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NEW ZEALAND
Audiological
Society

Understanding ACC Occupational Noise-induced Hearing Loss cover – Summary

For hearing loss assessors

Contents

Introduction

ACC is a Crown entity that delivers New Zealand's accident insurance scheme as set out in the Accident Compensation Act 2001 (AC Act). We all have a role to play in ensuring the continued sustainability of this unique scheme and this is why our partnership with you is so important.

This summary document will help you consider whether a client with occupational noise exposure could be considered to have occupational noise-induced hearing loss (ONIHL) which could qualify for ACC support.

We developed this summary document from an ONIHL learning module we produced with the New Zealand Audiological Society executive council members. It provides you with a useful tool to consider if your client has work-related hearing loss that ACC may cover.

Is your client's hearing loss covered by the AC Act?

For ONIHL to be covered by ACC, the portion attributed to injury causation must be at least 6% (*AC Act 2001 s26(1A)*).

This four-part test from the AC Act helps to determine if your client may be supported by ACC for ONIHL:

1. The hearing loss must have been caused by noise
2. Exposure to noise needs to be identified as having occurred *at work*
3. *Exposure to injurious noise must not have occurred to a material* extent away from work (material extent means that the non-work exposure acting alone could not have been sufficient to cause the NIHL)
4. Workers exposed to such workplace noise must be at a significantly greater risk of suffering NIHL than others not exposed to that environment. The comparison of risk is between people who generally perform work with such noise exposure and people in other work environments, not between the client and the general population. The fact that a client may be more at risk of suffering NIHL is not relevant to this consideration *AC Act 2001 s30(2)*

To be eligible, a person needs to establish that they were resident and working in New Zealand or working temporarily abroad as a New Zealand resident for a New Zealand agency or company when the noise exposure occurred (*AC Act, s17*).

Self-employed workers, e.g., farmers (but not normally their family members), are included under the scheme. The work must be for pecuniary gain or profit – unpaid work, or work that involves only an allowance that is not subject to taxation (such as volunteer firefighters and prisoners involved in work schemes), is not covered.

You can see from the legal framework that aspects of your clinical assessment are vital. This includes, for example, your:

- careful elicitation of the history of hearing loss and noise exposure
- understanding of the literature relating to risk of ONIHL in various worker groups and occupational environments.

It also includes your analysis of the:

- severity of the noise exposure
- relative risks of work and non-work exposure
- pattern of hearing loss, and whether this is typical of NIHL.

Key resources

Mirza R, Kirchner B, Dobie R, Crawford J (2018). ACOEM guidance statement – Occupational noise-induced hearing loss.

JOEM, 60(9). Reprinted in *Assessment of occupational noise-induced hearing loss for ACC, Appendix E pp.88-92*

ACOEM (2018, e498-9) defines the principal characteristics of ONIHL as follows:

It is always sensorineural, primarily affecting the cochlear hair cells in the inner ear.

It is typically bilateral since most noise exposures affect both ears symmetrically.

Its first sign is a "notching" of the audiogram at the high frequencies of 3,000, 4,000 or 6,000 Hz with recovery at 8,000 Hz.

- This notch typically develops at one of these frequencies and affects adjacent frequencies with continued noise exposure.
- The exact location of the notch depends on multiple factors including the frequency of the damaging noise and size of the ear canal.
- In early NIHL, average hearing thresholds at the lower frequencies of 500, 1,000 and 2,000 Hz are better than average thresholds at 3,000, 4,000 and 6,000 Hz, and the hearing level at 8,000 Hz is usually better than the deepest part of the notch.

Noise exposure alone usually does not produce a loss greater than 75 dB in high frequencies and greater than 40 dB in lower frequencies.

Hearing loss due to continuous or intermittent noise exposure increases most rapidly during the first 10-15 years of exposure, and the rate of hearing loss then decelerates as the hearing threshold increases. This contrasts with age-related loss, which accelerates over time.

Available evidence indicates that previously noise-exposed ears are not more sensitive to future noise exposure.

There is insufficient evidence to conclude that hearing loss due to noise will progress once the noise exposure is discontinued.

Greville, A. (2019). Occupational noise levels: A collection of reported measurements.

