



## Does Hearing Conservation Work?

Christine Harrison, M.Sc., Aud(C)

WorkSafeBC (WC or the Workers' Compensation Board of British Columbia, also known as "the board") is charged by law with providing workplace insurance coverage to the workers of the province and with developing and implementing occupational health and safety regulations (OSHR) to safeguard workers.

### Background

Occupational noise-induced hearing loss (ONIHL) became a compensable disease in British Columbia (BC) in 1975, while the OSHR designed to prevent it followed in 1978 (WCB, 1978). As of 1978, a "noise control and hearing conservation program" with wording around engineered noise control, hearing protection devices, warning signs, annual hearing tests, and record keeping provided by employers became mandatory. The trigger level for inclusion in the program was noise exposure in excess of 85dBA time-weighted average, with a 3dB exchange rate. Training of hearing testers, known as "industrial audiometric technicians" (IATs), was conducted by audiologists in the Occupational Health & Safety Division of the board.

In a forward thinking move, the board developed a centralized data base in 1978. The cornerstone of this database was the data entry method: a paper based, "mark sense" form which was printed and supplied by the board to all IATs and used to record all industrial hearing tests. IATs sent the forms to the board where they were scanned by an optical scan reader and then stored in a mainframe data base. The objective of this process was to ensure that the same information was collected and stored for each test conducted.

Each audiogram included, and still includes, the following information:

- hearing threshold measurements, to 0dB HL, at 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz
- age
- gender
- hours away from noise prior to test
- occupation
- years at occupation
- hearing protection use (consistency, type of device)
- medical history questions (which are optional)

- type of audiometer
- category of test

Currently the database contains well over three (3) million audiograms.

### Protocol

Requirements for both IATs and physical plant (audiometric facility) have been unchanged since 1978, save for complying with any amendments to the relevant ANSI Standards.

For example, every IAT who conducts industrial hearing tests in BC must successfully complete a four-day training course that is based on the CAOHC curriculum. There is no transferability of any credential from any jurisdiction or certification/licensing body anywhere in the world. In addition, a one day recertification course must be completed every two years. Manual hearing tests must be conducted in accordance with the current ANSI S3.21 Standard (ANSI, 2004b).

The board has strict requirements for physical plant (audiometric facilities):

1. Minimum of 50 square feet devoted to the hearing test area
2. Audiometer that meets the specifications of the current ANSI 3.6, at least a Type 4 (ANSI, 2004a)
3. Audiometric room (booth) that meets the current maximum permissible ambient sound levels in ANSI 3.1, Table 1 (ANSI, 2003)
4. Display of hearing protection samples
5. IAT certificate displayed
6. Confidential record keeping system

Both manual and automated audiometry (microprocessor or Bekesy type) are permitted. Personal, face-to-face counseling takes place immediately after each hearing

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## Chair's Message

By Mary M. McDaniel, AuD CCC-A CPS/A

What is the role of the occupational hearing conservationist (OHC)? CAOHC has done a fine job of defining the role of the OHC in terms of what responsibilities the certified OHC may or may not have. If those points have slipped your mind, please review the "Scope of Practice" document for OHCs on the CAOHC website.

The OHC often serves as the "point person" for the hearing loss prevention program. S/he may be responsible for scheduling the annual hearing tests as well as conducting the audiometric tests, including otoscopic inspection of the ear and review of an aural history. OHC's may make decisions about the purchase of hearing protectors after which they will be responsible for the instruction and assessment of the proper fit, use and care of hearing protectors in the workplace to ensure adequate safety measures are followed.

The OHC must have direct contact with the professional supervisor to verify that audiometric tests are appropriately reviewed and recordability decisions are made. Subsequent to the review by the professional supervisor, the OHC may be responsible for counseling, educating and training employees and maintaining the proper records of the program.

Along with the duties the OHC is qualified to perform, CAOHC clearly outlines the responsibilities the OHC is not trained or qualified to perform. Those duties include: diagnosing hearing problems, conducting professional review, making determinations about work-relatedness, and training other OHCs.

With the roles and responsibilities of the certified OHC clearly stated in the scope of practice, I ask the question again; what is the role of the OHC? As a CAOHC course director, I have students whose duties range from managing the hearing conservation program as part of a company's medical surveillance program, to newspaper pressmen trained to only do hearing tests for workers who missed the mobile van, to medical assistants in neighborhood clinics who do nothing other than pre-placement audiograms. The involvement of the OHC and his/her responsibilities vary greatly in the real world. When *you* answer the question, consider not only what CAOHC says you can and cannot do, but also your actual job responsibilities and your personal level of involvement with the program. With all the various hats an OHC may wear at his/her place of employment, what portion of the job is actually related to OHC duties?

I ask because CAOHC is continually working to improve the quality and distinction of CAOHC certification. CAOHC's mission is to promote the conservation of hearing by enhancing the quality of occupational hearing conservation programs. We accomplish this through our relevant and effective educational programs. The Council is currently reviewing the training curriculum for OHCs, for course directors, and for professional supervisors in an effort to ensure that the quality of our programming remains high. A job analysis of the OHC position, with all its variations, will be helpful in establishing the skills and knowledge required to perform the work. CAOHC is committed to preparing OHCs to assume appropriate responsibilities in the hearing conservation program, regardless of the role they play within their current employment.

