

Military noise induced hearing loss and the Lost Voices report: the evolution of earshot

BY ROBIN GARNETT

Brigadier **Robin Garnett** gives us a snapshot of the 2014 Royal British Legion report on hearing problems of Service personnel and veterans. The difficulties in assessing and managing hearing loss are reiterated in this article, with an introduction to how Earshot evolved; a consortium whose primary purpose is to contribute to the growing body of knowledge of hearing loss in the armed forces, and improve the lives of Service personnel and veterans.

Lost Voices [1] is a Royal British Legion report from 2014 on hearing problems amongst Service personnel and veterans. It surveyed 2,000 veterans and estimated that 11% of veterans reported having problems with hearing and 6% reported tinnitus. Veterans under the age of 75 were three to four times more likely to report difficulties in hearing than the general population.

A highly regarded publication is 'Noise and its Effects' by Luxon and Prasher [2]. The chapter on military noise induced hearing loss (MNIHL) is one of the shortest. Most of the information reviewed is from Israel, America, Germany and France. There has been considerable investment in research on MNIHL in the US and in 2009/10 the director of the National Center for Rehabilitative (Auditory) Research (NCRAR) said that:

- Auditory dysfunction is the most prevalent Armed Forces linked disorder
- One in four service members returning from conflicts complains of hearing loss and / or tinnitus.
- As the veteran population ages, hearing loss will become more prevalent and more veterans will

require rehabilitation.

- Effective hearing loss prevention strategies need implementing in order to reduce the financial and personal costs of auditory disabilities
- For the veteran the most relevant cost is the reduction in "readiness for life" [3].

Many people have experienced the temporary hearing loss which can accompany a nearby gun shot. The noise produced like that from blast and artillery or major naval guns is different from industrial noise against which regulated noise exposure is assessed. Whilst industrial noise is rarely measured at more than 90-100dB, noise from gun shot and blast (impulsive noise) can reach 200dB and rise to a maximum level in a few milliseconds. Industrial noise is usually much more constant and lacks such abrupt and sizeable pressure wave changes.

Although impulsive noise can damage the middle and outer ear, it is the inner ear damage that has much more long lasting effects. Only over the last few years have significant studies been carried out to discover exactly what sort of damage is done.

There are two main patterns associated with military NIHL; the first is simply noise induced hearing loss

from prolonged exposure to loud noise occurring most often in an industrial context and not associated with blast or gun shot.

The second type of hearing damage associated with military service is acoustic trauma or impulsive noise damage which occurs when an individual is exposed to very high sound levels for a short time such as an explosion or a gun shot at close range. The resulting hearing loss is usually sensorineural and is often worse in the ear that was closer to the sound.

Many veterans will appear to have normal hearing in simple one-to-one conversations but the picture changes dramatically with increasing background noise. Hearing mobile phone conversations on a busy high street or listening to one person whilst others are talking in a meeting or office often proves difficult. Hearing instructions on a building site and many similar situations can be difficult if not dangerous.

Increasingly evidence is accumulating that noise induced hearing loss has long-term progressive consequences, considerably more widespread than the effects revealed by conventional threshold testing using standard pure tone audiometry (PTA). Audiometry is the main procedure used for hearing

"It is anticipated that the clinical service will operate a complete and fully rounded hearing assessment service on which veterans can rely for high quality."

“The Lost Voices report has stimulated much interest. It has contributed to the Government decision to make significant monies available for deafness healthcare for veterans.”

assessment in the Armed Forces and for those seeking compensation. The nerve cell damage and loss outlined above may not be picked up by pure tone audiometry (PTA) but they will add to difficulties with hearing in noisy environments and can contribute to tinnitus, hyperacusis and or other problems more commonly associated with inner ear damage and sensorineural deafness.

A reduced ability to perceive certain sounds, especially speech, has been observed in individuals who have otherwise normal results on hearing threshold tests.

Animal studies have shown that noise exposure including loud music can lead to demyelination in the auditory nerve though effects of impulsive noise have yet to be tested with this technique. Blast induced injury in mice has been studied by researchers at Stamford University, California in an experiment reproducing human exposure to improvised explosive devices (IEDs). This research demonstrated that the blast caused damage to and loss of outer hair cells and led to reductions of a number of nerve cells inside the cochlea.

The evolution of earshot

Following its deliberations over hearing loss issues and military compensation (see Lost Voices report) [1], the hearing loss sub group of the veterans’ medical advisory committee decided to create a consortium of expertise in this area at the Ear Institute at UCL in London called Earshot. Earshot was created under the joint Chairmanship of Professor David McAlpine and Brigadier Robin Garnett, however Professor McAlpine has now been appointed to Macquarie University in Sydney.

Its aims are:

- To assess, advise, support and follow up veterans with hearing loss related to their time in the Armed Forces.
- To study the nature and evolution of service related hearing loss and the disabilities incurred.

It is anticipated that the clinical service will operate a complete and fully rounded hearing assessment service on which veterans can rely for high quality. It will include a full tinnitus advisory and treatment service including rehabilitation, a comprehensive assessment and analysis of hearing loss, communication difficulties, balance disorders and an accurate diagnosis of benign paroxysmal positional vertigo (BPPV), which can be associated with impulsive noise induced deafness. All patients would be given a comprehensive report and individualised management plan.

An academic section is being planned, consisting of an advisory board guiding academic data collection and a series of studies that will:

- Collate and store long-term data from at least five yearly reviews of audiovestibular function
- Provide long-term cohort analyses to examine age related hearing loss, how it develops and how it is related to service induced hearing dysfunction
- Assess the disabilities resulting from hearing loss between 25 and 50dB
- Examine how hearing loss disabilities are improved (or not) by hearing aids.
- Assess the gains achieved through tinnitus rehabilitation
- Provide long-term advice on hearing loss issues affecting the veteran community.

Earshot and the consortium supporting and running the charity are yet to be agreed and confirmed.

The Lost Voices report has stimulated much interest. It has contributed to the Government decision to make significant monies available for deafness healthcare for veterans. The case for supporting hearing and related difficulties for veterans is still in its early stages of knowledge and understanding. It is hoped that further research is funded and continued to increase the breadth of understanding of the impact of hearing loss from war and trauma, in order to improve the quality of life of our service personnel.

References

1. The Royal British Legion. Lost Voices. *A Royal British Legion report on hearing problems among Service personnel and veterans*. London, UK; The Royal British Legion; 2014. Available at <https://www.britishlegion.org.uk/media/2282/lostvoiceshearinglossreport.pdf>
2. Luxon L, Prasher D, (Eds.). *Noise and its effects*. Hoboken, USA; John Wiley & Sons Ltd; 2007.
3. Fausti S. *A Modern Approach to Noise Induced Hearing Loss on Military Operations*. Deafness Research UK Conference; London, UK; The Ear Institute, UCL and MOD, UK; 7 December 2009.



Robin Garnett

Consultant in Rheumatology and Rehabilitation Medicine, BMI Hospitals, London UK.

E: robin@rgarnett.net