Accident Compensation Corporation, NZ: ACC8023 (May, 2019)

This document records noise levels found across a number of sectors, and reported in a range of different publications, both within New Zealand and elsewhere. Many are historical, which can be useful when assessing people's noise exposure over their working lives. This is also available in spreadsheet form on ***audiology.org.nz***.

Coles RRA, Lutman ME, & Buffin JT (2000). Guidelines on the diagnosis of noise-induced hearing loss for medicolegal purposes.

Clin Otolaryngol, 25, 264-273. Reprinted in *Assessment of occupational noise-induced hearing loss for ACC, Appendix D pp.77-87*

These UK guidelines aim to assist in the diagnosis of noise-induced hearing loss (NIHL) in medicolegal settings.

Requirements	**Modifying factors**
High-frequency hearing impairment	The clinical picture
Potentially hazardous amount of noise exposure	Compatibility with age and noise exposure
Identifiable high-frequency audiometric notch (Figure 1) or bulge (Figure 2) – note that these are not pathognomic of NIHL without a history of noise exposure, as they can be present in people without NIHL	Other causation – complications such as asymmetry, mixed disorder, and conductive hearing impairment

Figure 1: High-frequency audiometric notch

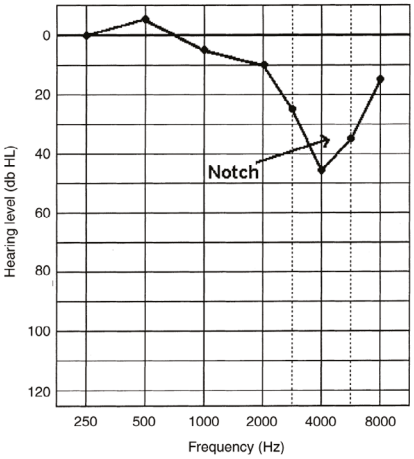
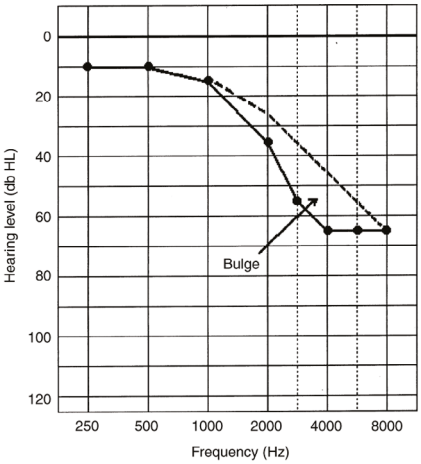


Figure 2: High-frequency audiometric bulge



Percentage loss of hearing scale

The percentage loss of hearing **(PLH) scale was developed by John Macrae of the National Acoustic Laboratories in Sydney during the 1970s and 1980s. It was designed to correlate with the Articulation Index (Kryter, 1962**[1]**)**. The PLH scale was incorporated into ACC's hearing assessment regulations as the method for determining degree of hearing loss originally in 1992 and amended in 1996, 1999 and 2003.

The NZAS revamped version of their PLH spreadsheet enables calculation for each ear individually as well as the binaural calculation and a number of other refinements help you to evaluate the strength of the case for an ACC claim. The current version of the NZAS PLH spreadsheet is available on ***audiology.org.nz***.

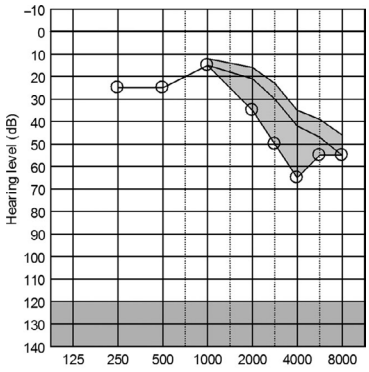
1. Kryter, K. D. (1962). Methods for the calculation and use of the Articulation Index. *Journal of the Acoustical Society of America*, *34*(11), 1689–1697

Lutman ME, Coles RRA, & Buffin JT (2015). Guidelines for quantification of NIHL for medicolegal purposes.

