Add Value to Your Hearing Conservation Program

Outgoing Chairperson's Message
by Jeffrey C. Morrill, MS
CAOHC Immediate Past Chair

I have often heard the statement that the best hearing protection is the one that the employee will wear consistently. I would like to add and correct that phrase. I hope that you as an OHC understand the noise reduction rating (NRR) is a rating of a meaningful number for selecting hearing protection devices (HPDs).

The value that the OHC can add to the program is through inspecting how the employee inserts the HPD and providing one-on-one training until the employee can insert it properly. This is best done at the time of the hearing test when the results can be used to illustrate how the hearing is changing. When the employee can demonstrate proper insertion, the OHC will have achieved the next step in building real value and potential return on the company's investment.

The next step is in the periodic inspections of how employees are actually wearing the HPD in the work environment. A periodic audit or inspection to the only way to accomplish this unannounced. By documenting the observations and the individuals encountered, the OHC will help establish the company's defense against both citations and compensation claims...more value for your company.

Hearing protection programs have been a challenge in my career in occupational audiology of more than 25 years. Occasionally, I am disappointed at witnessing the same problems that were encountered before OSHA, especially failure of the employer to comply. These problems will probably always be there as a challenge to each of us.

It has been an honor to serve for the past 10 years on the CAOHC Council and to have been associated with so many fine professionals throughout the years. One thing that we all have in common is a goal to eradicate unnecessary hearing loss due to occupational exposure. Our body of knowledge and tools is certainly better today than yesterday, however, it is the one-on-one interaction between the OHC and the employee that makes the difference and adds VALUE to the program.

Unique Hearing Protection Devices—The Search for a Balance

Donald G. Gasaway, MA
Hearing Conservationist with E-A-R/Aceco Co., San Antonio, Texas

Wearing personal hearing protection devices (HPDs) universally results in an altered world of sound. Few people realize the dramatic effect cutting out just 10 to 20 decibels of sound can have on their normal hearing function.

Humans depend on their hearing as they consciously and unconsciously monitor the incessant world of sounds and acoustic events that surround them. Reduce the ease with which a person can detect and "hear" this multitude of sound sources, and the effect can be profound. Hearing is an orientation, alerting, warning, and constant monitoring sense. Basically, hearing is the sentinel of the brain— for most, requiring little conscious effort.

continued on page 8

CAOHC to Celebrate 25th Anniversary in 1998

CAOHC celebrates twenty-five years as the "Council for Accreditation in Occupational Hearing Conservation." Its roots began with the Intersociety Committee on guidelines for noise exposure control in the mid-1960s. The Intersociety became active when the noise standard was being promulgated in the early 1970s, changing its name and makeup to the current CAOHC in 1973.

What's Inside?

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New Executive Committee Named to CAOHC Council

Outgoing and Incoming CAOHC Council Members met in Denver, October 9, 1997. They are pictured left to right first row: Elliott Berger, Alacie Healy, Myrna Stephens, William Monk, Richard Danforth, Theresa Schultz. Second Row: Jeff Morris, Michael Halloswey, Alex Samaras, Dennis Driscoll, James Rouchak, Susan Megerman, Robert Dobie, Peter Weber, Barbara Panterol-Lacouri, Linda Dobbs (RL Niland, not pictured)

The Council for Accreditation in Occupational Hearing Conservation elected a new Executive Committee effective October 9, 1997.

The Executive Committee is headed by the CAOHC Chair, Susan Cooper Megerman, MA, CCC-A. Megerman represents the American Speech-Language-Hearing Association on the CAOHC Council. She is the President of IMPACT Health Services, Inc. of Kansas City, Missouri, which provides hearing conservation and respiratory surveillance services for over 5,000 industrial clients throughout the United States and Canada. Megerman succeeds Jeffrey Mullin, MS.

Other officers include Vice-Chair, COL Richard Danielson, PhD, CCC-A. Danielson, a representative of the Military Audiology Association, is currently the Director, US Army Audiology and Speech Center, Walter Reed Army Medical Center, Washington, D.C.

