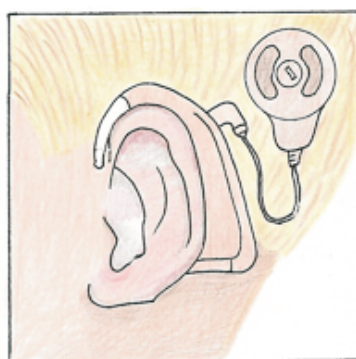


## Communication and habilitation for wearers of cochlear implants

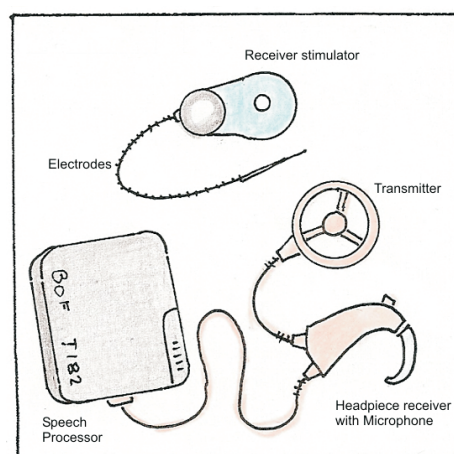
The big advantage of a cochlear implant over a normal hearing aid is that you are able to hear spoken language and speech sounds more acutely, and this facilitates more natural speech development. The implant is particularly adept at facilitating the perception of certain frequencies of speech and the individual is also able to monitor their own speech more successfully.

When children receive a cochlear implant they will require a huge amount of input from the Speech and Language Pathologist/Therapist, the professional implant team, and the parents/care-givers of the child. For adults acquiring a cochlear implant, it is likely that they once had some hearing and already have speech skills, so any input from professionals may be less demanding.



Normal hearing aids amplify the sound, implants attempt to bypass the damaged parts of the hearing mechanism and take the sounds straight to the auditory nerve. Implants require a surgical procedure to implant an electrode into the cochlea. The whole device is made up of several parts:

- A microphone which picks up the sounds
- A speech processor that selects the relevant sounds from the microphone
- A transmitter that turns the sounds into electrical impulses
- A receiver under the skin that sends the impulses to an electrode array which sits in the cochlea. This sends electrical impulses to the auditory nerve



For more information on Cochlear Implants go to [www.icommunicatetherapy.com](http://www.icommunicatetherapy.com)



Once the operation is over for the child, and the cochlear implant is working, there will be several years work by all those involved with the child to facilitate listening, speech, and language development. There are several aspects of the child's development and their environment that need to be a focus:

#### Changing the communication environment at home and school

As well as helping the hearing impaired child to communicate, everyone around the child must also have a heightened awareness of their own communication and the communication environment. As communicators with deaf children we must be aware of a number of our own behaviours, including facing the hearing impaired child when communicating, talking clearly so they can see our lip patterns, and when needed, using gesture, sign or visuals to help understanding (with Auditory-Verbal Therapy, which we discuss later, you may actually not follow some of these processes, as you are trying to teach the child to listen and discriminate). We must also pay attention to the physical environment and communicate in an area that is well lit and where there is less background noise.

#### Language Development

Hearing impaired children are likely to have difficulty learning language, but implanted children should have a good chance of catching up with their peers provided they are implanted early and have frequent language input from those around them. Be aware that hearing children in the pre-verbal stage get feedback from an adult when they look at things, like a running commentary. It is important to have a joint focus, letting the child explore and control their environment, but you can facilitate language development by sitting with the child and talking about what they are doing. Keep bringing your child's attention to sounds that you can hear. As an adult with a hearing impaired baby, try and respond as often as possible, and try to follow your babies focus (as you would with a hearing baby or young child).



#### Pragmatics, Social skills and Conversational skills

These areas of communication describe learning the use of language in context, turn taking, attention getting, initiating, responding, repairing, topic maintenance, shared knowledge and inference, facial expression, eye contact, proximity and touch. These are all skills that most of us learn easily in the first few years of life, but they may not evolve naturally for children with hearing impairment. The important point here is, don't let the deaf child be a passive participant, we want them to learn to turn-take, respond and share their thoughts and feelings. Videoing the hearing impaired individual interacting is a good way to highlight certain skills to them.



