



IPP-aMSE

***Identification and prioritization of relevant prevention issues
for work-related musculoskeletal disorders (MSDs)***

Work Package 4

Prevention approaches

Defizites and needs

Research activities and intervention strategies



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Part I
***Evidence-based
intervention effects***

Part II
***Prioritized intervention and
research strategies
from international expert's point of view***



Methods part I: Included publications

Journals, peer-reviewed

- Systematic search in 2 databases
 - MEDLINE, PSYCINFO

Gray publications of engaged institutions (internet)

- **Work & Health Institute, Canada**
 - Several systematic reviews
- **OSHA, EU**
 - Prevention Report 2008, Back to Work Report 2007
- **IGA (Initiative Health and Work), Germany**
 - Kreis & Bödeker 2008: Effectivity and benefit of workplace health promotion and prevention. Compilation of the scientific evidence 2000-2006

German OSH research databases

- Federal Ministry of Labour and Social Affairs and of the
- Social Accident Insurance (DGUV)



Inclusion criterias (databases)

Evidence-based approach

(gold standard: RCT)

- Systemat reviews, reports (meta-reviews), empirical meta-analysis studies
- No single studies
- No single professions

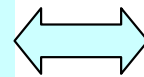
Selection criterias

- language English/German
- culture EU,USA/CAN/AUS (not: Asia, Africa)
- publication period 2000 - spring 2009

Prevention categories

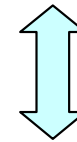
Primary prevention (PP)

- (a) Behavioural prevention
- (b) Situational prevention
- (c) Risk assessment



Secondary prevention (SP)

Health surveillance
(occupational medicine)



Tertiary prevention (TP)

Return-to-work programs

- in the clinical and occupational setting
- in the occupational setting
(German „Company Reintegration Management“)



Search results

Primary prevention (n= 21)

- 15 systematic reviews + 4 reports + 2 meta-analysis studies

Tertiary prevention (n= 16)

- 11 systematic reviews + 5 reports

Secondary prevention (n= 2)

- 0 systematic reviews with close relationship to the topic
- 2 systematic reviews discussing the flag-system for screening

Various ...

- specifications/definitions/
combinations of body localization

→ Carpal tunnel syndrome,
low back pain, neck pain,
upper/lower extremities, MSDs...



Review quality: AMSTAR checklist (used for primary prevention publications)

- 1 À priori design?
- 2 Assessment by two reviewers?
- 3 At least 2 databases checked?
- 4 Search strategy documented?
- 5 In-/exclusion criterias documented?
- 6 In-/excluded literature documented?
- 7 Table with study information?
- 8 Non-randomized trials excluded?
- 9 Study quality discussed?
- 10 Data pooling methods appropriate?
(Meta-analysis)
- 11 Publication bias discussed?
- 12 Funding source documented?

**standardized
AMSTAR quality
mean value / std.dev.
0.73 ± 0.12**

**(range from
0.50 to 0.91)**

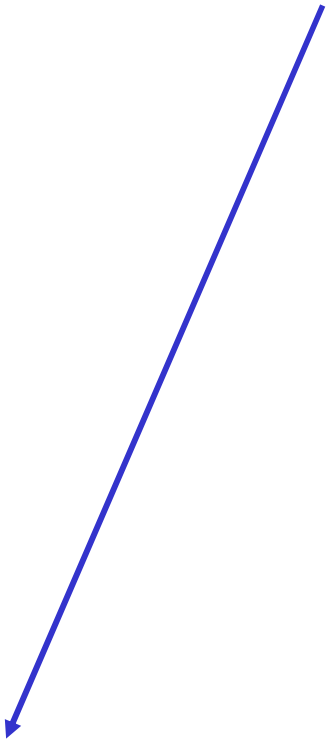


Results

Evidence for effects on MSD-outcomes?

