

Hearing Aids & Implants

Disclaimer

Clinical guidelines are developed and adopted to establish evidence-based clinical criteria for utilization management decisions. Clinical guidelines are applicable according to policy and plan type. The Plan may delegate utilization management decisions of certain services to third parties who may develop and adopt their own clinical criteria.

Coverage of services is subject to the terms, conditions, and limitations of a member's policy, as well as applicable state and federal law. Clinical guidelines are also subject to in-force criteria such as the Centers for Medicare & Medicaid Services (CMS) national coverage determination (NCD) or local coverage determination (LCD) for Medicare Advantage plans. Please refer to the member's policy documents (e.g., Certificate/Evidence of Coverage, Schedule of Benefits, Plan Formulary) or contact the Plan to confirm coverage.

Summary

The Plan members who have a hearing impairment may be eligible for a hearing aid depending on their plan. Hearing aids are amplifying devices designed to help compensate for hearing loss, and come in several different types. These include devices outside the ear or in the ear canal that bring sound more effectively into the eardrum; devices that attach to bones in the ear to help transmit sound through vibration; and special devices that can be implanted in the ear or skull that help sound travel through the ear and reach the brain. Certain hearing aids are not appropriate for all types of hearing impairment, and special hearing tests should be done to determine the degree of hearing loss and see if a device may be helpful. The device must be prescribed by a licensed physician or audiologist.

Definitions

“Air-Conduction (Standard Wearable) Hearing Aids” include devices that are placed outside the ear or in the external ear canal which help amplify sound through the ear canal to the eardrum.

“Bone-Anchored Hearing Aids” are surgically implanted prosthetic devices, which transmit sound through bone to the inner ear, bypassing the external auditory canal and middle ear.

“Cochlear Implants” are surgically implanted, electronic medical devices, that do the work of damaged parts of the inner ear and provide sound signals to the brain. They require an intact auditory nerve to transmit signals to the brainstem.

“Hybrid cochlear Implants” are used in individuals with some preserved low frequency hearing. These function by combining a partial cochlear implant with an external hearing aid.

“Auditory brainstem implants” (ABI) are surgically implanted devices that stimulate the brainstem directly in response to external sounds. These devices are used most often for individuals with loss of function of the auditory nerve that transmits sound information from the cochlea to the brainstem.

Clinical Indications

Air-Conduction (Standard Wearable) Hearing Aids

(Please see the member’s plan benefits)

The Plan considers air-conduction (AC) hearing aids from a network hearing aid provider medically necessary. AC hearing aids are medically necessary when ALL of the following criteria are met:

1. A prescription or medical clearance from a licensed provider, with documentation that hearing loss has been medically evaluated AND documentation of a plan for hearing aid test and fitting with a licensed audiologist. Furthermore, a statement that the member is able to utilize the device properly; *and*
2. At least ONE of the following:
 - a. Sensorineural hearing loss at a threshold of greater than 30 dB HL at any two frequencies of 500, 1,000, 2,000, 3,000, and 4,000 Hz in the ear(s) to be aided for adult members; *or*
 - b. Pure tone average sensorineural threshold measured at frequencies of 500, 1,000, 2,000, 3,000, and 4,000 Hz greater than or equal to 26 dB HL in the ear(s) to be aided for adult members ; *or*
 - c. Sensorineural hearing loss at a threshold of 25 dB HL or greater at frequency of at least 500 Hz in the ear(s) to be aided for members under the age of majority. Furthermore, a medical clearance must be obtained from a health care provider within 6 months to hearing aid fitting.

Bone-Anchored Hearing Aids

(Please see the member’s plan benefits)

The Plan considers bone-anchored hearing aids (BAHA) provided by a network hearing aid provider medically necessary. BAHA are medically necessary when ALL of the following criteria are met:

1. The member is age 5 years or older; *and*
 - a. Note: Children under the age of 5 may be eligible for a soft headband with a partially or fully-implanted transcutaneous bone conduction hearing aid when other criteria are met.
2. Hearing loss is unilateral or bilateral; *and*
3. Hearing loss is either of the following:
 - a. Conductive or mixed (both conductive and sensorineural) without improvement after medical or surgical interventions; *or*
 - b. Unilateral pure sensorineural; *and*

4. Use of conventional AC hearing aids have failed or are not appropriate due to:
 - a. Congenital or surgically induced malformations (e.g., atresia) of the external ear canal or middle ear; *or*
 - b. Chronic external otitis or otitis media; *or*
 - c. Tumors of the external canal and/or tympanic cavity; *or*
 - d. Dermatitis of the external canal; *or*
 - e. Other conditions for which an AC hearing aid is contraindicated; *and*
5. Pure tone average bone conduction hearing threshold measured at 500, 1,000, 2,000, and 3,000 Hz less than or equal to level appropriate for model to be implanted in the affected ear(s) such as thresholds of 45, 55, or 65 dB HL depending on model of device. The requested device must be FDA approved; *and*
6. If a bilateral implant is requested, members should meet the above audiologic criteria, the device must be FDA approved, and have symmetrically conductive or mixed hearing loss as defined by:
 - a. 10 dB average difference between ears measured at 500, 1,000, 2,000, 3,000 and/or 4,000 Hz, or less than a 15 dB difference at individual frequencies; *and*
7. A prescription or medical clearance from a licensed provider with documentation that hearing loss has been medically evaluated AND documentation of a plan for hearing aid testing and fitting with a licensed audiologist. Furthermore, a statement that the member is able to utilize the device properly.

Cochlear Implants (For hybrid cochlear implants, please see the section below)

(Please see the member's plan benefits)

The Plan considers cochlear implants medically necessary when the device is FDA approved and ALL of the following criteria are met:

Severe to Profound Bilateral Sensorineural Hearing Loss (for asymmetric or single-sided deafness please see criteria below):

1. For children up to 18 years (ALL of the following):
 - a. Severe to profound bilateral sensorineural hearing loss as measured by the unaided pure-tone average threshold that is greater than or equal to 70 dB (severe) (e.g., measured at 500, 1,000, 2,000 Hz, etc.); *and*
 - b. For severe to profound bilateral sensorineural hearing loss, a 1-month hearing aid trial has been undertaken by the child without previous experience with hearing aids with limited benefit as defined by failure to achieve developmentally appropriate auditory milestones on a validated, age appropriate measure; *and*
 - i. *Note:* Members with complete or total hearing loss (95 dB or greater) do not require a hearing aid trial.
 - c. No medical contraindications to cochlear implantation exist, as documented on MRI or CT scan when applicable, including but not limited to:
 - i. Dysfunctional acoustic nerve; *or*
 - ii. Cochlear aplasia; *or*

- iii. Complete labyrinthine aplasia; *or*
 - iv. Absent cochlear nerve; *or*
 - v. Central auditory dysfunction (e.g. cortical deafness); *or*
 - vi. Tympanic membrane perforation; *or*
 - vii. Active inner or middle ear infection; *and*
- d. Family support and motivation to participate in post-implant rehabilitation; *or*
- 2. For adults aged 18 years and older, the initial unilateral cochlear implant (ALL of the following):
 - a. Severe or profound bilateral sensorineural hearing loss as measured by the pure-tone average threshold that is greater than or equal to 70 dB (measured at 500, 1,000, 2,000 Hz, etc.); *and*
 - b. Limited benefit from binaural hearing aids as defined by "open-set sentence recognition" (e.g., HINT) of 50% or less in the best-aided condition; *and*
 - c. No medical contraindications to cochlear implantation exist, as documented on MRI or CT scan when applicable, including but not limited to:
 - i. Dysfunctional acoustic nerve; *or*
 - ii. Cochlear aplasia; *or*
 - iii. Complete labyrinthine aplasia; *or*
 - iv. Absent cochlear nerve; *or*
 - v. Acoustic nerve lesion; *or*
 - vi. Central auditory dysfunction (e.g. cortical deafness); *or*
 - vii. Tympanic membrane perforation; *or*
 - viii. Active inner or middle ear infection; *and*
 - d. Member is motivated to participate in post-implant rehabilitation; *or*
- 3. For adults aged 18 years and older, the second (sequential) cochlear implant (ALL of the following):
 - a. Original implant on the opposite side is functioning successfully; *and*
 - b. Medical contraindication criteria in "2C" are ruled out for the unimplanted side; *and*
 - c. There continues to be zero or a minimal benefit from a hearing aid in the unimplanted ear; *and*
- 4. For all members, a prescription or medical clearance from a licensed provider with documentation that hearing loss has been medically evaluated AND documentation of a plan for implant testing and fitting with a licensed audiologist. Furthermore, a statement that the member is motivated to participate in post-implant rehabilitation.

