Hearing loss in children

PART ONE
EnginEars is a hearing implant program that helps babies, children and teenagers with severe to profound hearing loss. It includes a range of hearing implant options and a complete suite of services that addresses the child’s hearing loss, their language, cognitive, social, emotional and physical development, and their educational needs. Each child is regularly assessed and monitored and their program tailored to their individual needs. Once their education is complete, the young adult can continue to access cochlear implant and associated services for the rest of their life.

The ESIA Hearing Implant Centre and the School of Special Educational Needs: Sensory (SSEN:S) work in partnership to deliver EnginEars. Each institute has a well established service; SSEN:S has provided education services to the hearing impaired community since 1949 and ESIA has specialised in hearing implantation for over ten years. EnginEars has three convenient locations in Subiaco, Padbury and Hamilton Hill.

EnginEars is unique. It provides a consistent and highly supportive environment that our children ‘grow up within’, developing relationships with our staff and familiarity with our co-located facilities from an early age. This consistency ensures they remain settled through early intervention, education and their transition through adolescence into adulthood, giving them every opportunity to develop to their full potential.

This guide
This guide is the first of a three part series that will help you understand how hearing works, what hearing loss is and the options available to parents who have children with hearing loss.

‘Hearing loss in children’ will give you an understanding of how children are affected by hearing loss, the developmental stages of hearing and the importance of early intervention. It also provides information about how we assess children’s hearing and introduces a variety of ways to manage hearing loss in your child.
The first three years of a child’s life are vital for hearing development. The brain learns to understand sound and develop spoken language skills within these crucial years. For around the next four years of life, the brain’s capacity to process new language and speech reduces. Although each child develops at a different rate, most pass through milestones that serve as a guide as to what to expect.

Typical milestones

**Birth – 3 months**
- Reacts to loud sounds with involuntary movement (e.g. whole body or eye blink)
- Is soothed and calmed by soft sounds
- Turns head to you when you speak
- Is awakened by loud voices and sounds
- Smiles in response to voices when spoken to
- Seems to know your voice and quietens if crying

**3 – 6 months**
- Looks or turns toward a new sound
- Responds to “no” and changes in tone of voice
- Copies his/her own voice
- Enjoys rattles and other toys that make sounds
- Begins to repeat sounds (such as ooh, aah, and ba-ba)
- Becomes scared by a loud voice or noise

**6 - 10 months**
- Responds to his/her own name, the sound of the telephone ringing, and voices - even when they are not loud
- Understands common nouns (cup, shoe) and greetings (bye-bye)
- Makes babbling sounds, even when alone

**10 – 15 months**
- Plays with own voice, enjoying the sound and feel of it
- Points to or looks at familiar things or people when asked to do so
- Copies simple words and sounds; may say a few single words
- Enjoys games like peek-a-boo and pat-a-cake
- Follows one-step commands when shown by a gesture

**15 – 18 months**
- Follows simple directions, such as “give me the ball” without being shown
- Uses words he/she has learned often
- Uses 2 to 3 word sentences to talk about and ask for things
- Knows 10 to 20 words
- Points to some body parts when asked

**18 – 24 months**
- Understands simple “yes/no” questions (e.g. “Are you hungry?”)
- Understands simple phrases (e.g. “in the cup”, “on the table”)
- Enjoys being read to
- Points to pictures when asked

**24 – 36 months**
- Understands “not now” and “no more”
- Chooses things by size (big, little)
- Follows two-step commands, such as “get your shoes and come here”
- Understands many action words (run, jump)

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1 Adapted from http://www.lpch.org/DiseaseHealthInfo/HealthLibrary/ent/aahms.html
To better understand your child’s hearing loss, it is important to learn how natural hearing works. Hearing is the sense by which sound is perceived and hearing loss is a reduced ability to hear. It can vary from mild to total loss of hearing and occur in one or both ears.

How do our ears work?

1. Sound waves are guided down your ear canal by the pinna.
2. The sound waves hit your ear drum and it vibrates.
3. The small bones (ossicles) vibrate with the ear drum, transferring the sound across the middle ear to the inner ear (cochlea).
4. The fluid inside the cochlea picks up the vibrations and carries them to thousands of tiny hair cells. These hair cells change the movement of this fluid into electrical impulses which are sent along the auditory nerve to the brain. The hearing centre of the brain interprets the impulses as sound.

