



Determining When Hearing Loss is Work Related

By Peter M. Rabinowitz, MD MPH

Case vignette 1:

John T., a 47-year-old worker, gets an annual audiogram at his worksite. It is his 14th year on the job in a metal factory. After age-correcting the results of the audiogram, the Occupational Hearing Conservationist (OHC) calculates a 12-dB average shift at 2,3,4 kHz from baseline in his left ear, and a 9-dB average shift from baseline at 2,3, and 4 kHz in his right ear. The average of thresholds at 2, 3, and 4 kHz in the left ear is 28 dB. A repeat audiogram two weeks later is essentially unchanged.

The OHC notifies the Professional Supervisor (PS) of the audiometric component of the hearing conservation program (a physician) that Mr. T has had a confirmed threshold shift.

The PS makes a determination that, more likely than not, Mr. T's hearing loss was work related. He notifies the safety director (whose job it is to maintain the Occupational Safety and Health Administration [OSHA] 300 log) that the case of hearing loss needs to be reported in the workplace OSHA log.

The next day, the safety manager notifies the PS that he has decided that the loss is not going to be recorded because Mr. T has been regularly instructed in the correct use of hearing protection at work, and that Mr. T is known to enjoy going to NASCAR rallies on weekends. The safety manager, whose bonus is tied to safety performance figures, also tells the PS that to report the case in the OSHA log would hurt the company's chances to achieve their safety target numbers for the year, and could also risk increasing their workers compensation insurance rates. In a conversation about the situation with a plant administrator, the safety manager notes that this physician has called several other injuries work related during the past year, and the administrator wonders whether it would be better to hire a different occupational medicine provider.

Case vignette 2:

Mary P., a worker in a different company, is noted by the OHC to have a confirmed, age-corrected threshold shift from baseline in the right ear. Ms. P has been working at the plant for 3 years. The area where she works is considered to be noisy, and she wears hearing protection regularly. She has also been noticing some fullness in her left ear over the past two months, but fails to mention this on her audiometric questionnaire.

The OHC notifies the safety manager that the employee has had an age-corrected threshold shift. The safety manager, intent on being cautious about possible cases of noise-induced hearing loss, reports the case on the OSHA log as work-related hearing loss.

One month later, Ms. P is diagnosed with a smoldering ear infection. After appropriate treatment, her hearing loss is found to have resolved.

Introduction

These cases illustrate some of the issues involved with the determination of whether hearing loss in an employee working in a noisy area is or is not work related. In the first case, conflict arose about whether an employee's hearing loss could be explained by off-the-job noise. The tension between management's incentive to keep recordable illnesses and injuries to a minimum and the need to accurately detect a case of occupational hearing loss is evident. This situation can result in "false negatives" of cases of work-related hearing loss that fail to be reported and acted upon. The second case illustrates the consequences of calling a case of hearing loss work-related noise-induced hearing loss (NIHL), and in doing so, overlook a potentially treatable medical condition due to a "false positive" assumption, that in a noisy work area all cases of hearing loss are work related. It also demonstrates the pitfalls of not involving a Professional Supervisor in the follow-up of problem audiograms.

One of the most important responsibilities of the OHC or the PS, therefore, is to work cooperatively in the determination of whether an individual's hearing loss is considered to be work related. If a worker's hearing loss is truly due to noise exposures on the job, it is important for that to be recognized so that steps can be taken to reduce workplace noise exposure for that individual and any similarly exposed colleagues. It is equally important to recognize if there is an underlying medical problem or significant off-the-job noise exposure so that these can be addressed.

This article will outline some of the pertinent issues relating to work-relatedness determinations, including the responsibilities of the OHC and the PS. It is by necessity only an introductory treatment of a very complex subject. For an in-depth discussion of this process, readers are advised to consult Dr. Robert Dobie's book *Medical-Legal Evaluation of Hearing Loss* (Dobie, 2001).

When is it necessary to determine work-relatedness?

Whenever a worker has experienced a persistent standard threshold shift (STS), it is necessary to determine whether the loss is work related. An STS is a worsening of at least 10 dB in average hearing thresholds for the frequencies of 2, 3, and 4 kHz in either ear compared to the most recent baseline (age correction optional). Note that it is possible to have an STS that is not recordable (since the absolute value of threshold average at 2, 3, and 4 kHz is less than 25 dB) yet still could be work related and require worker notification and follow-up.

Work-relatedness determinations are also necessary when a worker has filed a workers compensation claim for hearing loss. The focus of this article, however, will be work-relatedness decisions at the time an STS occurs.

Who determines if a case of hearing loss is work related?

The recent OSHA final rule on recordkeeping related to hearing loss states that the determination of work-relatedness should be made by a "physician or other licensed health care professional."