Asymmetric Sensorineural Hearing Loss, or Severe to Profound Single-Sided Deafness (SSD)/Unilateral Sensorineural Hearing Loss (*Please see the member's plan benefits*):

The Plan considers cochlear implants medically necessary when the device is FDA approved for the age range and ALL of the following criteria are met:

- 1. The member meets one of the diagnosis:
 - a. Asymmetric sensorineural hearing loss, as defined by hearing loss in both ears (threshold of 20.0 dB or greater) but level of loss is different in each ear by 15dB; *or*

- b. Unilateral Sensorineural Hearing Loss, Single-Sided Deafness (SSD) as defined by when one ear hearing normal (threshold < 20.0 dB), but the other ear has severe, profound, to complete hearing loss with a threshold greater than or equal to 70 dB; *and*
- 2. The member conducts a hearing aid trial:
 - a. For children, at least 1-month hearing aid trial has been undertaken without previous experience with a hearing aid in the ear to be implanted with limited benefit as defined by failure to achieve developmentally appropriate auditory milestones on a validated, age appropriate measure; *or*
 - b. For adults 18 years or older, at least 1-month hearing aid trial has been undertaken and limited benefit from hearing aid in the ear to be implanted as defined by "open-set sentence recognition" (e.g., HINT) of 50% or less in the best-aided condition; *and*
- 3. No medical contraindications to the cochlear implantation exist:
 - a. Acoustic nerve lesion; *or*
 - b. Dysfunctional acoustic nerve; *or*
 - c. Cochlear aplasia; *or*
 - d. Complete labyrinthine aplasia; *or*
 - e. Absent cochlear nerve; *or*
 - f. Central auditory dysfunction (e.g. cortical deafness); *or*
 - g. Tympanic membrane perforation; *or*
 - h. Active inner or middle ear infection.

Depending on your individual plan, the Plan considers hybrid cochlear implants medically necessary only when ALL of the following criteria are met:

- 1. The member is age 18 years or older; *and*
- 2. Severe or profound bilateral sensorineural hearing loss of high-frequency sounds in both ears, but can still hear low-frequency sounds with or without a hearing aid; *and*
- 3. ALL of the following hearing thresholds are met:
 - a. Low frequency hearing thresholds of no worse than 60 dB up to and including 500 Hz (averaged over 125, 250, and 500 Hz) in the ear selected for implantation; *and*
 - b. Severe to profound mid-to-high frequency hearing loss (threshold average of greater than or equal to 75 dB measured at 2000, 3000, and 4000 Hz) in the ear to be implanted; *and*
 - c. Moderately severe to profound mid-to-high frequency hearing loss (threshold average greater than or equal to 60 dB measured at 2000, 3000, and 4000 Hz) in the contralateral ear; *and*
 - d. Aided consonant-nucleus-consonant word recognition score from 0% to 60% in the ear to be implanted in the preoperative aided condition; *and*
 - e. Aided consonant-nucleus-consonant word recognition score in the contralateral ear will be equal to or better than that of the ear to be implanted but less than 80% correct.
- 4. Limited benefit from trial of binaural hearing aids; *and*
- 5. No medical contraindications to the cochlear implantation exist:

- a. Acoustic nerve lesion; *or*
 - b. Dysfunctional acoustic nerve; *or*
 - c. Cochlear aplasia; *or*
 - d. Complete labyrinthine aplasia; *or*
 - e. Absent cochlear nerve; *or*
 - f. Central auditory dysfunction (e.g. cortical deafness); *or*
 - g. Tympanic membrane perforation; *or*
 - h. Active inner or middle ear infection; *and*
6. A prescription or medical clearance from a licensed provider with documentation that hearing loss has been medically evaluated AND documentation of a plan for implant testing and fitting with a licensed audiologist. Furthermore, a statement that the member is motivated to participate in post-implant rehabilitation.

Auditory Brainstem Implant (ABI)

The Plan considers auditory brainstem implants (ABI) medically necessary when ALL of the following criteria are met:

1. Member is 12 years of age or older; *and*
2. Diagnosis of neurofibromatosis type 2 with ANY of the following
 - a. At least 70 dB hearing loss due to bilateral functional loss of the auditory nerves; *or*
 - b. Planned surgery that is reasonably expected to result in bilateral loss of function of the auditory nerves and complete deafness, where the implant will be placed at the time of surgery; *and*
3. Limited benefit from trial of binaural hearing aids (in cases of an intact auditory nerve(s)); *and*
4. A prescription or medical clearance from a licensed provider with documentation that hearing loss has been medically evaluated AND documentation of a plan for implant testing and fitting with a licensed audiologist. Furthermore, a statement that the member is motivated to participate in post-implant rehabilitation.

Additional Medically Necessary Services include:

- Comprehensive hearing assessment; *or*
- Charges for associated fitting and testing; *or*
- Applicable dispensing fees; *or*
- Ear molds and 1 headband per year for bone-anchored hearing implants or bone-conduction hearing aids, if applicable.

Re-implantation, Removal, Replacements, or Upgrades

The Plan considers re-implantation, removal, replacements, or upgrades for cochlear implants, hybrid cochlear implants, auditory brainstem implants medically necessary when any of the following criteria are met:

1. Re-implantation or removal for internal device due to failure or malfunction of device; *or*

2. Replacement for external device or components due to failure or malfunction when the warranty has expired or cannot be repaired; *or*
3. Re-implantation, removal, or replacement needed due to medical complications related to the implant site; *or*
4. An upgrade for devices or components meet medical necessity when BOTH of the following are met:
 - a. There is a change in the member's condition and the current device no longer meets the individual's needs or the device is interfering with activities of daily living; *and*
 - b. The member meets the criteria above for an initial request.

The plan considers replacements or upgrades for hearing aids medically necessary when either of the following criteria are met (*please refer to the member's plan documents for benefits*):

1. Hearing aids (Air-Conduction or Bone-Anchored)
 - a. Replacement for device failure or malfunction when the warranty has expired or cannot be repaired; *or*
 - b. An upgrade for devices or components meet medical necessity when BOTH of the following are met:
 - i. There is a change in the member's condition and the current device no longer meets the individual's needs or the device is interfering with activities of daily living; *and*
 - ii. The member meets the criteria above for an initial request.