Secretary-Treasurer is Robert Dobie, MD, CAOHC’s representative from the American Academy of Otolaryngology-Head and Neck Surgery (AOO-HNS). He is currently Professor & Chairman, Dept. of Head and Neck Surgery, University of Texas Health Science Center, San Antonio, TX.

CAOHC Council Holds Fall Meeting

The CAOHC Council held its Fall meeting October 9, 1997 in Denver, Colorado. While business items for 1997 were reported, the main agenda focused on the development of a Professional Supervisors Course. The objectives have been developed and course curriculum is now being finalized. Plans are for the first course to be held in the Fall of 1998.

The newsletter also reported that CAOHC has received 18,500 Certified Occupational Hearing Conservationists and nearly 400 Certified Course Directors.

In addition, plans for the announcement of CAOHC’s 25th Anniversary in 1998 were discussed. (This newsletter will feature historical articles and interviews throughout 1998.)

"FITTING HEARING PROTECTION" GUIDE

One of CAOHC’s goals is to provide education and information in occupational hearing conservation. CAOHC has purchased the printing rights to 7 practical guides from the National Hearing Conservation Association.

CAOHC will print one new brochure from the NHCA series in this and upcoming issues of the UPDATE. We hope that you will find this comprehensive brochure helpful in your hearing conservation efforts. See Page 3 to contact NHCA for additional copies.
Three Steps to Effective Hearing Protection

1) Select

Offer a variety of hearing protectors, including a minimum of two types of premolded earplugs: two types of formable earplugs: semi-inser devices, and earmuffs. Identify the HPDs which are appropriate for the individual by considering the noise level, work environment, and the wearer's convenience, communication needs, and pre-existing hearing loss.

2) Fit the Individual

Not every suitable device will fit the individual comfortably. Starting with the wearer's choice of HPDs, check the fit in each ear to see if the device is a good match for the individual's anatomy. The two canals may differ.

...the best HPD is the one that gets used... comfort is the key

comfort. The best HPDs are the ones that will be worn all day, every day. Comfort is the key to user acceptance.

3) Train, train, train!

Don't just tell the individual how to wear the HPDs — have the wearer demonstrate correct placement of the device. Stress the importance of a good seal for adequate noise reduction, show what a good fit feels and sounds like, and reinforce the need to use HPDs at all times in noise. Teach the wearer how to size for HPDs and recognize when they need to be replaced.

One Size Does NOT Fit All

An important and often overlooked part of an effective hearing conservation program is the fitting of hearing protection devices (HPDs).

Although some expandable foam earplugs come close, there is really no such thing as a one-size-fits-all HPD. Each person must be individually evaluated to determine the best match of HPD for their environment, noise exposure, anatomy, and hearing ability.

Individual fitting is also a great opportunity to provide training about the effects of noise and proper use of hearing protection. The individual attention given to the worker during the fitting session can increase the acceptance of HPDs by the user and can help the user get more protection by learning how a proper fit should feel and sound.

Guide 2

Fitting Hearing Protection

A practical guide to:

National Hearing Conservation Association

The mission of the National Hearing Conservation Association is to prevent hearing loss due to noise and other environmental factors in all sectors of society.
The Survey is Coming! The Survey is Coming!

Beverly Pothier-Lester, EdD RN COHN-S
CAHC Representative of the American Association of Occupational Health Nurses

I am going to tell you about the survey and its implications for all Occupational Hearing Conservationists (OHCs), but first, I want to address a few questions that have come forth from several of my past columns. Since some people called or wrote for clarification on certain issues, I thought perhaps none of you might be wondering the same thing.

Recording on the OSHA 200 Log

**Question:** I work in a state that recognizes average shift noise over a 25 db (I can't tell you at what times) noise exposure on the OSHA 200 Log. You write that everyone must follow up on standard threshold shifts (STSs). Does this mean that everyone must keep track of new baseline?

