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Prevention of Work-Related Musculoskeletal Disorders and Disability Management using holistic Risk Assessment Data about Physical Exposures at Work

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Background:

In Germany, as in many other countries too, occupational rehabilitation and inclusion of disabled people at work is an important topic. Especially due to the demographic changes, disability management is an emerging issue. To find a suitable workplace for disabled people or workers which are coming back to the company after rehabilitation of certain illnesses related to the musculoskeletal system, a systematic workplace assessment is necessary.

Methods:

Since many years, workplaces in the production areas at Continental Corporation are analysed systematically and objectively focussing physical exposures using the ergonomic assessment tool “Exposure-Documentation-System” (BDS, Klussmann et al., 2013). Detailed assessment of physical exposures of workplaces of all 19,000 employees in all production areas in of the company in Germany have been carried out. The results could be displayed in bar charts (**Fig. 1**) using a traffic light system: green bars: a physical overload is not expected; yellow bars: transition area, the work situation may be critical for people with reduced resilience but usually executable; red bars: there is a serious risk of physical overload. The original idea was “only” to use this system to identify workplaces with risk of physical overload to prioritise ergonomic measures systematically. Between the years 2011 and 2015, a significant improvement for approx. 3,000 employees from “red” to “green” workplaces could be achieved.

Results:

Actually, criteria are defined within an expert group, which physical exposures could be managed by employees with specific disabilities (**Fig. 2**).

Discussion:

A structured and systematic evaluation of workplaces with a focus on physical exposures may help to systematically

a) prioritise ergonomic measures to prevent MSDs, and

b) match workplaces with low physical load to employees with specific disabilities (**Fig. 3**).

The system is planned to rollout in further plants worldwide.

