



**Health
Information
and Quality
Authority**

An tÚdarás Um Fhaisnéis
agus Cáilíocht Sláinte

Cochlear implants for adults: protocol for a health technology assessment

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About the Health Information and Quality Authority

The Health Information and Quality Authority (HIQA) is an independent statutory body established to promote safety and quality in the provision of health and social care services for the benefit of the health and welfare of the public.

Reporting to the Minister for Health and engaging with relevant government Ministers and departments, HIQA has responsibility for the following:

- **Setting standards for health and social care services** — Developing person-centred standards and guidance, based on evidence and international best practice, for health and social care services in Ireland.
- **Regulating social care services** — The Chief Inspector of Social Services within HIQA is responsible for registering and inspecting residential services for older people and people with a disability, and children's special care units.
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- **Health technology assessment** — Evaluating the clinical and cost effectiveness of health programmes, policies, medicines, medical equipment, diagnostic and surgical techniques, health promotion and protection activities, and providing advice to enable the best use of resources and the best outcomes for people who use our health service.
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- **National Care Experience Programme** — Carrying out national service-user experience surveys across a range of health and social care services, with the Department of Health and the Health Service Executive (HSE).

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List of abbreviations used in this report

BCHI	bone conduction hearing implant
BIA	budget impact analysis
BSPHL	bilateral severe-to-profound hearing loss
CEA	cost-effectiveness analysis
CHEERS	Consolidated Health Economic Evaluation Reporting Standards
CROS	contralateral routing of signals
EAG	Expert Advisory Group
EUnetHTA	European Network for Health Technology Assessment
HIQA	Health Information and Quality Authority
HSE	Health Service Executive
HTA	health technology assessment
ICER	incremental cost-effectiveness ratio
NOS	Newcastle-Ottawa Scale
NHIVRC	National Hearing Implant and Viani Research Centre
PICOS	Population, Intervention, Comparator, Outcomes and Study Design
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta-Analyses
QALY	quality-adjusted life year
RCT	randomised controlled trial
RoB2	Cochrane revised risk of bias tool for RCTs
RQ	research question
SSD	single-sided deafness
WTP	willingness-to-pay

1. Introduction

1.1. Background

Unilateral hearing loss is a condition that affects only one ear and can vary in severity from mild to total hearing loss. The most severe form of this condition is known as single-sided deafness (SSD), where there is severe-to-profound or total hearing loss in one ear and normal to near-normal hearing in the contralateral ear. SSD can be congenital or acquired, and when acquired, onset can be sudden or gradual. Among adults, SSD can have different causes (such as, vestibular schwannomas, infections, traumatic brain injury, or acoustic injury due to exposure to loud noises) or it can arise idiopathically.^(1, 2)

For those whose hearing loss cannot be managed or reversed medically, there are alternative treatment options to manage symptoms of SSD and improve quality of life. These include non-surgical interventions (contralateral routing of signals (CROS) devices and non-implantable bone conduction hearing aids) and surgical interventions (bone conduction hearing implants (BCHIs)). While these devices can help by routing the sound from the deaf side to the hearing side, they do not restore the binaural cues, which are essential for spatial hearing and functional listening. Currently, cochlear implants are the only intervention that can potentially restore hearing in the affected ear.⁽³⁾

Bilateral hearing loss affects both ears and can also vary in severity. For adults with bilateral severe-to-profound hearing loss (BSPHL), unilateral cochlear implantation has traditionally been employed as a treatment strategy. In more recent years, studies have explored the potential benefit of binaural hearing over monaural hearing. For adults with a unilateral implant, two options exist to restore some degree of binaural hearing. Depending on the severity of hearing loss in the contralateral ear, there is the option of adding a hearing aid (bimodal hearing). However, if hearing loss is severe, a second cochlear implant can be considered (bilateral cochlear implants),^(4, 5) depending on patient age and country-specific reimbursement criteria. If bilateral implantation is supported, it can be completed simultaneously or sequentially. Sequential cochlear implantation is a strategy whereby people with BSPHL receive the second implant some period of time after the first.