**Answer:** Yes, the criteria for a STS and a 25 db shift are very different. A STS is an average loss in either ear of 10 or more at 3000, 4000, and 6000 Hz from the initial baseline. A 25 db shift is an average loss of 25 db or more at 3000, 4000, and 6000 Hz when the test is compared to the initial baseline or the last 25 db baseline (see next question regarding revision). There can be several STSs with new baselines established before a 25 db shift occurs. As would before, Form 200 requirements are under review. Ask your Professional Supervisor to help you with this.

**Question:** When a 25 db shift occurs, do I establish a new baseline for comparison? Doesn't the memorandum on OSHA 314 require someone to go to a new baseline?

**Answer:** Yes, to both questions. When I visited OSHA for interpretation, I was told of the initial baseline is not changed when a 25 db shift occurs, every test thereafter would continue to show a shift. Our employees would not be happy about listing all these shifts on the OSHA Log. My comment for this new baseline is fast 25 db baseline. I use this terminology so I don't get confused with the STS baseline. And, yes, this is confusing.

Role of the Professional Supervisor

**Question:** Since a microprocessor audiometer operator does not have to be certified, why can a non-company use the equipment without having trained OHCs?

**Answer:** Every OHC must be trained and report to a Professional Supervisor who oversees his/her competence in obtaining valid audiograms, properly using, maintaining, and checking calibration and proper functioning of audiometers. Everyone must have suitable training.

Occupational Hearing Conservation Recording

**Question:** Can a registered nurse or other trained personnel diagnose or determine the job-relatedness of a standard threshold shift?

**Answer:** According to the noise standard (1910.95[b](1) follow-up procedure), unless a physician (my bold) determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, the employer shall ensure that the following steps are taken: when a STS occurs...

In early 1998, over 1,000 OHCs will be invited to complete this new survey. The results will help the CAHC Council in their continuing efforts to improve hearing health. If you are one of the OHCs selected randomly by the computer, please take a few minutes to complete the survey and become instrumental in CAHC's future as well as yours as an Occupational Hearing Conservationist in the 21st century!

CAHC will report the findings of the survey in upcoming issues of the UPDATE and any subsequent modifications will be shared with you as well.
Arbitrarily choosing too high an NRR for use in ambient noise settings that actually are not severe would be like wearing welding goggles to reduce light in a brightly lighted room and trying to read a newspaper.

New Kids on the Block
The HPD neighborhood has received several new arrivals. Some of these new arrivals are in their teens and are the grandchildren and great-grandchildren of many of the original HPD users. Although the group is different, the fact remains that HPDs are still being used for education.

Most conventional HPDs are passive and offer linear attenuation. Conventional plugs and muffls tend to deliver greater amounts of attenuation within the higher range of frequencies (at and above about 2000 Hz) than within the lower range (below 2000 Hz), serving essentially as a "low-pass" filter. This type of filtering distorts intelligibility of speech sounds. Typically, sounds which arrive at the ear are described as "indistinct," eliciting a response such as, "I can hear the speaker but I can't understand what is being said." The primary acoustic portions of human speech necessary for a listener to distinguish word differences are consonants, especially voiceless components, which reside in the frequency range above 1000 Hz.

Using a conventional HPD tends to functionally diminish the intelligibility of spoken language, but the degree of difficulty experienced is far less when one possesses normal hearing (no hearing loss of 25 dB at 500 through 2000 Hz). If the listener has a typical noise-induced hearing loss (NIHL), where the most impaired range of the hearing lies above 1000 Hz, then the low-pass filtering presented by a conventional HPD has a far more profound detrimental effect on functional hearing. The person with moderate to severe NIHL faces a "Catch-22" situation - if the person wears HPDs his already compromised hearing function is further impaired, and if he does not wear protection it is only a matter of time until the already marginal hearing performance becomes so impaired he cannot adequately accomplish listening tasks essential to achieve and sustain satisfactory job performance.