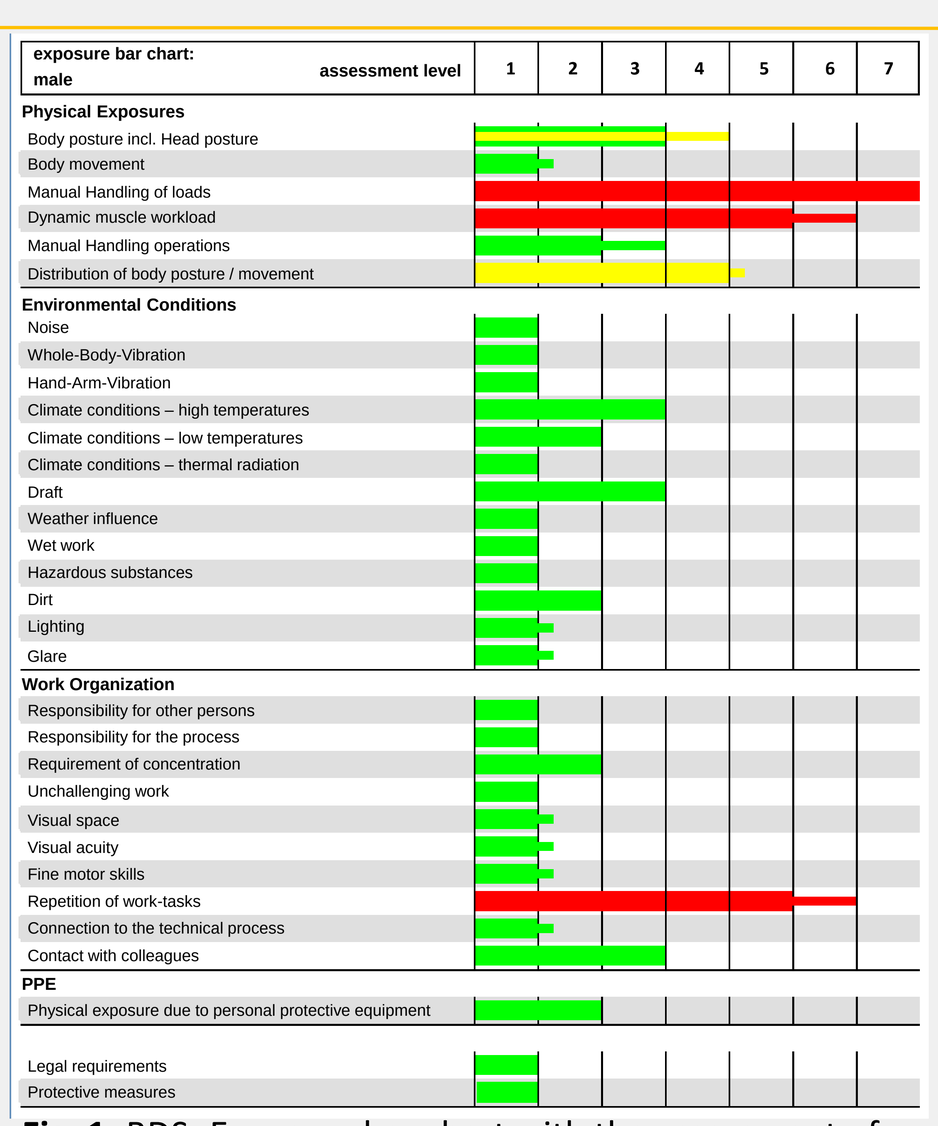

Fig. 1: BDS -Exposure bar chart with the assessment of 32 items

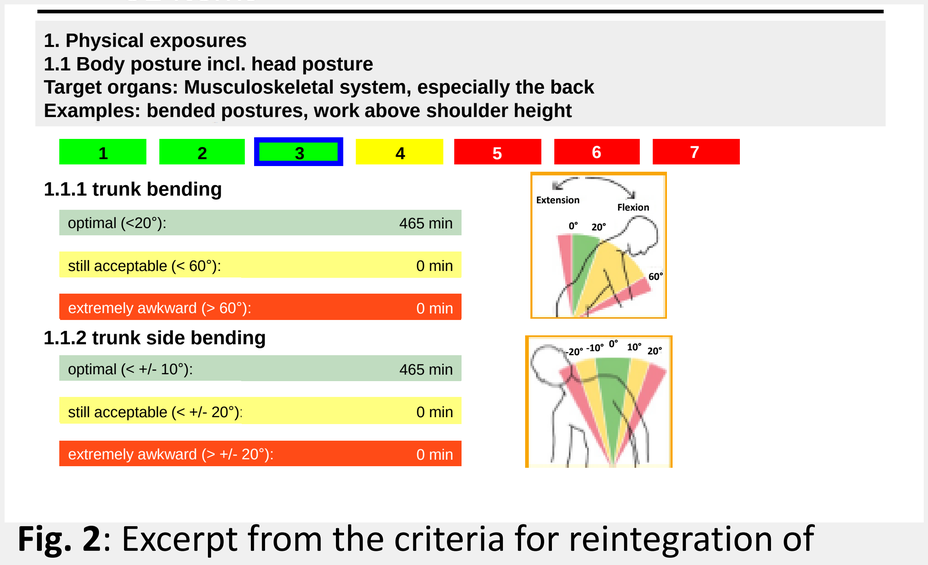

Fig. 2: Excerpt from the criteria for reintegration of employees with specific disabilities

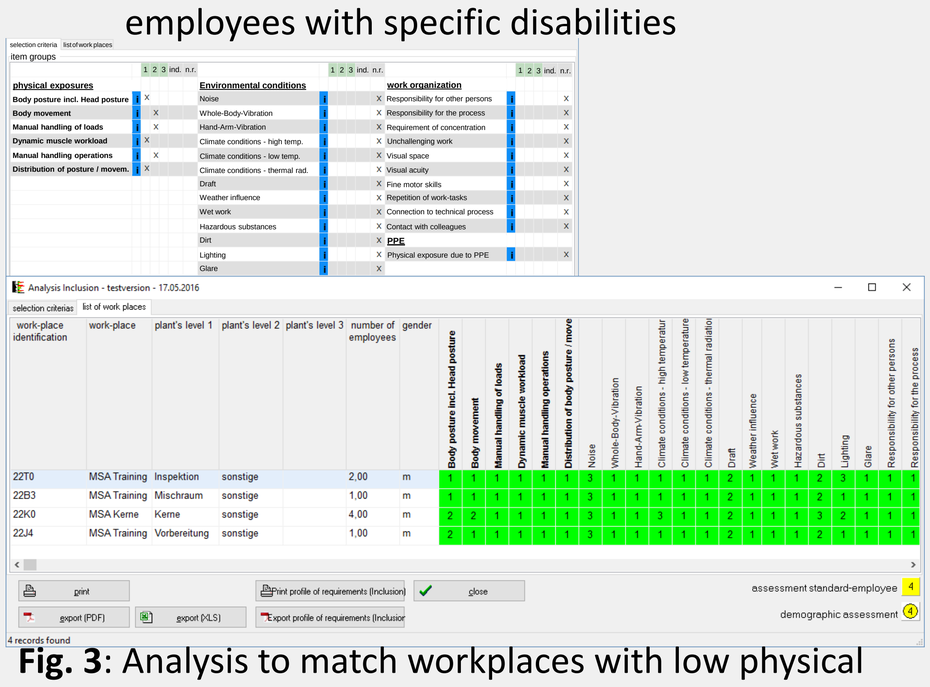

Fig. 3: Analysis to match workplaces with low physical load to employees with specific disabilities

