Study Protocol

Systematic Review: Does the usage of small aids during patient handling activities lead to a decreased occurrence of complaints and diseases in the region of the lumbar spine, the cervical spine and the shoulder joints?

<table>
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<th>Authors' contribution</th>
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<tbody>
<tr>
<td>Alice Freiberg (AF)</td>
<td>development of the study conduct, coordination of the study conduct, data extraction of included studies, quality assessment, if applicable statistical analysis, interpretation and summary of the study results, participation in the conduction of the study, reading and approval of the final manuscript</td>
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<td>Ulrike Euler (UE)</td>
<td>development of the study conduct, title and abstract screening, full text screening, data extraction of included studies, quality assessment, if applicable statistical analysis, interpretation and summary of the study results, participation in the drafting of the manuscript, reading and approval of the final manuscript</td>
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<td>Maria Girbig (MG)</td>
<td>participation in the development of the study design and the study conduct, coordination of consensus conference in case of diverging opinions, participation in the interpretation and summary of the study results, participation in the conduction of the study, participation in the drafting of the manuscript, reading and approval of the final manuscript</td>
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<td>Albert Nienhaus (AN)</td>
<td>participation in the development of the study design and the study conduct, participation in the interpretation and summary of the study results, participation in the conduction of the study, participation in the drafting of the manuscript, reading and approval of the final manuscript</td>
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<td>Sonja Freitag (SF)</td>
<td>participation in the development of the study design and the study conduct, participation in the interpretation and summary of the study results, participation in the conduction of the study, participation in the drafting of the manuscript, reading and approval of the final manuscript</td>
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<td>Andreas Seidler (AS)</td>
<td>development of the study design and the study conduct, coordination of consensus conference in case of diverging opinions, if applicable participation in statistical analysis, participation in the interpretation and summary of the study results, participation in the conduction of the study, participation in the drafting of the manuscript, reading and approval of the final manuscript</td>
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1. Background

Nursing staff has an increased risk for developing work-related musculoskeletal complaints and diseases, especially in the region of the lumbar spine, the thoracic and cervical spine and the shoulder joints (Hignett, 1996; Cameron et al., 2008; Seidler et al., 2008; Kromark et al., 2009). Most injuries of these body areas are associated with planned patient transfers, particularly when patients are physically or mentally handicapped (Engkvist, 2008). Persons who conduct at least ten patient transfers a day have a five times increased risk for pain of the lumbar spine (Nelson et al., 2003). Prevalence for work-related back injuries of nursing staff is in some extent by up to six times increased compared to other occupational groups (Cohen-Mansfield et al., 1996; Hofmann et al., 2002). The highest risk for the occurrence of shoulder and neck pain constitutes mobilization of patients (grasp, push or pull) (Smedley et al., 2003).

There is slight to moderate quality evidence, that the effect of manual material handling advice and training (with or without assistive devices) on back pain or back pain-related disability for professionals who conduct material handling is as big as no intervention or alternative intervention (few advice, professional education, exercises, back belts) (Verbeek et al., 2011). The use of adequate equipment for the mobilization of patients is recommended (Hignett, 2003). This equipment should comprise at least hoist devices, standing aids, sliding sheets, lateral transfer boards, gait belts and height-adjustable beds (Hignett, 2003). The German Social Accident Insurance Institution for the Health and Welfare Services (Berufsgenossenschaft für Gesundheitsdienst und Wohlfahrtspflege (BGW)) labels the selection and acquisition of adequate work equipment as one of four columns for a healthy back of nursing staff (BGW, 2013). Thereby they distinguish between technical aids (nursing beds, patient lifting devices, care chairs, lifters etc.) and small aids (BGW, 2013). Small aids are among others bed
ladders, anti-slide mats, slide boards, turn tables, handling belts, transfer boards, transfer mats, slide sheets and slings (Hignett et al., 2003; Unfallkasse Berlin, 2006; BGW, 2013).

An explicit definition of “small aids” is not known. The following definition was carried out by the authors. According to that small aids are assistive devices that support caregivers with transfers (moving, positioning, transfer to bed or to chair) of weight bearing or non-weight bearing patients and do not work electric driven. They can be stored and transported easily because of their handy seize.

To date there is no systematic review, which surveys the effectiveness of small aids related to the occurrence of musculoskeletal complaints and diseases (especially for the lumbar and cervical spine and for the shoulder joints) for persons, who conduct patient handling activities.

