



Children's Health Ireland
at Temple Street

Your Child's Hearing Test

Information for Parents and Carers

Pure Tone Audiometry

How Does Your Ear Work?

Your ear picks up sound

Sound travels in invisible waves through the air. Sound occurs when a moving or vibrating object causes the air around it to move.

Sound waves travel down the ear canal and hit the eardrum in the middle ear. This causes the eardrum to vibrate. Three tiny bones in your middle ear link the vibrating ear drum to the cochlea in the inner ear.

The cochlea is filled with liquid that carries the vibrations to thousands of tiny hair cells. The hair cells fire off tiny electrical signals. These electrical signals travel up the cochlear nerve of the auditory pathway to the brain that processes them. All this happens in a fraction of a second.

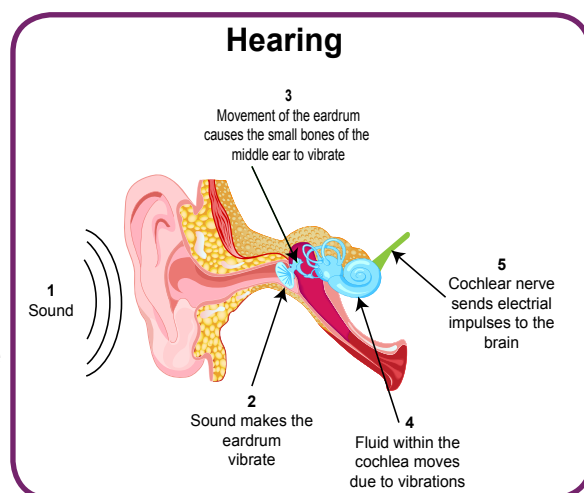
In today's test we will be assessing all the different parts of the ear when they work together.

Pure Tone Audiometry

Background

Children need to be able to hear speech sounds so that they can understand what is being said to them. If a child has a hearing loss and cannot hear speech sounds in at least one ear, their school work may be affected. In some cases, they may have social and psychological difficulties. If a child has normal hearing in one ear and a hearing problem in their other ear, they may have difficulty understanding what is being said to them when there is background noise and it will be more difficult for them to work out where a sound is coming from.

The aim of Pure Tone Audiometry is to find out if there is a hearing loss in one or both ears by testing each ear separately through headphones.



Instruction

Before the test begins, the tester will;

- 1) Ask the child to press a button every time they hear a noise, even when the noise is very quiet.
- 2) Explain there will be times when there is no sound, so it is important to wait until the sound is heard before pressing the button.

The tester may also play the sounds that the child will be listening for before the headphones are placed on their ears, at an intensity/loudness level (about 60dBHL) that can be heard comfortably by someone with normal hearing.

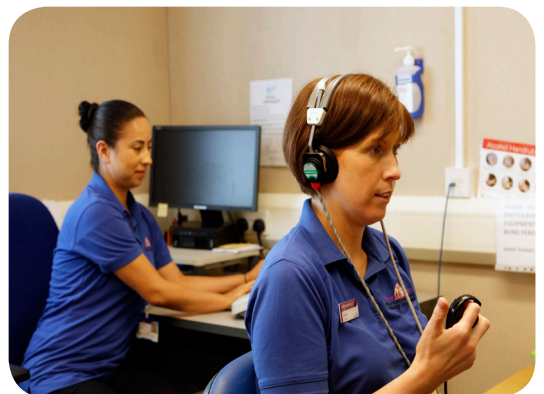
The Assessment

Following instruction, headphones are placed over the child's ears and the hearing assessment can begin.

Testing is usually carried out for six different frequencies/pitches: 250Hz (similar to the "m" sound in "moo"), 500Hz (similar to the "oo" sound in "boo"), 1kHz (similar to the "ah" sound in "bath"), 2kHz (similar to the "sh" sound in "shoe"), 4kHz (similar to the "ss" sound in "hiss") and 8kHz (a sound that is beyond the speech range, but can be useful when monitoring possible progressive hearing loss).

Sounds are played at different intensity/loudness levels and at irregular intervals, so that it is difficult for a child to anticipate when the sound will be played.

During the test some children may try to press the button before they hear the sound ("guessing behaviour"). The tester will ask the child to wait for the sound if this happens. If the guessing behaviour continues re-instruction may be needed. Longer gaps may also be needed in between sounds being presented to make sure that true responses are being obtained. The test will take longer if a child is guessing as more sounds need to be played for a reliable result. A review appointment will be required when the Audiologist feel that a result is not reliable.



Other children lose interest in the test and don't respond consistently for the quietest sounds that they can hear. A review appointment will also be needed under these circumstances to try and obtain a reliable result.

The Results

When the assessment has been completed the following results are possible:

1) Normal Result

If your child responded at a quiet level of 20dBHL or less for 250Hz, 500Hz, 1kHz, 2kHz, 4kHz and 8kHz for each ear with good reliability, this is considered to be a normal result. When a normal result has been achieved, it is likely your child has sufficient hearing for the sounds of speech to be heard in both ears.

Although we always try to test down to 20dBHL, the World Health Organisation and the HSE National Audiology Review Group (2011) also consider the slightly louder level of 25dBHL to mean that there is no hearing impairment. Given this, if 25dBHL is the lowest level that your child responds at (for one or some of the sounds that were tested), we may recommend monitoring the hearing levels rather than referral to an ENT Consultant.

2) Repeatable responses at a quiet level of 20dBHL or less but response reliability issues

If the tester/s felt that there was some uncertainty about response reliability of a child's test a review will be required even when there were repeatable responses at 20dBHL or less for 250Hz, 500Hz, 1kHz, 2kHz, 4kHz and 8kHz. A significant hearing loss in both ears is unlikely under these circumstances, but review is needed to make sure that your child meets the criteria for a satisfactory result.

3) Responses at elevated levels with response reliability issues

When responses are very variable it can be difficult to establish an accurate hearing test result. As previously described, some children exhibit frequent guessing behaviour and others lose interest in the test part of the way through the assessment. A review appointment will be required.

4) Responses at elevated levels with good reliability

A hearing loss is likely that may be temporary or permanent in nature. The Audiologist should be able to give you an estimate of the degree of hearing loss that your child has in the better ear. Audiology will refer your child to an Ear, Nose and Throat (ENT) Consultant if they are not under the care of ENT already.

If you have any further queries about your appointment, please do not hesitate to contact us on telephone: 01 878 4577.

To arrange any further appointments, please contact the Audiology secretary on Telephone: 01 8784533.

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