Experimental or Investigational / Not Medically Necessary

- The Plan considers upgrades to hearing aids, external devices or components for implants NOT medically necessary when the medical necessity criteria are not met, current devices are functional, under warranty, or the request for newer technology is solely based on convenience or a desired model change.
- The Plan considers the following alternative listening devices [e.g., advanced hearable devices, smartphone/wireless products, and non-conventional hearing devices, Personal Sound Amplification Products (PSAPs)] not medically necessary.
- The Plan considers the use of BAHA for bilateral pure sensorineural hearing loss experimental and investigational.
- Devices that are considered experimental or investigational, such as:
 - Free-floating piezoelectric microphone
 - Implantable and semi-implantable hearing aids of the middle ear
 - *Rationale: There is limited evidence on the effectiveness and safety of middle ear implants. A meta-analysis found zero randomized studies, and that the general quality of the existing studies was poor and with short-term follow up. Other meta-analyses have largely reflected these findings and the general consensus has been that further long-term data is required.*
 - Intra-oral bone conduction hearing aids (e.g., SoundBite Hearing System)

- The Plan considers the following auditory brainstem implants (ABI) experimental and investigational:
 - Penetrating electrode auditory brainstem implants (PABI)
 - *Rationale: The evidence for PABI is limited to single institution retrospective experiences and there have been no established data comparing this technique to traditional ABI. Furthermore, this approach has not yet been FDA approved, limiting application to clinical trial study.*
 - ABI in children under the age of 12 years old
 - *Rationale: ABI has not yet been fully evaluated in children under the age of 12, and at the present time is not FDA approved in that population. There are open clinical trials looking at the use of ABI in this population, however the current data is limited in that it is retrospective or in small case-studies.*
 - Bilateral use of an auditory brainstem implant.
 - *Rationale: The evidence for bilateral use of auditory brainstem implant is limited. Additional research is needed to demonstrate improvement with second auditory brainstem implants.*

Applicable Billing Codes (HCPCS/CPT Codes)

Codes considered medically necessary if clinical criteria are met:

Table 1	
CPT/HCPCS Codes considered medically necessary if criteria are met:	
Code	Description
69501	Transmastoid antrotomy (simple mastoidectomy)
69502	Mastoidectomy; complete
69505	Mastoidectomy; modified radical
69511	Mastoidectomy; radical
69530	Petrous apicectomy including radical mastoidectomy
69535	Resection temporal bone, external approach
69540	Excision aural polyp
69550	Excision aural glomus tumor; transcanal
69552	Excision aural glomus tumor; transmastoid
69554	Excision aural glomus tumor; extended (extratemporal)
69601	Revision mastoidectomy; resulting in complete mastoidectomy
69602	Revision mastoidectomy; resulting in modified radical mastoidectomy

69603	Revision mastoidectomy; resulting in radical mastoidectomy
69604	Revision mastoidectomy; resulting in tympanoplasty
69610	Tympanic membrane repair, with or without site preparation of perforation for closure, with or without patch
69620	Myringoplasty (surgery confined to drumhead and donor area)
69631	Tympanoplasty without mastoidectomy (including canalplasty, atticotomy and/or middle ear surgery), initial or revision; without ossicular chain reconstruction
69632	Tympanoplasty without mastoidectomy (including canalplasty, atticotomy and/or middle ear surgery), initial or revision; with ossicular chain reconstruction (eg, postfenestration)
69633	Tympanoplasty without mastoidectomy (including canalplasty, atticotomy and/or middle ear surgery), initial or revision; with ossicular chain reconstruction and synthetic prosthesis (eg, partial ossicular replacement prosthesis [PORP], total ossicular replacement prosthesis [TORP])
69635	Tympanoplasty with antrotomy or mastoidotomy
69636	Tympanoplasty with antrotomy or mastoidotomy (including canalplasty, atticotomy, middle ear surgery, and/or tympanic membrane repair); with ossicular chain reconstruction
69637	Tympanoplasty with antrotomy or mastoidotomy (including canalplasty, atticotomy, middle ear surgery, and/or tympanic membrane repair); with ossicular chain reconstruction and synthetic prosthesis (eg, partial ossicular replacement prosthesis [PORP], total ossicular replacement prosthesis [TORP])
69641	Tympanoplasty with mastoidectomy (including canalplasty, middle ear surgery, tympanic membrane repair); without ossicular chain reconstruction
69642	Tympanoplasty with mastoidectomy (including canalplasty, middle ear surgery, tympanic membrane repair); with ossicular chain reconstruction
69643	Tympanoplasty with mastoidectomy (including canalplasty, middle ear surgery, tympanic membrane repair); with intact or reconstructed wall, without ossicular chain reconstruction
69644	Tympanoplasty with mastoidectomy (including canalplasty, middle ear surgery, tympanic membrane repair); with intact or reconstructed canal wall, with ossicular chain reconstruction
69645	Tympanoplasty with mastoidectomy (including canalplasty, middle ear surgery, tympanic membrane repair); radical or complete, without ossicular chain reconstruction

69646	Tympanoplasty with mastoidectomy (including canalplasty, middle ear surgery, tympanic membrane repair); radical or complete, with ossicular chain reconstruction
69650	Stapes mobilization
69660	Stapedectomy or stapedotomy with reestablishment of ossicular continuity, with or without use of foreign material
69661	Stapedectomy or stapedotomy with reestablishment of ossicular continuity, with or without use of foreign material; with footplate drill out
69662	Revision of stapedectomy or stapedotomy
69666	Repair oval window fistula
69667	Repair round window fistula
69670	Mastoid obliteration (separate procedure)
69676	Tympanic neurectomy
69710	Implantation or replacement of electromagnetic bone conduction hearing device in temporal bone
69711	Removal or repair of electromagnetic bone conduction hearing device in temporal bone
69714	Implantation, osseointegrated implant, skull; with percutaneous attachment to external speech processor
69716	Implantation, osseointegrated implant, skull; with magnetic transcutaneous attachment to external speech processor, within the mastoid and/or resulting in removal of less than 100 sq mm surface area of bone deep to the outer cranial cortex
69717	Replacement (including removal of existing device), osseointegrated implant, skull; with percutaneous attachment to external speech processor
69719	Replacement (including removal of existing device), osseointegrated implant, skull; with magnetic transcutaneous attachment to external speech processor, within the mastoid and/or involving a bony defect less than 100 sq mm surface area of bone deep to the outer cranial cortex
69726	Removal, entire osseointegrated implant, skull; with percutaneous attachment to external speech processor
69727	Removal, entire osseointegrated implant, skull; with magnetic transcutaneous attachment to external speech processor, within the mastoid and/or involving a bony defect less than 100 sq mm surface area of bone deep to the outer cranial cortex

69728	Removal, entire osseointegrated implant, skull; with magnetic transcutaneous attachment to external speech processor, outside the mastoid and involving a bony defect greater than or equal to 100 sq mm surface area of bone deep to the outer cranial cortex
69729	Implantation, osseointegrated implant, skull; with magnetic transcutaneous attachment to external speech processor, outside of the mastoid and resulting in removal of greater than or equal to 100 sq mm surface area of bone deep to the outer cranial cortex
69730	Replacement (including removal of existing device), osseointegrated implant, skull; with magnetic transcutaneous attachment to external speech processor, outside the mastoid and involving a bony defect greater than or equal to 100 sq mm surface area of bone deep to the outer cranial cortex
69930	Cochlear device implantation, with or without mastoidectomy
92550	Tympanometry and reflex threshold measurements
92551	Screening test, pure tone, air only
92552	Pure tone audiometry (threshold); air only
92553	Pure tone audiometry (threshold); air and bone
92555	Speech audiometry threshold
92556	Speech audiometry threshold; with speech recognition
92557	Comprehensive audiometry threshold evaluation and speech recognition
92558	Evoked otoacoustic emissions, screening (qualitative measurement of distortion product or transient evoked otoacoustic emissions), automated analysis
92567	Tympanometry (impedance testing)
92568	Acoustic reflex testing, threshold
92579	Visual reinforcement audiometry (VRA)
92582	Conditioning play audiometry
92583	Select picture audiometry
92584	Electrocochleography
92587	Distortion product evoked otoacoustic emissions; limited evaluation (to confirm the presence or absence of hearing disorder, 3-6 frequencies) or transient evoked otoacoustic emissions, with interpretation and report
92590	Hearing aid examination and selection; monaural
92591	Hearing aid examination and selection; binaural

