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Ontario's Workers' Safety and Insurance Board (WSIB) Policy Change-What They Got Right and What They Got Wrong…

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After a public request for comments, the Province of Ontario recently updated its Workers' Safety and Insurance Board (WSIB) policy on occupational noise exposure. The Canadian Academy of Audiology submitted a detailed response on several issues that would bring the Ontario policy in line with current research literature, not just anecdotes. Three areas were responded to, of which only one was addressed appropriately by the Province of Ontario: (1) Age correction for those workers over the age of 60, (2) Audiometric notch, and (3) The extension of occupational hearing loss to musicians. Only the removal of the age correction was correctly acted upon.

1. Removal of the ?0.5 dB/year Correction for Those Workers Over Age 60

The Canadian Academy of Audiology supports removing the ?0.5 dB/year correction for workers over age 60. In the old policy, 0.5 dB for each year over age 60 was subtracted from the 500 Hz, 1000 Hz, 2000 Hz, and 3000 Hz average. No significant data have ever supported this assumption, despite this topic being on the agenda of almost every National Hearing Conservation Association (NHCA) conference and every Acoustical Society meeting since the 1980s. Rosenhall et al. (1990) clearly identified that while presbycusis is certainly a factor in hearing loss for those over the age of 60, the effects of presbycusis become much more dominant and by age 79, the measured hearing loss is similar to their age-matched peers who have never been exposed to occupational sources of noise. Rosenhall and his colleagues showed that over the years, ISO R. 1999 (R. 2013)- a large international model- predicts a "toughening" of the hearing mechanism where exposures early in a worker's career contribute more to permanent hearing loss than if the same exposure was later in their career (shown in Figure 1).

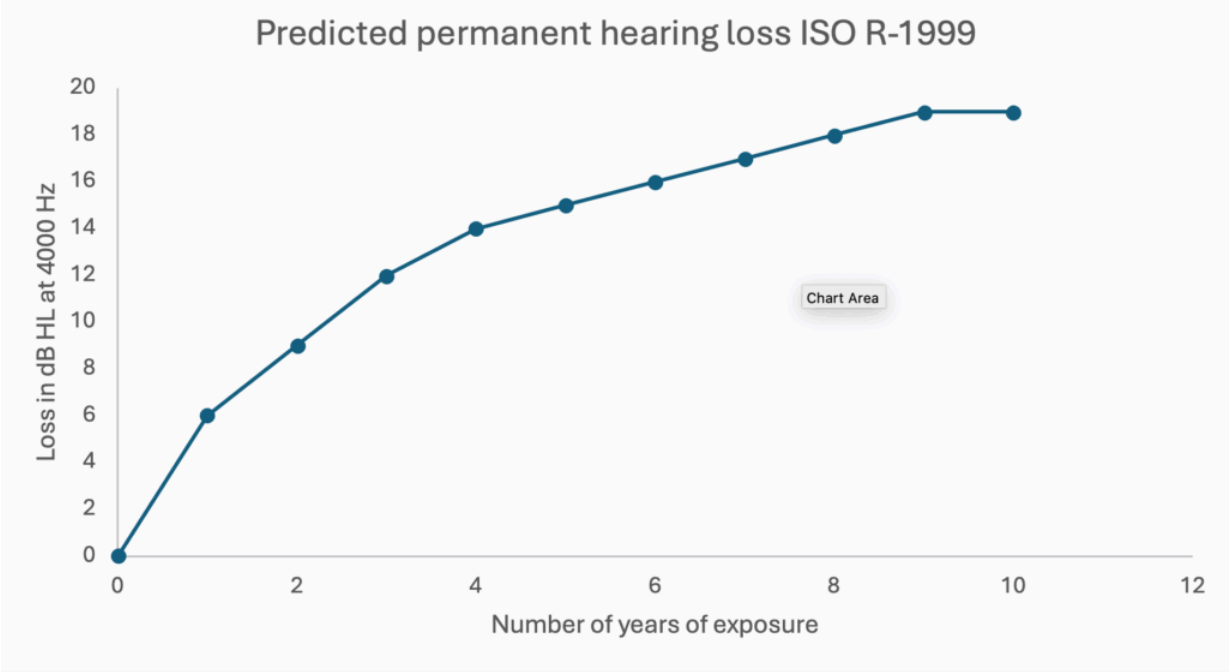


Figure 1. Rosenhall et al. (1990) demonstrate that ISO R. 1999 predicts a gradual reduction of additional hearing loss from noise as the number of years of exposure increases. This supports that an age-correction would have differing accuracies for different workers; especially comparing a 60-year-old worker who has only been exposed to noise for 5 years vs. a 60-year-old worker who has been exposed for 35 years. Some of the literature refers to this "slowing down" of hearing loss progression as "asymptotic" hearing loss, despite the inaccurate usage of that term.