## Speech Development and Expressive Communication

Speech development has a number of elements:

- Phonological awareness and letter sound knowledge
- Articulation of speech sounds
- Prosody and intonation (sign language does not have this, but the use of facial expression adds emphasis to meaning)
- Voice quality is another aspect of speech that is sometimes an issue for hearing impaired children. Children with hearing impairment are often not able to monitor their own voices effectively and may speak too quietly or loudly. They may also not be aware of breath control when talking

Cochlear implanted children will have the benefit of having a device that allows them to “tune into” speech sounds more easily and monitor their own speech. However, there will be a number of key listening skills the child will need to learn through auditory training before they can develop speech sounds.

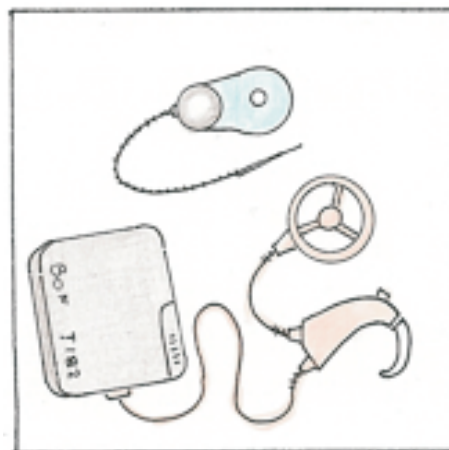
### **Things to remember when communicating with an individual with an implant**

- Always be on the implanted side of the person when you talk to them
- Think about the environment - lighting, clothing, background noise etc
- Use facial expression and gesture to add meaning
- When carrying out listening activities try not to let the child read your lips and refrain from signing or gesture
- Repeat and rephrase your communication if not understood
- Request confirmation from the hearing impaired individual
- Comment on what the child is doing or looking at, have a joint focus
- Keep bringing your child's attention to sounds that you can hear
- Do not over articulate, but do not mumble either
- Think about the volume and rate of your own speech
- Set the context to help the hearing impaired person understand
- Always respond and reward with a smile



## **Auditory training for cochlear implant**

It is vitally important that parents are involved in the habilitation of their child immediately following a cochlear implant. Much of this habilitation can be achieved through listening activities. These activities can be done during structured play sessions, or throughout the day while you are doing everyday tasks, such as shopping trips, bath-time etc. It is important to be aware of the language level of your child, and this will depend on the age of the child, their level of understanding, and their auditory abilities prior to the implant. It is vitally important to start training at the right level and not make tasks too difficult, so the child can be motivated by a high success rate during activities. It is also important to note that if the child has previously used sign, we may need to try and avoid using it when we are working on sound discrimination and listening. This might be difficult to do, but we need to train the child's ear and signing often gives too many clues and so the child relies on the sign language at the expense of focussing on listening.



### What to be aware of when carrying out auditory training:

- Is the implant on and set up (volume, batteries, tuning etc)
- Are you close enough to the child
- Are you on the right side of the child (the aided side)
- Check environment for noise and visual distractions
- Has the child got a cold/ear infection (this can impact on hearing ability)
- Make sure the child is actually listening and not reading lips
- Be aware of the child's language level and developmental level when carrying out auditory tasks
- Have you carried out a "Ling Sound Test" (see information sheet on Hearing Aids and Cochlear Implants at [www.icommunicatetherapy.com](http://www.icommunicatetherapy.com))





## Auditory Training

There is a hierarchy of treatment with auditory training, and if you are starting at the beginning with a child that has only recently been aided or implanted, the initial auditory work will just be getting the child to discriminate between sound and no sound. Firstly, a child just needs to hear and react to sounds. Can they tell the difference between no sound and a sound? Do they react with a pause or a look when they hear a new sound? One way to start sound awareness is to encourage the child to wait, with their back to you, then you make a sound with a toy or object (such as shaking a marble in a cup), and see if they react. When the child hears the sound and reacts, praise him. Doing this in a structured activity relies on teaching the child a conditioned response. This means they will respond by looking, touching, holding your hand or even putting a bean in a cup, each time they hear a sound. Initially, although the child may acknowledge sounds, they may not necessarily recognise them. When the child can react to the difference between sound and no sound we work through a number of steps:

- Discrimination between long and short sounds
- Discrimination between 2 different sounds. If working on speech sounds, discriminating vowel sounds can be difficult so we must use sounds that are not only different, but also have different formant frequencies
- Differentiating between one and two syllable words/nonsense words
- Discriminating between words containing different vowels (e.g pot and pet)
- Discriminating between words with different initial or final sounds (e.g. day/pay or hearse/herd)
- Discriminating words in Closed Set word lists and Open Set word lists. Closed set word lists may be a smaller set of words that are familiar to the listener and initially quite different in sound. Open set word lists introduce new words and might be more complicated because some words may be in the same category or have similar sounds

An example of a Closed Set word list - *shoe, pyjamas, gloves* (this group of words has different initial sounds, different vowel sounds, and pyjamas has more syllables). A much harder closed set would be - *hat, mat, mouse, house, rat* (this group is more difficult as some initial and vowel sounds are the same, there is rhyme, and there are also words with close semantic links e.g. Mouse/rat). An Open Set word list can have an endless list of choices and exposes the child to new words, these tasks are much more difficult.