Seeking a Balance
First and foremost - recognize that overprotecting people who work in noise is not the way to go. Each HPD available for employees should be continued on next page
Unique Protection Devices, continued from page 6

individually selected to ensure that the device chosen provides a reasonable safe level of protection while balancing the ability of the wearer to sufficiently hear desired auditory signals in the presence of noise. Because the majority (92 percent) of industrial type noise levels are 95 dBA or less, then devices which deliver 10 to 15 dBA (NPR) of effective at-the-ear attenuation should be adequate to protect the integrity of hearing of most workers while still facilitating audibility of desired auditory signals.

It is within the realm of lower, rather than maximum achievable, attenuation where a wide range of superior choices between protection and retention of auditory performance while wearing HPDs comes into play. In this approach, the safety-heath provider is making discriminating choices based on "better" HPD performance, rather than the more common and naive "highest is best" concept. A refined benefit commensurate with making better choices, each on an individual basis, is the enhancement such HPD selections will have on the person's greater acceptance of the need to properly and consistently wear HPDs during all encounters with potentially hazardous noise.

Level-Dependent or Nonlinear Devices

These devices can be either active or passive; i.e., electronic or non-electronic. A 1995 listing of commercially available models of level-dependent devices included 20 insert devices and 17 circumual muff type units of either passive or electronic design. The term nonlinear can apply to acoustic alterations of either frequency (spectrum composition) or level of attenuation. Typically, a passive (no electronics) level-dependent device is designed with an amplifier; like a valve or small round hole or slit(s) in a metal cone or diaphragm, which is installed in an acoustic duct through which sound passes to reach internal hearing mechanisms. This aperture tends to partially bypass the normal attenuating properties of the device when installed.

The amount of attenuation provided by such devices remains linear until the level of external sounds (usually impulse or impact) reaches a rather high level, like 120 dBA. At this level and above, the action of the level-dependent apparatus creates an inaudible flow within the aperture or slit that causes a restriction of the internal noise level passage. The increase in attenuation delivered by this type of device once the level exceeds about 120 dBA, may, for example, be about one-half dBA per 1 dBA increase. The limiting factor associated with providing additional sound reduction performance is dictated by the inherent passive sound attenuation properties of the device in which the apparatus is installed.

These types of nonlinear (level) devices are primarily beneficial for encounters with open-field gunfire, allowing the wearer to better hear communications and environmental sounds but providing some degree of additional protection during encounters with impulse-type noise associated with firing. Typically, these devices are relatively low attenuating units, usually between 6 to 16 dBA (NPR), when used in sound or noise environments below about 120 dBA. Also, the nonlinear apparatus does not operate as effectively when impulse-type acoustic emissions are in the near vicinity to a roof, panel, concrete walls, and other surfaces that result in a reverberant sound field.

An electronic level-dependent nonlinear device is typically of muff design and contains electronic components that serve to pick up ambient sounds with an externally mounted microphone and deliver them to the ears of the wearer by earphones located in the exterior muff caps. Sixteen such commercially available devices were listed in the 1995 HPD compendium. These units are fitted with electronic amplification units, which deliver from 5 to 10 dBA of signal gain and are usually outfitted with an electronically activated system that causes the signal gain to either cut-on or suppress at the ear level delivered to the ear when ambient levels reach some pre-set level, usually about 82 to 85 dBA. If the level continues to increase beyond 85 dBA, for example, the electronically amplified signal typically shuts off, leaving the inherent normal (linear) attenuating properties of the 16 dBA muff to operate in a passive manner.