In the near future, you may be asked to participate in a survey to assess the roles and responsibilities of the OHC. I hope you'll take the time to consider the issues, assess your individual circumstances, and respond accordingly. Our goal is to better align the OHC course curriculum with the day-to-day activities of certified OHCs. CAOHC already maintains a high standard of excellence, but we are not satisfied to let it rest. We want to respond to current trends in the field, maintain a realistic view of the process, and continue to improve our educational programming, in order to live up to our motto.....CAOHC there is no equal.

**Does Hearing Conservation Work?... – continued from page 1**

test and includes an explanation of the audiogram and the significance of any non-normal results, recommended follow-up for significant hearing loss, and an evaluation of the worker’s hearing protection. The hearing protection evaluation includes examination of the protector’s fit and a discussion of the worker’s use, care, maintenance, and replacement of the device. Off-the-job use of hearing protection is also discussed.

The watchword of this program is consistency; consistency so that reasonably rigorous research can be conducted using the data collected. Assessing the success of an occupational health or safety program is always on the mind of those who fund the programs. “Are we getting our money’s worth” is a common question.

With over three million audiograms on file, spanning a 30 year period, there should be a robust enough data base to reveal important hearing conservation results and trends, and to be able to answer this question.

**This Study**

In this longitudinal study, the workers considered were all male, in the wood products manufacturing (sawmills, pulp mills, etc.) and construction industries. These workers were tested in 1988, when they were 16-24 years of age, and again in 2007, when they were 35-43 years of age. In 1988, both groups had a mean age of 22 years, with a mean of two years of occupational noise exposure; in 2007, they had a mean age of 41 years, with 21 years of occupational noise exposure. The number of workers tested in the wood products manufacturing industry was 1255, while in construction it was 427. All 1682 workers reported wearing hearing protection consistently over the 19 year period. In fact, it was impossible to get a group of workers of any size, in either industry, who did not report consistent use of hearing protection (good news!).

Why these two industries? On the surface, they differ in several important ways which might lead to different hearing conservation outcomes.

1. Wood Products Manufacturing:
  - a. stable workforce
  - b. physically captive workforce, i.e., in ‘mills’ or ‘plants’
  - c. engineered noise control used, to varying degrees
  - d. formal hearing conservation education & training conducted fairly consistently
  - e. good occupational health and safety buy-in from employers
2. Construction:
  - a. highly transient workforce
  - b. physically mobile workforce, i.e., “work outside all over the place”
  - c. very little engineered noise control, except in some mobile equipment
  - d. very little formal hearing conservation education & training, beyond what can occur during the counseling portion of the annual hearing test
  - e. general health and safety buy-in from employers may be good, but not necessarily around hearing conservation

The hearing conservation outcomes examined were:

1. 0,5 fractile (median) hearing levels, better ear, at 500, 1000, 2000, 3000, 4000, 6000, 8000 Hz; comparison between industries in 1988 and 2007, and then compared to
2. 0,5 fractile hearing levels per the International Standards Organization ISO-1999 standard
  - a. Total predicted hearing levels, which comprise predicted noise, induced permanent threshold shift, or NIPTS (ONIHL)+Annex B (unscreened population) thresholds. We have assigned the noise exposure level 90 dBA for both industries, for 20 years duration.
  - b. Annex B thresholds (= median age related hearing). We have used the 4<sup>th</sup> decade, i.e., 40 years of age.

So, two null hypotheses for this research would be

1. there is no difference in hearing conservation outcomes between workers in the wood products manufacturing and construction industries
2. there is no difference between hearing levels in these two industries compared to the same-age total predicted hearing levels from ISO-1999

**Results**

**Null hypothesis 1**

Figure 1 shows the two industries’ median hearing levels for 1988 and 2007.

It is clear no statistically significant differences in hearing levels exist between the two industries, both in 1988 and then again in 2007. Thus the null hypothesis is proven.

There are obvious differences between hearing levels between the two sample years, as the workers have aged 19 years between the two tests.

**Null hypothesis 2**

Figure 2 shows two additional graphs from the ISO-1999—median hearing levels for 40 year old males with 20 years of noise exposure at 90 dBA and median hearing levels for 40 year old males with no noise exposure (ISO, 1990).

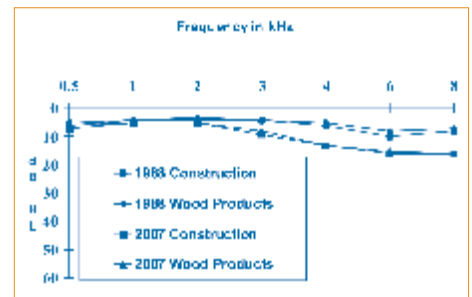


Figure 1. Median Hearing Levels—Comparison between two industries

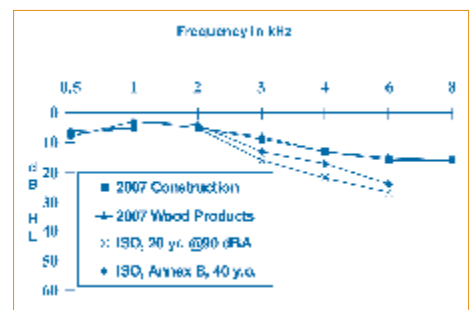


Figure 2. Median Hearing Levels—Comparison with Predicted Values from ISO 1999

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Not only are the median hearing levels of the BC workers better than the predicted median hearing levels based on age plus noise exposure, but the hearing levels are better than the predicted hearing levels based on age alone!