In Ireland, all publicly funded cochlear implant procedures for adults have been provided through a single centre, the National Hearing Implant and Viani Research Centre (NHIVRC) in Beaumont Hospital, which has been carrying out cochlear implant procedures since 1995. Patients who receive cochlear implants remain under the care of the NHIVRC for life, as the devices receive regular tuning sessions and

life-long support. In accordance with current funding policy, children with BSPHL (>70 decibels) are eligible for bilateral implantation while adults with BSPHL can receive unilateral implantation. Adults with SSD are not currently eligible for a cochlear implant;⁽⁶⁾ however, a small number of adults with SSD have been approved by the publicly funded healthcare system to travel abroad for their cochlear implant procedure, with follow-up care provided through the NHIVRC.

The HSE requested that HIQA undertake a health technology assessment (HTA) to establish the clinical effectiveness and economic implications of expanding the criteria for providing cochlear implants to include adults with SSD and a sequential cochlear implant for adults with BSPHL who previously received a unilateral implant. The HTA will provide evidence-based advice to inform decision making by the Minister for Health and the HSE.

This protocol presents the proposed methodology for assessing the provision of cochlear implants as a solution for two populations: 1) adults with severe-to-profound SSD and 2) adults with BSPHL who have previously received a unilateral implant. The assessment will be conducted in line with the HIQA quality assurance framework for HTA.

1.2. Aims and objectives

The aim of this HTA is to assess the provision of cochlear implants in Ireland to adults with SSD, and to adults with BSPHL who currently have one (unilateral) cochlear implant, as a treatment to restore binaural hearing.

In relation to these populations, the objectives for this HTA are to:

- Describe the types of deafness, epidemiology, and burden of disability.
- Describe the current treatment options.
- Describe cochlear implants.
- Review the current evidence of the clinical efficacy, clinical effectiveness, and safety of unilateral cochlear implants.
- Assess the cost effectiveness and budget impact of providing unilateral cochlear implants.
- Consider any potential organisational implications of providing unilateral cochlear implants.
- Consider any ethical, patient, and social implications that providing unilateral cochlear implants may have for the patients, the general public and the healthcare system in Ireland.

- Based on the evidence of this assessment, provide advice to the HSE to inform a decision whether to expand the criteria of cochlear implants to include adults with SSD or with BSPHL who currently have one (unilateral) cochlear implant.

1.3. Establishment of the Expert Advisory Group

An appropriately represented Expert Advisory Group (EAG) will be convened as a source of expertise to inform the interpretation of the evidence and development of the advice to the HSE. This group will comprise nominees from a range of stakeholder organisations, including patient representation, healthcare providers, methodological experts, and clinical and public health experts.

The terms of reference of the Expert Advisory Group are to:

- Contribute to the provision of high quality and considered advice by HIQA to the Minister for Health and the HSE.
- Contribute fully to the work, debate and decision-making processes of the group by providing expert guidance, as appropriate.
- Be prepared to provide expert advice on relevant issues outside of group meetings, as requested.
- Provide advice to HIQA regarding the scope of the analysis.
- Support the Evaluation Team led by HIQA during the assessment process by providing expert opinion and access to pertinent data, as appropriate.
- Review the project plan outline and advise on priorities, as required.
- Review the draft report from the Evaluation Team and recommend amendments, as appropriate.
- Contribute to HIQA's development of its approach to HTA by participating in an evaluation of the process on the conclusion of the assessment.

2. Epidemiology and burden of disease

A comprehensive description of the current epidemiology of SSD and of BSPHL treated with a unilateral cochlear implant will be provided, along with a description of the associated disease burden in the Irish public health system. This section will be informed by a review of national and international literature and data.

3. Description of the technology

A description of cochlear implants will be provided in addition to a description of the currently available treatment options for SSD and for BSPHL in the publicly funded healthcare system in Ireland.

A review of international practice will be undertaken with respect to publicly funded access to and criteria for unilateral cochlear implants for individuals with SSD and for those with BSPHL who currently have one (unilateral) cochlear implant. The following Western European countries will be considered: United Kingdom (England, Scotland, Wales, Northern Ireland), Germany, Spain, Belgium, Netherlands, Austria, Denmark, Sweden, France, Switzerland, Italy, Portugal, Luxembourg, and Norway. Additionally, practices in Australia, New Zealand, and Canada will be reviewed. Selection of these countries was informed by their European Union membership and or high-income status as well as having healthcare systems that are broadly comparable to that in Ireland.