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Manual Handling of Loads: Types, Amount and Frequencies of typical Load Handling in a large-scale industrial Company

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Background:

Physical exposures like manual handling of loads (i.e. lifting, carrying, pushing and pulling of loads) still describe an important factor at work. Aim of this study is to provide information about typical distributions of load weights, handling frequencies (number of repetitions) and distances covered in manual load handling tasks in industry.

Methods:

Data of a large-scale industrial company with 40 plants and approx. 20,000 employees in manufacturing area was analyzed. Data is determined with the Exposure-Documentation System – BDS (Klussmann et al., 2013). Overall, the data set consists of more than 38,000 single work tasks, 5,186 work tasks include lifting and carrying and 4,407 work tasks include pushing and pulling.

Results:

About 60% of the loads handled in lifting and carrying are up to 10 kg, 35% weigh between 11 kg and 25 kg, 5% of the loads are heavier than 25 kg (**Fig. 1**). In 74% of the work tasks with lifting and carrying, the handling frequency is up to 50 times per work task (**Fig. 2**). The single distance covered per lifting and carrying action is up to 2 m in 80% of the work tasks, in 19% the distance ranges between 2 m and 20 m (**Fig. 3**). In about 40% of pushing and pulling tasks, the load is 50 kg or less, in 42% the load is between 50 kg and 300 kg (**Fig. 4**). The number of repeated pushing and pulling actions is up to 50 times per shift in 89% (**Fig 5**). The single distance covered in pushing and pulling is up to 5 m in 43% of the work tasks, in 52% the distance ranges between 5 m and 50 m (**Fig 5**).

Discussion:

Even if the data cannot be considered as representative for the totality of all employees, the analysis shows a typical distribution of load weights, handling frequencies and distances in load handling tasks. This can be seen as valuable information e.g. for the scaling of assessment methods for physical exposures at work.

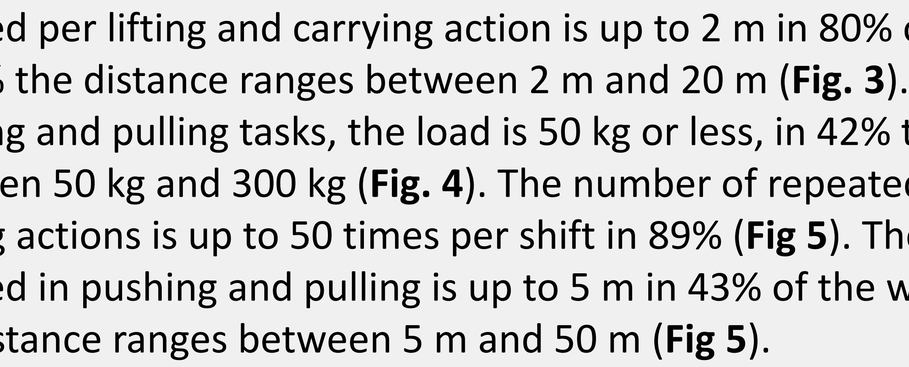

Fig. 1: Distribution of load weights in 5,186 work tasks including lifting and carrying

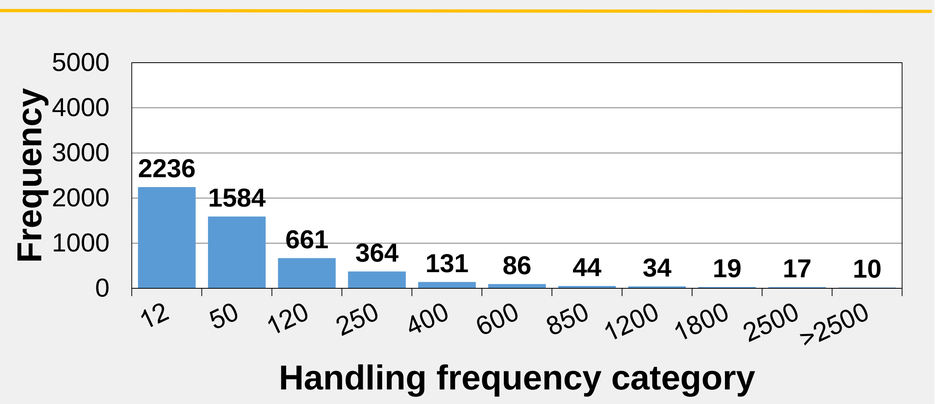

Fig. 2: Distribution of handling frequencies (number of repetitions per work task) in 5,186 work tasks including lifting and carrying