Active HPDs of the type described here can amplify ambient sound levels to partially overcome the attenuation normally delivered by the device, but the electronic quality of the amplified sounds may be less than optimum because all sounds, desired and otherwise, receive increased gain and, in addition, inherent electronic "noise" tends to be present to some extent in most units. Operationally, it is best to obtain units which separate (independent external pick-up) microphones and internal electronic systems are installed in each muff unit. This arrangement enhances localization of sounds reaching the head of the wearer and more evenly simulates true stereophonic hearing of ambient signals. Typically, when muff or cup contains electronic components, including batteries, volume control, and on-off switches and other internal components, the acoustic attenuation properties of the basic muffcup unit has been compromised, that is, it offers less overall noise attenuation. When such units are worn around gunfire, impulses created in near proximity to the wearer "trigger" the amplifier delivered suppression circuit, and this may result in annoying "gaps" that occur in an ongoing continuous communication as other shooters fine their weapons. As with all types of level-dependent units, the potential user should try out the units under actual operational conditions to ensure proper compatibility and user functions prior to deciding they are "best" for a desired application.

Active Noise Control Devices

Active noise control (ANC) devices are also available, of which five were identified as commercially available in continued on next page
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October 1993. These devices, if they are to be put to use in potentially hazardous noise settings, are solely available in circumferential muff models at present. These units also use electronic processing but in a different manner from simple electronic level-dependent or nonlinear type units previously released.

The ANC unit pads to ambient sounds through use of an externally mounted microphone and by electronic processing, delivers the sound inside the cup through a separate transducer in the muff. During this processing the phase of the sound striking the outer surface of the muff is offset by about 180 degrees out of phase, canceling the acoustic signal within the lower frequencies. Basically, the adaptive noise-control features delivered by such systems are limited to about 800 to 1000 Hz and below range of frequencies. This type of unit is typically the most expensive of the all types of noise or acoustic altering devices currently available commercially. As technology advances and manufacturing procedures and materials advance, the effectiveness of the noise-canceling capability should increase, and the overall noise-reduction.

ANC devices containing communication elements necessary for two-way communications, including integration of at-the-tip or hand-held microphones/transducers, have received the greatest usage of such units, such as those employed in private, military, and commercial aviation. Basically, choices among these types of units are dictated by the spectrum of the ambient noise in which worn. That is, noise dominated by lower frequencies and constraints imposed by economy and operational constraints associated with remote use.

Of course, a limiting factor is the level of the ambient noise in which these units will be worn. Even though they can deliver some degrees of low frequency attenuation at 800 to 1000 Hz and below, the actual passive attenuation provided by the cup cushions is generally in the lower range of overall performance. This is due to overall properties associated with the acoustic interface that have been compromised by conventional electronic components, batteries, switches, and more. Therefore, these units may be restricted from routine use in many industrial work environments containing high noise levels where some safety-hosts providers, managers, and others had first sought their use as a solution in controlling exposures.

Flat-Response, Moderate Attenuation Devices

The concept of designing an HPD that selectively filters or modifies the levels of sound within the frequency distribution of the sound spectrum reaching the hearing mechanisms is not new. But recent advancements in manufacturing capability and molded materials, coupled with applied developmental research, have delivered some interesting results.

As of October 1995, sixteen models were commercially available within the industrial market and fifteen more industrial units exist within domestic market areas. Available in an insert or circumferential muff, these devices contain acoustic apparatus design that after the degree of attenuation affected by the primary audible range. The design goal has been to achieve a "flat" attenuation across the overall ambient frequency range, particularly from 300 to 4000 Hz, thereby improving the "waterline" of ambient sounds delivered at the ear of the user. These devices typically offer low attenuation; between about 6 and 20 (NRR).

Because the uniqueness of the design of these devices is to more evenly provide attenuation across adjoining frequency ranges, the signal reaching the auditory system of the wearer is relatively "flat." If a way, these flat-response, moderate attenuation devices are the neutral gray tinted safety glasses. Level I hearing attenuating unit that does not severely discriminate against the remainder of the color dependent spectrum. Applications for flat moderate HPDs include performing and practicing musicians and audiences attending concerts; reducing disturbing sound while retaining easier hearing of essential social events; settings such as a study hall or library; keypunch operators; busy office areas; and for wearing in airports, subways, and in noisy vehicles.

