A systematic review of the nonacoustic benefits of bone-anchored hearing aids

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CRD summary
This review of the nonacoustic benefits of bone-anchored hearing aids (BAHAs) found limited evidence of increased quality of life following BAHA implantation in comparison with conventional hearing aids or no hearing aids at all. The conclusions reflect the limited evidence available but, given the poor quality of the primary studies and potential methodological weaknesses in the review, the reliability of these conclusions remains unclear.

Authors' objectives
To review the nonacoustic benefits of bone-anchored hearing aids (BAHAs) in comparison with other forms of amplification.

Searching
ComDisDome and PubMed were searched; the search terms were reported. The reference lists of all included articles were checked.

Study selection
Eligible study designs for this review included randomised controlled trials (RCTs), non-randomised controlled trials, cohort studies and case-series. The included studies were retrospective or prospective uncontrolled within-subject designs. Any adult population eligible for a BAHA was considered for this review, and the relevant intervention was the BAHA itself. The included studies comprised diverse populations including children and geriatric patients; some participants had diagnosed ear-related aetiologies and there was considerable variation in history of amplification use. Appropriate outcome measures were pre-specified as generic or disease-specific quality of life (QoL) measures. The included studies reported disease-specific QoL using the Glasgow Benefit Inventory, Hearing Handicap and Disability Inventory, and generic QoL with the SF 36 and the EQ-5D.

Three reviewers selected the studies.

Assessment of study quality
The criteria for the quality assessment were adapted from published guidelines: level of evidence, equality of groups at baseline, intention-to-treat analysis, power, description of inclusion and exclusion criteria, and description or hearing aid fitting or verification.

Two reviewers independently assessed the quality of each paper, while a third reviewer checked their decisions.

Data extraction
The authors appear to have summarised the results and presented an indication of no benefit, significant benefit or significant deterioration in QoL following BAHA fitting, without reporting study level p-values.

The authors did not state how the data were extracted for this review, or how many reviewers performed the data extraction.

Methods of synthesis
A narrative synthesis was carried out. Pooling was not possible because of diversity in the outcome measures used and inconsistencies in the presentation of primary data.

Results of the review
Seven studies (total n=560) of varying sample sizes (range: 9 to 227) were included in this review. Three studies used a prospective within-subjects design (n=82) and four used a retrospective design (n=478).
Based on the quality assessment details presented in the paper, only two of the included studies met more than one of the specified five criteria.

Four studies reported on the impact of BAHA on QoL for new hearing aid users (3 retrospective, 1 prospective). All found a benefit following BAHA implantation when measured by disease-specific QoL measures. A mixture of descriptive statistics and statistically significant differences contributed to this finding.

Three studies reported on the impact of BAHA on QoL for experienced hearing aid users (1 retrospective, 2 prospective). Mixed results were obtained. The generic QoL measures found either no nonacoustic benefit of BAHA or a negative effect, while a disease-specific QoL measure reported significant improvements following BAHA implantation.

**Authors' conclusions**

There is some limited evidence to support the increased nonacoustic benefits of BAHAs in comparison with conventional hearing aids or no hearing aids at all.

**CRD commentary**

This review addressed a clearly defined research question with appropriate inclusion criteria. However, despite the population being specified as adults, several primary studies which included children were used in the review. The searches may not have covered all of the relevant literature as there was no apparent search for unpublished studies, and it is unclear if language restrictions were applied. Both of these issues may have resulted in the omission of potentially relevant research. A validity assessment was carried out, but the poor quality of the included studies suggests that any conclusions should be tentative and hypothesis-forming at best. There were insufficient details of the data extraction and analysis stages of this review to rule out the possibility of error or bias entering the process, which suggests that the authors' conclusions may not be reliable. The method of synthesis was appropriate and the conclusions reflected the limited evidence presented. However, given the poor quality and varied sample size of the included studies, and the potential methodological weaknesses in the review process, the reliability of the authors' conclusions is unclear.

**Implications of the review for practice and research**

Practice: The authors stated that health professionals should be cautious when explaining the potential QoL benefits arising from BAHAs.

Research: The authors stated that further research is needed to explore the potential nonacoustic benefits of BAHAs using prospective, homogeneous cohort designs; to develop useful disease-specific QoL measures; and to encourage researchers to follow good reporting guidelines.

**Funding**

Not stated.

**Bibliographic details**


**PubMedID**

17086080

**DOI**

10.1097/01.aud.0000240635.70277.3f

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**
AccessionNumber
12006007835

Date bibliographic record published
06/12/2007

Date abstract record published
01/12/2008

Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.