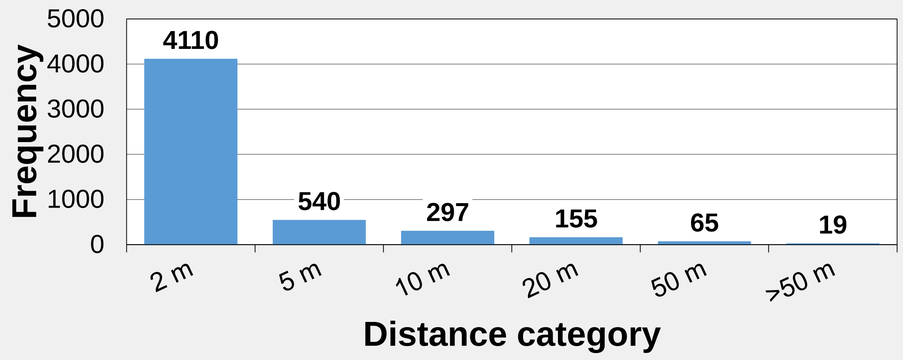

Fig. 3: Distribution of single distances (one way) covered in 5,186 work tasks including lifting and carrying

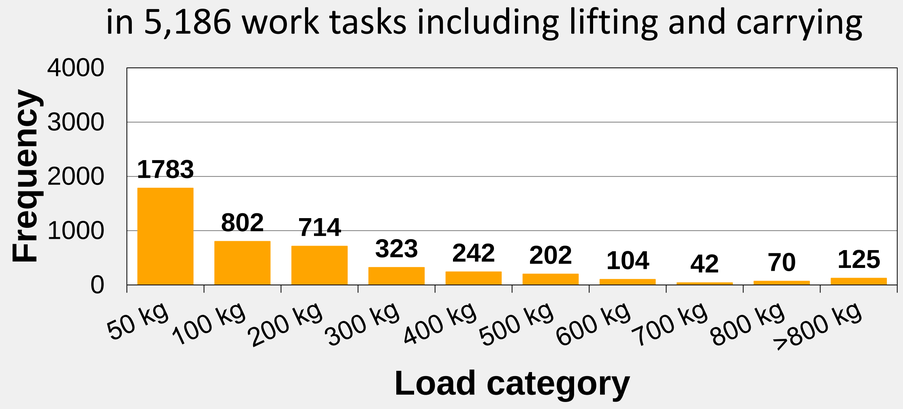

Fig. 4: Distribution of load weights in 4,407 work tasks including pulling and pushing

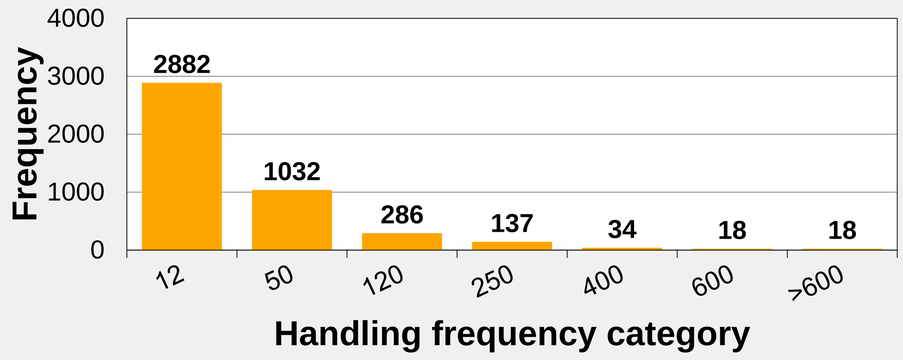

Fig. 5: Distribution of handling frequencies (number of repetitions per work task) in 4,407 work tasks including pulling and pushing

