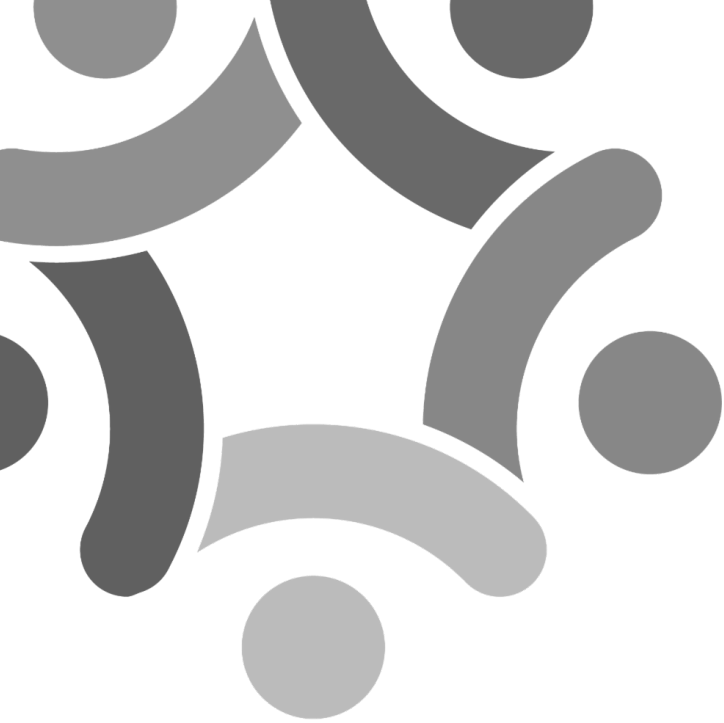

NHS
Royal Berkshire
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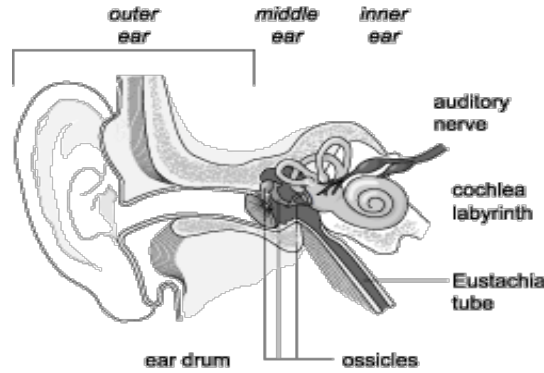
Your hearing and noise exposure

Information on how you can protect yourself from damage

Exposure to loud / intense noise can affect your hearing.

How do we hear?



The ear has three main parts: the outer, middle and inner ear: sound waves enter the ear and travel down the ear canal to the eardrum. The sound waves cause the eardrum to vibrate, which in turn makes the three tiny bones (the ossicles) behind the eardrum vibrate. The ossicles are located in the middle ear. Just beyond the ossicles is the inner ear. Part of the inner ear is called the cochlea; it contains thousands of tiny hair cells. Some of these hair cells sense the sound vibrations and convert them to nerve signals. The brain translates these nerve signals into what we experience as sound and that is how we hear. Some of the hair cells receive signals from the brain which enables fine tuning of sound.

How does noise cause hearing loss?

Any damage to the cochlear hair cells can result in permanent hearing loss or hearing distortion. The degree of damage depends on both the level of noise and the duration of exposure. After relatively short periods of loud noise exposure, the ear suffers from something called **temporary threshold shift**, a temporary dullness in your hearing that usually recovers within two days. Avoid any further significant noise exposure during this time. Temporary hearing loss is a warning sign that the hearing system has been put under great stress and that there is a risk of permanent damage. If the noise exposure continues, over a prolonged period of time, permanent changes may occur. This is called **permanent threshold shift**. Regular exposure to noise can lead to **permanent noise-induced hearing loss** as the hair cells continue to be damaged.

- **Acoustic trauma:** this can occur on exposure to very intense sounds for a short time, an explosion for example. In some cases, a very intense sound can also damage your eardrum.
- **Tinnitus caused by noise:** tinnitus is a medical term to describe noises that people can hear in one ear, both ears or in the head, such as ringing, humming, buzzing or whistling.
  Sometimes, tinnitus is the first sign that your ear has been damaged by noise. For some people it can be temporary but continued exposure to loud noise may lead to permanent tinnitus.

How can I tell if sounds are too loud?

Being unable to talk to people two metres away without shouting because of background noise. Ringing in your ears for a few hours after noise exposure. The level of sound hurts your ears.

How do I protect myself from noise exposure?

- **Work:** Employers have a legal duty to protect your hearing. The regulations say that if you are exposed to loud noise at work, your employer must have noise levels assessed and recorded. They must take steps to reduce the level of noise where possible and provide ear protection where required. They may also arrange regular hearing tests to monitor changes in your hearing.
- **Play:** Earplugs, earmuffs and canal caps can protect your ears from loud noise by reducing the level of sound reaching your ears. If you are exposed to noise that cannot be stopped, reduced or avoided, you should use earplugs or earmuffs. Musicians may wish to purchase specialist ear plugs. You may also want to consider noise-cancelling headphones that will enable you to listen to your MP3 player at a lower volume by reducing noise around you, such as on public transport. There are suggestions that children should be limited to a maximum of one hour per day using earphones. The device volume should be set no higher than 60%.

Symptoms and early signs of hearing loss

Conversation becomes difficult or impossible. Your family complains about the television being too loud. You have trouble using the

telephone. You find it difficult to catch sounds such as 't', 'd' and 's', so you confuse similar words. You develop tinnitus.

What level of noise exposure is safe?

It is important to consider both the level of noise and duration of exposure. If the noise is uncomfortable for you to listen to then it is probably too loud. Smart phone apps for noise level measurements cannot be guaranteed to be sufficiently accurate to be a reliable source of information. There is good evidence that the human ear can tolerate sound levels below 85dB (a busy bar or city traffic noise) almost indefinitely but with increasing sound levels above this, the risk of permanent hearing damage rises.

Noise level (dB)	Safe exposure time (hours)
85	8
88	4
91	2
94	1
97	0.5

Adapted from information provided by the British Tinnitus Association

The most important thing is prevention – i.e. protecting your ears from noise-induced hearing loss. **Raise any concerns you have regarding your hearing with your GP.** For further information visit www.royalberkshire.nhs.uk/media/525dgnlt/protect-your-ears-customised-ear-protectors_oct23.pdf

Sources: *British Tinnitus Association – www.tinnitus.org.uk, RNID – https://rnid.org.uk/, Health and Safety Executive – www.hse.gov.uk, Laryngoscope. 2013 Sep;123(9):2240-4. doi: 10.1002/lary.23667. Epub 2013 Jul 2.*

Find more information at www.royalberkshire.nhs.uk/audiology

If you would like this leaflet in other languages or formats (e.g. large print, Braille or audio), please contact the Audiology Department.

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