Primary prevention (PP)

- (a) Behavioural prevention
- (b) Situational prevention
- (c) Risk assessment



**Prevalence / incidence / recurrence rate of
symptoms, pain intensity, discomfort
injuries
sick leave**



Results: (a) Primary behavioural prevention

Strong evidence for missing effects

- Education (instructions, back school, guidelines)
- Protection equipment (lumbar supports, wrist splints)

“Several, high-quality RCTs with consistent findings”

- Sufficient sample size
- Adequate and “true” control groups
- Appropriate outcome measurement
- Control of confounder variables
- Proper documentation of design / intervention processes



Results: (a) Primary behavioural prevention

Moderate evidence for missing effects

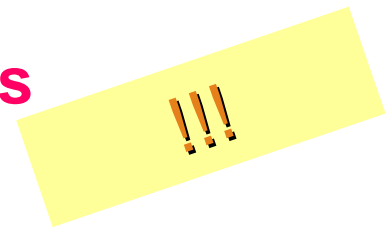
- **Training of risk-reducing working techniques (manual handling)**

Limited to no evidence for any effect

- **Modification of individual risk factors (overweight)**

Strong to moderate evidence for positive effects

- **Exercises (muscle strengthening, fitness)**





Results: (b) Primary situational prevention

Overall, *inconclusive* evidence for positive effects

- **Technical workplace measures**
(tools, e.g. lifting equipment, ergonomic computer devices)

But: *strong* evidence for positive effects

- **on load reduction, if evaluated!**

***Limited* evidence for positive effects**

- **Workplace modification**
work re-organization, organizational development
(job enrichment, participative work(place) design,
leadership ability improvement, expert “task force”)



Results: Multidimensional approaches

!!!
Reported results apply to
single measures!

Moderate evidence for positive effects
Multidimensional approaches

= combination of

- technical AND
- behavioural AND
- work organizational measures

!!!
promising!



Results: (c) Risk assessment

a) Workplace risk assessment by OHS experts

- No reviews/ studies found → research need!

b) Health assessment

- 1 syst. review (Waddell & Burton 2001): To match physical capability to job demands

Limited/contradictory evidence → research need!

Need for further high quality research!

But: limitations when screening is voluntary



Conclusions: Primary prevention

Single measures

- Results for general MSD outcomes not very positive, exception: exercises
- Economic studies are scarce!

Multi-dimensional approaches

- Promising, but further - good studies – needed

Evidence based assessment approach

- Caution: Missing evidence \neq missing effects, but too few good studies
- Some authors criticize application of this strict approach
- More positive effects reported, inclusion of e.g. more experimental studies recommended



Results

Evidence for effects on MSD-outcomes?

**Secondary prevention
by occupational physicians**

Health surveillance of workers at risk
(high MSD-workplace exposure, chronic MSDs)

Results: Health surveillance



- No *specific* reviews found
- **Screening** by „4-flag-system“ (acute low back pain: risk of chronification and early intervention)
 - **“Red flags”**: **individual physiological risk factors**
 - (e.g. persistent severe restriction of lumbar flexion, structural deformity)
 - **“Yellow flags”**: **psychomental risk factors**
 - (e.g. negative attitudes or beliefs about pain)
 - **“Blue flags”**: **high job requirements**
 - (e.g. high demands, poor social support)
 - **“Black flags”**: **objective workplace risk factors**
 - (e.g. high biomechanical demands)



??? Needs for further research !!!



Results: Tertiary prevention (TP)

Evidence for effects on MSD-outcomes?

--- Low back pain ---

Strong evidence for positive effects

- exercises
- behavioral treatment

Moderate evidence for positive effects

- modified work
- intensive back schools
- multidisciplinary return-to-work approaches
 - work(place) modification
 - work hardening (training)
 - behavioural therapy to modify pain processing

OSHA Back-to-Work Report

!!! good cost-benefit ratio demonstration !!!!



