The Journal of Laryngology & Otology

cambridge.org/jlo

Noise, trauma and the ear

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Editorial

Cite this article: Fisher EW, Lesser TJ. Noise, trauma and the ear. *J Laryngol Otol* 2020;**134**: 189–190. https://doi.org/10.1017/S0022215119002068

First published online: 6 November 2019

The Journal of Laryngology and Otology (JLO) archive from 1874 gives an opportunity to delve into the history of noise-induced ear trauma publications, which is topical in the light of the WHO publication on 'The burden of disease from environmental noise'.[1]

The early days of industrial noise damage are recorded in the JLO with relation to boilermakers and weavers[2–3] and later from drills in an article by Fisch, for example.[4]

Much of the interest in industrial noise-induced deafness arose from the work of armed services doctors from the Great War (1914–18) and subsequently World War II. Ritchie Rogers and Yearsley contributed to the JLO in the earlier war[5] and Dickson published work on aviation noise in World War II and afterwards,[6–8] which led to his involvement in industrial noise in the post-war years.[9] The Royal Navy and Marines have not been left out, with a contribution by Coles.[10] A very recent historical article addressed the question of ear damage in the trenches.[11]

From the early reports onwards, there have been frequent comments from authors regarding the need for hearing conservation measures, both in the military and industrial settings, yet these measures were not taken seriously until the latter half of the 20th century.

The British Association of Otolaryngologists (BAO later BAO-HNS, now ENT-UK) was at the forefront of attempts in the UK at rationalising an approach to the numerous claims for industrial deafness that arose after World War II, and a committee set up by the BAO reported in the JLO in 1960. Professor Ross Coles contributed to the journal and became a leading light in the field, being a co-author in much subsequent published work on assessment for noise deafness.[12–13] Further post-war literature on gunfire and industrial noise appeared in the JLO[14–15] and Chung and Gannon discussed the matter of low frequency deafness in noise-exposed cases.[16]

The related subject of blast injury to the ears generated publications following on from the 'troubles' in Ireland from the late 1960s onwards. Two major arenas, the Birmingham pub bombings and the Northern Ireland experience led to JLO articles by Pahor and Kerr, respectively.[17–18]

Later articles have highlighted the problems faced by motorcyclists,[19] the assessment of asymmetry in weapons noise[20] and the use of more sophisticated audiology techniques in the assessment of noise damage.[21]

The concept of 'acoustic shock' has arisen in recent years, particularly in relation to staff in telecommunications and call centres, and a major UK court case has arisen in the music industry with respect to an opera orchestra viola player. Acoustic shock was reviewed by Baguley and McFerran[22] and further discussed in a later JLO article.[23] Discussion of socio-accusis from personal stereo systems has also arisen more recently.[24]

Global medicine is currently in vogue, and with the 'development' of low-income countries such as Nepal, has come the problem of industrial noise.[25]

Despite this wealth of literature in the JLO archive and elsewhere there are many unanswered questions. Just as importantly there is a need to revisit the statements and "truths" of the past with modern scientific methods. Unfortunately, the literature on compensation for industrial noise-induced deafness is based on variable quality science that often fails to achieve a high level of evidence. Looking at the evidence as described in over a century of JLO articles, there are common qualitative themes identified. There is an apparent contrast with more recent statistics-based schemes for noise-induced deafness diagnosis and quantification. As our forebears have said, the subject *'… baffles even an expert otologist, since so many other factors complicate the diagnosis'*. Few would disagree with that.

The unanswered questions raised in the literature about industrial and environmental noise include: Why is noise damage considered to cause a 4K dip? Do different noises cause different frequency losses? Why are noise-induced hearing loss (NIHL) notches considered to be usually symmetrical? Why are many notches in the population asymmetrical? Why do non noise-exposed individuals have notches? What underpins the wide individual susceptibility to hearing loss from noise? Why is a pure tone test still thought to be usually accurate and consistent in NIHL claimants? What can resolve the dispute about whether age and noise components to deafness are additive? Why does noise damage interact with solvents and smoking? Is hair cell damage or cochlea synaptopathy the cause of most disability? What is the role of genetics in susceptibility? What is the role of co-existent health issues? There are many more unresolved questions.

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https://doi.org/10.1017/S0022215119002068 Published online by Cambridge University Press

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https://doi.org/10.1017/S0022215119002068 Published online by Cambridge University Press