work package 1

Overview of work-related musculoskeletal disorders structured according to affected areas of the body and diagnoses, and their prevalence in various fields of activity/occupational groups in Germany

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introduction

The German Social Accident Insurance (DGUV) has set itself the target of collecting existing data concerning links in the causal chain between occupation and MSDs in order to provide an overview of the current situation in Germany

(Scientific) literature research to answer the following questions:

- What are the frequency distributions of musculoskeletal disorders, structured according to body areas affected and diagnoses, in the various fields of activity/occupational groups in Germany?
- Is it possible to identify a disorder hierarchy from this information?

methods

German health reporting and European health reporting with a focus on Germany	research of the international literature of industrialized countries
health reports of various statutory health insurance funds (Betriebskrankenkasse (BKK), Innungskrankenkasse (IKK), Techniker Krankenkasse, Deutsche Angestellten Krankenkasse (DAK), BARMER-Ersatzkasse)	**research strategy:** **MSD:** musculoskeletal disease, musculoskeletal disorder, tendon, ligament, tendonitis, tendinopathy, joint, arthrosis, arthritis, arthalgia, spine, spinal, spondylitis, spondylosis, impingement, degeneration, prolapse,… **AND** **occupational reference:** job, occupation*, work, employ*, industr* **AND** **prevalence/incidence/risk**
BAuA (Federal Institute for Occupational Safety and Health)	
DGUV (German Social Accident Insurance association), **BGIA** (Institute for Occupational Safety and Health), **BG Bau, BGW, etc.** (industrial accident insurance associations)	data base: pubmed, embase limit: human, reviews, language: English/German, years: 2000 - 2009
OSHA: European Network Germany	

German health reporting

- Safety and Health at Work 2007 and 2002
- health reports (BKK, DAK, BARMER, Techniker Krankenkasse, IKK)
- health report for the building materials industry (quarrying industry accident insurance association)
- 2005 BGW-IKK health report: hairdressers
- 2003 BGW-DRK health report: geriatric nurses
- 2006 DRK-BGW health report: outpatient care
- "Work-Related Health Risks in the Construction Industry – ARGO"
- "Musculoskeletal Disorders in the Building and Construction Industry – Occupational Health Findings – Risk Characteristics and Prevention Recommendations", authors Hartmann and Seidel
- Health reporting on occupational diseases (OD)
- "Industrial health management and prevention of work-related health risks (Volume 32)", Bienek et al. 2004
- "Case-control study on disc prolapses in the cervical spine due to occupational stress", Elsner et al. 2009
- "Occupations associated with a high risk of self- reported back pain", Schneider et al. 2006
- German Spine Study ("Deutsche Wirbelsäulenstudie", Michaelis et al. 2007
- „Kniegelenksarthrose und arbeitsbedingte Faktoren", Elsner et al. 1996
- "Data from occupational health screenings regarding the state of health of workers in Western and Eastern Germany", Enderlein et al. 1998
- research project F1996 of the Federal Institute for Occupational Safety and Health, Liebers and Caffier 2009
- www.osha.europa.eu/de/topics/msds/index_html/facts_html
- "Work and health in the EU - A statistical portrait"

health reports of German statutory health insurance funds

Safety and health at work 2007	MSD in general	metal industry and foundries	ceramic and glass industry	chemical and plastics industry	assembly line work	forestry worker
BKK	MSD in general	garbage collection, recycling	postal and courier service	metal industry	traffic and railway sector	ceramic, glass, quarrying industry
IKK	MSD in general	building and construction	forestry worker	electronics and metal sector	textile and leather sector	glass and paper sector
National association of health insurance funds	MSD in general	fine mechanics	glass, steel, rubber production	building and construction	communal waste disposal	mass passenger transport
Safety and health at work 2002	LBP	agriculture, forestry worker	building and construction	transport/traffic	production, mining	service sector
DAK	back disorders	health care	building and construction	transport and telecommunicatin	food sector	agriculture, forestry worker, energy sector
TKK	back pain	metal industry	building and construction	traffic and storekeeping	chemical and plastics industry	hairdresser, cleaner, housekeeper
Barmer	back pain	salesmen	social worker	directors	office workers	banker
Safety and health at work 2002	neck and shoulder pain	agriculture, forestry worker	administration and office work	building and construction	transpor/traffic	production, mining
Safety and health at work 2002	pain in arms and/or hands	building and construction	agriculture, forestry worker	production, mining	transpor/traffic	service sector
Safety and health at work 2002	hip pain	agriculture, forestry worker gardening	building and construction	transport/traffic	production, mining	service sector
Safety and health at work 2002	knee pain	building and construction	agriculture, forestry worker gardening	production, mining	transport/traffic	service sector
Safety and health at work 2002	foot and/or leg pain	agriculture, forestry worker gardening	building and construction	traders	production, mining	transport/traffic