It is "metaphorically" as if the cochlea becomes toughened over time- while there is no histologic data to support this, many references go back to the mid-1980s that refer to this "auditory toughening". Regardless of the neuro-physiology involved, ultimately as the years pass, presbycusis as a primary source of hearing loss, becomes a much more dominant factor. This gradual flattening of hearing loss progression is predicted by ISO R. 1999 (R. 2013). An age correction for someone who is over 60 and has just begun their occupational career may make sense, but given that most industrial workers have already reached this "flattening" part of the ISO curve by the time they reach age 60 (or even less), it makes no sense to include an age correction.

Removing the 0.5 dB correction for every year over age 60 is a "linear" correction that is the same for all age groups, but as shown in Figure 1, this correction is anything but linear. One cannot model non-linear behavior with a simplistic linear equation. The Canadian Academy of Audiology supports this long-overdue removal.

2. Audiometric "Notch" and the "Consistency" of Audiometric Pattern with NIHL:

There is very little evidence that a notch or a dip pattern is consistent (or even necessary) for a compensable hearing loss caused by noise exposure. Only one other jurisdiction in the world comments (or requires) a notch in the audiogram in the 3000-6000 Hz region and that is the Province of Alberta (https://www.wcb.ab.ca/assets/pdfs/providers/HCP_Hearing_loss.pdf). In the new Ontario Policy, while this is not a strict requirement, a notch is mentioned as an example of the "configuration being consistent with noise exposure." (p. 5).

Barrs et al. (1994) point out that only about 37% of noise-exposed individuals had such a "notch"

in their audiometric configuration. Nondahl et al. (2009) found that “among participants with a notched audiogram, almost one third did not have a history of occupational noise exposure … and results were more variable with woman”. Lie et al. (2015), analyzing the results of over 12,000 railway workers, found that 61% of those who were noise-exposed had notches… but 51% of workers who were not exposed… also had notches. They state that “Audiometric notches commonly occur among both noise-exposed and those not exposed to noise in railway personnel. The usefulness of audiometric notches in the diagnosis of NIHL is therefore limited”.

None of the other jurisdictions in the world (correctly) require the “configuration to be consistent with noise exposure, such as an audiometric “notch” criterion. This is the case in the United States (e.g., Occupational Safety and Health Administration, OSHA) or the European Union (e.g., ISO R. 1999 (R. 2013)). This criterion is an unfounded uniquely Ontario suggestion and an Alberta requirement.

3. Occupational Hearing Loss with Music as the Noise Source

Since 1993 in Ontario, and more recently in British Columbia, the relevant worker’s compensation boards have accepted claims from professional musicians as well as their industrial colleagues. This is well supported in the literature, and Ontario has a policy document from its Ministry of Labor (1993) on this. Figure 2 (based on Russo et al., 2013, 2017) shows a comparison of the permanent hearing loss from classical musicians at Canada’s National Ballet compared with the predicted hearing loss from the large international standard ISO R. 1999- used by the European Union and which serves as the basis for most other regulatory agencies worldwide.