4. Clinical efficacy, effectiveness and safety

Up-to-date evidence on the clinical efficacy, clinical effectiveness, and safety of unilateral cochlear implants as treatment for adult patients with SSD, and sequential cochlear implants for adults with BSPHL who have previously received a unilateral implant, will be central to decision-making regarding the expansion of this service in Ireland.

Two research questions (RQs) have been formulated to establish the clinical efficacy, effectiveness and safety of cochlear implants in these populations:

RQ1 What is the clinical efficacy, effectiveness, and safety of unilateral cochlear implants as treatment for SSD in adults?

RQ2 What is the clinical efficacy, effectiveness, and safety of sequential cochlear implants for adults with BSPHL who have previously received a unilateral cochlear implant?

A systematic review will be conducted. The reporting of the review will adhere to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) criteria⁽⁷⁾ and national guidelines.

4.1. Inclusion criteria

The eligibility criteria for inclusion in the review were formulated according to the Population, Intervention, Comparator, Outcomes and Study Design (PICOS) framework. The review will focus on comparative studies only. Table 1 outlines the eligibility criteria for the review of clinical efficacy, effectiveness, and safety of

cochlear implants for adults with SSD.

Table 1 Population, Intervention, Comparator, Outcomes and Study Design (PICOS) eligibility criteria – SSD population

Item	Inclusion
Population	Adults with SSD defined as: ▪ Pure-tone air conduction average ≥ 70 decibels in poor ear and ▪ Pure-tone air conduction average ≤ 35 decibels in contralateral ear across at least four frequencies. Excluded: asymmetrical hearing loss; conductive hearing loss; mixed hearing loss; participants requiring a hearing aid in the non-implanted ear; paediatric populations.
Intervention	▪ Cochlear implant. ▪ Bone conduction hearing implant.
Comparators	▪ Alternative SSD treatment (cochlear implant, bone conduction hearing implant), if not the intervention of interest. ▪ No treatment.
Outcomes	▪ Spatial hearing outcomes: – sound localisation – speech recognition in noise (e.g., group and one-to-one conversation) – speech recognition in quiet (e.g., group and one-to-one conversation). ▪ Tinnitus. ▪ Changes in degree of hearing loss. ▪ Quality of life and subjective hearing benefit using one of the following tools: – Abbreviated Profile of Hearing Aid Benefit – Speech, Spatial and Qualities of Hearing Scale – Glasgow Health Status Inventory – Glasgow Benefit Inventory – Glasgow Hearing Aid Benefit Profile – EQ-5D health questionnaire – Health Utilities Index Mark 3. ▪ Treatment satisfaction. ▪ Device usage. ▪ Safety: – adverse events. Outcomes should be comparative (e.g., difference between groups with and without implants; difference within individuals pre- and post-implant).

Study design	Randomised controlled trials, comparative cohort studies, single-arm trials, case series. Exclude: conference abstracts, case reviews, qualitative studies, studies with < 10 SSD participants.
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Key: SSD – single-sided deafness.

The primary intervention of interest is cochlear implant. However, due to the anticipated limited direct head-to-head data between cochlear implant and other implantable hearing aids for adults with SSD, data for bone conduction hearing implants as an intervention will also be collected to facilitate indirect treatment comparison. Some heterogeneity in study populations is expected because of variations in defining SSD, which may lead to heterogeneity in reported treatment effects.

The eligibility criteria for the review of clinical efficacy, effectiveness, and safety of sequential cochlear implants for adults with BSPHL is shown in Table 2.