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1904.10(b)(6) “if a physician or other licensed health care professional determines that the hearing loss is not work-related or has not been significantly aggravated by occupational noise exposure, you are not required to consider the case work-related or to record the case on the OSHA 300 log.”

[Licensed audiologists are included by OSHA definition as a health care professional.]

CAOHC, in its scope-of-practice document for the Professional Supervisor of the audiometric component of a hearing conservation program (CAOHC, 2003a), states that the PS will:

- a. Review the audiometric history and information regarding the adequacy of the testing environment and performance
- b. Review the medical history and determine whether additional medical evaluation is indicated. If such an evaluation is required, either performs the evaluation or makes appropriate referral for such testing, and then reviews the test results.
- c. Review the history of exposures to occupational and non-occupational noise, as well as hearing protector use and exposures to ototoxic chemicals.
- d. Based on the above evaluation, either make a determination of work-relatedness or make appropriate referral for final determination whether the hearing loss is work-related or due to other factors.

CAOHC has also stated that the scope of practice for an OHC (who is not a physician or audiologist) does *not* include the determination of work-relatedness, since the OHC is not allowed to interpret audiograms, diagnose hearing disorders, or assume the role of a Professional Supervisor (CAOHC, 2003b). However, the OHC plays a crucial role in assembling the evidence necessary to make adequate decisions regarding work-relatedness.

Steps in determining work-relatedness

Table 1 [see page 9] outlines the steps involved in making a determination of work-relatedness. The first is to evaluate the validity of the test results. For example, is this a permanent rather than a temporary threshold shift, and have shift calculations (including optional age correction) been correctly performed? Is there a sudden jump in thresholds from previous tests? Were there problems with the employee not understanding the test instructions? The CAOHC hearing conservation manual (*Hearing Conservation Manual, 4th ed.*, 2002) has an appendix

that can be useful to an OHC in ensuring that problems with validity have been addressed. Otoscopy can help rule out obstruction due to cerumen that could interfere with test validity. The OHC should note any unusual behavior during the test that could be suggestive of malingering, but should never confront an employee with such an accusation.

The second step, assuming the test is valid, is to assess whether the employee has been exposed to potentially damaging noise (or ototoxic chemicals) at work. This can be a trickier process than some might think. Some workers may be getting annual hearing tests in a hearing conservation program, yet not be exposed to occupational noise sufficient to cause damage. The OSHA action level for noise exposure of 85 dBA is considered to be the level where risk increases significantly, but it should be kept in mind that some workers may lose hearing at time-weighted exposures less than 85 dBA. All noise exposure readings for the employee’s job during the period when hearing loss has taken place should be assembled for the PS to review. Obviously, hearing protection use can affect the degree of noise exposure, yet the field performance of hearing protectors may vary greatly from the labeled NRR (noise reduction rating), due to differences in fit and usage (Berger, et al., 1998). Therefore any available information about type of hearing protection worn, assessment of HPD (hearing protection device) fit, and frequency and consistency of use, is vital to include in the assessment. There is some evidence that exposures to significant levels of certain chemicals such as organic solvents and heavy metals could be toxic to hearing (Morata, 2003), and any information related to the employee’s exposure to such substances should also be provided to the PS.

The third step is to determine whether the hearing loss appears consistent with noise-induced hearing loss, or whether instead a medical condition is present that can completely explain the loss. A review of the audiometric history is essential to determine whether the progression and pattern of the hearing loss is consistent with NIHL. Criteria for this judgment have been published (ACOEM, 2003), and include a “notch” in the audiogram in the frequencies around 4 kHz. It is important, too, for clinicians to consider whether the audiometric pattern is more suggestive of another disorder, such as presbycusis alone, ear infection, or a retrocochlear lesion. This process is termed “considering the differential diagnosis” and requires a thorough knowledge of ear disorders. It also may involve legal liability if a significant medical problem has been missed. Information from the audiometric questionnaire about medical risk factors and ear symptoms is important for the PS to review, and s/he may elect to personally examine the employee and take a more complete history. The Professional Supervisor may also decide to refer an employee to an audiologist for full audiological testing, and/or to an ENT (Ear Nose and Throat) specialist for an evaluation of medical causes. Even if the hearing-loss case appears to be at least in part work related, the PS should ensure

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Table 1: Steps in determining work-relatedness of a hearing loss case

