



**Boston  
Children's  
Hospital**

Until every child is well™

# Cochlear Implant Program



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# Welcome to our program

» To schedule an appointment or speak with a member of our team, email [cochlearimplant@childrens.harvard.edu](mailto:cochlearimplant@childrens.harvard.edu) or call us at 781-216-2250.

The Cochlear Implant Program at Boston Children’s Hospital is designed to give your child the tools she needs to understand language and learn to communicate effectively and confidently.

Our interdisciplinary program is located within the [Department of Otolaryngology and Communication Enhancement](#) and is recognized as the largest and most comprehensive pediatric cochlear implant program in New England.

Our interdisciplinary team provides: comprehensive evaluation by our expert staff, an assessment of your child’s language skills and cochlear implant benefit potential, educational and communication options for your child, candidacy evaluation and surgery and cochlear implant programming or “mapping” services, ongoing care, professional support and education to families following surgery.

Our expert staff is skilled in the use of advanced hearing technologies, and provides unparalleled and compassionate care to hearing impaired and deaf children.

[» MORE ABOUT OUR PROGRAM](#)



## Our team of specialists

Over the course of the candidacy process, your child will meet with many members of our cochlear implant team, including:



**An audiologist** provides hearing testing and an information session for the parents, family members and caregivers to learn more about cochlear implants and our program. The audiologist, along with our program coordinator, will be your family's main contact with our program.

**An otolaryngologist (ear, nose and throat doctor)** assesses your child from a medical perspective to ensure that a cochlear implant is an appropriate option. This may involve ordering specialized tests, such as a CT scan or MRI, or blood work, to assess your child's anatomy and possibly the cause of the hearing loss. The otolaryngologist will also invite you to meet with the surgeon who would perform the cochlear implant surgery. Together, they will share additional information regarding what to expect during and after surgery.

**A psychologist** assesses your child's cognitive function and general development. The psychologist helps ensure there is adequate family support and commitment and that your child has access to an appropriate educational program. For older children, the psychologist can also help prepare the child for what to expect during surgery.

**A speech-language pathologist (SLP)** assesses your child's speech and language development. This may include sign or spoken language, as our SLPs are fluent in sign language. The SLP will also assess your family's access to aural rehabilitation (listening therapy) services, which are required following implantation. The SLP will also help your family secure services for your child when needed. In addition, they are able to provide direct aural rehabilitation services when therapy cannot be established closer to home.

» Other Boston Children's specialists from developmental pediatrics, occupational therapy, genetics, ophthalmology and neurology are available for consultation as needed.

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## About cochlear implants

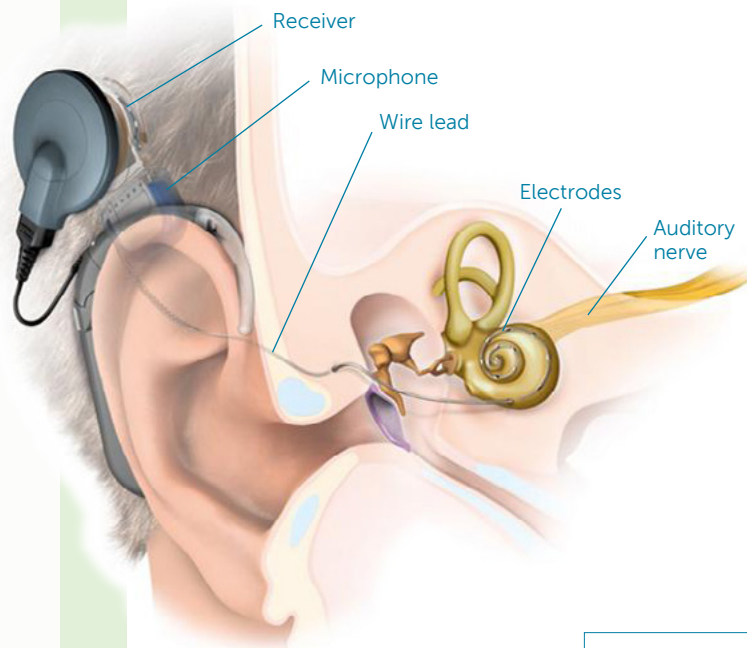
A cochlear implant is an electronic device that provides a sensation of hearing to individuals who have severe to profound hearing loss. It does not provide or restore "normal" hearing. However, the device, which has an external part called a speech processor (resembles a behind-the-ear hearing aid) and an internal device surgically implanted under the skin and into the inner ear, can allow children access to sound and spoken language.