Table 2 Population, Intervention, Comparator, Outcomes and Study Design (PICOS) eligibility criteria – BSPHL population

Item	Inclusion
Population	Adults with BSPHL who have previously received a unilateral cochlear implant. Excluded: asymmetrical hearing loss; conductive hearing loss; mixed hearing loss; paediatric populations.
Intervention	Sequential cochlear implant.
Comparators	- No additional treatment. - Simultaneous cochlear implantation. - One cochlear implant and one hearing aid (i.e., bimodal intervention).
Outcomes	- Spatial hearing outcomes: - sound localisation - speech recognition in noise (e.g., group and one-to-one conversation) - speech recognition in quiet (e.g., group and one-to-one conversation). - Tinnitus. - Changes in degree of hearing loss. - Quality of life and subjective hearing benefit using one of the following tools: - Abbreviated Profile of Hearing Aid Benefit - Speech, Spatial and Qualities of Hearing Scale - Glasgow Health Status Inventory - Glasgow Benefit Inventory

	– Glasgow Hearing Aid Benefit Profile – EQ-5D health questionnaire – Health Utilities Index Mark 3. ▪ Treatment satisfaction. ▪ Device usage. ▪ Safety: – adverse events. Outcomes should be comparative (e.g., difference between groups with and without implants; difference within individuals pre- and postimplant).
Study design	Randomised controlled trials, comparative cohort studies, single-arm trials, case series. Exclude: conference abstracts, case reviews, qualitative studies, studies with <10 participants.

Key: BSPHL – bilateral severe-to-profound hearing loss.

4.2. Search strategy and information sources

Two separate comprehensive searches will be performed in the following databases: Embase (Elsevier), MEDLINE Complete (Ebscohost), CINAHL Complete (EBSCOhost), PsycINFO (EBSCOhost), and the Cochrane Library. The search strategies will be developed by a librarian and peer reviewed by a second librarian. A search for ongoing clinical trials relevant to the research question will also be conducted in clinicaltrials.gov. Draft search strategies are provided in Appendix 1.

4.3. Study selection

Titles and abstracts of articles retrieved will be screened independently by two reviewers. The full text of potentially eligible articles will be retrieved and independently assessed for eligibility by two reviewers according to the specified criteria (outlined in section 4.1). A PRISMA flow diagram, outlining the study selection process, will be completed. Disagreements will be resolved through discussion, or if necessary, through involvement of a third reviewer.

4.4. Data extraction

Data extraction will be conducted independently by two reviewers using a standardised, pre-piloted electronic data extraction form. Disagreements in data extraction will be resolved through discussion, or if necessary, a third reviewer. Previous systematic reviews that align with our eligibility criteria will be identified and used to aid data extraction.

4.5. Quality assessment

Two reviewers will independently assess the quality of included studies. Risk of bias

will be assessed using the Cochrane revised risk of bias tool for RCTs (RoB2).⁽⁸⁾ The Newcastle-Ottawa Scale (NOS) tool⁽⁹⁾ will be used to assess the quality of non-randomised studies. Disagreements will be resolved through discussion, or if necessary, a third reviewer.

4.6. Data synthesis and analysis

Where feasible, meta-analysis of outcomes will be undertaken. Where meta-analysis is not considered appropriate, for example in the case of considerable clinical heterogeneity or a small number of events, outcomes will be synthesised narratively. Meta-analysis will be undertaken in accordance with Cochrane methodology.

5. Economic evaluation

5.1. Targeted review of cost-effectiveness models

A targeted review of the literature will be conducted to inform the structure of a de novo Irish specific cost-effectiveness model (Section 5.2). If required, a systematic review will be conducted to identify relevant utility values to inform the model.

5.2. Cost-effectiveness analysis

A cost-effectiveness analysis (CEA) of cochlear implants for adults with SSD and for adults with BSPHL who currently have one (unilateral) cochlear implant will be conducted in line with national guidelines⁽¹⁰⁾ and reported in accordance with the Consolidated Health Economic Evaluation Reporting Standards 2022 (CHEERS 2022) reporting guidance.⁽¹¹⁾ For both populations, the analysis will be conducted from the perspective of the publicly funded healthcare system (that is, the HSE), with consideration also given to the presentation of the societal perspective. The primary outcome of the CEA will be an incremental cost-effectiveness ratio (ICER) expressed in terms of the mean cost per quality-adjusted life year (QALY) gained. A discount rate of 4% will be applied to costs and outcomes occurring after the first year. There is currently no accepted willingness-to-pay (WTP) threshold for health technologies in Ireland. However, WTP thresholds of €20,000/QALY and €45,000/QALY are generally employed to interpret evidence of cost effectiveness.