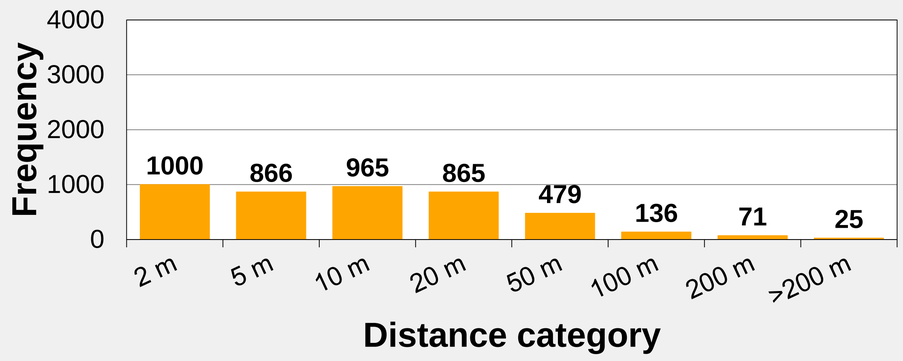

Fig. 6: Distribution of single distances (one way) covered in 4,407 work tasks including pulling and pushing

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Occupational Health Care as a Measure to Prevent Work Related Musculoskeletal Disorders – Trigger-Criteria for Health Care and Estimation of Employees concerned

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Background:

In Germany it is - like in many other countries too - a legal requirement to assess the working conditions of employees and to arrange - if necessary - measures to eliminate or reduce the loads if certain levels are exceeded. These measures should be prioritized: technical before organizational before personal measures. High physical exposures may lead to musculoskeletal disorders and diseases. The German legislation implemented this aspect in a specific occupational health care ordinance in 2013 (AMR 13.2 - cf. www.baua.de/amr). The employer is obliged to offer this health care for employees with work tasks with substantially increased physical exposures. These are increased exposures in 1) lifting, holding and carrying, 2) pulling and pushing, 3) manual handling operations, 4) kneeling/squatting, 5) bending forward, 6) work above shoulder height, 7) awkward sitting posture and 8) permanent standing (**Tab. 1**).

Method:

There is little systematic data about which physical exposures occur and how often they are. The data of a large industrial company with 40 plants and more than 50,000 employees, including 20,000 employees in manufacturing area has been analyzed. Data is determined with the Exposure-Documentation System – BDS (Klussmann et al., 2013) and the Key Indicator Methods for Lifting, Holding and Carrying (KIM-LHC - cf. www.baua.de/leitmerkmalmethoden), Pulling and Pushing (KIM-PP - cf. www.baua.de/leitmerkmalmethoden) and Manual Handling Operations (KIM-MHO - cf. www.baua.de/leitmerkmalmethoden) implemented in BDS (**Fig. 1**).

Results:

From approx. 20,000 employees in production area, almost 1/3 meet at least one criteria to get the health care, 5.5% meet two or more criteria (**Fig. 2**). Most common increased physical exposures are load handling (approx. 22%), followed by manual handling operations (about 8%) and work above shoulder height (approx. 6%) (**Fig.3**).

Discussion:

The empirical analysis shows the relevance of physical exposures at work. Even if the data cannot be considered as representative for the totality of all employees, it can be deduced that the number of employees with substantially increased physical exposures is considerable. The assessment of working conditions is as important as taking further steps to reduce increased physical exposures and to offer occupational health care.

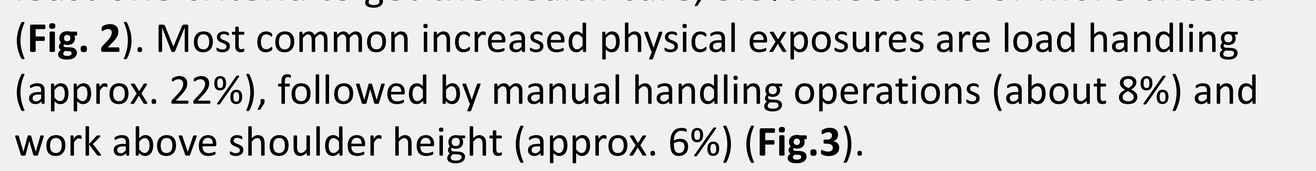

Fig. 1: Risk categories of the KIM (top) with point values (bottom).