Steps	Evidence to consider	OHC responsibility	PS responsibility
1. Is the audiometric test valid?	Adequacy of test environment (calibration records etc.) and test results (test-test variability, etc.); earcanal obstruction. Is shift permanent not temporary; evidence of malingering.	Perform retest and otoscopy if indicated, supply records of calibration, etc. to PS.	Review records, make final determination of validity.
2. Is the employee exposed to potentially damaging noise (or ototoxic chemicals) at work?	Records of industrial hygiene testing for noise and chemicals; preferably results of personal sampling for this individual. Records of and reported use of hearing protection: type, frequency (including fit testing, if available).	Assemble records regarding noise exposure as well as exposure to possibly ototoxic chemicals.	Review records, make final determination whether occupational exposures sufficient to cause loss.
3. Is the hearing loss consistent with NIHL, OR is there a medical condition present that can completely explain the loss?	Absolute amount of hearing loss. Audiometric history, audiometric configuration, differential diagnosis, audiological testing, medical history, physical examination.	Provide PS with previous audiograms and audiometric questionnaire results; assist with medical referrals if indicated.	Perform history and physical examination, review testing results, decide on referral.
4. Considering Steps 1-3, did a work exposure either cause or contribute to the hearing loss, or significantly aggravate a pre-existing hearing loss?	All evidence listed above, including non-occupational noise exposures.	None	Reach a clinical opinion of "more probable than not."

The reference here is to general OSHA guidance regarding the determination of work-relatedness (1904.5 29 CFR). This document states; *“You must consider an injury or illness to be work-related if an event or exposure in the work environment either caused or contributed to the resulting condition or significantly aggravated a pre-existing condition or illness. Work-relatedness is presumed for illnesses and injuries resulting from events or exposures occurring in the work environment, unless an exception in 1904.5(b) (2) specifically applies.”*

These exceptions include a number of possible reasons to not consider an illness or injury work related, most notably: 1904.5(b) (2)

i. The injury or illness involves signs or symptoms that surface at work but result solely from a non-work-related event or exposure that occurs outside the work environment.

In other words, if a credible case can be made that the hearing loss is due **solely** to non-occupational noise exposure (or a medical

problem), it can be considered non-work related. To make this case, one must be able to convincingly demonstrate that noise exposures at work were insufficient to have contributed to the loss. OSHA appears to allow for such a determination, on a case-by-case basis. Ideally, this issue should have been addressed during Steps 2 and 3 outlined above.

that the employee has been counseled to seek appropriate otological evaluation and treatment if there is a suspicion of a concomitant medical problem.
The final step is for the Professional Supervisor to consider all the evidence accumulated during steps 1-3, and then to decide, on a “more probable than not” basis, whether the hearing loss was related to work exposures. If the previous steps above have been carried out conscientiously, the final determination of work-relatedness can be a fairly straightforward process. Yet, as the clinical vignettes illustrate, the process of recording work-related cases on the OSHA log has implications for all parties involved, and therefore things may become contentious.

In anticipation of this situation, OSHA’s final rule: Recording Criteria for Cases Involving Occupational Hearing Loss 1904.10 (OSHA, 2002) provides an answer to the question, “Are there any special rules for determining whether a hearing-loss case is work-related?” 1904.10(b)(5). *The answer is No. You must use the rules in 1904.5 to determine if the hearing loss is work-related.*

The process of making work-relatedness determinations is therefore where the “rubber meets the road” in a hearing conservation program. While the bulk of the responsibility falls on the Professional Supervisor, it tests the resolve of all members of the hearing conservation team to keep the priorities of the program in mind. The point of doing surveillance audiometry on noise-exposed workers, after all, is to accurately detect cases of hearing loss that indicate that noise controls and other protective measures are not working. This information is vital to the ongoing quality improvement of an effective hearing conservation program.

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*The listed dates indicate day one of the scheduled classes; certification courses are 20 hours in length; recertification classes are 8 hours.

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11/16/2005	OH	Cleveland	Carol J. Snyderwine	216-491-6104	01/04/2006	IL	Rockford	Charles A. Russell	770-754-4415
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12/01/2005	NJ	Piscataway	Ellen J. Kelly	732-238-1664	03/21/2006	MA	Auburn	Steven R. Fournier	508-832-8484
12/05/2005	NJ	Piscataway	Ellen J. Kelly	732-238-1664	03/22/2006	WI	Brookfield	Edward W. Korabic	262-547-2227
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12/07/2005	TN	Chattanooga	Melette L. Meloy	678-363-9897	07/11/2006	IL	Rockford	Charles A. Russell	770-754-4415
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12/08/2005	NC	Greensboro	George R. Cook, Jr.	336-834-8775	11/16/2006	PA	Pittsburgh	Roger M. Angelelli	412-831-0430
12/09/2005	NC	Morrisville	Thomas H. Cameron	919-657-7500	11/29/2006	WA	Bellevue	Mary M. McDaniel	206-706-7352

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