

Interventions to prevent occupational noise induced hearing loss

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

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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.

Cochrane noise Review Protocol (1)

Interventions to prevent occupational noise induced hearing
loss (Protocol)

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This is a copy 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 designs, Controlled before-after studies, Interrupted time series

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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
Gosztanyi 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
P □ □ kk □ nen 1998	Hearing Protectors	6 versus 6 types of devices	Attenuation - MIRE
P □ □ kk □ nen 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 (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)

Included studies

- Evaluation of noise reduction strategies (1)
- Evaluation of hearing protective devices (6)
- Evaluation of hearing loss prevention programs (14)

Cochrane Noise Review 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)

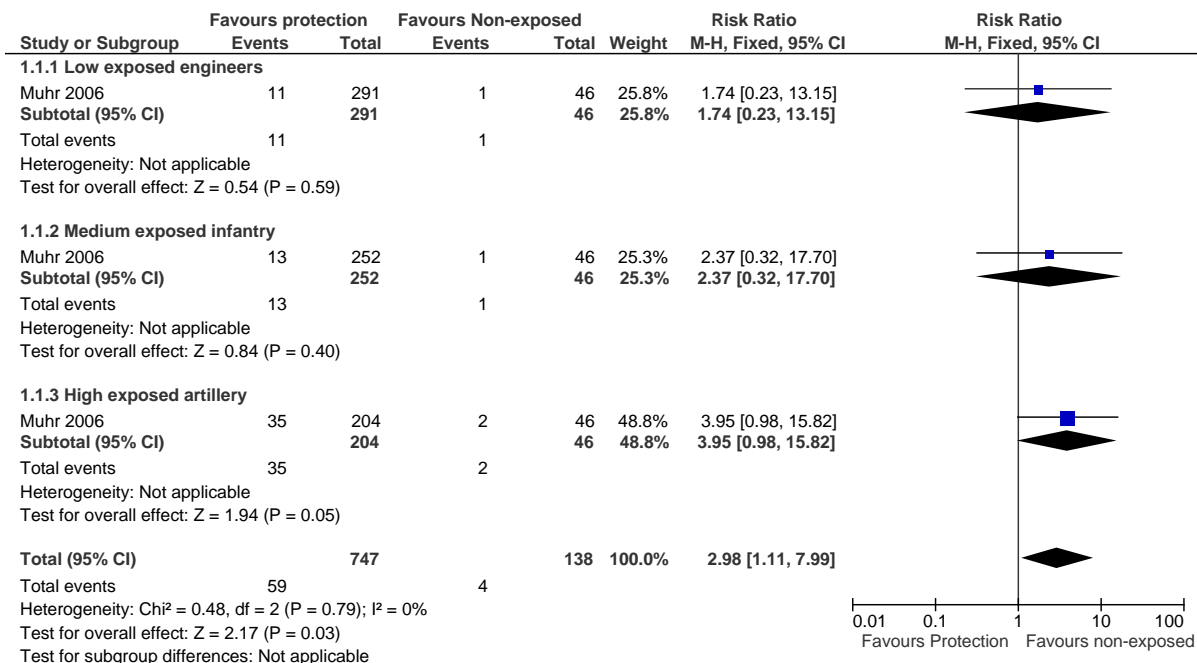
Long term HLPP evaluation studies

Hearing Loss for exposed in program equals non-exposed?

- Studies with one year follow up
 - HLPP for army recruits:
 - RR of sustaining STS 3 times higher for those exposed
 - RR increased with level of exposure

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Forrest Plot Muhr (4.1)



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Analysis (4.2)

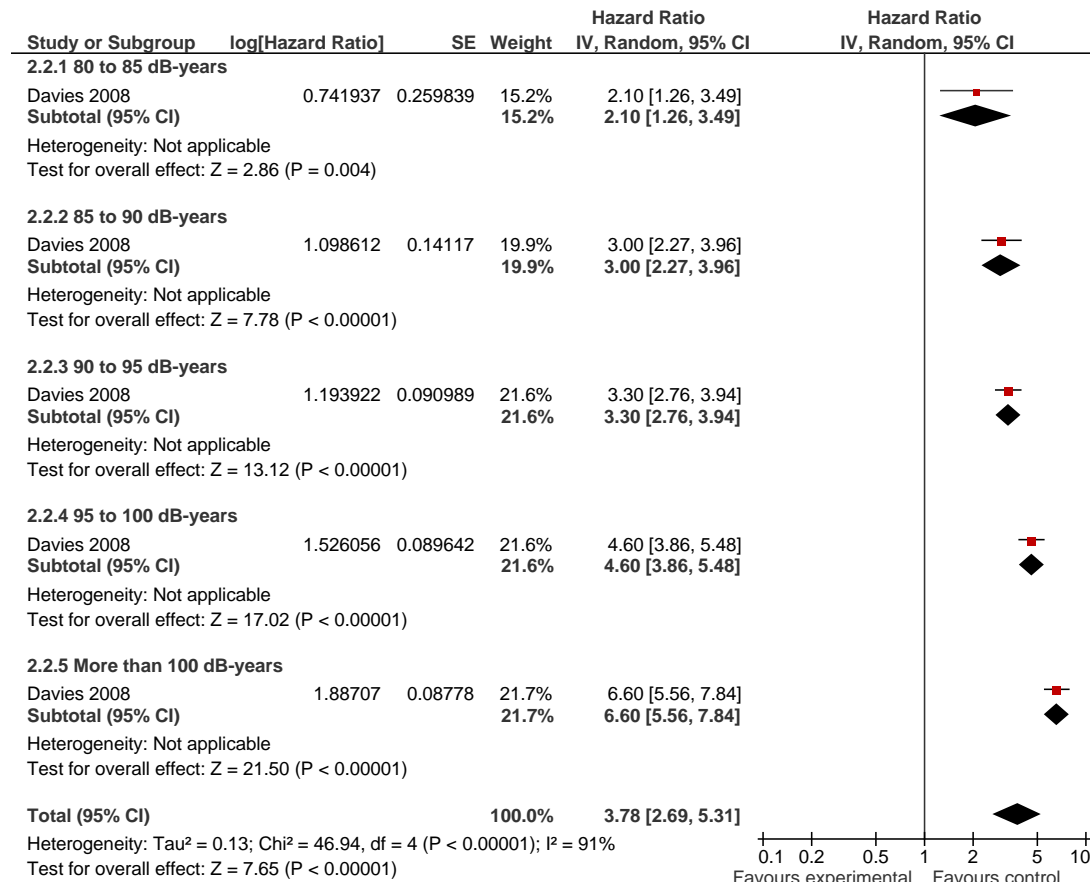
Long term HLPP evaluation studies

Hearing Loss for exposed in program equals non-exposed?

- Studies with five year follow up
 - Meta-analysis on HL at 4kHz
 - with 4 studies mean change in HL no significant difference program and non exposed. High confidence interval.
 - with 3 studies HL equals exposure 85dB(A) cannot be ruled out
 - HR time to a STS in lumber mill industry
 - for exposed HR significant higher
 - dose response relationship.

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Forrest plots 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 for one type of industrie
- 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
- Better implementation and reinforcement is needed

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Authors' conclusion

Implications for research

- Better evaluations of technical measures are needed
- Better use of available audiometric data is needed

- *Within Cochrane Collaboration:*
Discussion on the need for controlled studies in the case of considerable changes in for example, noise exposure

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For now

- Thank you for your attention
- The review is published in Cochrane library
<http://www2.cochrane.org/reviews/en/ab006396.html>
- More on reviews in the field of occupational health
<http://www.ttl.fi/Internet/partner/Cochrane>

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