If hearing loss is undetected your child could miss much of what is said around them resulting in delayed speech and language development, social problems and academic difficulties. The following signs may indicate an undetected hearing loss:

- Not responding when called
- Shouting or whispering while speaking
- Failure to use single words
- Misunderstand instructions and seems constantly restless
- Being easily distracted and distracting other children in school
- Has a tendency to increase the volume of the TV and radio
- Not responding to soft speech
- Delayed speech development, or impaired speech, and has limited vocabulary
- Failure to startle to sudden loud sounds
- Failure to develop typical milestones (as listed previously)

Act on your concerns

If you think that your child may be having difficulty hearing, it is important to act on your concerns and contact us to arrange a hearing test as soon as possible, just to be sure.
Assessing your child’s hearing

Hearing tests are simple and painless assessments of your child’s hearing sensitivity. The tests are conducted by an audiologist who assesses the nature and type of possible hearing loss and identifies the best management options for your child. A speech and language assessment maybe included. The assessment process will include a variety of tests and may take more than one appointment so we get a complete picture of your child’s hearing loss without tiring them too much in one sitting. Some tests involve watching your child’s reactions to different sounds and others use electrodes to see how your child’s brain is hearing. The tests used are adapted depending on the age of your child. For more information about these assessments please contact our clinic.

Diagnosis
Understanding your child’s audiogram

An audiogram is a type of graph that shows the hearing levels for the left and right ears. It plots the usable hearing and hearing loss for each ear. Your child’s audiologist will test sounds one frequency at a time from low sounds to high pitched sounds. The softest level that can be heard is plotted onto the audiogram. The closer the marks are to the top of the graph, the quieter the sound that they heard in that frequency. The audiogram can be used to help the audiologist understand what speech sounds your child can hear.
Types of hearing loss

There are three different types of hearing loss; sensorineural, conductive and mixed hearing loss.

Sensorineural hearing loss

Sensorineural hearing loss is caused by damage to the cochlea or inner ear, or the nerve pathways between the cochlea and the brain. Sensorineural hearing loss can be mild, moderate, severe, or profound. It can affect one or both ears, and is permanent. Children with mild-to-moderate sensorineural hearing loss usually benefit from wearing hearing aids. Children with moderately-severe to profound hearing loss may benefit from a cochlear implant. Sensorineural hearing loss in children can be caused by:

- Inherited hearing loss
- Viral infections such as rubella, measles, meningitis, mumps and cytomegalovirus
- Drugs which damage the hearing system
- Birth trauma
- Complications from premature birth
- Trauma (e.g. head injury.)

Conductive hearing loss occurs when there is a problem with the outer or middle ear. This means that sound is unable to travel or ‘conduct’ from the outer ear to the eardrum and the tiny bones, or ossicles, of the middle ear. A conductive hearing loss may occur in both ears or just one ear and can often be helped by medical or surgical treatment. Conductive hearing loss in children can be caused by:

- Congenital factors
- Excess wax or a foreign object in the ear canal
- Outer ear infection
- Chronic ‘glue ear’ or middle ear infection, called otitis media
- A hole in the eardrum (perforation)

Mixed hearing loss

Mixed hearing loss is a combination of sensorineural and conductive hearing loss. Mixed hearing loss can occur in one or both ears.
Communication options

There are multiple options for a child with a permanent hearing loss and your audiologist will go through these with you. Below is a brief description of the most common options:

Hearing aids
A hearing aid is a battery powered electronic device. These devices are usually digital, worn at ear level, small, discreet and programmable. Hearing aids generally comprise three parts: a microphone, an amplifier and a receiver, all of which are designed to assist hearing and make sounds louder.

Cochlear implants and electroacoustic stimulation
For some children, hearing aids on their own will not provide the best results. In some cases wearing a hearing aid can only make the sound louder, instead of providing the clarity that is required to understand speech. In this instance, a cochlear implant or electroacoustic stimulation device may be a suitable alternative.

A cochlear implant (sometimes called a ‘bionic ear’) is an electronic device that provides a sense of sound to someone who has severe to profound deafness. The device consists of a sound processor, worn externally behind the ear, and the implant that is surgically placed under the skin. Electroacoustic stimulation (EAS) is the use of a hearing aid and a cochlear implant together in the same ear. The hearing aid (acoustically) amplifies low frequencies, while the cochlear implant (electrically) stimulates the middle and high frequencies of the ear. The inner ear processes acoustic and electric stimuli at the same time. Eligibility criteria apply for both cochlear implants and EAS devices. Further information on these are provided in Part Two of this series, ‘Cochlear implants for children.’