Most children with good language abilities, consistent listening therapy, and full-time use of the device can learn to use this sound to understand spoken language.

## How they work

The speech processor houses a microphone that picks up sound and a computer that codes the sound into electrical signals.

These signals are sent to a transmitting coil, which is circular and about one inch in diameter, and held onto the side of the head with a magnet.



Transmitting coil



Speech processor

The transmitting coil sends the coded signal through the skin to a receiver.

The signal is then sent to an array of electrodes implanted in the inner ear and stimulates the hearing nerve, taking over the function of damaged or missing hair cells.

Cochlear implants from different manufacturers vary in several aspects, including but not limited to the number of electrodes, channels, programming, sound processing strategy and appearance of the externally worn device.

## Is it the right choice for my child?

Determining if a cochlear implant is right for your child is a process that includes appointments and evaluations with various members of our team. If your child is approved for implantation, family members will be asked to attend programming sessions, maintain equipment and support their child and her progress during all waking hours.

### Your child may be a candidate for a cochlear implant if she:

- » is under 3-years-old (earliest is best)
- » was born without hearing
- » once had enough hearing to perceive the sounds of speech
- » never heard sounds before and possesses good cognitive (learning) ability

Most children who receive cochlear implants do enjoy some degree of benefit. Goals and expectations for the outcome of cochlear implantation vary for different children and are reviewed thoroughly with the family before the surgery.

[» MORE ABOUT WHO IS A CANDIDATE](#)





## Factors that promote successful implantation include:

- » favorable cochlear anatomy
- » cochlear implantation surgery at a young age
- » a solid base of age-appropriate language development prior to surgery
- » a high level of motivation and commitment on the part of the family to keep frequent appointments, maintain the device and encourage listening skills
- » an appropriate educational program which incorporates listening activities into the curriculum
- » regular speech/language therapy given by a clinician with specific expertise and experience in the area of spoken language development in deaf children using cochlear implants

The benefit from a cochlear implant may be limited by a child's previous language deprivation or by a particular child's disorder in language-acquisition skills. The anatomy of the child's ear and auditory nerve also may limit sound reception and clarity with an implant. Illnesses such as meningitis may also impact the success of a cochlear implant.

[»» MORE ABOUT WHO IS A CANDIDATE](#)



## At what age should a child receive a cochlear implant?

Children can receive an implant beginning at 10–12 months of age. For a child hoping to receive a cochlear implant at this age, evaluations should ideally start around 3–4 months of age.

A congenitally (at birth) deaf child who is going to have a cochlear implant, should have the surgery before 3 years old, or earlier if possible. Early implantation gives the child the best chance to learn to use sound while language skills are developing.

A child with progressive to profound hearing loss who makes maximal use of hearing aids and who already uses spoken language may benefit from a cochlear implant.

## For consideration

Many children who are deaf either from birth or before they speak their first word and who receive cochlear implants when they are older do not develop the ability to recognize speech with the implant and ultimately may reject its use. For these children, a cochlear implant may not be recommended.

Children who once had normal hearing or partial hearing and then become deaf may be implanted as soon as it is clear that the child's hearing is not going to recover and that there is little or no benefit from a hearing aid.

Older children and teenagers who lose their hearing should participate in the decision whether to have a cochlear implant.





## Your first visit

You will be asked to fill out an intake questionnaire and provide any relevant audiological, speech/language, educational and medical reports if these evaluations occurred outside Boston Children's. This information will be reviewed by our team and will help us determine the most appropriate course of appointments to evaluate your child's candidacy for a cochlear implant.

### How long does the evaluation process take?

Children frequently require multiple tests and meet with a number of specialists during the evaluation process, often requiring several visits. We will keep you informed of your child's potential candidacy along the way. It is our job to determine, from all possible perspectives, whether a cochlear implant is truly the best option for your child.

