

CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Non-Invasive Bone Conduction Devices for Conductive Hearing Loss: Clinical Effectiveness, Cost- Effectiveness, and Guidelines

Service Line: Rapid Response Service
Version: 1.0
Publication Date: November 11, 2019
Report Length: 6 Pages

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Cite As: *Non-Invasive Bone Conduction Devices for Conductive Hearing Loss: Clinical Effectiveness, Cost-Effectiveness, and Guidelines*. Ottawa: CADTH; 2019 November. (CADTH rapid response report: summary of abstracts).

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Funding: CADTH receives funding from Canada's federal, provincial, and territorial governments, with the exception of Quebec.

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Research Questions

1. What is the clinical effectiveness of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss?
2. What is the cost-effectiveness of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss?
3. What are the evidence-based guidelines regarding the use of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss?

Key Findings

One randomized controlled trial and four non-randomized studies were identified regarding the clinical effectiveness of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss. Additionally, no relevant economic evaluations or evidence-based guidelines were identified regarding the cost-effectiveness and use of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss.

Methods

A limited literature search was conducted by an information specialist on key resources including PubMed, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concepts were non-invasive bone conduction devices and hearing loss. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2014 and October 29, 2019. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Patients (any age) with unilateral or bilateral conductive hearing loss
Intervention	Non-invasive bone conduction hearing devices (e.g., the ADHEAR system)
Comparator	Alternative hearing devices (e.g., bone-anchored hearing devices, conventional hearing devices)

Outcomes	Q1: Clinical effectiveness (e.g., improvement in hearing, ease of use, comfort, safety, patient satisfaction) Q2: Cost-effectiveness Q3: Evidence-based guidelines
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines.

One randomized controlled trial¹ and four non-randomized studies²⁻⁵ were identified regarding the clinical effectiveness of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss. Additionally, no relevant health technology assessments, systematic reviews, meta-analyses, economic evaluations or evidence-based guidelines were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

One randomized controlled trial¹ and four non-randomized studies²⁻⁵ were identified regarding the clinical effectiveness of non-invasive bone conduction hearing devices for patients with unilateral or bilateral conductive hearing loss. The authors of the randomized controlled trial¹ aimed to compare the average daily wearing time of an adhesive bone conduction device versus conventional bone conduction device in patients with conductive hearing loss. The authors found that there were no statistically significant differences in sound field audiometry, Freiburg monosyllables word test, the Oldenburg sentence test or quality of life between the two groups.¹ Moreover, the authors of two non-randomized studies^{2,3} found that the adhesive bone conduction device significantly improved functional hearing thresholds compared to conventional bone conduction hearing devices² or softband hearing aids.³ Alternatively, the last two non-randomized studies^{4,5} found no significant difference in hearing thresholds or sound field measurements between adhesive bone conduction devices and conventional bone conduction devices and whether they are implanted⁴ or attached to a softband.⁵ Authors of all four non-randomized studies found similar benefits in speech perception in quiet and noisy environments, between the adhesive device and conventional devices, as well as adhesive device and softband hearing aids.²⁻⁵

References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-analyses

No literature identified.

Randomized Controlled Trials

1. Dahm V, Auinger AB, Liepins R, Baumgartner WD, Riss D, Arnoldner C. A randomized cross-over trial comparing a pressure-free, adhesive to a conventional bone conduction hearing device. *Otol Neurotol*. 2019 Jun;40(5):571-577.
[PubMed: PM31083074](#)

Non-Randomized Studies

2. Neumann K, Thomas JP, Voelter C, Dazert S. A new adhesive bone conduction hearing system effectively treats conductive hearing loss in children. *Int J Pediatr Otorhinolaryngol*. 2019 Jul;122:117-125.
[PubMed: PM31004837](#)
3. Osborne MS, Child-Hymas A, Gill J, Lloyd MS, McDermott AL. First pediatric experience with a novel, adhesive adapter retained, bone conduction hearing aid system. *Otol Neurotol*. 2019 Oct;40(9):1199-1207.
[PubMed: PM31469800](#)
4. Skarzynski PH, Ratuszniak A, Osinska K, et al. A comparative study of a novel adhesive bone conduction device and conventional treatment options for conductive hearing loss. *Otol Neurotol*. 2019 Aug;40(7):858-864.
[PubMed: PM31295197](#)
5. Gawliczek T, Munzinger F, Anschuetz L, Caversaccio M, Kompis M, Wimmer W. Unilateral and bilateral audiological benefit with an adhesively attached, noninvasive bone conduction hearing system. *Otol Neurotol*. 2018 Sep;39(8):1025-1030.
[PubMed: PM30015748](#)

Economic Evaluations

No literature identified.

Guidelines and Recommendations

No literature identified.

Appendix — Further Information

Previous CADTH Reports

6. ADHEAR System for Conductive Hearing Loss: Clinical Effectiveness; 2018. <https://www.cadth.ca/adhear-system-conductive-hearing-loss-clinical-effectiveness-0>

Systematic Reviews

Comparator Not Specified

7. Liu CC, Livingstone D, Yunker WK. The role of bone conduction hearing aids in congenital unilateral hearing loss: A systematic review. *Int J Pediatr Otorhinolaryngol.* 2017 Mar;94:45-51. [PubMed: PM28167010](#)

Intervention Not Specified

8. Ferguson MA, Kitterick PT, Chong LY, Edmondson-Jones M, Barker F, Hoare DJ. Hearing aids for mild to moderate hearing loss in adults. *Cochrane Database of Systematic Reviews* 2017, Issue 9. Art. No.: CD012023. <https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD012023.pub2>
9. Mandavia R, Carter AW, Haram N, Mossialos E, Schilder AGM. An evaluation of the quality of evidence available to inform current bone conducting hearing device national policy. *Clin Otolaryngol.* 2017 Oct;42(5):1000-1024. [PubMed: PM28101972](#)

Randomized Controlled Trials – Alternative Population

10. Mertens G, Gilles A, Bouzegta R, Van de Heyning P. A Prospective Randomized Crossover Study in Single Sided Deafness on the New Non-invasive Adhesive Bone conduction Hearing System. *Otol Neurotol.* 2018 Sep;39(8):940-949. [PubMed: PM30020266](#)

Non-Randomized Studies - No Comparator

11. Milan U, Dagmar H, Ivo S, et al. First experiences with a new adhesive bone conduction hearing device in children. *Int J Pediatr Otorhinolaryngol.* 2019 Jul 29;126:109614. [PubMed: PM31377401](#)
12. Dahm V, Baumgartner WD, Liepins R, Arnoldner C, Riss D. First Results With a New, Pressure-free, Adhesive Bone conduction Hearing Aid. *Otol Neurotol.* 2018 Jul;39(6):748-754. [PubMed: PM29889785](#)

Additional References

13. ADHEAR Adhesive Adapter System for Conductive Hearing Loss Cleared by FDA. The Hearing Review; 2018. <http://www.hearingreview.com/2018/05/adhear-adhesive-adapter-system-conductive-hearing-loss-cleared-fda/>