Results: TP

--- Upper extremities ---

Limited to moderate evidence for positive effects

- **technical or mechanical interventions**

* (depending on intervention type)

Insufficient/ limited evidence for positive effects

- **psychosocial interventions (organizational changes)**

- **exercises**

- **multidisciplinary treatment**

--- Lower extremities ---

- **no evidence for any effects of any interventions**



Conclusions

Secondary / tertiary prevention

Research deficits in the field of

- screening and surveillance of workers and workplaces at risk
- upper extremity disorders
- lower extremity disorders

Promising

- multidisciplinary return-to work approaches



Part II
***Prioritized intervention and
research strategies
from international expert's point of view***

Part I
***Evidence-based
intervention effects***



**Expertises
Conference reports**



Sources: a) Expert group publications

BAuA, Germany

- Nolting et al. / Bruder et al. 2007: Expertises: Innovative and integrative prevention approaches

NORA (Nat. Occupational Research Agenda, NIOSH, USA)

- Recommendations for further action and research (8 occup. sectors)

Work Safe Australia

- National strategies and recommendations for further action and research



Sources: b) MSD conferences

EUROFOND „Musculoskeletal disorders & organisational change“ Lisbon 2007

- European Foundation for the Improvement of Living and Working Condition www.iwh.on.ca

PREMUS „Prevention of work-related musculoskeletal disorders“ Boston, 2007

- Musculoskeletal Disorders Scientific Committee of the International Commission of Occupational Health www.premus2007.org/

ANNAPOLIS MSD-Conference (upper extremity disorders) USA, 2005

- Feuerstein & Harrington 2006: Secondary prevention of work-related upper extremity disorders: Recommendations from the Annapolis conference. J. Occup. Rehab. 16(3)



Concluded recommendations

More action for target groups with...

a) ... high exposure to certain demands:

- **forced postures**
in standing, bending, kneeling or overhead positions
- **high and/ or low level static exertions**
especially combined with mental demands
- **psychosocial risk factors/stress**
- **repetitive work**
with lack of recovery
- **manual work load**



Concluded recommendations

More action for target groups in ...

b) ...certain industrial sectors: focus on...

- In general: **SMEs** (small and medium sized enterprises)
- More detailed: services, esp. hotel/ gastronomy, retail trade
- Sectors with **high physical load**
e.g., construction, manufacture, transportation/ distribution,
health services/nurses, agriculture/ forestry/ fishing
- Sectors with **static load** (e.g., computer user).



Concluded recommendations More action for target groups...

c) Individual risk predisposition: focus on...

- **Older workers**, especially in highly demanding professions (high loads, long duration of forced postures, psychomental demands)
- Employees with **overweight** and other important functional impairment risks
often correlated with MSDs, e.g. metabolic syndrome



Concluded recommendations More action for target groups...

d) Higher risk for certain MSDs, focus on...

- **Upper extremities**
especially shoulder disorders
- **Lower extremities**
especially knee disorders

Besides back
disorders!



Concluded recommendations More interventions / evaluation ...

a) Prevention type

- **Screening / surveillance followed by early intervention**
(OHS experts)
- **Risk assessment**
including development / dissemination of applicable tools for employers
- **Organizational changes**
in the enterprise
- **Return-to work programs**
work-related, as described before

**!!! Always
multi-dimensional /
multidisciplinary !!!**



Concluded recommendations National/political strategies

a) Focus on more efforts to help employers

- **Networking** of social partners / insurances
!!! Return-to-work programs and
!!! to address and integrate SMEs in prevention issues
- Development and provision of **information registers**
- **Incentives** to encourage employers for taking part in preventive measures
- **(More) guidelines** for successful intervention strategies
- **Evaluation routines** for preventive measures
- Innovative ways to **reach employers**



Concluded recommendations Research efforts

a) Design: focus on...

- **High-quality study design**

 - Calculation of study power analysis & effect sizes

 - Use of concurrent control groups

 - (Cluster-) randomized controlled trials

 - Long-time follow ups (> 12 months).

- **Adequate outcome evaluation**

 - Consideration of confounding predictors / “intermediate” variables

 - Evaluation of economic outcomes



**Thank you
for your
attention!**

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