make a final decision based on the information from our expert panel at the workshops.

4.5. Implications

The described development process is a feasible process for gathering important knowledge from practice. This paper has important implications for future guideline development; it provides valuable information on how practitioners can be included in the development process, with the aim of increasing the implementability of the developed guidelines. In order to enhance the field of guideline development it is imperative that end-users are included in the development and that approaches to include end-users are evaluated and described. In addition, this study has contributed with valuable information from OHS

practice, and the findings can be used to inform the content of guidelines for preventing and handling work-related MSDs. We are confident that this participatory approach can be applied in a wider community than the Danish context to increase implementability of guidelines for OHS practices.

5. Conclusion

Overall, the findings of this study showed that there is limited consensus among a sample of OHS professionals for OHS practices related to prevention and handling of MSDs at workplaces in Denmark. Furthermore, the findings indicate that the OHS professionals request guidelines for preventing and handling work-related MSDs and that the guidelines need to focus on several OHS challenges. These findings will be used in the further process towards developing a guideline for Danish OHS professionals on how to prevent and handle MSDs at the workplaces. The rigorous methods used to involve end-users in the initial development process are important prerequisites to improve the uptake and use of guidelines and succeed in preventing and handling MSDs at the workplaces. The next phases of the development process will involve a literature study to review evidence of effective interventions for the chosen OHS activities, workshops with a diverse group of highly experienced OHS professionals to combine and fill out evidence gaps with best practice, and a feasibility study to test and refine the guideline. The onward process will continuously involve OHS professionals, as they are the target group of the finished guideline. Our goal with this project is to help reducing the prevalence of work-related MSDs by enhancing the use of evidence-based OHS practices among OHS professionals. With a thorough description of the participatory development process we wish to inspire other OHS practice guideline working groups to heavily include end-users throughout the process. As previously shown, this should improve uptake of guidelines by OHS professionals (Carpenter, 2012; Bumbarger and Campbell, 2012).

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