5.3. Budget impact analysis

A budget impact analysis (BIA) for both populations will be conducted from the perspective of the HSE and in accordance with national guidelines.⁽¹²⁾ The BIA will provide information for decision makers regarding the potential affordability of the provision of cochlear implants for the treatment of SSD in adults and provision of a subsequent cochlear implant for unilaterally implanted adults with BSPHL. It will predict the costs to the HSE associated with implementing this service over an initial five-year time horizon, reported in terms of incremental annual cost. Estimates of

the impact of this service will consider capital costs, resource use, staffing costs and any potential cost-offsets.

A summary of the model characteristics for each of the CEA and BIA is presented in Table 3.

Table 3 Model characteristics for CEA and BIA

Model characteristics	CEA	BIA
Perspective	Publicly funded health and social care system (HSE)	Publicly funded health and social care system (HSE)
Time horizon	Lifetime	Five years
Discount rate	4% (costs and QALYs) after the first year	N/A
Outcome	ICER	Incremental cost per annum
Sensitivity analysis	Deterministic and probabilistic	Deterministic and probabilistic

Key: BIA – budget impact analysis; CEA – cost-effectiveness analysis; HSE – Health Service Executive; ICER – incremental cost-effectiveness ratio; N/A – not applicable; QALY – quality-adjusted life year.

5.4. Data requirements

Data requirements for the economic analysis will include definitive data on the clinical effectiveness, clinical efficacy, safety, and long-term evidence of impact of cochlear implants. For parameters that are unsupported by published literature, input from the EAG will be required to inform plausible values. In addition to the cost of this service, changes to organisational processes resulting from the addition of this service will be identified and considered as part of the economic evaluation.

6. Organisational considerations

The assessment of necessary organisational changes will be carried out in accordance with the European Network for Health Technology Assessment (EUnetHTA) Core Model.⁽¹³⁾ This assessment will include the impact of providing cochlear implants to the populations of interest (adults with SSD and adults with BSPHL who have previously received a unilateral cochlear implant) on various types of resources (such as human resources, equipment and supplies, and facilities). It will also consider requirements for any additional associated healthcare interventions (for example, additional patient education and support services).

7. Ethical, patient and social aspects

There are many factors that need to be considered prior to the implementation of a

health technology. This chapter will examine the patient, social and ethical considerations relating to a decision to provide cochlear implants to adults with SSD, and a second implant to adults with BSPHL who have previously received a unilateral implant, guided by the EUnetHTA Core Model. In the context of this chapter, 'patient aspects' will refer to issues such as the burden, experiences and expectations that are relevant to patients, individuals and carers. The term 'social aspects' refers to issues experienced by groups or communities of patients or individuals that may be relevant to the topic under assessment. The ethical analysis will consider key social and moral norms and values relevant to the provision of cochlear implants as a treatment for SSD and solution for binaural hearing in adults with BSPHL who wish to avail of the intervention. Key ethical issues, as outlined in the EUnetHTA Core Model, will be used to guide the ethical analysis, under some or all of the following topic headings:

- benefit-harm balance at both the individual and population level
- autonomy
- respect for persons
- justice and equity
- ethical consequences.

8. Dissemination

The evidence gathered, as outlined above, will be synthesised in a report to be published on the HIQA website. The findings of the report will inform HIQA's advice to the Minister for Health and the HSE.