The null hypothesis has been resoundingly disproven. This means that workers in these two industries demonstrate the success of their hearing conservation programs. To have hearing levels better than non-noise exposed men of the same age is truly amazing

Another interesting set of numbers reveals the pattern of hearing protection use in the two industries, and in the two test years. Table 1 shows this. Note: the system of hearing protection classification used in BC is called the “Class” system. Basically, Class A protectors have NRRs of 24 dB or higher and Class B protectors have NRRs between 17-24 dB.

**Table 1. Hearing Protection Use (Percentage)**

	1988 WPM	1988 C	2007 WPM	2007 C
A Class EP	61	57	62	73
A Class EM	31	18	20	13
B Class EP	3	10	12	7
B Class EM	2	8	1	1
Combination	3	7	5	6

WPM = Wood Products Manufacturing

C = Construction

EP = earplug

EM = earmuff

Highlights:

1. Both industries show increased use of earplugs from 1988 to 2007.
2. Wood products manufacturing shows increased use of Class B earplugs, which are likely the vented, custom molded type.
3. Wood products manufacturing shows increased use in both protectors worn simultaneously (“combination”).

**Conclusions:**

It is apparent that this hearing conservation program has been a success and for two very different industries. Workers show median hearing levels better than predicted, even based solely on their age alone, let alone age plus occupational noise exposure. This may not be a surprise to anyone familiar with the wood products industry, but construction? For those who think that the second group is too transient, difficult to find, and difficult to monitor, think again. This is evidence that any industry is able to experience success in hearing conservation.

**References:**

- 1) ANSI (2003). American National Standard—Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms S3.1-1999 (reaffirmed 2003). Acoustical Society of America: New York.
- 2) ANSI (2004a). American National Standard—Specification for Audiometers S3.6-2004. Acoustical Society of America: New York.
- 3) ANSI (2004b). American National Standard—Methods for Manual Pure-Tone Threshold Audiometry S3.21-2004. Acoustical Society of America: New York.
- 4) ISO (1990). Acoustics - Determination of occupational noise exposure and estimation of noise-induced hearing impairment ISO-1999:1990(E). International Organization for Standardization. Geneva, Switzerland.
- 5) WCB (1978). Industrial Health & Safety Regulations. Workers’ Compensation Board of British Columbia: Vancouver, pp 13-4 to 13-8.

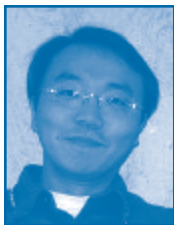
*Christine Harrison is the sole occupational audiologist for the province of British Columbia, Canada, and works for WorkSafeBC (formerly the Workers’ Compensation Board). She oversees hearing conservation programs for over 10,000 employers and 250,000 workers. Her particular areas of professional interest include speech and communication challenges in noisy industry, hearing conservation in the construction industry, use of hearing protection in different industries and age groups, as well as adult education.*

**SAVE the DATE**  
Upcoming **Course Director** Workshop

Friday, November 13, 2009 | 8:00am-4:00pm  
Warwick Hotel | Philadelphia, PA

**SAVE the DATE**  
Upcoming **Professional Supervisor** Workshop

Saturday, November 14, 2009 | 8:00am-4:00pm  
Warwick Hotel | Philadelphia, PA



## Noise, Hearing Protector Use, and Hearing Loss in American Workers

*SangWoo Tak, ScD, MPH*

NIOSH has recently published two studies that estimated the prevalence of hearing difficulty, workplace noise exposure, and non-use of hearing protection device (HPD) among U.S. workers using nationally representative survey data collected from 1997 through 2004. These analyses showed that more than 22 million U.S. workers were exposed to hazardous workplace noise (noise loud enough to require a raised voice to be heard). Over 7 million of these noise-exposed workers (34%) reported that they never used hearing protectors when working in noisy environments. Finally, 12.2 million current U.S. workers (11.4%) have at least some self-reported hearing difficulty. Of these, 3.3 million (24%) are considered to have occupational hearing loss (Tak and Calvert 2008; Tak et al. 2009). Higher prevalence of hearing difficulty was found in several industries, including: mining, manufacturing, construction, agriculture, forestry and fishing, railroads, utilities, trucking service and warehousing, and repair services. Some industry sectors and occupation groups were also found to have significant risk of exposure to hazardous workplace noise. The following statistics are the industry-specific findings from our two studies.

### Mining

Workers in the mining industry had the highest prevalence of workplace noise exposure; almost three out of four mining industry workers are exposed. The mining industry has the second highest prevalence of hearing difficulty among all industrial sectors. Although few miners reported non-use of HPDs, the high prevalence of hearing difficulty (24%) suggests that further efforts are needed to protect workers' hearing in this industry.

### Manufacturing

Over one third of all manufacturing workers (5.7 million workers total) reported exposure to loud noise. The manufacturing industry is divided into many subsectors. Most manufacturing industry subsectors had a higher prevalence of loud noise exposure compared to workers in all industry sectors combined. Notably, one in two workers in the lumber and wood product, and rubber, plastics, and leather products manufacturing industries were exposed to hazardous workplace noise. Overall, one in four manufacturing workers exposed to loud noise reported non-use of HPDs. The highest prevalence of hearing difficulty was reported from workers in the primary metal manufacturing industries (22%). Furniture, lumber, and wood manufacturing workers had the second highest prevalence of hearing difficulty.