health reports of German statutory health insurance funds

	ifw (cases)	ifw (days)	occupation or industry sector	specific MSD diagnosis
Safety and Health at Work 2007 and 2002	ifw cases in %	-	industry sector	yes/no
BKK	cases of disorder/1000 insured persons	-	industry sector	no
DAK	-	ifw days/100 insured persons	industry sector	back disorders
TKK	-	ifw days/100 insured years	industry sector	back disorders M40-54, and M54
Barmer	ifw cases for all insured persons	ifw days for occupational groups	no, except for M53/54	yes
IKK	ifw cases because of MSD in general	ifw days	industry sector	no

ifw: incapacity for work

industry-sector specific health reports

- in most cases cooperation between industrial accident insurance associations and statutory health insurance funds

quarrying industry	**27.4 ifw cases/100 insured persons as compared to 22.4 ifw cases in the BKK general population**	**ifw cases; MSD in general**
hairdressers	**15.1% of all ifw cases**	**ifw cases; MSD in general**
geriatric nurses	**16.2 % of all ifw cases**	**ifw cases; MSD in general**
workers in outpatient care	**M54 (back pain): 8% of all ifw cases M51(disc disorders): 0.7% M53 (spine disorders): 1.3% M75 (shoulder): 0.7% M23 (knee disorders): 0.6%**	**ifw cases; M23/51/53/54/75**
building and construction (2x)		**detailed description of ifw cases and standardized morbidity ratios, as well as results of occupational health screenings, more detailed data on occupation**

health reporting on occupational diseases (OD)

- there are currently ten occupational diseases related to MSDs
- the numerical most relevant ODs (notification of suspicion) are:

- disc-related diseases of the lumbar spine caused by lifting or carrying heavy loads over many years or in an extremely bent posture over many years…(2108)
- meniscus lesions caused by excessive physical load on the knee joints either sustained or repeated over several years (2102)
- disc-related diseases of the cervical spine caused by carrying heavy loads on the shoulder over many years… (2109)
- conditions affecting the tendon sheaths or the peritendinous tissue or the insertions of tendons or muscles (2101)

- Affected industrial accident insurances/industry-sectors:
  - building and construction,
  - health care and welfare,
  - metal industry,
  - commerce and administration,
  - precision and electrical engineering.

health reporting on occupational diseases (OD)

- since 2009 new OD „knee osteoarthrosis“ – numbers are not clear yet
- notices of suspected ODs are not necessarily (legally) relevant ODs
- nevertheless, they depict the problems of certain industrial sectors

research reports on MSDs in Germany

- Topics:
  - pain: neck/shoulder/arm; thoracic spine, low back (1)
  - disc prolapses of the cervial spine
  - back pain reports (2)
  - disc prolapses of the lumbar spine
  - osteoarthrosis of the knee
  - degenerative disorders of the spine, degenerative joint disorders
  - ifw due to MSD (ICD10 codes) (3)
- Occupations at risk (examples):
  - **Low back pain (1):** salesmen (food), fitter, grinder, worker at straightening machines, truck driver, salesmen (without food), office workers, warehousemen
  - **Back pain (7-day prevalence) (2):** foremen in industry, salesmen, paver, concrete worker, translator, librarian, hairdresser, beauticians, bookbinder, plumber, assembly line workers, nurses, warden, saddler, shoemaker, leather worker, tailor
  - **M54: back pain (3):** *men:* garbage collector, street attendant, enameling and galvanizing worker, caster, woodworker, *women:* street attendant, meat processing, fish processing, riveter, flour producer