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Appendix 1: Search strategy

Research question 1

Databases	Number of results	Date searched
Medline Complete via Ebscohost	1253	21/11/2025
Embase via Elsevier	1367	21/11/2025
The Cochrane Library	48	21/11/2025
CINAHL Complete via Ebscohost	770	21/11/2025
PsycInfo via Ebscohost	164	21/11/2025
Clinicaltrials.gov	75	21/11/2025
Total	3677	
Total after duplicates removed in Endnote and Covidence	1994	

Database	Medline Complete via Ebsco
Date run	21 Nov 2025

#	Query	Limiters/Expanders	Last Run Via	Results
S14	S12 NOT S13	Expanders - Apply equivalent subjects	Interface - EBSCOhost Research Databases	1,253

		Search modes - Proximity	Search Screen - Advanced Search Database - MEDLINE Complete	
S13	S5 AND S11	Limiters - Publication Type: Case Reports, Conference Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	73
S12	S5 AND S11	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	1,326
S11	S6 OR S7 OR S8 OR S9 OR S10	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	44,794
S10	XB "bone anchored hearing" or "bone conduction hearing" or BAHA	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	4,709
S9	XB contralateral routing of signal*	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	105
S8	XB "contralateral routing of sound"	Expanders - Apply equivalent	Interface - EBSCOhost Research	7,978

	or "bi-contralateral routing of sound" or CROS or BICROS	subjects Search modes - Proximity	Databases Search Screen - Advanced Search Database - MEDLINE Complete	
S7	XB ("cochlear implant*" OR "cochlear prosth*" OR "hearing prosth*" OR "hearing implant*" OR "aud* prosth*" OR "aud* implant*")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	21,461
S6	(MH "Cochlear Implants") or (MH "Bone Conduction") or (MH "Hearing Aids")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	26,696
S5	S1 OR S2 OR S3 OR S4	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	15,758
S4	XB "single sided deafness" or "single sided hearing loss" OR SSD	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	10,880
S3	XB ("asymmetric* hearing loss" OR AHL)	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	3,202

S2	XB (unilateral N1 ('hearing loss' OR deafness))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	2,276
S1	(MH "Hearing Loss, Unilateral")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	1,198

Database	Embase via Elsevier
Date run	21 Nov 2025

No.	Query	Results
#14	#12 NOT #13	1367
#13	#5 AND #11 AND ('conference abstract'/it OR 'conference paper'/it OR 'conference review'/it)	191
#12	#5 AND #11	1558
#11	#6 OR #7 OR #8 OR #9 OR #10	52463
#10	'bone anchored hearing' OR 'bone conduction hearing' OR baha	6172
#9	'contralateral routing of signal*':ab,ti	132
#8	'contralateral routing of sound':ab,ti OR 'bi-contralateral routing of sound':ab,ti OR cros:ab,ti OR bicros:ab,ti	1691
#7	'cochlear implant*':ab,ti OR 'cochlear prosth*':ab,ti OR 'hearing prosth*':ab,ti OR 'hearing implant*':ab,ti OR 'aud* prosth*':ab,ti OR 'aud* implant*':ab,ti	24487
#6	'hearing aid'/exp	42332
#5	#1 OR #2 OR #3 OR #4	14585
#4	'single sided deafness':ab,ti OR 'single sided hearing loss':ab,ti OR ssd:ab,ti	9270
#3	'asymmetric* hearing loss':ab,ti OR ahl:ab,ti	2935

#2	(unilateral NEAR/1 ('hearing loss' OR deafness)):ab,ti	1740
#1	'unilateral hearing loss'/exp	2135

Database	CINAHL Complete
Date run	21 Nov 2025

#	Query	Limiters/Expanders	Last Run Via	Results
S14	S12 NOT S13	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	770
S13	S5 AND S11	Limiters - Publication Type: Case Study Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	64
S12	S5 AND S11	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	834
S11	S6 OR S7 OR S8 OR S9 OR S10	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	24,780
S10	XB "bone anchored hearing" or "bone conduction hearing" or BAHA	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,847
S9	XB contralateral routing of signal*	Expanders - Apply equivalent	Interface - EBSCOhost Research	54

		subjects Search modes - Proximity	Databases Search Screen - Advanced Search Database - CINAHL Complete	
S8	XB "contralateral routing of sound" or "bi-contralateral routing of sound" or CROS or BICROS	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	655
S7	XB ("cochlear implant*" OR "cochlear prosth*" OR "hearing prosth*" OR "hearing implant*" OR "aud* prosth*" OR "aud* implant*")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	10,422
S6	(MH "Cochlear Implant+") OR (MH "Hearing Aids") OR (MH "Bone Conduction")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	21,433
S5	S1 OR S2 OR S3 OR S4	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	3,540
S4	XB "single sided deafness" or "single sided hearing loss" OR SSD	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	2,742

