

Interventions to prevent occupational noise induced hearing loss

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Interventions to prevent occupational noise induced hearing loss: A Cochrane Systematic Review

- final draft -

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Outline

1. Cochrane Systematic Review
2. Noise Review
 - Protocol
 - Search & Selection
 - Quality assessment & Data Extraction
 - (Meta) analysis
3. Authors' conclusions
 - Implications for practise
 - Implications for research



Cochrane Systematic Review

- Systematic Review on the effectiveness of medical treatment
 - Structured process according to a written protocol
 - Always in co-operation with co-reviewers and relevant Collaborative Review Group
 - According to handbook Cochrane Collaboration
-
- To enable people to make well-informed decisions about healthcare



Noise Review

Cochrane Systematic Review

Cochrane Occupational Health Field

Objectives

To assess the effectiveness of non-pharmaceutical interventions for preventing occupational noise exposure or occupational hearing loss.



Review Team Noise Review

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Protocol (1)

Interventions to prevent occupational noise induced hearing loss (Protocol)

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This is a reprint of a Cochrane protocol, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2007, Issue 2

<http://www.thecochranelibrary.com>



Interventions to prevent occupational noise induced hearing loss (Protocol)
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- Background and Relevance of review
- Criteria for considering studies
- Search methods
- Methods of the Review
 - . Study selection
 - . Quality assessment
 - . Data extraction
 - . Data analysis

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Protocol (2)

Criteria for considering studies

- Participants: Workers exposed to noise
- Intervention: Industrial hierarchy of controls & Hearing Loss Prevention Programs
- Comparison: Alternative interventions and no interventions
- Outcome: Noise Exposure / Hearing Loss

- Study design: Randomized, Controlled before-after, ITS

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Protocol (3)

Search Strategy

- #1 noise AND (reduction OR abatement OR diminishment OR elimination OR "engineering controls" OR "administrative controls")
- #2 "hearing loss prevention" OR "hearing conservation" (425) OR "hearing surveillance"
- #3 "ear protective device" OR "ear protective devices" OR "hearing protective device" OR "hearing protective devices" OR "hearing protector" OR "hearing protectors" OR "hearing protection" OR "ear muffs" OR "ear plugs" OR "ear defenders"
- #4 (noise, occupational[mesh] AND "protective equipment") OR ("noise reduction" AND "protective equipment")
- #5 #1 OR #2 OR #3 OR 4
- #6 (effect*[tw] OR control*[tw] OR evaluation*[tw] OR program*[tw]) AND (work*[tw] OR worker* [tw] OR workplace*[tw] OR working[tw] OR occupation*[tw] OR prevention*[tw] OR protect*[tw])
- #7 #5 AND #6
- #8 NOT animal[mh]
- #9 #7 AND #8

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Search & Selection (1)

Results

- Search Pubmed, Embase, CINAHL, Cisdoc, Niostic, Central, Biosis Previews, Web of science:
1626 titles & abstracts
- Scanning abstracts:
104 full articles
- Reading full articles:
21 included studies

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Search & selection (2)

Included studies

Publication	Intervention	Comparison	Outcome
Adera 1993	HLPP	Study population versus reference population	Hearing Loss
Adrea 2000	HLPP	Good program versus Bad program	Hearing Loss
Brink 2002	HLPP	Wear Time of hearing protectors	Hearing Loss
Davies 2008	HLPP	Exposed versus non-exposed	Hearing Loss
Erlandsson 1980	HLPP	Plug versus Muffs	Hearing Loss
Gosztonyi 1975	HLPP	Exposed versus non-exposed	Hearing Loss
Hager 82	HLPP	Levels of enforcement	Hearing Loss
Horie 2002	Hearing Protectors	ANR-muff versus Regular Muff	Hearing Level - TTS
Joy 2007	Legislation	Before after change in legislation	Noise Levels
Lee-Feldstein 1993	HLPP	Noise exposed versus Controls	Hearing Loss
Meyer 1993	HLPP	Yes or not follow-up audiometric examinations	Hearing Loss
Muhr 2006	HLPP	Exposed versus non-exposed	Hearing Loss
Nilson 1980	HLPP	Plug versus Muffs	Hearing Loss
Park 1991a	Hearing Protectors	4 versus 4 types of devices	Attenuation - REAT
Park 1991b	Hearing Protectors	2 types of training	Attenuation - REAT
Pell 1973	HLPP	High versus low versus no noise exposure	Hearing Level - TTS
Pökkönen 1998	Hearing Protectors	6 versus 6 types of devices	Attenuation - MIRE
Pökkönen 2001	Hearing Protectors	ANR-muff versus Regular Muff	Attenuation - MIRE
Reynolds 1990	HHLPP	8 hr versus 12 hr shifts	Hearing Level - TTS
Royster 1980	Hearing Protectors	2 versus 2 types of devices	Hearing Level - TTS
Simpson 1994	HLPP	Good program versus -Bad program	Hearing Loss

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Search & Selection (3)

Included studies: study design

- Randomized design (2)
- Quasi randomized design (1)
- Controlled before-after (18)
- Interrupted Time-series (1)

