

## About Hearing Loss...

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### **Possible signs of hearing loss in children include:**

- Stops early babbling
- Has a lot of ear infections/colds
- Fluid drains from ears
- Does not respond when called
- Speech/language delay (no words by 12 months of age)
- Turns up volume on radio or TV (disturbing to other listeners)

**Children who are considered "at risk"** for having hearing loss are those who experienced complications during pregnancy, birth and early childhood, including:

- Family history of hearing loss
- Severe jaundice
- Rh incompatibility [mother's (-) and child's (+) blood cells do not match]
- Low birth weight [less than 3.3 lbs. or 1500grams]
- Low APGAR scores [less than "7" at 5 minutes]
- Lack of oxygen at birth and/or required mechanical ventilation [>5 days]
- Head and neck abnormalities [cleft lip/palate, skin tags or pits, etc.]
- Birth abnormalities [kidneys, heart, eyes, lungs, diaphragm, etc.]
- Strong medications/drugs [especially through IV-antibiotics, chemo, etc.]
- Infections prior to and present at birth [CMV, toxoplasmosis, herpes, etc.]
- Childhood infections [meningitis, measles, mumps, severe chicken pox]
- Syndromes [Neurofibromatosis, Usher's, Down, Turner's, Alport's, etc.]
- Head injury/skull fracture
- Parental concerns
- Admission to NICU (48 Hours+)

\*This list is not exhaustive and is not considered a "catch-all". This list will only identify approximately 50% of children with hearing loss acquired prior to the age of 3 years. Speech and language problems/delays usually occur prior to identification of hearing impairment. Early detection is the key!

**Possible signs of hearing loss in adults that may indicate the need for assessment include:**

- People seem to "mumble"
- Can hear but have trouble with understanding speech
- Trouble hearing, especially in the presence of background noise
- Difficulty understanding someone unless they are facing you
- Ringing/buzzing/noises in the ear(s)
- Ask for frequent repetition
- TV/radio louder than others prefer it to be
- Avoid social situations
- Friends/family express their concerns
- Exposure to loud noise/equipment
- Sudden hearing loss (over night or past 90 days)
- Hearing difficulty in one ear
- Dizziness (severe or frequent)
- Pain in one or both ears (in the absence of an ear infection)
- Chronic ear infections (especially with drainage present)

If you experience any of the items listed above, it may be necessary to see your physician prior to being referred to an audiologist for hearing assessment. Some facilities do not require a doctor referral and appointments may be available by calling one of the community audiology sites for more information.

**Types of Hearing Loss**

A **conductive hearing loss** is caused by problems occurring in the outer or middle ear. It is called "conductive" because something reduces or stops the conduction of sound from reaching the inner ear or cochlea, where sound is sent to the brain via the hearing nerve. Holes in the ear drum, a middle ear infection, wax in the ear canal, a missing ear canal, disease, etc. are examples of a conductive hearing loss.

Most often a conductive hearing loss is medically or surgically treatable through a physician or specialist (Ear Nose and Throat physician). In the event a specialist deems the conductive problem untreatable, a special type of hearing aid may be appropriate to help an individual to hear better. Special bone conduction hearing aids transmit sound to the cochlea through vibration, however, these devices require that a **sensorineural**

**(inner ear) hearing loss** is **not** present at the same time or is at least minimal. A standard assessment performed by an audiologist may determine candidacy for such a device.

A **sensorineural hearing loss** occurs in the inner ear and is caused by damage sustained to the cochlea or hearing nerve. Nerve cell damage can be caused by noise exposure (music, machinery, etc.), aging, meningitis, strong medications (antibiotics, chemotherapy, diuretics through intravenous or IV, etc.), maternal diseases (such as rubella), heredity, chronic ear infections, head injury, to name a few. Sensorineural hearing losses are typically irreversible (or permanent) and may require the use of hearing aids depending on the cause of the hearing impairment and its severity.

### **Degrees of Hearing Loss**

The effects of hearing impairment can be staggering. Depending on the degree or configuration of a conductive and/or sensorineural hearing impairment, simple day to day tasks can be challenging. From simply understanding spoken communication to lack of speech and language development or social isolation, hearing is a sense that is taken for granted until we have lost normal functioning of our auditory system. An individual, who has acquired hearing loss, either through birth or disease or aging, etc., is not necessarily considered "deaf" but may be more appropriately termed "hearing impaired".