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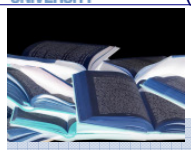
exclusion criteria and final number of reviews (research of the international scientific literature)



8233 reviews -> exclusion criteria

altogether, 59 reviews were included in the analysis

Exclusion criteria:

- injuries/accidents
- quality/success of intervention
-

NOT: AMSTAR-ranking

47 reviews depicted data on the association between occupation/field of activity and MSD

1 was no review at all

3 only depicted data of the general population or patients at hospitals

In 8 reviews we found only data on exposures (e. g. using vibrating tools) and MSD

Table 2: AMSTAR is a measurement tool created to assess the methodological quality of systematic reviews.

1. Was an 'a priori' design provided? The research question and inclusion criteria should be established before the conduct of the review.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
2. Was there duplicate study selection and data extraction? There should be at least two independent data extractors and a consensus procedure for disagreements should be in place.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
3. Was a comprehensive literature search performed? At least two electronic sources should be searched. The report must include years and databases used (e.g. Central, EMBASE, and MEDLINE). Key words and/or MESH terms must be stated and where feasible the search strategy should be provided. All searches should be supplemented by consulting current contents, reviews, textbooks, specialized registers, or experts in the particular field of study, and by reviewing the references in the studies found.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
4. Was the status of publication (i.e. grey literature) used as an inclusion criterion? The authors should state that they searched for reports regardless of their publication type. The authors should state whether or not they excluded any reports (from the systematic review), based on their publication status, language etc.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
5. Was a list of studies (included and excluded) provided? A list of included and excluded studies should be provided.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
6. Were the characteristics of the included studies provided? In an aggregated form such as a table, data from the original studies should be provided on the participants, interventions and outcomes. The ranges of characteristics in all the studies analyzed e.g. age, race, sex, relevant socioeconomic data, disease status, duration, severity, or other diseases should be reported.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
7. Was the scientific quality of the included studies assessed and documented? 'A priori' methods of assessment should be provided (e.g., for effectiveness studies if the author(s) chose to include only randomized, double-blind, placebo controlled studies, or allocation concealment as inclusion criteria); for other types of studies alternative items will be relevant.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
8. Was the scientific quality of the included studies used appropriately in formulating conclusions? The results of the methodological rigor and scientific quality should be considered in the analysis and the conclusions of the review, and explicitly stated in formulating recommendations.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
9. Were the methods used to combine the findings of studies appropriate? For the pooled results, a test should be done to ensure the studies were combinable, to assess their homogeneity (i.e. Chi-squared test for homogeneity, I^2). If heterogeneity exists a random effects model should be used and/or the clinical appropriateness of combining should be taken into consideration (i.e. is it sensible to combine?).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
10. Was the likelihood of publication bias assessed? An assessment of publication bias should include a combination of graphical aids (e.g., funnel plot, other available tests) and/or statistical tests (e.g., Egger regression test).	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable
11. Was the conflict of interest stated? Potential sources of support should be clearly acknowledged in both the systematic review and the included studies.	☐ Yes ☐ No ☐ Can't answer ☐ Not applicable

AMSTAR

★	N
0	13
1	7
2	2
3	2
4	3
5	3
6	3
7	5
8	8
9	0
10	1
11	0
	47

***Shea et al. BMC Medical Research Methodology* 2007, 7:10**

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international literature research

