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UPDATE

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The Newsletter of the Council for Accreditation in Occupational Hearing Conservation

Chair's Message

By Theresa Y. Schulz, PhD
Representative of the Military Audiology Association

Do you ever get lost in the "voice mail jungle"? It's happened to me a couple of times recently when I've called a large company for assistance or information. I dial in, then get a lengthy choice of 5 or 6 items, none of which sounds like one that will answer my question (but who can be sure, since some of them use jargon that I don't understand). And, there is not an option to speak to a real person.

As I thought about why this is so frustrating, I decided that there are a few basic things I expect when I make that call. One is for someone to be **attentive** to my question. Even when I get to a real person, he or she sometimes absent-mindedly transfers me to someone else or gives me a canned answer that doesn't really address my concerns. The second is for **clarity**. I want choices and answers that I can understand that are not filled with jargon. The third is for **enthusiasm**, or at least a desire to meet my needs rather than giving me the feeling that I'm intruding by wanting to speak with someone.

Then it occurred to me that what I want is an **ACE** (attentive, clear, enthusiastic) response. We should all strive to provide ACE service. As a certified Occupational Hearing Conservationist (COHC) don't *you* want to provide ACE service? Here's how…

A – Be **attentive** during your interactions. Connect with each patient and make sure you listen and address his or her concerns. Doesn't it bother you when *you* are ignored when you arrive and are waiting for service? Acknowledge the presence of people as soon as possible. Even the way you get the worker seated and give the audiometric test instructions can help or hinder your ability to relate to that person. Don't be a robot shuttling people in and out of the booth. Make sure they understand what they are supposed to do.

C – Make your comments and explanations **clear** and understandable. Don't use jargon or, even worse, don't just say, "You passed, see you next year." After the audiometric test, the patient usually wants to know, "How'd I do?" Use that opportunity to explain the audiogram and also to give the person information that will help him or her prevent noise-induced hearing loss. Ask questions about hearing protection use and possible ways to reduce exposure to loud noise.

E – Be **enthusiastic**. Show that you care about your employees' hearing health. If you're not enthused about preventing noise-induced hearing loss, it's guaranteed that workers will not be enthused either. Someone has to get noise-exposed employees motivated to protect themselves and keep that motivation going. Workers would never stand for over-exposure to asbestos, for instance, and they ought to feel the same way about over-exposure to noise.

So now you can go out and be an **ACE** hearing conservationist and make a real difference!

Insert Earphones for Hearing Conservation Audiometric Testing

By Allan H. Gross, MA

Insert earphones have proven their value for a variety of reasons over the past decade in the clinical setting, but can you use them for audiometric baseline and monitoring hearing tests in an occupational hearing conservation program (HCP)? If so, is there any "value added" over the supra-aural earphone? Without fear of becoming the "weakest link," the simple answer to both questions is yes. There are, however, (OSHA) requirements and implications associated with insert earphones in HCPs that you should be aware of before you switch from a supra-aural to an insert earphone.

The contentious issues that exist primarily arise from the fact that the audiometric testing standard used as the basis for the OSHA Amendment was quite specific, and developed when many currently practicing OHCs were working on their first books, with crayons in hand, i.e., long before insert earphones existed commercially. Although the ANSI standard for audiometers has evolved since 1969 (to ANSI S3.6-1989 and currently S3.6-1996) to include new information and technological advances, the OSHA Amendment remains linked to the 1969 ANSI document.

Paragraph (h) (2) of 29 CFR 1910.95, Occupational Noise Exposure; Hearing Conservation Amendment; Final Rule states, "*Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969.*" The General Requirements section of

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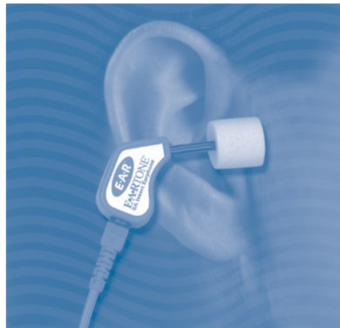
that ANSI Standard, in paragraph *3.2 "*Earphones*"* states that "*Each earphone shall be equipped with an earphone cushion for contact with the head of the subject,*" and paragraph *3.3 "*Headbands*"* of the same document specifies that "*There shall be provided a spring headband which is adequate to hold the earphones against the ears to provide a satisfactory seal*."

Insert earphones have neither an "earphone cushion" nor a "spring headband" and do not meet the criteria specified in the (1969) ANSI Standard for Audiometers. Although the current standard has a section in the body of the document devoted exclusively to the use and calibration of insert earphones, that status has no effect with regard to the OSHA Amendment.