### 2. Methods

The systematic review is performed in accordance with the PRISMA statement (Preferred Reporting Items for Systematic reviews and Meta-Analyses) (Moher et al., 2009).

### 3. Research question

The research question of this systematic review is:

**Does the usage of small aids during patient handling activities lead to a decreased occurrence of complaints and diseases in the region of the lumbar spine, the cervical spine and the shoulder joints?**

The PICO-schema was used to specify the research question (Moher et al., 2009). Thereby, “P” stands for population, “I” for intervention, “C” for comparison and “O” for outcome.

(P) employed persons who conduct patient handling activities (especially nursing staff, therapists (physical therapists, occupational therapists); volunteers and caregiving family members who conduct patient handling activities.

(I) usage of small aids during patient handling activities, with subsequent categorization:

1. usage of small aids as individual measure
2. usage of small aids as part of a multimodal intervention (in combination with education, training, instruction etc.)

(C) execution of patient handling activities without the usage of small aids

(O) 1. Complaints/diseases of the lumbar spine
2. Complaints/diseases of the cervical spine
3. Complaints/diseases of the shoulder joints region

### 4. Search strategy

A systematic electronic literature search is conducted using the following databases up to May 2014:

- MEDLINE (via PubMed)
- EMBASE (via OVID)
- AMED (via OVID)
- CINAHL (via Ebsco Host)
- PEDro

The systematic electronic search does not apply any language restrictions. The search string is created by combining the keywords (see Table 1 and Table 2) with Boolean operators.

A hand search in the reference lists of all included studies, in related key articles and in related narrative and systematic reviews will supplement the electronic search.
Table 1: List of keywords

**Table 1**: List of keywords

<table>
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<th>(P) Population</th>
<th>(I) Intervention</th>
<th>(O) Outcome</th>
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<tr>
<td>moving and lifting patients, patient handling, patient transfer, aged, elderly, disabled persons, handicapped persons, family, relatives, therapist, physical therapist, physiotherapist, occupational therapist, nursing home, retirement home, home for the aged, old age home, residential home, ambulatory, ambulant, outpatient, hospital, ambulatory care facility, clinic, medical center, rehabilitation</td>
<td>small aid, self-help device, assistive device, non-mechanical device, equipment and supply, friction reducing device, slide sheet, handling belt, gait belt, lifting belt, back belt, sling, turn table, slide board, transfer board, rope ladder, bed ladder, hand block, positioning aid, swivel aid</td>
<td>low back pain, neck pain, shoulder pain</td>
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The search strategy for database search in MEDLINE (via PubMed) is listed in Table 2 and will be adapted respectively for the other databases (EMBASE, AMED, CINAHL, PEDro). To be as sensitive as possible the search strategy contains two search alternatives, which are interconnected with the Boolean operator “OR” (No. 23, Table 2). The first alternative combines all possibilities of the population with “OR” and then links it with the intervention and with the outcome via the Boolean operator “AND” (No. 20, Table 2). The second alternative considers merely the terms for “patient handling” as population. Population and intervention are linked via “OR” and then combined with the outcome via “AND” (No. 22, Table 2). The “OR”-linkage between “patient handling” and the intervention is used to broaden the second search alternative. For MEDLINE we use the Medical Subject Headings (MeSH)- and the All Fields-Function.

Table 2: Search strategy in Medline (via PubMed)

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<tr>
<th>No.</th>
<th>Query</th>
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<tr>
<td>2</td>
<td>(“aged”[MeSH Terms] OR “aged”[All Fields] OR “elderly”[All Fields])</td>
</tr>
<tr>
<td>4</td>
<td>(“family”[MeSH Terms] OR “family”[All Fields] OR “relative”[All Fields])</td>
</tr>
<tr>
<td>8</td>
<td>(ambulatory[All Fields] OR ambulant[All Fields] OR “outpatients”[MeSH Terms] OR “outpatients”[All Fields] OR “outpatient”[All Fields])</td>
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<tr>
<td>11</td>
<td>#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7 OR #8 OR #9 OR #10</td>
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To eliminate all duplicates the results of each search are combined in a literature database.