## The initial stages of sound development

A newly implanted child is likely to have very little sound knowledge. It is the role of parents and/or caregivers to label these sounds for the child, bring the child's attention to the sound and have a joint focus. Outside the therapy environment the parent or caregiver should be alerting the child to all sorts of sounds, pointing to the source of sounds, naming the source of sounds, and having a joint focus.



Once the child starts to become aware of their own name and some sounds around them in the environment, it might be time to look at doing some more structured tasks involving pattern perception. Pattern perception refers to a child's ability to differentiate between long and short sounds, or continuous and interrupted sounds, and later, small words and big words. To start with, we want to perform **closed set** activities, meaning that the child knows and is aware of all the sounds or words we want them to listen to. For instance, look at a familiar group of toys and name them all so the child is familiar with them. Then choose two toys which vary in name, sound, and syllable length, and without using sign or letting the child lipread, (sit behind or at the side of the child), name one item and see if the child can point to it by listening, discriminating and understanding. Once the child becomes used to the game and adept at discriminating sounds you can do this activity throughout the day, for instance, discriminating between products in a shop, or objects when out for a walk. As the child improves, increase the number of items in the choice from two to three, and so on.

As the child's skills develop, you can progress to using simple sentences in closed tasks e.g. This can begin with some same/different tasks e.g. 2 sets of the same words, but one set has a different word at the end - "are these 2 sets the same, or different?"

- pot pot pot pot      pot pot pot pet
- tap tap tap tap      tap tap tap tap

Asking the child to discriminate words in phrases and words with background noise will also facilitate their listening development. Finally, to promote their word knowledge, we offer choices with questions (e.g. "Which one do you write with"), so their auditory comprehension is developed further. Once the child feels confident at this level, we need to start considering open set tasks. Open set tasks begin to introduce new sounds or words that the child is not familiar with. The child will need to discriminate, learn and attempt to articulate them as their skills develop.



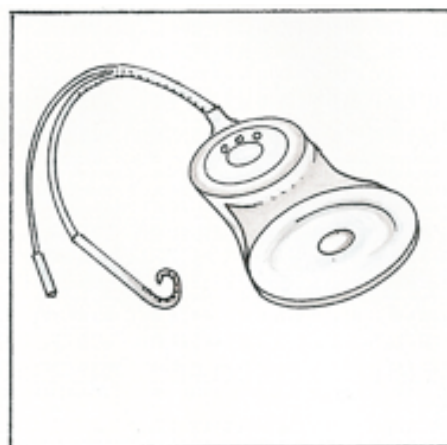
## **Auditory Verbal Therapy**

One of the most successful approaches for facilitating speech and listening for children with cochlear implants, is Auditory Verbal Therapy. This approach focuses on listening and sound awareness, as this is the most natural and efficient way that children learn speech. With auditory verbal therapy every possible opportunity to listen and learn is used through the day, using the child's environment as a learning tool.

Auditory Verbal Therapy (AVT) involves the family and Speech and Language Therapist/Pathologist (SLT) who facilitate the child to learn to talk through listening (as a naturally hearing child would learn). Listening, speech, and language are all developed through active listening activities which become a part of play, education and communication on a daily basis. Parents are encouraged to be the primary facilitators of their child's listening and speech development.

The process is helped by early diagnosis of hearing impairment and the fitting of hearing aids or a cochlear implant for optimal amplification. Parents also have to be committed to participate and work closely with the relevant professionals. The child learns through listening rather than watching. AVT should be administered by a qualified Auditory-verbal therapist who will guide and work with the parents so that they re-produce therapy activities at home in a natural way. Many of the activities we have discussed earlier in this information sheet will be part of the AVT program.

One of the techniques used in AVT is called an "auditory sandwich" where the therapist sits on the aided side of the child repeating auditory information several times, then presenting a visual clarifier (object, picture etc), and then presenting the auditory information again, making sure to use language that is rich in suprasegmental qualities (e.g. Pitch, prosody etc).



Acoustic highlighting is also used to stimulate the listening environment. This involves using variables such as background noise, distance, complexity and rate of utterance to vary the acoustic conditions and really train the child to listen.