### Construction

Approximately 4.5 million construction workers reported exposure to loud workplace noise. Unfortunately, almost one in three of these noise exposed construction workers reported that they never use HPDs at work. Hearing difficulty was reported from one in seven construction workers (15%). About 30% of these construction workers with hearing difficulty are estimated to have occupational hearing loss.

### Transportation

Overall, workers employed in the transportation industries are at a high risk of workplace noise exposure; almost one out of three workers are exposed. Transportation and material moving occupations (other than motor vehicle operators) in the transportation, warehousing and utilities industry showed the second highest prevalence of noise exposure (Three in four workers in these occupations). Over 30% of these exposed workers reported non-use of HPDs. Our findings in the railroad industry stood out for example; no other industry had a higher prevalence of hearing difficulty than the railroad industry (35%) after adjusting for other individual factors. Motor vehicle operators and material moving equipment operators in other industry sectors, such as mining, manufacturing, construction, were also among the occupations with the highest prevalence of hearing difficulty. Noise exposures and hearing loss among rail yard and railway workers have been long understudied. Our results further justify the need to both confirm the magnitude of noise exposure and prevent hearing loss in the transportation industry, and in railroads in particular.

### Agriculture

Workers in agriculture, forestry, and fishing industries also had a high prevalence of exposure to hazardous workplace noise (43.3%). One in four workers in this industry sector reported non-use of HPDs. While only 11% of farm workers and agricultural workers reported hearing difficulty, farm operators and managers and forestry and fishing occupations had the second highest prevalence (22%) of hearing difficulty compared to all other occupational categories. This may be because farm operators and managers operate or work in proximity to mechanized farm equipment which is likely to be the source of noise exposure in this industry.

### Repair and maintenance service

The repair and maintenance service industry is at high risk of workplace noise exposure. Almost one in two workers in this industry reported exposure to loud noise. Over 40% of those who are exposed to loud noise reported non-use of HPDs. No previous study is available to specifically estimate noise exposure levels among workers employed in this industry. Note that this industry does not include all establishments that do repair and maintenance, for example, a large amount of repair is done by establishments in the manufacturing, construction and transportation sectors. Mechanics and repairers are also captured as an occupation category (i.e. vehicle and mobile equipment mechanics and repairers). Mechanics and repairers are at high risk of hearing impairment across a variety of industries. For example, over 60% of mechanics and repairers with hearing

## Assessing a Non-Standard Day... – continued from page 5

difficulty in manufacturing, transportation, communication, and public administration industries are considered to have occupational hearing loss. There has been no study addressing noise exposure levels and occupational hearing loss among those in this occupation. There are possible explanations for the high rates of hearing difficulty among mechanics and repairers. Mechanics and repairers are potentially exposed to high noise levels due to the nature of their work. Mechanics in the heavy equipment manufacturing industry, for example, use a variety of pneumatic tools that generate high noise levels. Because mechanics and repairers often need to hear and detect the unusual noises coming from machinery or equipment to diagnosis mechanical problems, they may not consistently use hearing protection devices. Further surveillance and intervention efforts should be focused on this industry.

### A new NIOSH Surveillance effort

Surveillance of occupational hearing loss and noise exposure is vital to prevention because it can identify the most problematic industries, occupations and work activities, and because it can be used to evaluate the effectiveness of intervention activities. The National Academies Institute of Medicine evaluated the NIOSH Hearing Loss Research Program in 2005 and concluded that the program could not establish and prioritize research goals due to the lack of surveillance data on occupational hearing loss and noise exposure for U.S. workers. One of our first responses was to publish the two articles described in this report.

NIOSH is planning to develop and conduct an ongoing

surveillance program of occupational hearing loss in collaboration with audiometric services providers. NIOSH will develop a database and protocols to manage and analyze de-identified individual level audiometric data. Data from this surveillance effort will be used in several important ways. It will help to identify emerging hearing loss problems, including those associated with new industries, new technologies, or new pieces of equipment. The analysis of the data will also produce national reference statistics for the incidence (or prevalence) rate of occupational hearing loss across industry and occupations.

NIOSH plans to recruit three providers by October 2009 and, by 2012, plans to have a total of 15 providers participating in this surveillance program. For more information about this surveillance program or if you are interested in participating in the surveillance program, please contact me directly at (513)458-7117 or email: STak@cdc.gov.

### Reference

- 1) Tak, S., Davis, R., & Calvert, G. M. (2009). Exposure to hazardous workplace noise and use of hearing protection devices among US workers—NHANES 1999-2004. *American Journal of Industrial Medicine*, 52(5), 358-371.
- 2) Tak, S., & Calvert, G. M. (2008). Hearing difficulty attributable to employment by industry and occupation: an analysis of the National Health Interview Survey—United States, 1997-2003. *Journal of Occupational and Environmental Medicine*, 50(1), 46-56.

*SangWoo Tak is an epidemiologist in the Surveillance Branch of the National Institute for Occupational Safety and Health—NIOSH*

## Look what's New from CAOHC

Earlier this year CAOHC launched two new items that are available to Course Directors (CD), Professional Supervisors (PS) and Occupational Hearing Conservationists (OHC) to promote the VALUE of the certified occupational hearing conservation team.