exemplary table: international literature: **driver/operator**

author(s)	year	land	*	occupation	task	country	MSD	body part	prevalence/risk
Waters, T. et al.	2005	USA	8	fork lift operator, stradle carrier operator, crane operator		I	pain	LB	one-year-prevalence ratio: 1.42 (1.13 - 1.78)
Waters, T. et al.	2005	USA	8	fork lift operator, truck driver, operator of large machines	WBV	D	pain	LB	one-year-prevalence ratio: 0.65
Waters, T. et al.	2005	USA	8	forklift operator, container operator		NL	pain	LB	one-year-OR: 2.2 (1.03 - 4.7)
Waters, T. et al.	2005	USA	8	excavator operator, bulldozer operator, forklift operator		J	pain	LB	OR 2.67 (1.10 - 6.48)
Waters, T. et al.	2008	GB	8	bulldozer operator			pain	back	OR 2.2 (1.03 - 4.7),
Cote, P., et al.	2008	USA	6	crane operator		SWE	disorders	neck	one year prevalence 74,0%
van der Windt, D.A.W.M. et al.	2000	GB	7	motorcycle driver (Japanese police)	high vibration	Japan	pain, stiffness	shoulder	prevalence of pain: 20.6% (p<0.05) prevalence of stiffness: 55.9% (p<0.05).
van der Windt, D.A.W.M. et al.	2000	GB	7	truck driver		NL	pain	shoulder	(OR, 90% CI,age adjusted) skid lifting: 2.1 (1.3 - 3.6); boxes with rolls: 2.0 (1.1 - 3.7); boxed goods: 2.3 (1.3 - 3.9).

international literature research (occupations from A-Z)

occupation/industry-sector	no. of reviews	occupation/industry-sector	no. of reviews
building and construction	9	mining	7
dancer	2	musicians	5
dentists and assistants	8	newspaper worker	3
driver	3	office worker	8
factory worker	11	professional athletes	3
farmers/agricultural worker	11	teacher	2
forestry worker	5	telecommunication worker	5
hospital/health care	7	sales personnel	6
meat/fish processing industry	5	ship and dock workers	6
military/soldiers	5	other	7

summary (upper extremity and neck)

disc-related neck disorders	
metal industry	RR: 1.9-2.1; OR: 5.6
waste disposal	RR: 2.2
forestry worker	RR: 1.9
warehousemen	RR: 1.9
neck/shoulder pain	
agriculture	OR: 1.6 – 2.4
office work	OR: 1.5 – 4.4
building and construction	OR: 2.3 – 3.2
elbow (enthesopathy, epicondylitis)	
upholsterer	OR: 2.8
forestry worker	OR 2.5
waste disposal	OR: 2.2 – 2.4
factory worker	RR: 6.4 – 35.1; OR: 1.5 – 7.0
office worker	OR: 2.9 – 6.2

rhizarthrosis	
metal worker	RR: 2.0 – 2.4
assembly worker	RR: 2.4
carpal tunnel syndrome	
upholsterer	RR: 3.3
meat/fish processing, frozen food processing	OR: 8.0 – 36.0; RR: 2.7 – 14.3
metal worker	2.0 – 2.6
(teno)synovitis, wrist disorder	
office worker	OR: 2.0 – 2.4
factory worker	OR: 1.1 – 2.8, RR: 2.4 – 14
metal worker	RR: 2.0 – 2.6
interior outfitter	RR 2.5 – 5.3

summary (lower extremity and back)

disc-related back disorders	
metal worker	OR: 4.5
print and paper industry	OR: 2.9 – 3.1
traffic and warehousemen	OR: 1.7 – 1.9
building and construction	OD 2108
low back pain	
waste disposal	OR: 1.9 – 2.1
security personnel (police, military)	prevalence of up to > 90%
metal worker	OR: 2.0 – 2.2
hip osteoarthrosis or pain	
forestry worker	RR: 2.4
waste disposal	RR: 2.0 – 2.5
agriculture/farmer	RR: 2.0 – 4.0; OR: 1.8 – 13.3

knee osteoarthrosis or pain	
building and construction	RR: 2.2 – 23.1; OR: 1.4 – 5.1
mining	OR: 2.8 – 14.8
waste disposal	RR: 2.0
agriculture/farmer	OR: 3.2
forestry worker	OR: 2.1
foot disorders or pain	
waste disposal	OR: 2.3 – 2.4
forestry worker	RR: 2.0
soldiers