Tab. 1: Physical exposures and trigger-criteria according to AMR 13.2

Physical exposure	Trigger-criteria
1) lifting, holding and carrying	≥ 25 points (KIM-LHC)
2) pulling and pushing	≥ 25 points (KIM-PP)
3) manual handling operations	≥ 25 points (KIM-MHO)
4) kneeling/squatting	≥ 1 h per shift
5) bending forward	≥ 1 h per shift
6) work above shoulder height	≥ 1 h per shift
7) awkward sitting posture	≥ 2 h per shift
8) permanent standing	≥ 4 h per shift

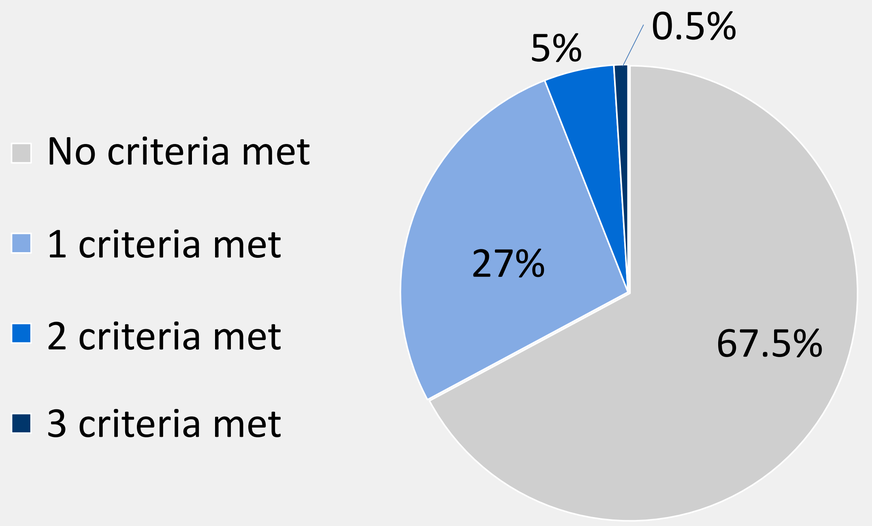

Fig. 2: Physical exposures and trigger-criteria according to AMR 13.2

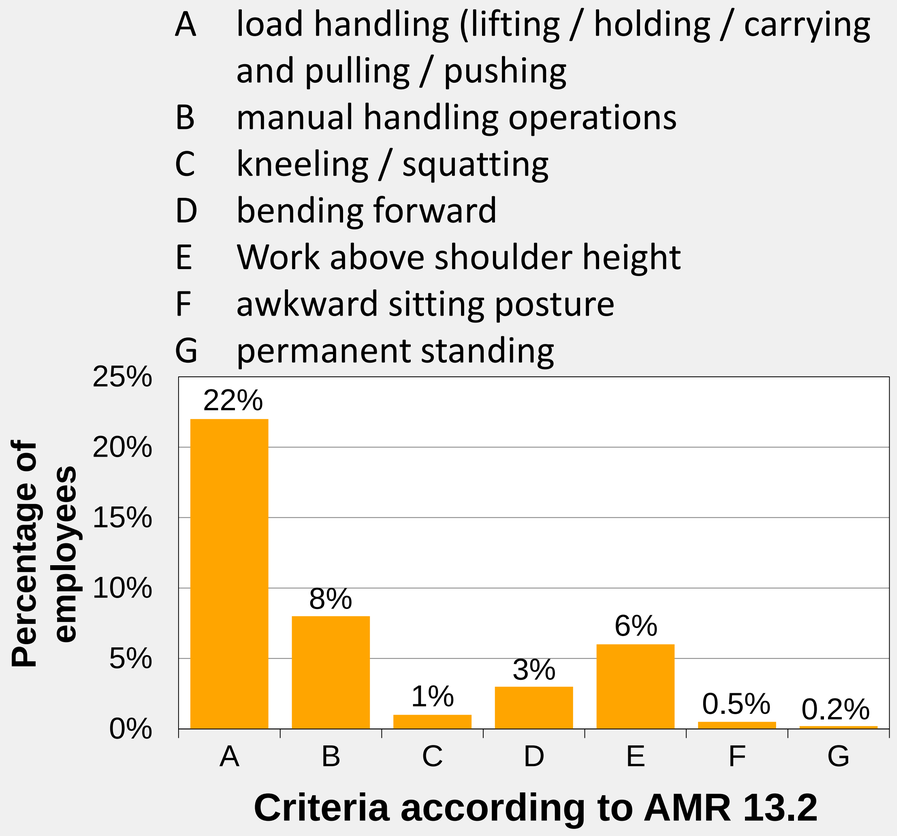

Fig. 3: Percentage of employees meeting trigger-criteria according to AMR 13.2

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