For CDs, the new marketing brochure replaces the “Stamp of Approval” brochure. This brochure can be used to advertise upcoming courses, or as supplemental material distributed to new and renewing OHCs to continue to spread the hearing conservation message.

Professional Supervisors will find the new brochure clearly illustrates the role of the PS as a critical supervisory entity of the hearing conservation program.

And OHC's will be able to use the new brochure as an informational tool to promote the Value of CAOHC products and services within your workplace.

As our brochure states; “the need for qualified occupational hearing conservation professionals has never been greater. As concerns about workplace and community health and safety grow the demand for quality professionals to maintain occupational hearing conservation programs grows as well.”

Please use this brochure to help CAOHC promote the Value of a Quality Hearing Conservation Program. Order forms can



be found on the CAOHC website at [www.cahoc.org](http://www.cahoc.org) or by contacting the CAOHC administrative office at [info@cahoc.org](mailto:info@cahoc.org).

This spring CAOHC added a new curriculum slide set to its line up of power point resources: **Training, Education, and Motivation of Noise-Exposed Personnel**. This educational tool provides a comprehensive resource for CDs to aid in planning, execution and evaluation of a successful OHC course as well as information for OHCs on how to properly train and motivate their employees on the importance of adherence to an occupational hearing conservation program.

The slide set includes but is not limited to the following:

- Overview of regulatory guidance which governs the requirement for training
- Overview of the required and optional training elements of an OHC course
- Overview of adult learning principles and tips for successful information delivery
- Examples of practical training methodology

The slide set can be ordered through CAOHC's website [www.cahoc.org](http://www.cahoc.org) or by contacting CAOHC's administrative office at [info@cahoc.org](mailto:info@cahoc.org).

# First Safe-in-Sound Excellence in Hearing Loss Prevention Awards™ Presented

*Pamela S. Graydon, M.S. and Thais C. Morata, Ph.D.*

Hearing loss continues to be a major health and quality-of-life problem in the United States. It is the second most self-reported ailment after back problems. In the workplace, hearing loss is one of the most prevalent work-related conditions. Although some employers focus their hearing conservation efforts on compliance alone, other companies recognize that mere compliance with regulations will not prevent hearing loss, and these companies have redirected their programs to have zero tolerance for hearing loss. The Safe-in-Sound Excellence in Hearing Loss Prevention Awards™ program was designed to reward and learn from those companies that have excellent programs for preventing hearing loss.

## 2009 Awards

The first Safe-in-Sound Awards were presented during the 2009 Conference of the National Hearing Conservation Association (NHCA). Co-sponsored by NHCA and the National Institute for Occupational Safety and Health (NIOSH), these awards honor companies that have shown their dedication to excellent hearing loss prevention practices in the work environment. The objectives of these awards are to recognize organizations that document measurable achievements in hearing loss prevention programs, obtain information on their real-world successes, and widely disseminate information on how others can use these successful strategies or benchmark their own programs.

“We are pleased to be able to recognize these organizations for their leadership in preventing work-related hearing loss,” said NIOSH Acting Director Christine Branche, Ph.D. “NIOSH is constantly looking to elevate the quality of hearing loss prevention programs, and this is an excellent opportunity to share new ideas and best practices to help improve many areas in worker safety and health.”

## Manufacturing Sector

Pratt & Whitney, a United Technologies Corp. Company, was recognized for the comprehensive approach taken at its East Hartford, Connecticut, facility which aims at excellence in every component of the hearing loss prevention program; for their exceptional commitment to noise control and for promoting the active involvement of the workforce in their efforts.

Domtar Paper Company in Kingsport Mill, Tennessee, was recognized for the comprehensive integration of its hearing loss prevention program and a demonstrated commitment to extend hearing loss prevention practices beyond the occupational work environment into recreational and community activities enjoyed by their workers and their families.

## Services Sector

Public entities in Ohio do not fall under the purview of the Federal or State Occupational Safety and Health Administration (OSHA), but the Montgomery County Water Services

proactively addresses each of the components of an effective hearing loss prevention program, often extending beyond minimal regulatory requirements. They were recognized for the comprehensive approach taken, aiming at excellence in every component of the hearing loss prevention program, for developing innovative strategies for addressing the variable work routine of their noise-exposed workers, and for promoting the active involvement of the workforce in their safety and health efforts.

## Innovation Award

Sensaphonics Hearing Conservation, Inc., in Chicago, IL, received the Safe-In-Sound Innovation in Hearing Loss Prevention Award for being a pioneer in combining products, audiology services, and education to reach their hearing loss prevention goals, for a culture of innovation and educational outreach, and for having raised awareness of the importance of hearing loss prevention among audiologists, the music industry and the general public.



*Back row, top left to top right: Charlie Floyd (Domtar), Mark Skripol (P&W), Pam Graydon (NIOSH), Tim Brooks (P&W), Nancy Hitchins (P&W), Meg Gildea (P&W), Ed Nelson (P&W), Thais Morata (NIOSH), Dom Chiulli (P&W), Craig Thompson (P&W), Deanna Meinke (NHCA), Jim Newhall (NIOSH) and James Lankford (NHCA). Front row (seated), left to right: Connie Muncy (MCWS), Debbie Davis (Domtar), Dave Russel (P&W) and Michael Santucci (Sensaphonics).*

More details on each award recipient and their nominations can be found online at: <http://www.safeinsound.us/09winners.html>

## Safe-In-Sound Website

The traffic recorded on the Safe-in-Sound website is being monitored to quantify interest in this initiative. This monitoring has indicated that the initiative has been well received. So far this year website traffic is more than double that of the same time last year.