92592	Hearing aid check; monaural
92593	Hearing aid check; binaural
92594	Electroacoustic evaluation for hearing aid; monaural
92595	Electroacoustic evaluation for hearing aid; binaural
92601	Diagnostic analysis of cochlear implant, patient younger than 7 years of age; with programming
92602	Diagnostic analysis of cochlear implant, patient younger than 7 years of age, subsequent reprogramming
92603	Diagnostic analysis of cochlear implant, age 7 years or older; with programming
92604	Diagnostic analysis of cochlear implant, age 7 years or older; subsequent reprogramming
92626	Evaluation of auditory function for surgically implanted device(s) candidacy or postoperative status of a surgically implanted device(s); first hour
92627	Evaluation of auditory function for surgically implanted device(s) candidacy or postoperative status of a surgically implanted device(s); each additional 15 minutes (List separately in addition to code for primary procedure)
92630	Auditory rehabilitation; prelingual hearing loss
92633	Auditory rehabilitation; postlingual hearing loss
92640	Diagnostic analysis with programming of auditory brainstem implant, per hour
92650	Auditory evoked potentials; screening of auditory potential with broadband stimuli, automated analysis
92651	Auditory evoked potentials; for hearing status determination, broadband stimuli, with interpretation and report
L8614	Cochlear device, includes all internal and external components
L8615	Headset/headpiece for use with cochlear implant device, replacement
L8616	Microphone for use with cochlear implant device, replacement
L8617	Transmitting coil for use with cochlear implant device, replacement
L8618	Transmitter cable for use with cochlear implant device or auditory osseointegrated device, replacement

L8619	Cochlear implant external speech processor and controller, integrated system, replacement
L8621	Zinc air battery for use with cochlear implant device and auditory osseointegrated sound processors, replacement, each
L8622	Alkaline battery for use with cochlear implant device, any size, replacement, each
L8623	Lithium ion battery for use with cochlear implant device speech processor, other than ear level, replacement, each
L8624	Lithium ion battery for use with cochlear implant or auditory osseointegrated device speech processor, ear level, replacement, each
L8625	External recharging system for battery for use with cochlear implant or auditory osseointegrated device, replacement only, each
L8627	Cochlear implant, external speech processor, component, replacement
L8628	Cochlear implant, external controller component, replacement
L8629	Transmitting coil and cable, integrated, for use with cochlear implant device, replacement
L8690	Auditory osseointegrated device, includes all internal and external components
L8691	Auditory osseointegrated device, external sound processor, replacement
L8692	Auditory osseointegrated device, external sound processor; used without osseointegration, body worn, includes headband or other means of external attachment
L8693	Auditory osseointegrated device, abutment, any length, replacement only
L8694	Auditory osseointegrated device, transducer/actuator, replacement only, each
L8699	Prosthetic implant, not otherwise specified <ul style="list-style-type: none"> • <u>Due to multiple prosthetic implants represented by this CPT/HCPCS code, specific indications are indicated:</u> • When this code is billed for a hybrid cochlear device, including all internal and external components, it is considered medically necessary
S2235	Implantation of auditory brain stem implant
V5008	Hearing screening

V5010	Assessment for hearing aid
V5011	Fitting/orientation/checking of hearing aid
V5014	Repair/modification of a hearing aid
V5020	Conformity evaluation
V5030	Hearing aid, monaural, body worn, air conduction
V5040	Hearing aid, monaural, body worn, bone conduction
V5050	Hearing aid, monaural, in the ear
V5060	Hearing aid, monaural, behind the ear
V5070	Glasses, air conduction
V5080	Glasses, bone conduction
V5090	Dispensing fee, unspecified hearing aid
V5100	Hearing aid, bilateral, body worn
V5110	Dispensing fee, bilateral
V5120	Binaural, body
V5130	Binaural, in the ear
V5140	Binaural, behind the ear
V5150	Binaural, glasses
V5160	Dispensing fee, binaural
V5171	Hearing aid, contralateral routing device, monaural, in the ear (ite)
V5172	Hearing aid, contralateral routing device, monaural, in the canal (itc)
V5181	Hearing aid, contralateral routing device, monaural, behind the ear (bte)
V5190	Hearing aid, contralateral routing, monaural, glasses

V5200	Dispensing fee, contralateral, monaural
V5211	Hearing aid, contralateral routing system, binaural, ite/ite
V5212	Hearing aid, contralateral routing system, binaural, ite/itc
V5213	Hearing aid, contralateral routing system, binaural, ite/bte
V5214	Hearing aid, contralateral routing system, binaural, itc/itc
V5215	Hearing aid, contralateral routing system, binaural, itc/bte
V5221	Hearing aid, contralateral routing system, binaural, bte/bte
V5230	Hearing aid, contralateral routing system, binaural, glasses
V5240	Dispensing fee, contralateral routing system, binaural
V5241	Dispensing fee, monaural hearing aid, any type
V5242	Hearing aid, analog, monaural, cic (completely in the ear canal)
V5243	Hearing aid, analog, monaural, itc (in the canal)
V5244	Hearing aid, digitally programmable analog, monaural, cic
V5245	Hearing aid, digitally programmable, analog, monaural, itc
V5246	Hearing aid, digitally programmable analog, monaural, ite (in the ear)
V5247	Hearing aid, digitally programmable analog, monaural, bte (behind the ear)
V5248	Hearing aid, analog, binaural, cic
V5249	Hearing aid, analog, binaural, itc
V5250	Hearing aid, digitally programmable analog, binaural, cic
V5251	Hearing aid, digitally programmable analog, binaural, itc
V5252	Hearing aid, digitally programmable, binaural, ite
V5253	Hearing aid, digitally programmable, binaural, bte

V5254	Hearing aid, digital, monaural, cic
V5255	Hearing aid, digital, monaural, itc
V5256	Hearing aid, digital, monaural, ite
V5257	Hearing aid, digital, monaural, bte
V5258	Hearing aid, digital, binaural, cic
V5259	Hearing aid, digital, binaural, itc
V5260	Hearing aid, digital, binaural, ite
V5261	Hearing aid, digital, binaural, bte
V5262	Hearing aid, disposable, any type, monaural
V5263	Hearing aid, disposable, any type, binaural
V5264	Ear mold/insert, not disposable, any type
V5265	Ear mold/insert, disposable, any type
V5266	Battery for use in hearing device
V5267	Hearing aid or assistive listening device/supplies/accessories, not otherwise specified
V5273	Assistive listening device, for use with cochlear implant
V5275	Ear impression, each
V5298	Hearing aid, not otherwise classified
V5299	Hearing service, miscellaneous
ICD-10 codes considered medically necessary if criteria are met:	
<i>Code</i>	<i>Description</i>
H90.0	Conductive hearing loss, bilateral

H90.11	Conductive hearing loss, unilateral, right ear, with unrestricted hearing on the contralateral side
H90.12	Conductive hearing loss, unilateral, left ear, with unrestricted hearing on the contralateral side
H90.3	Sensorineural hearing loss, bilateral
H90.41	Sensorineural hearing loss, unilateral, right ear, with unrestricted hearing on the contralateral side
H90.42	Sensorineural hearing loss, unilateral, left ear, with unrestricted hearing on the contralateral side
H90.5	Unspecified sensorineural hearing loss
H90.6	Mixed conductive and sensorineural hearing loss, bilateral
H90.71	Mixed conductive and sensorineural hearing loss, unilateral, right ear, with unrestricted hearing on the contralateral side
H90.72	Mixed conductive and sensorineural hearing loss, unilateral, left ear, with unrestricted hearing on the contralateral side
H90.8	Mixed conductive and sensorineural hearing loss, unspecified
H90.A11	Conductive hearing loss, unilateral, right ear with restricted hearing on the contralateral side
H90.A12	Conductive hearing loss, unilateral, left ear with restricted hearing on the contralateral side
H90.A21	Sensorineural hearing loss, unilateral, right ear, with restricted hearing on the contralateral side
H90.A22	Sensorineural hearing loss, unilateral, left ear, with restricted hearing on the contralateral side
H90.A31	Mixed conductive and sensorineural hearing loss, unilateral, right ear with restricted hearing on the contralateral side
H90.A32	Mixed conductive and sensorineural hearing loss, unilateral, left ear with restricted hearing on the contralateral side