There are a number of levels of development of speech and listening skills following the implant:

- Awareness of sound - responding to sounds
- Sound has meaning - associating a specific sound with an object in the environment
- Early Listening - responding to music, vocalising, imitating mothers vocal play, some approximations of short words - e.g. "Mama"
- Discrimination - discriminating between environmental sounds (inside and outside), quiet and loud sounds and different peoples voices. Beginning to recognize own name, discriminating some short common phrases, imitating some short phrases
- Localization Skills - beginning to be able to localize sounds from increasing distances
- Distance and directional listening - having awareness of sounds in all directions. Discriminating familiar words and familiar commands from all directions at increasing distances
- Listening in background noise - recognising familiar words, phrases and commands with increasing differences, in all directions with background noise
- Auditory memory and sequencing - ability to make choices from several options, starting to have ability to select pictures in sequence. Imitating several word sequences
- Development of short term memory - ability to pick several named objects from a larger group. Longer term memory will also expand, remembering names and more vocabulary
- Using more words and phrases, and knowing some simple songs. Ability to recount information such as addresses and describe past events

This development will not happen overnight and the success of therapy will be dependant on total commitment from the parents, caregivers and educational / healthcare team around the child.

Visit [www.icommunicatetherapy.com](http://www.icommunicatetherapy.com) for more information, activities and programmes for individuals with cochlear implants.





## Speech

At the same time as teaching listening, we also want to promote speech. Trying to get children to repeat or name items on request is not the best way to teach speech, we need to find a way for the child to speak on their own terms, where they are in control and in a relaxed environment with no pressure. We need to provide good models for speech, not only naming things for the child, but also repeating back a correct version of their attempts at speech, and praising them every time they attempt speech (see [www.icommunicatetherapy.com](http://www.icommunicatetherapy.com) for information on good modelling for speech and language).



Once the child is actively listening, discriminating and using some speech we can start to look at some speech therapy ideas that focus on speech as well as listening. Usually it helps if the child is a little older when you want to start speech work, because the younger child is often either unaware of what the therapist is trying to achieve, and/or it is difficult to describe certain concepts such as back and front sounds etc. However, listening activities should still be the priority.

It will take time for the child to develop their new listening skills and speech. We have to remember that for some children it will be as if they have the hearing of a newborn and every sound they hear will be new. A cochlear implant can be very effective at promoting listening and speech skills and many children's speech will eventually become as good as their peers.

For more information on hearing impairment, aided hearing, and speech, language and communication activities go to [www.icommunicatetherapy.com](http://www.icommunicatetherapy.com)



To learn more about hearing impairment, hearing aids and strategies to enhance communication, you can read about and purchase books on our website [www.icommunicatetherapy.com](http://www.icommunicatetherapy.com). Click this link to see our online Resource Centre.

### ***Suggested Reading***

#### **Suggested reading:**

**Cochlear Implants: A Practical Guide** by Huw Cooper and Louise Craddock

**Hearing Impairment, Auditory Perception and Language Disability** by John Bamford and Elaine Saunders

**Children With Hearing Loss: A Family Guide** by David Luterman

**Auditory-Verbal Therapy for Parents and Professionals** by Warren Estabrooks

**A Journey into the Deaf-World** by Harlan L. Lane, Robert Hoffmeister, and Ben Bahan

**Inside Deaf Culture** by Carol A. Padden and Tom L. Humphries

**Rebuilt: My Journey Back to the Hearing World** by Michael Chorost

**Helping Deaf and Hard of Hearing Students to Use Spoken Language: A Guide for Educators and Families** by Susan Easterbrooks and Ellen L. Estes

**Cochlear Implants** by Susan B., Ph.D. Waltzman and J. Roland

**Cochlear Implants: A Practical Guide** by Huw Cooper and Louise Craddock

**School Professionals Working With Children With Cochlear Implants** by Patricia M. Chute and Mary Ellen Nevins

**Auditory-Verbal Therapy and Practice** by Warren Estabrooks

**Cochlear Implants: Auditory Prostheses and Electric Hearing** by Fan-Gang Zeng, Arthur N. Popper, and Richard R. Fay

**Children with Cochlear Implants in the Educational Setting** (School-Age Children Series) by Mary Ellen Nevins and Patricia M. Chute

**Better Communication and Cochlear Implants: A User's Guide** by Donna S. Wayner; Judy Abrahamson; June Casterton

**Cochlear Implant Rehabilitation in Children and Adults** by Dianne Allum

**[www.icommunicatetherapy.com](http://www.icommunicatetherapy.com)**

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