Clinical Otolaryngol, 41(4), 347-357, or **CLB-LCB2 Calculator app** (Mark Lutman Consultant Ltd)

These guidelines aim to provide a method of quantifying the amount of NIHL, distinguishing it from expected age-related hearing loss. Note that the "low fence" of the PLH scale used in New Zealand and Australia makes quantification more complex, but the graphical output from the CLB-LCB Calculator app can be helpful in identifying any possible NIHL component. This app is available on ***audiology.org.nz***. *In Figure 3 the CLB-LCB calculation shows the shaded area that represents the estimated NIHL, i.e., the difference between the top line, which is the modified age-related hearing loss, and the actual thresholds (the lower line).*

Figure 3: CLB-LCB calculation estimated NIHL



ISO 1999 (2013)

Table 1 below is derived from the international standard ISO 1999:2013E. It shows the 90th percentile age-corrected noise-induced hearing loss associated with various noise exposures for a 60-year-old male, expressed as PLH.

Table 1: ISO standard 90th percentile age-corrected NIHL (in PLH) for 60-year-old male

Noise level	**Years of noise exposure**			
	10 years	**20 years**	**30 years**	**40 years**
85	2	2	3	3
90	5	6	6	7
95	11	13	14	16
100	20	26	29	32

2. CLB-LCB Calculator app is available on ***audiology.org.nz***

Questions to ask when considering whether an ACC claim should be lodged

Weigh up your answers in relation to the six questions below to determine if there's likely to be a causal link between the client's hearing loss and occupational noise, and the potential relevance of other causes of the hearing loss.

Question 1: Does the client have evidence of noise-induced hearing loss?

Is the hearing loss (HL) sensorineural?

Is there a high-frequency (HF) notch or bulge present[3]?

Is the percentage loss of hearing (PLH) for 2-8 kHz at least 6% (use BC if there is an air-bone gap)?

Is the HL bilateral (not necessarily completely symmetrical)?

Is the degree of loss within limits of NIHL as defined by ACOEM?

Question 2: Is there likely to be co-existing pathology?

Is there HL at or below 1 kHz?

Is there a conductive component?

Is there a minimum of 6% HL (using BC thresholds if there is a conductive component) at frequencies above 1 kHz (age-corrected)? This will need to be greater than 6% if there is any low-frequency (LF) HL.

Is there significant asymmetry[4]? Is there a known cause for the worse ear?

Has there been a significant increase in hearing loss since noise exposure ceased?

Question 3: Is there evidence of significant noise exposure?

Were noise levels hazardous? (See: Occupational Noise Levels document or spreadsheet)

Was it necessary to shout to be heard?

Was there significant duration of noise exposure? Check ISO 1999 tables (*Assessment of occupational noise-induced hearing loss for ACC, Appendix C pp.73-76*).

If the exposure was in the armed forces, was this post 1974? Clients with exposures related to armed conflict prior to 1974 should be referred to Veterans' Affairs.

3. See (Lutman et al, 2016) or CLB-LCB Calculator app (Mark Lutman Consultant Ltd).
4. Refer to GP if significant asymmetry as defined by NZAS Best Practice Guideline (see ***audiology.org.nz***) exists. Note that ENT assessor's role does not include treatment.

Question 4: Was there recreational noise exposure?

Was the recreational noise exposure significant? Normal domestic chores such as mowing and use of power tools are unlikely to have a significant effect. The cut-off for shooting as a risk factor is usually taken as 100 rounds per year. Motor sports are another potential cause of recreational noise exposure.

If so, will allowance for this mean that there is likely to be <6% ONIHL?

Question 5: Did the noise exposure meet the definition of work?

Was the client in paid employment or self-employed?

Was the client a volunteer (e.g., volunteer firefighter) – if so, currently excluded from cover.

Question 6: Was the noise exposure in New Zealand?

Only work-related noise exposure in New Zealand qualifies for ACC cover[5].

If there has been overseas exposure, has there been sufficient noise exposure in New Zealand to qualify (see Q3)?

5. Exception is if the client was travelling from New Zealand base, i.e. was paid in New Zealand.

Disclaimer

All information in this publication was correct at the time of printing. This information is intended to serve only as a general guide to arrangements under the Accident Compensation Act 2001 and regulations. For any legal or financial purposes this Act takes precedence over the contents of this guide.

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