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## Safe-in-Sound... – continued from page 7

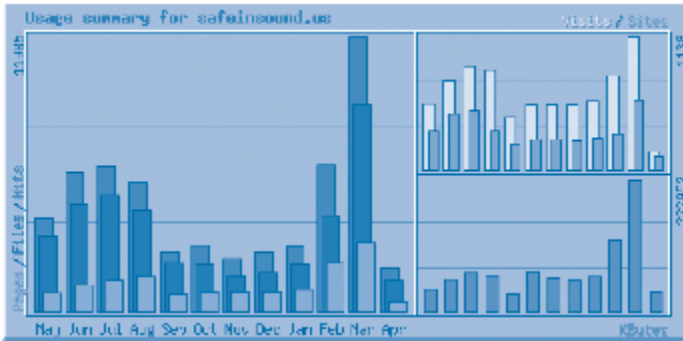


Figure 1: Traffic recorded by www.safesound.us between April 2008 and March 2009.

It is expected that interest and participation in this award will greatly increase in this and subsequent years as more organizations become aware of the opportunity.

Nominations for the next awards are due by Aug. 1, 2009. Visit [www.safesound.us](http://www.safesound.us) for information.

*Thais C. Morata, Ph.D. is a Research Audiologist and Project Director for the Safe-In-Sound Award Program. Pamela S. Graydon, M.S. is an Electronics Engineer and Project Manager for the Safe-In-Sound Award Program. They are employed by the National Institute for Occupational Safety and Health in Cincinnati, Ohio.*

## Top 25 Course Directors for 2008

CAOHC would like to thank the following Course Directors for their outstanding performance and contribution to the occupational hearing conservation industry.

The following individuals certified and re-certified a total of 2714 occupational hearing conservationists in 2008.



1. Timothy A. Swisher, MA, CCC-A  
Hearing Safety  
Pittsburgh, PA
2. James Jerome, MA, CCC-A  
Workplace Integra  
Fishers, IN
3. John Elmore, AuD, MBA, CCC-A  
Precision Hearing Conservation  
Helotes, TX
4. Johnny Sanders, MA, CCC-A  
Health Testing Solutions  
Houston, TX
5. Robert Rhodes, PhD  
OMI  
Hattiesburg, MS
6. Melette Meloy, MS, CCC-A  
Sound Solutions  
Dallas, GA
7. Cheryl Nadeau, MEd FAAA  
Workplace Integra  
Greensboro, NC
8. Thomas Thunder, AuD, FAAA, INCE  
Acoustic Associates, Ltd.  
Palatine, IL
9. Georgia Holmes, AuD, CCC-A  
Holmes Hearing Services  
Montgomery, AL
10. Linda Moulin, PhD, JD  
Environmental Technology  
Corporation  
Roswell, GA
11. Charles Fankhauser, PhD  
MEDI  
Benicia, CA
12. Kathryn Deppensmith, MS, CCC-A  
Occupational Marketing, Inc  
Houston, TX
13. Kristen McCall, AuD, CCC-A  
Center for Hearing Health  
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Thank you for your dedication to CAOHC and the Hearing Conservation industry



# Best Practices in Promoting the Use of Hearing Protection

Madeleine J. Kerr, PhD, RN

Occupational hearing conservationists can provide an important societal benefit by promoting the use of hearing protection to prevent noise-induced hearing loss. What are the best practices for education and motivation to promote hearing health? This article describes a national priority related to hearing protection, theory-based educational interventions, and documentation of education in the electronic health record.

Promoting hearing health through use of hearing protection is a priority in the United States. Recognizing that noise-induced hearing loss is the most common occupational disease, our national Healthy People 2010 initiative has an objective for prevention by increasing the use of appropriate ear protection devices, equipment and practices (Objective 28-16, USDHHS, 2000). This objective has received support for continuation in the Healthy People 2020 objectives now in the public comment phase through fall 2009 (<http://www.healthypeople.gov>). Health behaviors are notoriously difficult to change, therefore researchers look to theories for guidance in designing interventions.

The most common theoretical framework for studying use of hearing protection behavior has been the Health Promotion Model (Pender, 1987). This model has guided researchers in identifying the predictors of use of hearing protection and designing theory-based interventions to promote use of hearing protection (Kerr, Savik, Monsen & Lusk, 2007; Lusk, Ronis, & Kerr, 1995). In the model, five important factors influence use of hearing protection. Demographic/Experiential Factors such as job category and noise exposure at work are modifying factors. Self-efficacy is confidence in one's ability to use hearing protection. Benefits refer to the expected positive effects of use. Barriers refer to the potential negative aspects of using hearing protection. Social role models are the significant others who exemplify the behavior. A primary assumption of the Health Promotion Model is that persons value growth in directions which they view as positive. Therefore, in contrast to the Health Belief Model, beliefs of seriousness of a disease and personal susceptibility to it are not emphasized in the Health Promotion Model.

## Assessments and interventions

A theory-based assessment is an important way to personalize educational sessions to each worker. Key assessments and examples of interventions are shown in Table 1.