S3	XB ("asymmetric* hearing loss" OR AHL)	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	305
S2	XB (unilateral N1 ('hearing loss' OR deafness))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	722
S1	(MH "Hearing Loss, Partial")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	784

Database	PsycINFO via EBSCO
Date run	21 Nov 2025

#	Query	Limiters/Expanders	Last Run Via	Results
S11	S4 AND S10	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	164
S10	S5 OR S6 OR S7 OR S8 OR S9	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	7,189

S9	XB "bone anchored hearing" or "bone conduction hearing" or BAHA	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	176
S8	XB contralateral routing of signal*	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	19
S7	XB "contralateral routing of sound" or "bi-contralateral routing of sound" or CROS or BICROS	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	276
S6	XB ("cochlear implant*" OR "cochlear prosth*" OR "hearing prosth*" OR "hearing implant*" OR "aud* prosth*" OR "aud* implant*")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	4,237
S5	DE "Hearing Aids"	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	3,096
S4	S1 OR S2 OR S3	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	2,784

S3	XB "single sided deafness" or "single sided hearing loss" OR SSD	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	2,374
S2	XB ("asymmetric* hearing loss" OR AHL)	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	117
S1	XB (unilateral N1 ('hearing loss' OR deafness))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	331

Database	The Cochrane Library
Date run	21 Nov 2025

D	Search	Hits
#1	(unilateral NEAR/1 ('hearing loss' OR deafness)):ti,ab,kw (Word variations have been searched)	112
#2	("asymmetric hearing loss" OR "asymmetrical hearing loss" OR AHL):ti,ab,kw (Word variations have been searched)	41
#3	("single sided deafness" or "single sided hearing loss" OR SSD):ti,ab,kw (Word variations have been searched)	578
#4	#1 or #2 or #3	699
#5	((hearing or cochlear or aud*) NEAR/1 (implant* or prosth*)):ti,ab,kw (Word variations have been searched)	821
#6	("contralateral routing of sound" or "bi-contralateral routing of sound" or CROS or BICROS):ti,ab,kw (Word variations have been searched)	77
#7	(contralateral routing of signal*):ti,ab,kw (Word variations have been searched)	19
#8	("bone anchored hearing" or "bone conduction hearing" or BAHA):ti,ab,kw (Word variations have been searched)	122

#9	#5 or #6 or #7 or #8	972
#10	#4 AND #9	48

Database	Clinicaltrials.gov
Date run	21 Nov 2025

#1	Single Sided Deaf* AND cochlear implant*
#2	Single Sided Deaf* AND hearing aid*
#3	Single Sided Deafness AND cochlear implant
#4	Unilateral Hearing Loss AND cochlear implant
#5	Unilateral Hearing Loss AND (CROS or BICROS)
#6	Asymmetric Hearing Loss AND cochlear implant
#7	Asymmetric Hearing Loss AND Hearing Aid
#8	Unilateral Hearing Loss AND Hearing Aid

Research question 2

Databases	Number of results	Date searched
Medline Complete via Ebscohost	923	19/01/2026
Embase via Elsevier	739	19/01/2026
The Cochrane Library	50	19/01/2026
CINAHL Complete via Ebscohost	224	19/01/2026
PsycInfo via Ebscohost	93	19/01/2026

Clinicaltrials.gov	87	19/01/2026
Total	2116	
Total after duplicates removed in Endnote and Covidence	1513	

Database	Medline Complete via Ebsco
Date run	19 Jan 2026

#	Query	Limiters/Expanders	Last Run Via	Results
S10	S8 NOT S9	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	923
S9	S4 AND S7	Limiters - Publication Type: Case Reports, Conference Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	289
S8	S4 AND S7	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	1,212
S7	S5 OR S6	Expanders - Apply equivalent subjects	Interface - EBSCOhost Research Databases	23,044