Most health insurance plans cover the pre-implant candidacy evaluation, the cochlear implant device, hospitalization and surgery, and follow-up visits at the hospital, however the family may have some cost involved depending on the individual insurance plan.

**>> MORE ABOUT THE EVALUATION PROCESS**

**>>** To find out if your child is a candidate for a cochlear implant, email [cochlearimplant@childrens.harvard.edu](mailto:cochlearimplant@childrens.harvard.edu) or call our program coordinator at **781-216-2250**.





# 1 vs. 2

## Should my child receive one cochlear implant or two?

Each child is unique. Depending on your child's hearing, our team may recommend receiving two implants at the same time, or we may recommend starting with one implant. This is based on many things, and a decision is made in conjunction with the parents (and child when appropriate).

One cochlear implant provides greatly improved access to sound for most candidates with severe to profound hearing loss. Some implant users benefit from continuing to use a hearing aid in the other ear. If a hearing aid provides limited benefit, the child may be considered for candidacy to receive a second implant for the other ear. Bilateral cochlear implant use improves the ability to hear speech in noisy places and some ability to determine the direction a sound is coming from.



## About the procedure

Cochlear implant surgery is performed under general anesthesia and takes three to six hours. A child usually stays in the hospital one night after the surgery, and one parent or caregiver is encouraged to stay in the child's room during recovery.

During the surgery, an incision is made behind the ear exposing the area where the implant will be placed. The surgeon will place the receiver/stimulator in this small area under the skin. The electrode array is inserted into your child's inner ear, and the receiver/stimulator is fixed in place. Electrical recordings are made to show that the electrodes are providing stimulation. Then the area is reconstructed.

>> [MORE ABOUT THE PROCEDURE](#)



After surgery, the family is responsible for theft/loss insurance once the initial speech processor warranty expires. The family may also be responsible for repairs of the sound processor and its parts after this period, depending on the child's insurance coverage.

## What are the risks of the surgery?

The risks of anesthesia are the same as for any surgery. Surgery to the inner ear also carries the risks (although uncommon) of facial nerve paralysis, loss of taste sensation, dizziness or ringing in the ear. The surgery may destroy any ability the individual may have had to hear with a conventional hearing aid in that ear. It is possible that at some point in the future the implant may stop working and may need to be replaced in another operation.

>> For a more in-depth overview of the surgical procedure, email [cochlearimplant@childrens.harvard.edu](mailto:cochlearimplant@childrens.harvard.edu) or call us at **781-216-2250**.



## Preparing for surgery

Once your child has been approved to receive a cochlear implant, you will need:

- » a pre-operative appointment (typically takes place approximately two or three weeks before surgery and typically includes a consultation with the anesthesiologist and additional blood work)
- » updated immunizations, including one for meningitis
- » a surgery date

Our program coordinator will work with your family to ensure that your child has the necessary appointments and paperwork to proceed with surgery. With the guidance of the team, you will also need to choose an implant manufacturer and your child's external processor and equipment.

## Emotional support

- » A psychologist will meet with you and your child to help you find ways to feel comfortable and positive about the opportunity to have the surgery.
- » For a young child, playing with dolls, head bandages, doctors' masks, for example, will help prepare your child for the surgery.
- » Play dates or emails with other children who already have cochlear implants will help provide familiar role models.
- » The cochlear implant team will give your child a backpack of age-appropriate items and games to take to the hospital.
- » Your child will be encouraged to express questions and concerns. Brothers and sisters often have their own anxieties about the surgery, and their questions should be addressed so that they can feel positive and supportive about the implant.



## Activation

Your child has completed the cochlear implantation surgery and is now ready to begin her hearing journey. Our dedicated and expert team will follow her every step of the way.