A good place to start is assessing workers' awareness of their noise exposure. Workers in an occupational hearing conservation program may be aware of noise surveys of their work area. However, many workers are in variable working conditions and may not know how to assess their daily noise exposures. A useful rule of thumb to teach them is that you are in loud noise if you have to shout to be heard three feet away. It may also be helpful to refer workers to a wall chart

**Table 1 Assessments and interventions to promote use of hearing protection devices**

Model Factor	Assessment	Intervention
Demographic/Experiential factors	Describe your noise exposure at work.	Self-monitor. You're in loud noise if you have to shout to be heard 3 feet away.
Use of hearing protection device (HPD)	When you are in noise, what percent of the time do you wear hearing protection?	Monitor use of hearing protection. Set goal of 100% use when in high noise.
Barriers to use of HPDs	What gets in your way of wearing HPDs 100% of the time when in noise? (Inconvenient, uncomfortable, poor fit, difficulty communicating while wearing them)	Address personal concerns, misperceptions about HPDs. Offer choice of HPDs for more convenience, comfort, fit, communication.
Benefits of using HPDs	What do you see as benefits to wearing HPDs? (Keeping out harmful noise, lowering stress)	Recommend HPD trials in noise to experience benefits of reducing the hazardous noise
Self-efficacy in using HPDs	How confident are you in your use of HPDs? (Knowing how to roll foam plug into a small crease-free cylinder)	Demonstrate hands-on session with HPDs Teach fit-tests like the hum test: try inserting one plug and humming <a href="http://www.e-a-r.com/pdf/hearingcons/earlog19.pdf">http://www.e-a-r.com/pdf/hearingcons/earlog19.pdf</a>
Social models of HPD use	What percent of the time do coworkers, supervisors; others wear earplugs and earmuffs when exposed to noise?	Be a role model as an OHC by demonstrating how to use HPDs Use peers for behavioral modeling whenever possible

**Best Practices in Promoting the Use of Hearing Protection... – continued from page 9**

of noise levels or a resource such as the National Institute for Occupational Safety and Health Power Tools Database (<http://www.cdc.gov/niosh-sound-vibration/>).

Next, assess the worker’s use of hearing protection behavior by asking what percent of time he/she wears hearing protection when in noise. Simply monitoring by asking a question can have an impact on behavior.

For workers who use hearing protection less than 100% of the time in noise, assess the next four factors in Table 1 and make a plan to intervene now or in the near future. These assessments and interventions can be incorporated in an audiometric testing session, often considered the ideal teachable moment in hearing conservation practice. Alternatively, these interventions could take place in a group setting by engaging workers in discussion of the model factors and practicing with samples of hearing protection devices under the guidance of an occupational hearing conservationist.

**Recordkeeping**

The important final step is to record the interventions delivered to each worker. Documentation of occupational health services in an electronic health record (EHR) is an emerging goal in keeping with President Obama’s priority of EHRs for all by 2014. It is essential to document using a standardized language in order to enable health information exchange across the continuum of care. An occupational health service could implement their hearing conservation standard of care by embedding a pathway in their clinical information system. In this way, clinicians can readily follow the pathway to record assessments, interventions, and outcomes related to promoting hearing protection use. A documentation example will be given using the Omaha System, a standardized terminology in the public domain that is well suited for community-based care (<http://www.omahasystem.org>, Martin, 2005).

**Table 2 Example of an electronic health record entry**

Domain: Environmental
Problem: Neighborhood/Workplace Safety
Modifiers: Individual and Actual
Sign/Symptom of Actual: Physical Hazard (noise).
Intervention Category: Teaching, Guidance and Counseling
Target: Behavior modification
Client-specific information: use of hearing protection behavior and related noise exposure, barriers, benefits, self-efficacy and social models.

The example above focuses on the individual worker. However, by changing the modifier from individual to community, the pathway could also serve as a standard for group-level interventions throughout an organization.

Noise-induced hearing loss prevention will continue to be a priority as we move toward Healthy People 2020 objectives. Occupational Hearing Conservationists are sure to play an important role in promoting use of hearing protection with workers at risk for occupational noise exposure. Theory-based interventions recorded in new electronic health records can provide information to evaluate outcomes of quality hearing conservation efforts for occupational health services.

**References**

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**Spotlight on an OHC**



Betty Phillips is a CAOHC-certified OHC and an occupational health nurse with a 22 year tenure at Royal Development Company in High Point, North Carolina. She does hearing testing, training and hearing protection fitting on 200 employees annually. According to Tami Thompson, occupational audiologist for Examinetics, Inc., Betty manages, “an exceptional program and is very aware of regulations and issues” that help make their program so successful. After working with Betty for several years, Tami suggested that Betty be featured in the OHC Spotlight segment in *Update*.

Betty has noticed that “more people are protecting their hearing on and off the job” which she attributes to, “the education and awareness of occupational hearing loss and the preventative methods that can be employed by a hearing conservation program”.

She feels that the program at Royal Development Co. is effective because the management is very supportive and works well with her to ensure that the program is maintained properly. Betty has a good relationship with the employees and if they have concerns, she is always ready to address any issues they might have.

Betty stays current with her CAOHC certification and stays up to date with industry trends. According to Tami, “Betty is a pleasure to work with and the hearing conservation program she manages is a great example of teamwork and communication in action.”