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Search & Selection (4)

Included studies: participants

workers within:

- automobile industry (1)
- shipyards (2)
- chemical industries (2)
- military (5)
- steel industry (1)
- lumber mill industry (1)
- coal mining (1)
- unknown(3)
- various industries (5)

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Search & Selection (5)

Included studies: type of interventions

- HLPP (14)
- HPD's (6)
- Legislation (1)

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Search & Selection (6)

Included studies: type of outcomes

- Hearing loss (12)
- Hearing levels (6)
- Noise levels (3)

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Search & selection (7)

Great number of excluded studies:

- Cross sectional studies on hearing status;
- Studies on noise exposure survey's;
- Experimental studies
- Studies with volunteers
- Case studies on noise reduction

Nearly all studies stress the importance of reducing noise exposure!

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Analysis (1)

Classification for analysis

- Noise reduction studies
- Immediate effect HPD studies
- Long term HLPP evaluation studies

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Analysis (2)

Noise reduction studies

After change in legislation in mining industry

- Faster decrease in noise exposure
- Significant for underground job titles

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Analysis (3)

Immediate effect HPD studies

- Instruction increases noise reduction plugs
- EAR plug outperforms muffs after instruction
- No significant difference between muffs for peak exposure
- ANR increases noise reduction HPD's
- All HPD's performed worse than official attenuation

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Analysis (4.1)

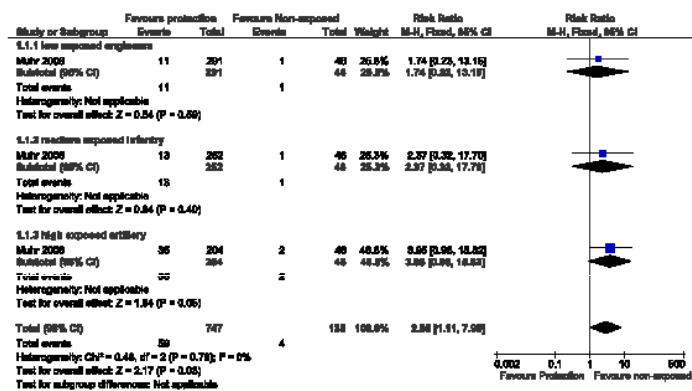
Long term HLPP evaluation studies

Exposed in program equals non-exposed?

- One year follow up
 - OR of sustaining STS significant higher for exposed
 - Well implemented HLPP lower risk, but not significant

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Forrest Plot Muhr (4.1)



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Analysis (4.2)

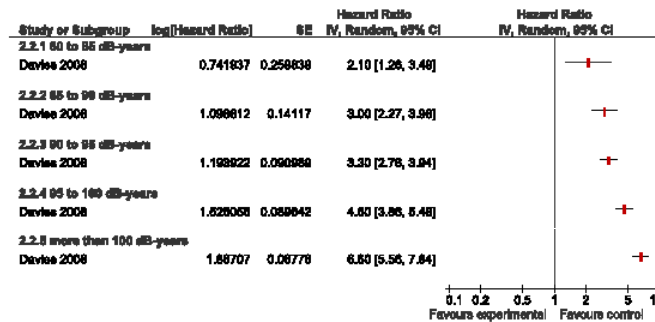
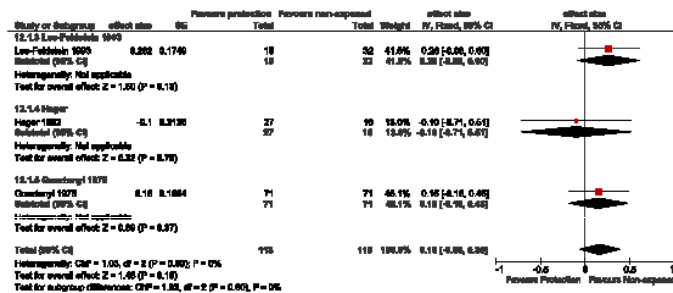
Long term HLPP evaluation studies

Exposed in program equals non-exposed?

- Five year follow up
 - Meta-analysis:
 - with 4 studies mean change in HL at 4Khz reveals slight difference with non-exposed
 - with 3 studies mean change in HL at 4Khz reveals no difference with exposure to 85dB(A)
 - Meta-analysis: well implemented lower risk, but low quality
 - OR time tot STS exposed compared to non-exposed significant higher, with dose response relationship.

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Forrest plots GHL and Davies (4.2)



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Authors' conclusions

Implications for practice

- No controlled evaluation studies on technical measures to reduce noise exposure
- Low quality evidence legislation can reduce occupational noise exposure at branch level
- Effectiveness of hearing protection less than stated by supplier and highly depend on proper instruction
- Contradictory evidence that HLPP are effective in the long term

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Authors' conclusion

Implications for research

- Better evaluations of technical measures are needed
- Better use of available audiometric data is needed
- *Discussion on the need for controlled studies in the case of considerable changes in for example, noise exposure*

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For now

- Questions & Discussion ?!?!?!?
- Thank you for your attention
- We will sent you the full review,
if you leave me your business card