Q16.1	Congenital absence, atresia and stricture of auditory canal (external)
Q85.02	Neurofibromatosis, type 2

Codes not considered medically necessary for indications listed in this Guideline:

Table 2	
<i>Code</i>	<i>Description</i>
69799	Unlisted procedure, middle ear
S2230	Implantation of magnetic component of semi-implantable hearing device on ossicles in middle ear
V5095	Semi-implantable middle ear hearing prosthesis
V5298	Hearing aid, not otherwise classified

References

Air-Conduction Hearing Aids

1. American Academy of Audiology. (April 2023). Standards of Practice for Audiology. www.audiology.org Retrieved from <https://www.audiology.org/practice-guideline/standards-of-practice-for-audiology/>
2. American Academy of Audiology. (April 2023). Scope of Practice. www.audiology.org Retrieved from https://www.audiology.org/wp-content/uploads/2023/04/Scope-of-Practice_2023.pdf
3. American Academy of Otolaryngology-Head and Neck Surgery. (April 16, 2021). AAO16: Age-related Hearing Loss: Audiometric Evaluation. www.entnet.org. <https://www.entnet.org/resource/aa016-age-related-hearing-loss-audiometric-evaluation/>
4. American Speech-Language-Hearing Association (n.d.). Hearing Aids for Adults (Practice Portal). Retrieved Nov 14, 2022 from www.asha.org/Practice-Portal/Professional-Issues/Hearing-Aids-For-Adults/.
5. American Speech-Language-Hearing Association (n.d.). Hearing Aids for Children (Practice Portal). Retrieved Nov, 14, 2022, from www.asha.org/practice-portal/professional-issues/hearing-aids-for-children/.
6. Aural Rehabilitation Clinical Practice Guideline Development Panel, Basura, G., Cienkowski, K., Hamlin, L., Ray, C., Rutherford, C., ... & Ambrose, J. (2023). American Speech-Language-Hearing Association clinical practice guideline on aural rehabilitation for adults with hearing loss. *American Journal of Audiology*, 32(1), 1-51.

7. Chandrasekhar, S. S., Tsai Do, B. S., Schwartz, S. R., Bontempo, L. J., Faucett, E. A., Finestone, S. A., ... & Satterfield, L. (2019). Clinical practice guideline: sudden hearing loss (update). *Otolaryngology–Head and Neck Surgery*, 161(1_suppl), S1-S45.
8. Chen C-H, Huang C-Y, Chen H-L, et al. (April 2022). Comparison of personal sound amplification products and conventional hearing aids for patients with hearing loss: A systematic review with meta-analysis. *The Lancet Discovery Science*. 46(101378). DOI:<https://doi.org/10.1016/j.eclinm.2022.101378>
9. American Speech-Language-Hearing Association (n.d.). Candidacy for Amplification in Children With Hearing Loss: A Review of Guidelines and Recommendations. Retrieved Nov 14, 2022 from https://pubs.asha.org/doi/10.1044/2019_AJA-19-0061
10. Tysome JR, Moorthy R, Lee A, Jiang D, O'Connor AF. Systematic review of middle ear implants: do they improve hearing as much as conventional hearing AIDS? *Otology and Neurotology* 2010;31(9):1369-75.
11. Klein K, Nardelli A, Stafinski T. A systematic review of the safety and effectiveness of fully implantable middle ear hearing devices: the carina and esteem systems. *Otology and Neurotology* 2012;33(6):916-21.
12. Shinnors MJ, Hilton CW, Levine SC. Implantable hearing devices. *Current Opinion in Otolaryngology and Head and Neck Surgery* 2008;16(5):416-9.
13. Martin C, et al. European results with totally implantable carina placed on the round window: 2-year follow-up. *Otology and Neurotology* 2009;30(8):1196-203.
14. Verhaert N, Desloovere C, Wouters J. Acoustic hearing implants for mixed hearing loss: a systematic review. *Otology and Neurotology* 2013;34(7):1201-9.
15. Backous DD, Duke W. Implantable middle ear hearing devices: current state of technology and market challenges. *Current Opinion in Otolaryngology and Head and Neck Surgery* 2006;14(5):314-8.
16. Jenkins HA, et al. U.S. Phase I preliminary results of use of the Otologics MET Fully-Implantable Ossicular Stimulator. *Otolaryngology Head and Neck Surgery* 2007;137(2):206-12.
17. Cremers CW, et al. International consensus on Vibrant Soundbridge implantation in children and adolescents. *International Journal of Pediatric Otorhinolaryngology* 2010;74(11):1267-9.
18. Kulkarni K, Hartley DE. Recent advances in hearing restoration. *Journal of the Royal Society of Medicine* 2008;101(3):116-24.
19. Maidment, DW, et al. Effectiveness of alternative listening devices to conventional hearing aids for adults with hearing loss: a systematic review protocol. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5093370/>. Accessed January 4, 2018.
20. U.S. Food & Drug Administration. CFR - Code of Federal Regulations Title 21, Volume 8. TITLE 21--FOOD AND DRUGS CHAPTER I--FOOD AND DRUG ADMINISTRATION DEPARTMENT OF HEALTH AND HUMAN SERVICES SUBCHAPTER H - MEDICAL DEVICES. Last updated July 20, 2022. Retrieved from: <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/CFRSearch.cfm?fr=801.421>

Bone Anchored Hearing Aids

1. American Speech- Language-Hearing Association. Guidelines for manual pure-tone threshold audiometry. Working Group on Manual Pure-Tone Threshold Audiometry. Last revised 2005.
2. American Academy of Otolaryngology- Head & Neck Surgery. Position Statement: Hearing aids. Last revised February 13, 2021.
3. American Academy of Otolaryngology Head & Neck Surgery. Position Statement: Bone Conduction Hearing aids. Last revised April 13, 2021.
4. Boeheim K, Pok SM, Schloegel M, Filzmoser P. Active middle ear implant compared with open-fit hearing aid in sloping high-frequency sensorineural hearing loss. *Otol Neurotol*. 2010 Apr;31(3):424-9. PubMed PMID: 20042907.
5. Dun CA, Faber HT, de Wolf MJ, Cremers CW, Hol MK. An overview of different systems: the bone-anchored hearing aid. *Advances in Oto-Rhino-Laryngology*. 2011;71:22-31.
6. Lagerkvist H, Carvalho K, Holmberg M, et al. (May 2020). Ten years of experience with the Ponto bone-anchored hearing system—A systematic literature review. *Clinical Otolaryngology*, 45(5): 667-680. Doi: <https://doi.org/10.1111/coa.13556>
7. Minovi A, Dazert S. Diseases of the middle ear in childhood. *GMS Current Topics in Otorhinolaryngology, Head and Neck Surgery* 2014;13:Doc11.
8. Colquitt JL, et al. Bone-anchored hearing aids (BAHAs) for people who are bilaterally deaf: a systematic review and economic evaluation. *Health Technology Assessment* 2011;15(26):1-200, iii-iv.
9. Bovo R, Prosser S, Ortore RP, Martini A. Speech recognition with BAHA simulator in subjects with acquired unilateral sensorineural hearing loss. *Acta Otolaryngologica* 2011;131(6):633-9.
10. Pai I, et al. Outcome of bone-anchored hearing aids for single-sided deafness: a prospective study. *Acta Otolaryngologica* 2012;132(7):751-5.
11. Kunst SJ, Leijendeckers JM, Mylanus EA, Hol MK, Snik AF, Cremers CW. Bone-anchored hearing aid system application for unilateral congenital conductive hearing impairment: audiometric results. *Otology and Neurotology* 2008;29(1):2-7.
12. Snik A, Leijendeckers J, Hol M, Mylanus E, Cremers C. The bone-anchored hearing aid for children: recent developments. *International Journal of Audiology* 2008;47(9):554-9.
13. McDermott AL, Sheehan P. Bone anchored hearing aids in children. *Current Opinion in Otolaryngology and Head and Neck Surgery* 2009;17(6):488-93.
14. Fuchsmann C, et al. Hearing rehabilitation in congenital aural atresia using the bone-anchored hearing aid: audiological and satisfaction results. *Acta Otolaryngologica* 2010;130(12):1343-51.
15. Roman S, Nicollas R, Triglia JM. Practice guidelines for bone-anchored hearing aids in children. *European Annals of Otorhinolaryngology, Head and Neck Diseases* 2011;128(5):253-8.
16. Farnoosh S, Mitsinikos FT, Maceri D, Don DM. Bone-anchored hearing aid vs. reconstruction of the external auditory canal in children and adolescents with congenital aural atresia: a comparison study of outcomes. *Frontiers in Pediatrics* 2014;2:5.
17. Saliba I, Woods O, Caron C. BAHA results in children at one year follow-up: a prospective longitudinal study. *International Journal of Pediatric Otorhinolaryngology* 2010;74(9):1058-62.