REFERENCES


Council Invites INCE to Join CAOH Council

At the October Council meeting, CAOH unanimously elected the Institute of Noise Control Engineering of the United States of America (INCE) to join the Council as a Component Professional organization. Two representatives will be appointed to the CAOH Council beginning with the 1998 Spring Council Meeting. INCEUSA will become CAOH's eighth component organization. We will profile INCE in our March 1998 issue.
FOUR NEW REPRESENTATIVES APPOINTED TO CAOHC COUNCIL

At the close of the Council meeting in Denver, CO, Oct. 9, 1997, four new representatives joined the CAOHC Council.

James D. Banach, MBA, will represent the American Industrial Hygiene Association, Holts/Quest Technologies, Inc. in Oconomowoc, Wisconsin, an international manufacturer of instrumentation for noise measurement and analysis. His roles have included regional and national sales management and general management with activity in noise measurement, computer development and presentation.

Elliott H. Berger, NS INCE, R.G. Cert., is also a new representative from the American Industrial Hygiene Association. Mr. Berger is Senior Scientist, Auditory Research for E-A-R/Aearo Company in Indianapolis, Indiana, an international manufacturer of safety products. He supervises and conducts research in hearing protector design, measurement, performance, and audiometric data base analysis, and the incidence of noise-induced hearing loss.

Maj Theresa Y. Schults, USAF, PhD, CCC-A, will represent the Military Audiology Association. She is the United States Air Force Executive Manager for Joint Service Hearing Conservation at the Aberdeen Proving Ground in Edgewood Area, Maryland. Dr. Schults has received numerous awards and decorations both within and outside the armed services for her contributions in hearing conservation.

Mysa M. Stephens, PhD, is a new representative from the American Speech-Language-Hearing Association. Dr. Stephens is owner and director of Audiology Consultants, Inc., of Davenport, Iowa. She is Chair of ASHA’s Special Interest Division for Hearing Conservation and Occupational Audiology, and is a CAOHC certified Course Director.

Fall 1997 Course Director Workshop

The Fall Course Director Workshop was held in Denver, Colorado on Friday, October 10, 1997. Eleven new Course Directors were awarded certification upon completion of this workshop. Four previously certified Course Directors renewed their certification. The Course Director is responsible for planning and conducting training courses for OHCs and ensuring CAOHC guidelines are followed.

CAOHC EXHIBITING AT TWO UPCOMING CONFERENCES

CAOHC will be exhibiting at the 23rd Annual NCHC Hearing Conservation Conference being held at the Hyatt Regency in Albuquerque, New Mexico, February 19-21, 1998.

In addition, CAOHC will exhibit at the American Occupational Health Conference being held in Boston, Massachusetts, April 24-May 1, 1998. You will be able to verify your certification at the booth and make any address corrections needed. Please stop by early to updated booth and say hello!
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Please contact the CAOHC office at 410-276-5338 for additional course availability. Publication dates may have precluded some course data.
# CAOHC Council Members and Their Represented Organizations

| Chair | James B. Banoch, MBA  
American Industrial Hygiene Association  
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E-H-R-Wick Company  
Indianapolis, IN |
| Immediate Past Chair | Linda Stolzy, RN COHN-OM  
American Association of Occupational Health Nurses  
The Christ Hospital Occ Net  
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Air Force Medical Department, NAS  
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| Immediate Past Chair | Myrna M. Stephens, PhD  
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Silver Spring, MD |
| Immediate Past Chair | Pat C. Webster, MD  
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Ear & Neck Surgery  
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| Immediate Past Chair | Col. Richard W. Danielson, PhD CCC-A  
Military Audiology Association  
Army Audiology Speech Center  
Walter Reed Army Medical Center  
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| Vice Chair | Robert A. Bohle, MD  
American Academy of Otolaryngology  
Head & Neck Surgery  
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