Example of an insert audiometric earphone

An intended loophole, however, within OSHA regulations does allow for the use of technology not realized at the time the Standard was promulgated. Under an OSHA policy for "de minimis violations" employers are allowed to comply with the most current consensus standard applicable to their operations, rather than with the standard in effect at the time of inspection, when the employer's action provides equal or greater employee protection. "De minimis" violations are violations of existing OSHA standards that have no direct or immediate relationship to safety or health and **result in no citation or penalty; they do not have to be abated.**

On August 31, 1993 Mr. Roger A. Clark, Director, Directorate of Compliance Programs for OSHA responded to the licensed manufacturer of insert earphones, regarding their use for audiometric testing. The complete text of this letter of interpretation is available on the OSHA web site **www.OSHA.gov.** under "Standards Interpretation and Compliance Letters, Use of insert earphones for audiometric testing." Nine bulleted paragraphs outline specific conditions that must be implemented by employers who intend to use insert earphones with their audiometers in order to meet the criteria of a de minimis violation of OSHA's noise standard. If the nine conditions are met then only a de minimis violation exists, however, failure to meet each of the conditions could result in issuance of a citation.

The "final answer" therefore is yes, you can use insert earphones for hearing conservation testing without concern about possible citation if you follow the points addressed in the 1993 compliance letter. The nine points are not particularly burdensome, with one exception. That paragraph of the compliance letter states, "*At the time of conversion from supra-aural to insert earphones, testing must be performed with both types of earphones. The test subject must have a quiet period of at least 14 hours before testing. Hearing protectors may be used as a substitute for this requirement. The supra-aural earphone audiogram shall be compared to the baseline audiogram, or the revised baseline audiogram if appropriate, to check for a Standard Threshold Shift (STS). In accordance with 29 CFR 1910.95 (g) (7) (ii), if the audiogram shows an STS, re-testing with supra-aural earphones may be performed within 30 days and the resulting audiogram adopted instead of the prior one. If re-testing with supra-aural earphones is performed, then re-testing with insert earphones must be performed in conjunction.*"

If the above is followed, subsequent annual testing can be performed with a single (insert earphone) audiogram, with the original insert earphone test designated as the "new reference audiogram for all future hearing tests performed with insert earphones." If no baseline testing has been done, i.e., a new program is initiated, then insert earphones can be employed without concern for the above, as long the other conditions are met. The other eight conditions, for the most part, amount to precautions that any prudent examiner would normally follow, e.g., technician training, (foam) coupler fit, calibration, and dutiful record keeping. It is hoped that OSHA may eventually eliminate the double testing requirement, but for now it remains as a formidable, but not insurmountable, barrier to insert earphone use in HCPs.

In answer to the "value added" part of the initial question, and in spite of the above, there are several reasons why you might consider using insert earphones. Essentially all of the clinical advantages of coupling the earphone directly to the earcanal are transferable to the threshold testing performed for baseline and monitoring hearing conservation testing. Those advantages are detailed in the following sections.

➤ Reduction of Background Noise

The sound attenuation of a supra-aural earphone with an MX-41/AR cushion is weak in the low frequency range (attenuation values of 5-6 dB at frequencies below 1 kHz) where problems related to high ambient noise levels are predominant (Arlinger, 1986; Michael & Bienvenue, 1981; Poulsen, 1988; Lindgren, 1990). With a foam plug as the coupler, however, an insert earphone has an overall NRR of approximately 25-dB, considerably greater than supra-aurals with or without an added circumaural enclosure. The greatest difference is in the frequency range below 1 kHz, where the effect is most needed.

Although one must use the OSHA "Maximum Allowable Octave-Band Sound Pressure Levels For Audiometric Test Rooms (Table D-1) that are less restrictive than the ANSI Standards now specify, the added margin of safety can be valuable particularly if the measured ambient levels are borderline relative to the guidelines, and the sound environment is not stable. Table 1 illustrates the difference between the ears-covered ambient attenuation for supra-aural and insert earphones.

Table 1. Mean attenuation values for supra-aural (SA) and insert (IE) earphones from ANSI S3.1-1999

Earphone	*Frequency in Hertz*								
Type	*125*	*250*	*500*	*1000*	*2000*	*3000*	*4000*	*6000*	*8000*
SA	6.0	4.0	5.0	12.5	19.5	25.0	25.5	24.0	23.0
IE	29.9	31.4	33.7	34.0	34.1	37.9	38.6	40.7	42.7

➤ Greater Interaural Attenuation

In subjects with large threshold differences between the right and left ears there is a chance when testing the poorer ear that the pure tone will be perceived by the non-test (better) ear. In a clinical setting that situation would be resolved by using clinical masking to prevent the non-test ear's participation. Although masking is not a part of routine industrial audiometry, the incidence of crossover will be effectively reduced with an insert earphone, thereby decreasing the need for follow-up testing by an audiologist.

➤ Elimination of Collapsed Canal Artifact and Greater Subject Comfort

The lateral pressure that supra-aural earphones apply to the test subject's head can result in a collapsed canal artifact. This closing of the external canal in some subjects may cause a false threshold shift that is not always detected initially. Audiological follow-up testing would employ one of several methods to circumvent this effect and establish true thresholds. With an insert earphone's foam tip properly placed in the external canal for testing, canal collapse ceases to be an

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Audiometric Distinctions

By Deanna Meinke, MA FAAA

The distinctions between a standard threshold shift (STS), regulatory recordability/reportablity and workers' compensation claim status are often difficult concepts to convey. How can an employee show an STS, need audiological rehabilitation but not be considered impaired for workers' compensation purposes? The answers are in the math, the timelines and the underlying definitions used in federal and state regulations or guidelines. So, first, let's consider each of the concepts and its definition.