18. de Wolf MJ, Hol MK, Mylanus EA, Snik AF, Cremers CW. Benefit and quality of life after bone-anchored hearing aid fitting in children with unilateral or bilateral hearing impairment. *Archives of Otolaryngology - Head and Neck Surgery* 2011;137(2):130-8.
19. Janssen RM, Hong P, Chadha NK. Bilateral bone-anchored hearing aids for bilateral permanent conductive hearing loss: a systematic review. *Otolaryngology Head and Neck Surgery* 2012;147(3):412-22.
20. Health Technology Inquiry Service (HTIS). Completely-in-the-canal and bone anchored hearing aids: A review of the clinical effectiveness and cost-effectiveness. Health Technology Assessment (HTA). Ottawa, ON: Canadian Agency for Drugs and Technologies in Health (CADTH); March 4, 2010.
21. Śliwińska-Kowalska M, Zaborowski K. WHO environmental noise guidelines for the European region: A systematic review on environmental noise and permanent hearing loss and tinnitus. *Int J Environ Res Public Health*. 2017; 14:E1139.
22. U.S. Food and Drug Administration (FDA). BAHA Cordelle II. Summary of Safety and Effectiveness. 510(k) No. K080363. Rockville, MD: FDA; April 10, 2008.
23. U.S. Food and Drug Administration (FDA). BAHA Intenso. Summary of Safety and Effectiveness. 510(k) No. K081606. Rockville, MD: FDA; August 28, 2008.
24. U.S. Food and Drug Administration (FDA). BAHA BP100. Summary of Safety and Effectiveness. 510(k) No. K090720. Rockville, MD: FDA; June 17, 2009
25. U.S. Food and Drug Administration (FDA). Cochlear BAHA Attract. 510(k) No. K131240. Silver Spring, MD: FDA; November 7, 2013.
26. U.S. Food and Drug Administration (FDA), Center for Devices and Radiologic Health (CDRH). Cochlear Baha 4 Sound Processor. 510(k) No. K132278. Silver Spring, MD: FDA; September 26, 2013.
27. U.S. Food and Drug Administration (FDA), Center for Devices and Radiologic Health (CDRH). Cochlear Baha 5 Sound Processor. 510(k) No. K142907. Silver Spring, MD: FDA; March 25, 2015.
28. Liu CC, Livingstone D, Yunker WK. The role of bone conduction hearing aids in congenital unilateral hearing loss: A systematic review. *International Journal of Pediatric Otorhinolaryngology* 2017;94:45-51. DOI: 10.1016/j.ijporl.2017.01.003.

Cochlear Implants

1. American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS). 'Position Statement: Cochlear Implants. . Last revised 11/10/2020. Available at: <http://www.entnet.org/content/position-statement-cochlear-implants>. Accessed July 21, 2023.
2. American Academy of Otolaryngology – Head and Neck Surgery (AAO-HNS). Position Statement: Pediatric Cochlear Implantation Candidacy. Adopted 4/15/2020. Available at: <https://www.entnet.org/resource/position-statement-pediatric-cochlear-implantation-candidacy/> Accessed July 21, 2023.
3. American Speech-Language-Hearing Association (n.d.). Hearing Loss: Ages 5+ (Practice Portal). Retrieved November, 1, 2021, from /Practice-Portal/Clinical-Topics/Hearing-Loss/

4. Arras T, Boudewyns A, Swinnen F, et al. Longitudinal auditory data of children with prelingual single-sided deafness managed with early cochlear implantation. *Sci Rep.* 2022;12(1):9376. doi:10.1038/s41598-022-13247-5
5. Benchetrit L et al: Cochlear implantation in children with single-sided deafness: As Systematic Review And Meta-Analysis. *JAMA Otolaryngology* 2021; 147(1): 58-69.
6. Boyd PJ. Potential benefits from cochlear implantation of children with unilateral hearing loss. *Cochlear Implants Int.* 2015;16(3):121-136. doi:10.1179/1754762814Y.0000000100
7. Cohen S & Svirsky Mario A. (2019) Duration of unilateral auditory deprivation is associated with reduced speech perception after cochlear implantation: A single-sided deafness study, *Cochlear Implants International*, 20:2, 51-56, DOI: 10.1080/14670100.2018.1550469
8. Dewyer NA, Smith S, Herrmann B, Reinshagen KL, Lee DJ. Pediatric single-sided deafness: a review of prevalence, radiologic findings, and cochlear implant candidacy. *Ann Otol Rhinol Laryngol.* 2022;131(3):233-238. doi:10.1177/00034894211019519
9. Deep et al: Cochlear Implantation in Children With Single-Sided Deafness. *Laryngoscope* 2021; 131(1): 271-277.
10. Dillon, M. T., Kocharyan, A., Daher, G. S., Carlson, M. L., Shapiro, W. H., Snapp, H. A., & Firszt, J. B. (2022). American Cochlear Implant Alliance Task Force guidelines for clinical assessment and management of adult cochlear implantation for single-sided deafness. *Ear and hearing*, 43(6), 1605-1619.
11. Dreyfuss M et al: Cost Effectiveness of Cochlear Implantation in Single-Sided Deafness. *Otol Neurotol* 2021; 42(8): 1129-1135.
12. Ehrmann-Mueller D, Kurz A, Kuehn H, et al. Usefulness of cochlear implantation in children with single sided deafness. *Int J Pediatr Otorhinolaryngol.* 2020;130:109808. doi:10.1016/j.ijporl.2019.109808
13. Greaver L, Eskridge H, Teagle HF. Considerations for pediatric cochlear implant recipients with unilateral or asymmetric hearing loss: assessment, device fitting, and habilitation. *Am J Audiol.* 2017;26(2):91-98. doi:10.1044/2016_AJA-16-0051
14. Hayes, Inc. Evidence Analysis Research Brief. Bilateral Cochlear Implantation for Treatment of Bilateral Hearing Loss in Adults. Lansdate, PA. Hayes,Inc.; Jul 24, 2023.
15. Hayes, Inc. Evidence Analysis Research Brief. Cochlear Implants for Children With Unilateral Deafness. Lansdate, PA. Hayes,Inc.; March 2023. <https://evidence.hayesinc.com/report/earb.unilateral5558>
16. Hayes, Inc. Health Technology Assessment. Cochlear Implantation for Adults With Single-Sided Deafness. Lansdate, PA. Hayes,Inc.; June 2023. <https://evidence.hayesinc.com/report/hta.cochlear5513>
17. Kamal SM, Robinson AD, Diaz RC. Cochlear implantation in single-sided deafness for enhancement of sound localization and speech perception. *Current Opinion in Otolaryngology and Head and Neck Surgery* 2012;20(5):393-7.
18. Lane, C., Zimmerman, K., Agrawal, S., & Parnes, L. (2020). Cochlear implant failures and reimplantation: A 30-year analysis and literature review. *The Laryngoscope*, 130(3), 782–789. <https://doi.org/10.1002/lary.28071>