## UPCOMING OHC CERTIFICATION AND \*RE-CERTIFICATION COURSES 2009

Below is a listing as of July 15th, 2009. Please note new courses are added daily,  
check our website [www.cahc.org](http://www.cahc.org) for the most up-to-date list

Start Date	State	City	Course Director	Phone	Start Date	State	City	Course Director	Phone
8/3/2009	IN	Indianapolis	James Jerome	317-841-9829	*9/10/2009	NC	Greensboro	Cheryl Nadeau	336-834-8775
8/3/2009	OR	Portland	Rodney Atack	503-614-8465	*9/10/2009	PA	Philadelphia	Timothy Swisher	412-367-8690
8/3/2009	VA	Norfolk	George Cook	919-962-2101	9/14/2009	GA	Atlanta	Herbert Greenberg	678-352-0312
*8/4/2009	IN	Indianapolis	James Jerome	317-841-9829	*9/15/2009	GA	Atlanta	Herbert Greenberg	678-352-0312
8/4/2009	MS	Hattiesburg	Robert Rhodes	601-264-3545	9/15/2009	MA	Auburn	Steven Fournier	508-832-8484
*8/4/2009	OR	Portland	Rodney Atack	503-614-8465	9/15/2009	NH	Manchester	Pamela Gordon-DuPont	860-526-8686
*8/4/2009	VA	Norfolk	George Cook	919-962-2101	9/16/2009	GA	Roswell	Jason Feld	770-475-2055
8/5/2009	AL	Birmingham	Georgia Holmes	205-934-7178	9/16/2009	MI	Detroit	John Elmore	800-357-5759
8/5/2009	FL	Jacksonville	Nancy Green	904-880-1710	9/16/2009	NC	Morrisville	Thomas Cameron	919-459-5255
8/5/2009	FL	Miami	John Elmore	800-357-5759	*9/16/2009	NH	Manchester	Pamela Gordon-DuPont	860-526-8686
*8/5/2009	MS	Hattiesburg	Robert Rhodes	601-264-3545	9/16/2009	OK	Oklahoma City	Johnny Sanders	800-869-6783
8/5/2009	NC	Morrisville	Thomas Cameron	919-459-5255	9/16/2009	OR	Portland	Michael Fairchild	503-259-2685
8/5/2009	OH	Cincinnati	Timothy Swisher	412-367-8690	*9/16/2009	OR	Portland	Michael Fairchild	503-259-2685
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*8/6/2009	FL	Jacksonville	Nancy Green	904-880-1710	9/16/2009	TN	Chattanooga	Melette Meloy	678-363-9897
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8/10/2009	FL	West Palm Beach	Herbert Greenberg	678-352-0312	9/17/2009	PA	Pittsburgh	Roger Angelelli	412-831-0430
*8/11/2009	FL	West Palm Beach	Herbert Greenberg	678-352-0312	*9/17/2009	TN	Chattanooga	Melette Meloy	678-363-9897
8/12/2009	GA	Atlanta	Michele Alexander	336-834-8775	*9/18/2009	ME	Waterville	Anne Louise Giroux	207-872-0320
8/12/2009	ID	Boise	Brek Stoker	206-376-3591	*9/18/2009	PA	Pittsburgh	Roger Angelelli	412-831-0430
8/12/2009	MI	Detroit	Johnny Sanders	800-869-6783	*9/22/2009	CA	Fremont	Kirsten McCall	425-254-3833
8/12/2009	NC	Hickory	Frieda Price	803-547-5935	9/22/2009	MO	North Kansas City	Linda Ratliff-Hober	913-268-0928
8/12/2009	PA	Pittsburgh	Timothy Swisher	412-367-8690	9/23/2009	CA	Fremont	Kirsten McCall	425-254-3833
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8/19/2009	FL	Tampa	Johnny Sanders	800-869-6783	*9/24/2009	IA	Iowa City	Laura Kauth	563-355-7712
8/19/2009	IL	Chicago/Schaumburg	Thomas Thunder	847-359-1068	*9/24/2009	TX	Houston	Johnny Sanders	800-869-6783
*8/19/2009	IL	Chicago/Schaumburg	Thomas Thunder	847-359-1068	*9/24/2009	VA	Richmond	Timothy Swisher	412-367-8690
8/19/2009	OH	Cleveland	John Elmore	800-357-5759	9/30/2009	CA	Walnut Creek	Charles Fankhauser	707-746-6334
*8/19/2009	PA	Bethlehem	James Robertson	610-868-8606	9/30/2009	UT	Salt Lake City	Pamela Cronin	801-566-8304
8/19/2009	TN	Nashville	Melette Meloy	678-363-9897	9/30/2009	WA	Seattle	Gaye Chinn	206-764-3330
*8/20/2009	FL	Tampa	Johnny Sanders	800-869-6783	10/1/2009	CA	Walnut Creek	Charles Fankhauser	707-746-6334
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*8/20/2009	TN	Nashville	Melette Meloy	678-363-9897	*10/1/2009	UT	Salt Lake City	Pamela Cronin	801-566-8304
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*8/25/2009	IL	Chicago/Oak Park	Robert Beiter	708-445-7171	10/5/2009	FL	West Palm Beach	Herbert Greenberg	678-352-0312
8/26/2009	CO	Loveland	Laurie Wells	970-593-6339	10/5/2009	NE	Omaha	Thomas Norris	760-636-4191
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*8/28/2009	CO	Loveland	Laurie Wells	970-593-6339	10/7/2009	MA	Auburn	Steven Fournier	508-832-8484
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