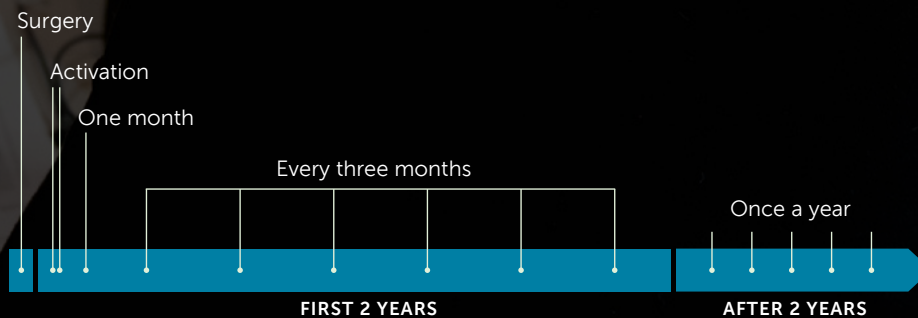
Three to four weeks after surgery your child will begin a series of appointments. At the first one an audiologist will activate the speech processor. This involves a “stimulation” where your child’s responses are assessed to help determine how much current each electrode should deliver.

The audiologist may also use neural response recordings to program the device to give sound sensations that are just loud enough to be heard and comfortable. This is called a “map,” and appointments such as these are called “mapping” appointments.

>> [MORE ABOUT ACTIVATION AND ADJUSTMENT](#)

### Activation, re-mapping and fine-tuning appointments

Your child will typically have their new implant activated 3–4 weeks after surgery and then have a follow-up appointment one month later. Additional appointments will occur every 3 months for the next year or two, with hearing testing and speech-language follow-along being done at the 6 month appointment. After that, your child will be seen about once a year.





## What will my child hear when the implant is activated?

Because only your child knows what she hears through a cochlear implant, we have to rely on what she tells us it sounds like.

Many older children tell us it sounds like static or buzzing or high-pitched squeaky sounds when it is first activated.

Regardless, in most cases your child will not understand speech when the processor is first turned on. Months to years of listening therapy is typically required to help your child's brain make sense of the sounds it is receiving. This is especially true for children who lost their hearing at birth or before hearing spoken language, and for children with limited spoken language abilities who receive them later.

[>> MORE ABOUT ACTIVATION AND ADJUSTMENT](#)



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## After activation

### Support services

In order to maximize your child's ability to understand and use spoken language, consistently using the device, attending appointments regularly, and interacting and talking with your child is critical. For all children and families, support services will also be needed. The family plays a strong role in advocating and arranging these services with support from our clinicians.

If your child is **under 3 years old**, your child's Individualized Family Services Plan (IFSP) might include:

- » Aural Rehabilitation (speech/language) therapy
- » services through a Teacher of the Deaf or Hard of Hearing

It is important that therapy be provided by a clinician who possesses specific expertise and experience in cochlear implant habilitation. These services may be provided through a combination of early intervention, specialized programs for children with hearing loss, private, or hospital-based services.

If your child is **3 or older**, your child's Individualized Education Plan (IEP) might include:

- » Aural Rehabilitation (speech/language) therapy
- » services through a Teacher of the Deaf or Hard of Hearing
- » an educational audiologist, which may be provided by the school district

Our cochlear implant program staff can also provide information on:

- » Short-term speech/language therapy through our [Deaf and Hard of Hearing Program](#)
- » Audiology services contracted through our [Sound Outreach to Schools Program](#)



Once implanted, children with early access to sign language often begin understanding spoken language earlier than those with no early language stimulation. Children may continue to use sign language as long as it is beneficial.

Once implanted, even for children who use sign language, continual opportunities for listening and developing understanding of spoken language should be provided throughout each day to maximize benefit using the cochlear implant.



## Appointments

Email [cochlearimplant@childrens.harvard.edu](mailto:cochlearimplant@childrens.harvard.edu) or call us at **781-216-2250**.

Our dedicated cochlear implant team is here to answer your important questions and assist you with decision-making.

## Transferring to Boston Children's Hospital

The center at which your child was implanted typically provides the follow-up for at least a year after the implant. Then, if the implanting center agrees that the child is ready for a transfer of care, the child and family should visit Boston Children's for a consultation or a team evaluation to discuss care.

If a transfer of care is accepted and the health insurance provider approves, then the otolaryngologist from the implanting center and Boston Children's must clearly determine who will follow the child in the event of any post-surgical complications or in the rare event of failure of the internal device.

Our expertly trained staff is looking forward to caring for your child and supporting your family throughout your child's hearing journey.



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