19. Liu, H., Yao, X., Kong, W., Zhang, L., Si, J., Ding, X., ... & Zhao, Y. (2023). Cochlear reimplantation rate and cause: A 22-year, single-center experience, and a meta-analysis and systematic review. *Ear and Hearing*, 44(1), 43-52.
20. Löfvenberg C, Turunen-Taheri S, Carlsson Per-Inge, & Skagerstrand A. Rehabilitation of Severe-to-Profound Hearing Loss in Adults in Sweden; *Audiology Research*, 2022 Aug; 12(4): 433–444.
21. Marx et al: Cochlear Implantation and Other Treatment in Single-Sided Deafness and Asymmetric Hearing Loss: Results of A National Multicenter Study Including A Randomized Controlled Trial. *Audiol Neurootol* 2021; 26(6): 414-424
22. Messersmith, J. J., Entwisle, L., Warren, S., & Scott, M. (2019). Clinical practice guidelines: Cochlear implants. *Journal of the American Academy of Audiology*, 30(10), 827-844.
23. National Institute for Health and Clinical Excellence (Great Britain). (2019). Cochlear implants for children and adults with severe to profound deafness. National Institute for Health and Clinical Excellence. <https://www.nice.org.uk/guidance/ta566>
24. Olusanya BO, Davis AC , and Hoffman HJ. (2022). Hearing loss grades and the International classification of functioning, disability and health. *Bulletin of the World Health Organization* Oct 1; 97(10): 725–728.
25. Park, Lisa R; Griffin, Amanda M.; Sladen, Douglas P.; Neumann, Sara; Young, Nancy M.,.. American Cochlear Implant Alliance Task Force Guidelines for Clinical Assessment and Management of Cochlear Implantation in Children With Single-Sided Deafness. *Ear and Hearing* 43(2):p 255-267, March/April 2022. | DOI: 10.1097/AUD.0000000000001204
26. Park LR, Gagnon EB , Brown KD. The Limitations of FDA Criteria: Inconsistencies with Clinical Practice, Findings, and Adult Criteria as a Barrier to Pediatric Implantation, *Seminars in Hearing*. 2021; 42(04): 373-380
27. Peterson NR, Pisoni DB, Miyamoto RT. Cochlear implants and spoken language processing abilities: review and assessment of the literature. *Restorative Neurology and Neuroscience* 2010;28(2):237-50.
28. Polonenko MJ, Gordon KA, Cushing SL, Papsin BC. Cortical organization restored by cochlear implantation in young children with single sided deafness. *Sci Rep*. 2017;7(1):16900. doi:10.1038/s41598-017-17129-z
29. Rubin R. (2022). Some Hearing Aids Will Soon Be Sold Over the Counter. *JAMA*, 328(11), 1030. <https://doi.org/10.1001/jama.2022.14714>
30. Selleck AM, Brown KD, Park LR. Cochlear implantation for unilateral hearing loss. *Otolaryngol Clin North Am*. 2021;54(6):1193-1203. doi:10.1016/j.otc.2021.07.002
31. Smulders YE, Rinia AB, Rovers MM, van Zanten GA, Grolman W. What is the effect of time between sequential cochlear implantations on hearing in adults and children? A systematic review of the literature. *Laryngoscope* 2011;121(9):1942-9.
32. Távora-Vieira D., Marino R., Acharya A., Rajan G. P. (2015). The impact of cochlear implantation on speech understanding, subjective hearing performance, and tinnitus perception in patients with unilateral severe to profound hearing loss. *Otol Neurotol*, 36, 430–436.

33. Terry, B., Kelt, R. E., & Jeyakumar, A. (2015). Delayed Complications After Cochlear Implantation. *JAMA otolaryngology-- head & neck surgery*, 141(11), 1012–1017. <https://doi.org/10.1001/jamaoto.2015.2154>
34. Gaylor JM, et al. Cochlear implantation in adults: a systematic review and meta-analysis. *JAMA Otolaryngology-- Head & Neck Surgery* 2013;139(3):265-72.
35. van Schoonhoven J, et al. The effectiveness of bilateral cochlear implants for severe-to-profound deafness in adults: a systematic review. *Otology and Neurotology* 2013;34(2):190-8.
36. Lammers MJ, van der Heijden GJ, Pourier VE, Grolman W. Bilateral cochlear implantation in children: a systematic review and best-evidence synthesis. *Laryngoscope* 2014;124(7):1694-9.
37. Heman-Ackah SE, Roland JT, Haynes DS, Waltzman SB. Pediatric cochlear implantation: candidacy evaluation, medical and surgical considerations, and expanding criteria. *Otolaryngologic Clinics of North America* 2012;45(1):41-67.
38. Hempel JM, Simon F, Müller JM. Extended Applications for Cochlear Implantation. *Adv Otorhinolaryngol.* 2018;81:74-80. doi: 10.1159/000485546. Epub 2018 Apr 6. Gaylor JM, Raman G, Chung M, Lee J, Rao M, Lau J, Poe DS. Cochlear implantation in adults: a systematic review and meta-analysis. *JAMA Otolaryngol Head Neck Surg.* 2013 Mar;139(3):265-72. doi: 10.1001/jamaoto.2013.1744.
39. National Institute for Health and Care Excellence. (March 2019). Cochlear implants for children and adults with severe to profound deafness. www.nice.org.uk. <https://www.nice.org.uk/guidance/ta566/chapter/1-Recommendations>
40. Niparko JK, et al. Spoken language development in children following cochlear implantation. *Journal of the American Medical Association* 2010;303(15):1498-506.
41. Johnston JC, Durieux-Smith A, Angus D, O'Connor A, Fitzpatrick E. Bilateral paediatric cochlear implants: a critical review. *International Journal of Audiology* 2009;48(9):601-17.
42. Sparreboom M, et al. The effectiveness of bilateral cochlear implants for severe-to-profound deafness in children: a systematic review. *Otology and Neurotology* 2010;31(7):1062-71.
43. Turton L, Souza P, Thibodeau L, Hickson L, Gifford R, Bird J, Stropahl M, Gailey L, Fulton B, Scarinci N, Ekberg K, Timmer B. Guidelines for Best Practice in the Audiological Management of Adults with Severe and Profound Hearing Loss. *Semin Hear.* 2020 Aug;41(3):141-246. doi: 10.1055/s-0040-1714744. Epub 2020 Dec 16. PMID: 33364673; PMCID: PMC7744249.
44. Eze N, Ofo E, Jiang D, O'Connor AF. Systematic review of cochlear implantation in children with developmental disability. *Otology and Neurotology* 2013;34(8):1385-93.
45. Ozdemir S, Tuncer U, Tarkan O, Kiroglu M, Cetik F, Akar F. Factors contributing to limited or non-use in the cochlear implant systems in children: 11 years experience. *International Journal of Pediatric Otorhinolaryngology* 2013;77(3):407-9.
46. Vlastarakos PV, Proikas K, Papacharalampous G, Exadaktylou I, Mochloulis G, Nikolopoulos TP. Cochlear implantation under the first year of age--the outcomes. A critical systematic review and meta-analysis. *International Journal of Pediatric Otorhinolaryngology* 2010;74(2):119-26.
47. Gantz BJ, Dunn CC, Walker EA, et al. Bilateral cochlear implants in infants: A new approach -- Nucleus Hybrid S12 project. *Otol Neurotol.* 2010;31(8):1300-1309.