5. Title and abstract screening
Title and abstract of the studies are screened independently by two authors (AF, UE) with regard to the a priori defined research question, in line with the defined inclusion and exclusion criteria (see Table 3). Disagreements are resolved by discussion in consensus conferences. With lack of agreement a third author (MG) will decide. The title and abstract screening process will be piloted beforehand.

Table 3: Inclusion and Exclusion criteria

<table>
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<th>Inclusion criteria</th>
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<tr>
<td>Population: Employed persons who conduct patient handling activities (especially</td>
<td>Animals</td>
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<td>nursing staff, therapists (physical therapists, occupational therapists))</td>
<td>Age: &lt;15 and &gt;70 years</td>
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<td>regardless of the educational level; volunteers and caregiving family members who</td>
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<td>conduct patient handling activities</td>
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Age: 15 to 70 years
All healthcare facilities

**Intervention**
Small aids as individual measure or as part of a multimodal intervention (in combination with education, training, instruction etc.).

Other intervention programs for patient handling activities with the aim of prevention of work-related diseases

**Comparison**
no comparison;
regular patient handling (without change of working habits);
patient handling without aids;
patient handling with other aids (e.g. technical aids);
the same or similar intervention as performed in the intervention group, but without usage of small aids

Other intervention programs for patient handling activities with the aim of prevention of work-related diseases

**Outcome**
Incidence or prevalence of musculoskeletal complaints and diseases of the lumbar spine, cervical spine and shoulder joints, regardless of the course of disease (acute, subacute, chronic) and method of diagnosis (objective versus subjective)

Biomechanical outcomes, Perceived exertion

**Study design**
Randomized, controlled trials (RCT), non-randomized controlled trials (CCT), controlled before-after-studies (CBA)

Narrative and systematic reviews, commentaries, editorials, case reports, case series, expert opinions

6. **Full text screening**
Subsequently the full texts of the remaining studies are screened independently by two authors (AF, UE) with regard to the a priori defined inclusion and exclusion criteria. Disagreements are resolved by discussion. With lack of agreement a third author (MG) will decide. Excluded studies with exclusion criterion are documented tabulary for each paper.

7. **Endpoint classification and data extraction**
Data extraction from included studies is done independently by two authors (AF, UE) and discussed subsequently in consensus conferences. Data extraction form includes information on relevant study characteristics (e.g. first author, year of publication, country, study design, working setting (nursing home, hospital, outpatient care, rehabilitation centre/clinic, therapy practice/centre, school, private household etc.)), intervention, control intervention, number of participants, characteristics of participants (age, sex, origin, occupation (nursing staff, therapist, volunteer, family member etc.), professional experience), duration of follow up, outcome (complaint/disease of the low back, neck, shoulder joint region), funding, conflict of interest, other. The mentioned study characteristics of included studies are recorded in evidence tables. The data extraction process will be piloted beforehand.

8. **Study quality assessment**
The assessment of the quality of included studies is done independently by two authors (AF, UE). Disagreement will be discussed in consensus conference and in case of lack of agreement a third reviewer (MG, AS) decides about evaluation.

Randomized controlled trials will be assessed with the “Risk of Bias tool” (Higgings & Greene, 2011), non-randomized trials with the “Downs and Black checklist” (Downs & Black, 1998).

The “Risk of Bias tool” is described in the “Cochrane Handbook of Systematic Reviews in Interventions”. It evaluates following domains of bias: random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, incomplete outcome data, selective outcome reporting and other bias. Every potential bias is classified as “high”, “low” or “unclear” and documented in a “Risk of bias” table.
The “Downs and Black checklist” has good reliability, internal consistency and validity (Downs & Black, 1998). The checklist can be used for the appraisal of randomized and non-randomized trial and comprises 27 questions about bias of internal and external validity and about the power of the study. Answers are adapted to the “Risk of Bias tool” with “high”, “low” or “unclear” instead of “0” and “1” as suggested initially by the authors of the checklist.

Authors of included studies will be contacted if information for quality assessment is missing. Reasons for study quality rating are documented for each study in an appraisal form. The quality assessment process will be piloted beforehand.

9. Data synthesis and statistical methods
After data extraction from included studies all data will be illustrated and summarized descriptively. With adequate number of studies all outcomes will be summarized separately in a meta-analysis. With sufficiently large amount of included studies analyses of subgroups (study quality, study design, study specific covariates like occupational or patient groups) will be carried out. The identified evidence will be graded according to the GRADE method.

References