Standard Threshold Shift (STS): This *administrative* determination is dependent on the average *change* in hearing between the baseline test and an annual test, at the frequencies of 2000, 3000 and 4000 Hz, which must be 10 dB or greater, with or without the use of age corrections. These test frequencies were targeted for monitoring because of the intent to identify an individual with an *early* indicator of a temporary noise-induced hearing loss and to allow early intervention *before* the hearing loss becomes permanent.

Recordable or Reportable Shift: This *administrative* determination is calculated in the same manner as an STS, except that the degree of *change* must be 25 dB or greater, with or without the use of age corrections. This amount of change in hearing is currently required to be recorded on the OSHA 300 log or reported on the MSHA 7000-1 form if the hearing loss is work-related. Again, the average of 2000-4000 Hz is targeted as an indicator of a noise-induced hearing loss, since noise damages this frequency range before others.

Compensable Hearing Impairment: Impairment means that there is an objectively measurable loss of function (as opposed to *change* in function) and it is a *medical* determination. Usually, it relies on a state-specific mathematical formula to calculate a percentage of hearing loss and is heavily weighted toward the lower "speech" frequencies. For instance, the more common 1979 American Academy of Otolaryngology (AAO-1979) impairment rating formula uses the following threshold calculation;

Monaural (one ear): Average of 500, 1000, 2000 and 3000 Hz thresholds, minus 25 dB and multiplied by 1.5%

Binaural (both ears): 5 times the better monaural percentage + the poorer ear percentage divided by 6.

The amount of financial compensation is directly related to the percentage of hearing impairment. For a noise-induced hearing loss to become compensable, it must progress well into the speech frequencies of 500-3000 Hz, an uncommon occurrence for most industrial noise exposures. There are a number of other factors that may further impact compensation such as age corrections and

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issue. Most test subjects report as well that comfort is greater with a soft foam tip in the canal as opposed to the weight and pressure that a TDH-type earphone exerts.

➤ **Improved Hygiene/Less Maintenance**

The disposable foam tips used with an insert earphone prevent any cross contamination between subjects. There are no headbands or cushions to adjust, clean and periodically replace. Most subjects are actually more comfortable with a foam tip in their earcanal than they are with a supra-aural set-up. The foam tips are not unlike the HPDs that many employees are used to wearing for much longer periods than the monitoring audiogram.

Insert earphones can make a valuable contribution to our efforts in the prevention of occupational hearing loss. With an initial sacrifice in time and effort you can take advantage of a clinically accepted tool that will enhance both test reliability and program effectiveness.

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References

American National Standards Institute (1999) Maximum permissible ambient noise levels for audiometric test rooms (ANSI S3.1-1999), New York: ANSI.

Arlinger, S.D. Sound attenuation of TDH-39 earphones in a diffuse field of narrow-band noise. J. Acoust Soc Am 1986;79;189-91

Lindgren, F. A Comparison of the Variability in Thresholds Measured with Insert and Conventional Supra-Aural Earphones. Scand Audiol 1990; 19: 19-23

Michael, P.L., Bienvenue, G.R. Noise Attenuation characteristics for supra-aural audiometric headsets using the models MX-41/AR and 51 earphone cushions. J. Acoust Soc Am 1981; 70: 1235-8

Poulsen, T. Sound attenuation of TDH-39 earphones in a standard headset an in a noise-excluding headset. Scand. Audiol 1988; 17: 147-9

Think Twice About Using Passive Noise-Reducing Earphone. . . .
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References

1. "Occupational Noise Exposure: Hearing Conservation Amendment," *Federal Register 48*:46 (March 8,1983), pp. 9738-9785.
2. American National Standards Institute. ANSI S3.1-1999. *Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms*. New York: ANSI, 1999.
3. Berger, E.H. & Killion, M.C. (1989). "Comparison of the noise attenuation of three audiometric earphones with additional data on masking new threshold.," *J. Acoust. Soc. Am. 86*:392-1403.
4. Frank, T. & Williams, D.L. (1993). "Effects of background noise on earphone thresholds." *J. Am. Acad. Audiol, 4*:201-212.
5. American National Standards Institute. ANSI S3.6-1996. *Specification for audiometers*. New York: ANSI, 1996.
6. Frank, T., Greer, A.C., & Magistor, D.M. (1997). "Hearing thresholds, threshold repeatability, and attenuation values for passive noise-reducing earphone enclosures." *Am. Ind. Hyg. Assoc. J. 58*:772-778.
7. American National Standards Institute. ANSI S12.6-1984. *Method for the measurement of the real-ear attenuation of hearing protectors*. New York: ANSI, 1984.

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