		Search modes - Proximity	Search Screen - Advanced Search Database - MEDLINE Complete	
S6	XB ("cochlear implant*" OR "cochlear prosth*" OR "hearing prosth*" OR "hearing implant*" OR "aud* prosth*" OR "aud* implant*")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	21,610
S5	(MH "Cochlear Implants")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	14,274
S4	S1 OR S2 OR S3	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	5,576
S3	XB ("bilateral hearing impairment")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	200
S2	XB (bilateral or binaural) N1 (('hearing loss' OR deafness))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - MEDLINE Complete	3,768
S1	(MH "Hearing Loss, Bilateral")	Expanders - Apply equivalent	Interface - EBSCOhost Research	2,397

		subjects Search modes - Proximity	Databases Search Screen - Advanced Search Database - MEDLINE Complete	
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Database	Embase via Elsevier
Date run	19 Jan 2026

No.	Query	Results
#10	#8 NOT #9	739
#9	#4 AND #7 AND ('conference abstract'/it OR 'conference paper'/it OR 'conference review'/it)	77
#8	#4 AND #7	929
#7	#5 OR #6	28013
#6	'cochlear implant*':ab,ti OR 'cochlear prosth*':ab,ti OR 'hearing prosth*':ab,ti OR 'hearing implant*':ab,ti OR 'aud* prosth*':ab,ti OR 'aud* implant*':ab,ti	24403
#5	'cochlea prosthesis'/exp	22492
#4	#1 OR #2 OR #3	4264
#3	'bilateral hearing impairment':ab,ti	273
#2	((bilateral OR biaural) NEAR/1 ('hearing loss' OR deafness)):ab,ti	2465
#1	'bilateral hearing loss'/exp	2349

Database	CINAHL Complete via Ebscohost
Date run	19 Jan 2026

#	Query	Limiters/Expanders	Last Run Via	Results
S9	S7 NOT S8	Expanders - Apply equivalent	Interface - EBSCOhost Research	224

		subjects Search modes - Proximity	Databases Search Screen - Advanced Search Database - CINAHL Complete	
S8	S3 AND S6	Limiters - Publication Type: Case Study Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	80
S7	S3 AND S6	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	304
S6	S4 OR S5	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	13,456
S5	XB ("cochlear implant*" OR "cochlear prosth*" OR "hearing prosth*" OR "hearing implant*" OR "aud* prosth*" OR "aud* implant*")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	10,868
S4	(MH "Cochlear Implant+")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	11,155

S3	S1 OR S2	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,055
S2	XB ("bilateral hearing impairment")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	53
S1	XB (bilateral or biaural) N1 ('hearing loss' OR deafness))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - CINAHL Complete	1,012

Database		PsycINFO		
Date run		19 Jan 2026		
#	Query	Limiters/Expanders	Last Run Via	Results
S7	S3 AND S6	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	93
S6	S4 OR S5	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	4,506

S5	XB ("cochlear implant*" OR "cochlear prosth*" OR "hearing prosth*" OR "hearing implant*" OR "aud* prosth*" OR "aud* implant*")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	4,258
S4	DE "Cochlear Implants"	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	3,785
S3	S1 OR S2	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	478
S2	XB ("bilateral hearing impairment")	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	26
S1	XB (bilateral or binaural) N1 ('hearing loss' OR deafness))	Expanders - Apply equivalent subjects Search modes - Proximity	Interface - EBSCOhost Research Databases Search Screen - Advanced Search Database - APA PsycInfo	456

Database	The Cochrane Library
Date run	19 Jan 2026

ID	Search	Hits
#1	((bilateral OR biaural) NEAR/1 ('hearing loss' OR deafness)):ti,ab,kw (Word variations have been searched)	206
#2	("bilateral hearing impairment"):ti,ab,kw (Word variations have been searched)	16
#3	#1 or #2	206
#4	((hearing or cochlear or aud*) NEAR/1 (implant* or prosth*)):ti,ab,kw (Word variations have been searched)	827
#5	#3 and #4	50

Database	ClinicalTrials.gov
Date run	19 Jan 2026
Search Strategies	#1 Bilateral Hearing Loss AND cochlear implant

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