48. Reiss LA, Perreau AE, Turner CW. Effects of lower frequency-to-electrode allocations on speech and pitch perception with the hybrid short-electrode cochlear implant. *Audiol Neurootol.* 2012;17(6):357-372.
49. Smith RJH, Gooi A. Hearing loss in children: Treatment. UpToDate.com https://www.uptodate.com/contents/hearing-loss-in-children-treatment?search=tr eatment%20of%20hearing%20impairment%20in%20children&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1 Last updated Nov 21, 2019.
50. Smith RJH, Gooi A. Hearing loss in children: Screening and evaluation. UpToDate.com. https://www.uptodate.com/contents/hearing-loss-in-children-screening-and-evaluation?search=se vere%20hearing%20loss%20measured&source=search_result&selectedTitle=1~150&usage_tpe=default&display_rank=1 Last updated March 31, 2021.
51. Lenarz T, James C, Cuda D, et al. European multi-centre study of the Nucleus Hybrid L24 cochlear implant. *Int J Audiol.* 2013;52(12):838-848.
52. Szyfter W, Wrobel M, Karlik M, et al. Observations on hearing preservation in patients with hybrid-L electrode implanted at Poznan University of Medical Sciences in Poland. *Eur Arch Otorhinolaryngol.* 2013;270(10):2637-2640.
53. U.S. Food and Drug Administration (FDA). FDA approves first implantable hearing device for adults with a certain kind of hearing loss. Press Release. Silver Spring, MD: FDA; March 20, 2014. Available at: http://www.fda.gov/NewsEvents/Newsroom/PressAnnouncements/ucm389860.htm?source=govdelivery&utm_medium=email&utm_source=govdelivery.
54. U.S. Food and Drug Administration. Summary of Safety and Effectiveness Data (SSED): Nucleus 24. Cochlear Implant System (P970051/S172). 2020; https://www.accessdata.fda.gov/cdrh_docs/pdf/P970051S172B.pdf.
55. Varadarajan VV, Sydlowski SA, Li MM, Anne S, Adunka OF. Evolving criteria for adult and pediatric cochlear implantation. *Ear Nose Throat J.* 2021;100(1):31-37. doi:10.1177/0145561320947258
56. Vlastarakos PV, Nazos K, Tavoulari EF, Nikolopoulos TP. Cochlear implantation for single-sided deafness: The outcomes. An evidence-based approach. *Eur Arch Otorhinolaryngol.* 2014;271(8):2119-2126.
57. van Zon A, Peters JP, Stegeman I, et al. Cochlear implantation for patients with single-sided deafness or asymmetrical hearing loss: A systematic review of the evidence. *Otol Neurotol.* 2015;36(2):209-219.
58. Einger TM, Koch M, Bornitz M, Zahnert T. Adaptive mechanical stabilization of a free-floating fully implantable hearing aid. *Otol Neurotol.* 2016;37(9):e377-e383.
59. Tysome JR, Moorthy R, Lee A, Jiang D, O'Connor AF. Systematic review of middle ear implants: do they improve hearing as much as conventional hearing AIDS? *Otology and Neurotology* 2010;31(9):1369-75.
60. Klein K, Nardelli A, Stafinski T. A systematic review of the safety and effectiveness of fully implantable middle ear hearing devices: the carina and esteem systems. *Otology and Neurotology* 2012;33(6):916-21

61. Otto SR, Shannon RV, Wilkinson EP, et al. Audiologic outcomes with the penetrating electrode auditory brainstem implant. *Otol Neurotol*. 2008;29(8):1147-54.
62. Ching TY, Incerti P, Plant K. Electric-acoustic stimulation: for whom, in which ear, and how. *Cochlear Implants Int*. 2015 Jan;16 Suppl 1:S12-5. Doi: 10.1179/1467010014Z.000000000225.
63. Sampaio AL1, Araújo MF, Oliveira CA. New criteria of indication and selection of patients to cochlear implant. *Int J Otolaryngol*. 2011;2011:573968. doi: 10.1155/2011/573968. Epub 2011 Oct 13.
64. Yawn R, Hunter JB, Sweeney AD, Bennett ML. Cochlear implantation: a biomechanical prosthesis for hearing loss. *F1000Prime Rep*. 2015 Apr 2;7:45. doi: 10.12703/P7-45. eCollection 2015.
65. Yoon PJ. Hearing loss and cochlear implantation in children. *Advances in Pediatrics* 2011;58(1):277-96.
66. Zheng, Y., Swanson, J., Koehnke, J., & Guan, J. (2022). Sound Localization of Listeners With Normal Hearing, Impaired Hearing, Hearing Aids, Bone-Anchored Hearing Instruments, and Cochlear Implants: A Review. *American journal of audiology*, 31(3), 819–834.
https://doi.org/10.1044/2022_AJA-22-00006
67. Zeitler, D. M., Prentiss, S. M., Sydlowski, S. A., & Dunn, C. C. (2024). American cochlear implant alliance task force: recommendations for determining cochlear implant candidacy in adults. *The Laryngoscope*, 134, S1-S14.

Auditory Brainstem Implant (ABI)

1. Wilkinson EP, Eisenberg LS, Krieger MD, et al. Initial results of a safety and feasibility study of auditory brainstem implantation in congenitally deaf children. *Otol Neurotol*. 2017;38(2):212-220.
2. Shah PV, Kozin ED, Kaplan AB, Lee DJ. Pediatric auditory brainstem implant surgery: A new option for auditory habilitation in congenital deafness? *J Am Board Fam Med*. 2016;29(2):286-288.
3. Puram SV, Barber SR, Kozin ED, et al. Outcomes following pediatric auditory brainstem implant surgery: Early experiences in a North American center. *Otolaryngol Head Neck Surg*. 2016;155(1):133-138.
4. Jackson KB, Mark G, Helms J, Mueller J, Behr R. An auditory brainstem implant system. *Am J Audiol*. 2002;11(2):128-33.
5. Vincent C. Auditory brainstem implants: how do they work?. *Anat Rec (Hoboken)*. 2012;295(11):1981-6.
6. Bouccara D, Kalamarides M, Bozorg grayeli A, Ambert-dahan E, Rey A, Sterkers O. [Auditory brainstem implant: indications and results]. *Ann Otolaryngol Chir Cervicofac*. 2007;124(3):148-54.
7. Sanna M, Di Iella F, Guida M, Merkus P. Auditory brainstem implants in NF2 patients: results and review of the literature. *Otol Neurotol*. 2012;33(2):154-64.
8. Goffi-gomez MV, Magalhães AT, Brito neto R, Tsuji RK, Gomes Mde Q, Bento RF. Auditory brainstem implant outcomes and MAP parameters: report of experiences in adults and children. *Int J Pediatr Otorhinolaryngol*. 2012;76(2):257-64.

9. Colletti L, Shannon R, Colletti V. Auditory brainstem implants for neurofibromatosis type 2. *Curr Opin Otolaryngol Head Neck Surg.* 2012;20(5):353-7.
10. Noonan KY, Rock J, Barnard Z, Lekovic GP, Brackmann DE, Wilkinson EP. Bilateral Auditory Brainstem Implants in Patients With Neurofibromatosis 2. *Otolaryngol Head Neck Surg.* 2021 Aug;165(2):339-343. doi: 10.1177/0194599820977420. Epub 2020 Dec 15. PMID: 33317418.
11. U.S. Food and Drug Administration (FDA), Center for Devices and Radiologic Health (CDRH). NUCLEUS 24 AUDITORY BRAINSTEM IMPLANT SYSTEM. PMA P000015. Silver Spring, MD: FDA; December 20, 2000.
12. Kaplan AB, Kozin ED, Puram SV, et al. Auditory brainstem implant candidacy in the United States in children 0-17 years old. *Int J Pediatr Otorhinolaryngol.* 2015;79(3):310-315.
13. Noij KS, Kozin ED, Sethi R, et al. Systematic review of nontumor pediatric auditory brainstem implant outcomes. *Otolaryngol Head Neck Surg.* 2015;153(5):739-750.
14. Behr R, Colletti V, Matthies C, et al. New outcomes with auditory brainstem implants in NF2 patients. *Otol Neurotol.* 2014;35(10):1844-1851.

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