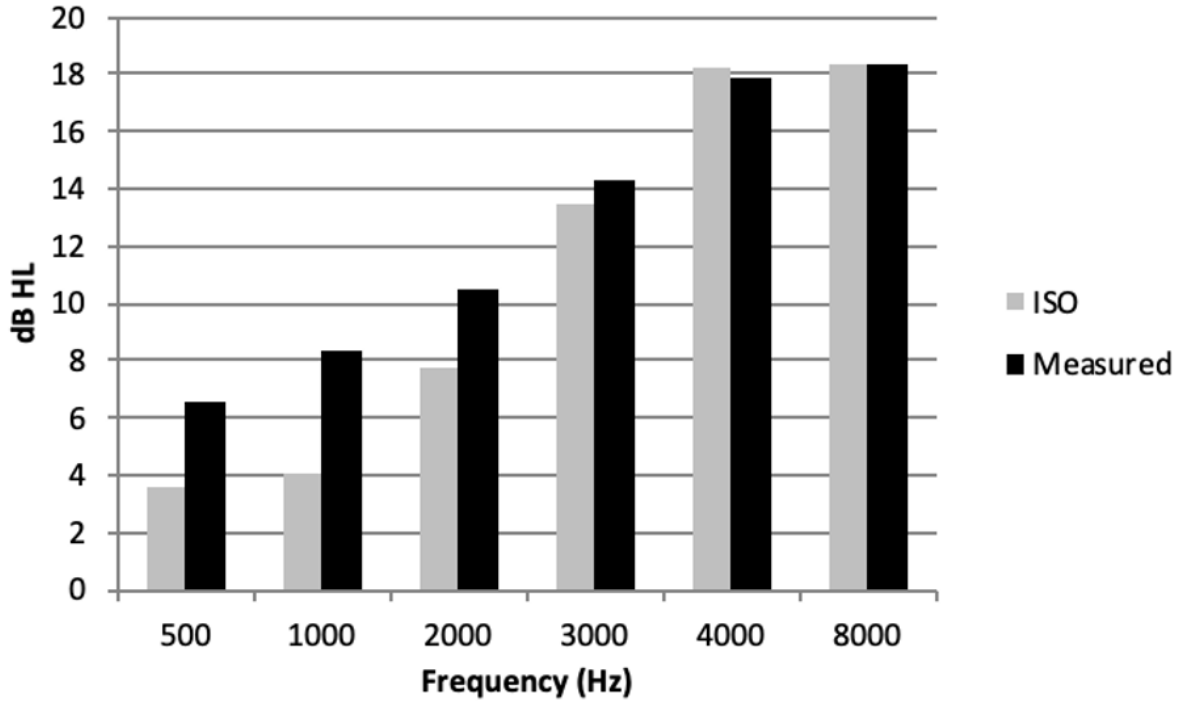


Figure 2. From Russo, Behar, Chasin and Mosher (2013) showing good agreement between ISO R. 1999 (R. 2013) and the measured sensori-neural hearing loss of musicians in Canada’s National Ballet. There is a statistically greater amount of measured hearing loss for professional musicians in the lower frequencies at 500 Hz and 1000 Hz, than predicted by ISO R. 1999

Given these data, the Canadian Academy of Audiology is concerned about both the vagueness of

the WSIB NIHL new policy and the lack of mention of non-industrial, yet “occupational,” sources of noise-related hearing loss such as music. In institutions such as professional musical groups and high school music teachers, the environment is well defined, with noise surveys conducted by qualified personnel that meet all requirements of the Workers’ Safety and Insurance Act (WSIA) regulations and the Ministry of Labor noise regulations in Ontario. Ontario also has a specific regulation from the Ministry of Labour for those in the performing arts industry (Ontario Ministry of Labour, 1993), which echoes the effects of noise and music being similar to ISO R. 1999 (R. 2013) and that of U.S. National Institute for Occupational Safety and Health (NIOSH) and Lempert and Henderson (1973) in the United States, whose data underlays the U.S. Environment Protection Agency’s findings.

Table I is from Chasin (2006) and shows the range of exposure of over 1000 musicians measured from 3 meters away while playing at an “average” mezzo-forte level. While there is some variability, most musicians consistently play (and are subject to) levels far above 85 dBA.

Musical Instrument (at 3 meters)*	dB (A-weighted)	dB SPL (peak)
Normal piano practice	60-90	105
Loud piano	70-105	110
Keyboards (electric)	60-110	118
Vocalist	70-85	94
Chamber music (classical)	70-92	99
Violin/viola (near left ear)	85-105	116
Violin/viola	80-90	104
Cello	80-104	112
Acoustic bass	70-94	98
Clarinet	68-82	112
Oboe	74-102	116
Saxophone	75-110	113
Flute	92-105	109
Flute (near right ear)	98-114	118
Piccolo	96-112	120
Piccolo (near right ear)	102-118	126'
French Horn	92-104	107
Trombone	90-106	109
Trumpet	88-108	113
Tympani and Bass drum	74-94	106
Percussion (high hat near left ear)	68-94	125
Amplified guitar (on stage using ear-monitors)	100-106	118
Amplified guitar (on stage with wedge monitors)	105-112	124
Symphonic music	86-102	120-137
Amplified rock music	102-108	140+
Portable music (eg, iPod) in ear canal (vol = 6)	94	110-130**
iPod in ear canal (vol = full)	105	110-142**

Table I is from Chasin (2006) showing sound levels (dBA) measured from 3 meters while the musician is playing their instrument at an “average” or mezz forte level. Many of these musicians generate levels in excess of 100 dBA with piccolo players being able to generate 126 dB SPL peaks measured on their right shoulder.

Concluding Remarks

The Canadian Academy of Audiology supports the removal of the age correction term in the evaluation of occupational noise-induced hearing loss which brings their new policy in line with the research literature, but is concerned about a mention or requirement of an audiometric notch as a fulfilling requirement to establish the audiometric configuration of long-term noise exposure, and also the vagueness of the eligibility of professional musicians to access the Ontario Worker’s Safety and Insurance Board program of care- a policy extending back more than 30 years in Ontario.

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