Sign language
Families may choose to support their child to use sign language to foster communication and language development. Australian sign language is called Auslan and is different from American sign language (ASL) and British sign language (BSL). Some babies and children will learn to use their hearing with the help of hearing aids or cochlear implants to develop speech and language. Some will use Auslan and some will use a combination of both. This can be called a blended approach.
Early intervention

Early childhood intervention is a group of services that promotes a child’s growth and development and supports families during the critical early years from birth to school entry. These services aim to equip your child with the skills that will enable them to successfully participate in their local kindergarten program and eventually at a regular school. Your early intervention team consists of educational audiologists, speech pathologists, teachers of the deaf, support workers and parent support groups. Families and children have the opportunity to engage in individual and/or group activities which promote the child’s language, cognitive, social, emotional, and physical development. Communication opportunities are offered in both spoken and signed language. Your child’s early intervention team will provide you with information to help you decide what is best for your family. It is important that sign and/or spoken language intervention occurs during the key language acquisition time between 0 - 5 years of age.
The impact of hearing loss in children

Coming to terms with your child’s hearing loss and making decisions for their future may seem overwhelming. It is helpful to learn about the different ways hearing loss can affect children and those around them. The ESIA Hearing Implant Centre is here to help you develop an understanding of the journey ahead. You don’t have to do it alone.

Hearing loss affects children significantly if it occurs early in their life. Once the crucial window for speech and language development, (between birth to three years) lapses, it becomes more difficult to teach your child the necessary skills they will need to hear and interpret sounds.

Generally, untreated hearing loss affects children in a number of ways:

1. It causes delay in the development of receptive and expressive speech and language. Children with hearing loss learn concrete words like ‘cat’, ‘jump’, and ‘red’ more easily than abstract words like ‘before’, ‘after’ and ‘jealous’.

2. The language deficit causes learning problems that result in reduced academic achievement. Children with hearing loss often have difficulty understanding and writing complex sentences.

3. Communication difficulties often lead to concerns about social and emotional well-being. Children with untreated hearing loss often report feeling isolated or unhappy in school, particularly when their contact with other children with hearing loss is limited.

4. The inability of the child to effectively communicate and socialise may have a detrimental impact on the child’s future vocational choices.

Understandably, learning about or experiencing such impacts can be quite daunting for families. It is important however to keep in mind that the impact of hearing loss may be minimised through some or all of the following:

1. Early diagnosis of your child’s hearing loss
2. Early commencement in education programs can help to maximise a child’s listening and/or language skills and enable them to be more successful with reading, writing, schoolwork and interpersonal relationships.
3. Early and consistent wearing of assistive devices such as a hearing aid or cochlear implant to allow access to speech sounds.
4. Attending a playgroup and meeting other children with hearing loss can help the child and the family feel less isolated and learn important skills.

These activities will have a significant and positive impact on the ability of your child to reach their full potential.

The impact on parents and families

95% of all children who are deaf or hard of hearing are born into hearing families. Generally family members will react differently to the diagnosis of hearing loss. Some families learn to cope more easily than others. Regardless of the time it takes, or the structure of the family, it is important for families to integrate hearing loss into their lives to reduce its impact on each other and the child. Open and honest communication will play a significant role in this process.

Who can I talk to?

As with any decision about your child’s health or learning, it is always important to make sure you are well informed. Some good places to start are:

**ESIA Hearing Implant Centre - Parent Liaison Service**

The decision to proceed with a cochlear implant for your child can be daunting. You are welcome to contact our Parent Liaison Officer for a confidential discussion over the phone or at our clinic. We aim to assist you, in whatever way we can, in choosing the best pathway for your family.

ESIA Hearing Implant Centre
Suite 2, Level 2, 1 Salvado Rd, Subiaco 6008
T: (08) 6380 4944  SMS: 0427 887 582
E: kids@hearingimplants.org.au  W: www.hearingimplantcentre.org.au

**The West Australian Foundation for Deaf Children (WAFDC)**

WAFDC aim to promote and support education, life skills and learning opportunities for deaf and hard of hearing children and young adults. They also provide parents with an information tool kit as a guide for families of such children. This includes summaries of the services available and stories from parents who have been through the journey of having a hearing impaired child.

West Australian Foundation for Deaf Children
53 Curtin Avenue, Cottesloe, WA 6011
T: (08) 9284 2016 or (08) 9385 3557
E: community.wafdc@optusnet.com.au
W: www.wafdc.org.au

**School of Special Educational Needs - Sensory (SSEN:S) formerly Western Australian Institute for Deaf Education (WAIDE)**

The School of Special Educational Needs - Sensory (SSEN:S) is provided by the State Government Department of Education and delivers education, support services and facilities for hearing impaired infants, children and their families throughout Western Australia. SSEN:S offers early intervention (EI) programs for infants and children (0-4yrs) and offers families a choice regarding different methods of communication including speech, hearing, sign language, or a combined approach. Families liaise with SSEN:S staff to make an informed choice for their family and their child. Intake coordinators are available to discuss the options and to assist with the enrolment process.

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More information on the EnginEars cochlear implant program from ESIA Hearing Implant Centre and SSEN:S are provided in Part Two of this series ‘Cochlear implants for children.’
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