For children, "**normal**" hearing sensitivity and its corresponding threshold (lowest level of hearing) responses fall between 0-15 decibels (dB). An adult may be considered to have normal hearing sensitivity if their responses fall between 0-25dB. Therefore a "minimal" hearing impairment category is reserved for children only.

For children who sustain a "**minimal**" hearing impairment (16-25dB) that is left untreated, a mild auditory dysfunction may occur and result in speech and language deficits as some high pitched unvoiced consonants (s, f, t, etc.) may be missed. It also may result in "inattentive" behaviour. Based on their existing vocabulary and knowledge of the rules of spoken language, adults have the ability to conclude what was said even if the whole message was not received.

A "**mild**" hearing impairment (26-40dB) allows only for louder speech (voiced consonants and vowels) sounds to be heard, therefore causing the same inattention and more severe language and auditory dysfunction. Based on the missing elements of spoken language a hearing aid is most often recommended (if sensorineural in nature) for children and adults and most times is beneficial for oral communication and education. Speech therapy may also be required for children.

A "**moderate to moderately severe**" hearing impairment (41-70dB) will miss most speech sounds at regular conversational levels in quiet, and all speech sounds in the presence of background noise (e.g. classroom). Hearing aids are strongly recommended for sensorineural hearing impairments in children and adults. Assistive listening devices (FM, infrared devices, etc.) are common in the child's classroom in addition to their amplification.

A "**severe**" hearing impairment (71-90dB) hears no speech sounds at regular conversational level in any situation. Hearing aids and assistive listening devices are necessary for the reason that severe speech and language problems occur and the noise in a regular classroom is too great for effective learning. A child may therefore require special classroom placement.

A "**profound**" hearing impairment (90dB and above) is the category usually reserved for the term "deaf" as most environmental sounds are not perceived (unaided). Depending on the individual and degree of hearing impairment a hearing aid may or may not be advantageous for speech and language reception and development. In the event an appropriate hearing aid fitting is deemed not beneficial the individual may be considered a potential candidate for a cochlear implant. Some individuals experience hearing loss as well as the inability to distinguish the small differences between similar sounds; therefore no amount of amplification will be sufficient for effective communication.

### **Configurations of Hearing Loss**

The normal human ear can hear frequencies (or pitch) from 20Hz to 20,000Hz. When testing an individual's hearing sensitivity, an audiologist will assess those frequencies that are most important for speech and language (or between 250-8000Hz) and find the lowest level of hearing (threshold) at each octave (and sometimes inter-octave) frequency. It is possible and common to have normal hearing in one range (e.g. low pitch) and a significant hearing loss in another (e.g. high pitch) range. These types of hearing losses can be ignored or go unidentified for a long time because the individual can hear but can't understand at times, particularly in noise or people appear to be "mumbling".

A "**sloping**" configuration of hearing impairment means better hearing in the lower range than in the higher range and is probably the most common configuration. The most important frequencies for speech occur between 500-4000Hz and if the hearing loss is sustained only in the higher frequencies, the individual may perceive little difficulty.

A "**flat**" configuration means most or all of the frequencies were affected equally. However, a minimal to mild flat hearing loss may seem insignificant to the adult listener but may affect a child's speech and

language development by missing the high pitched unvoiced consonants. A moderate to severe flat hearing loss would be difficult to deny any hearing handicap.

A "**rising**" configuration means low frequencies are affected greater than the higher frequencies. As with the sloping configuration, a rising configuration will be difficult to identify as most consonants are found in the mid to high frequencies and the vowels and voiced consonants found in the low frequency range are spoken of louder volume and may still be perceived (although softly).

A "**cookie-bite**" or mid frequency hearing loss is less common and is most problematic (hearing and rehabilitation wise). More sophisticated, special hearing aids are available and are prescribed to accommodate the configuration and may be more expensive than a standard hearing aid.

**NOTE: While hearing loss and amplification have been discussed routinely throughout these pages, it is acknowledged that some people do not benefit from hearing aids. Hearing aids are prescribed for improvement in speech understanding in quiet or in background noise, localization abilities and sometimes for environmental purposes (danger). While those people who benefit from amplification hear better with their hearing aids, it should be pointed out that the devices do not make their hearing "normal" again. The hearing aids are only designed to make sounds louder and cannot replace the function of the hearing nerve. The earlier an individual comes to terms with their hearing impairment and starts rehabilitation with amplification, the more successful and satisfied they will be with their hearing aids and communication abilities.**

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