

Evidence-Based Audiology Focus on Hearing Loss Prevention

By Thais C. Morata, PhD

Audiologists and other health professionals today share the challenge of dealing with information overload, much of it coming from sources of variable quality. Such exposure to super-abundant information also affects the populations we serve. To complicate things further, we are going through a period of diminished trust in authority and science. So we need to be ready to answer a very basic question: “What is and is not known to work in practice?” (Actually, when we are in the position of being patients ourselves, isn’t that what we would want to know about prescribed treatments?)

EVIDENCE-BASED PRACTICE

The term “evidence-based practice” has become commonplace. However, evidence being presented to support effectiveness of a specific practice can range from a “success story” based on a single example, to high-quality evidence involving formalized testing in carefully conducted experimental designs. Such inconsistency can become an obstacle for real evidence-based practice. David Sackett, OC FRSC, and colleagues offered a definition for evidence-based medicine that can be used in several health areas: “Evidence-based medicine is the conscientious explicit and judicious use of *current best* evidence in making decisions about the care of individual patients (*BMJ*. 1996; 312[7023]:71).”

So how can we get to that? How can we be prepared to do our best work and give convincing answers to the people we serve? One approach is to look for sources of information that use a rigorous method to synthesize the knowledge base of a topic. This is what is behind the demand for systematic reviews. The term “systematic” review implies a well-defined, rigorous approach that requires a clearly defined question, identification of relevant studies, assessment of study quality, and synthesis of evidence through an explicit methodology designed to minimize bias (*J R Soc Med*. 2003; 96[3]:118). When carried out properly, systematic reviews provide reliable estimates about the effects of interventions and demonstrate where knowledge is lacking to guide future research.



Dr. Morata is a research audiologist at the National Institute for Occupational Safety and Health (NIOSH). She directs the Safe-in-Sound Awards™ and is a founding associate editor for the *International Journal of Audiology* and for *Cochrane Work*. The opinions expressed in this article are the author’s and do not reflect the view of the NIOSH.



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OCCUPATIONAL NOISE EXPOSURE

Systematic reviews are particularly needed to understand noise exposure in the workplace and corresponding interventions for hearing loss prevention. While many companies comply with legal or obligatory requirements and implement required interventions, few publications documenting the effectiveness of these actions exist. Based on current evidence, public health agencies have recommended practices that expand on the existing requirements (see CDC’s Vital Signs and NIOSH Recommendations online).

However, the fields of audiology and occupational health have a modest and rather recent history of research on the effectiveness of interventions. Information on the effectiveness of current strategies could help correct weaknesses or further encourage their adoption and expansion.

A Cochrane Systematic Review examined the effectiveness of various interventions to prevent occupational noise-induced hearing loss (*Cochrane Database Syst Rev*. 2012; 10:CD006396). Cochrane is a not-for-profit organization that produces high-quality systematic reviews about the effectiveness of health interventions. It collaborates with experts from over 120 countries to produce credible and accessible health information free from commercial sponsorship and other conflicts of interest. Cochrane systematic reviews support the decision-making process by synthesizing the results of multiple studies and seeking answers to the most basic question: Does this intervention work?

The Cochrane review on noise-induced hearing loss evaluated a set of interventions or specific components of hearing loss prevention programs. Examined interventions had one or more of the following elements:

1. Engineering controls: reducing or eliminating the source of the noise, changing materials, processes, or workplace layout;

2. Administrative controls: changing work practices, management policies, or worker behavior;

3. Personal noise protection devices;

4. Hearing surveillance: monitoring the hearing levels of exposed workers (clinical interventions such as the use of antioxidants, magnesium, or other compounds were excluded).

The review found that the most common attempt to reduce occupational noise exposure was the distribution of hearing protectors despite the general acceptance that the preferred intervention is engineering noise reduction strategies in the workplace. Evidence of long-term evaluation studies of the individual components of a Hearing Loss Prevention Program (HLPP) showed that the use of hearing protection devices in a well-implemented HLPP was associated with less hearing loss. The studies that evaluated earmuffs versus earplugs also showed that earmuffs probably perform better than earplugs in high noise levels and vice versa in low noise levels. Success was not demonstrated in other elements of HLPPs such as worker training, audiometry alone, or noise exposure monitoring. More individual information on daily noise exposure as part of an HLPP showed favorable but non-significant effects both for hearing loss and for daily noise exposure levels.

When noise-exposed workers in a hearing loss prevention program were compared to non-exposed workers in long-term follow-up, the exposed workers had similar hearing thresholds

as the non-exposed workers. However, the 95 percent confidence interval includes the possibility of hearing loss as great as 4.2 dB. This threshold is equivalent to thresholds resulting from five years of exposure to 85 dB(A). Two other studies that could not be combined in the meta-analysis (for their different methodologies) also found considerable risks of hearing loss in spite of participants being covered by an HLPP. While better use of available data for retrospective cohort studies is needed, the current results reinforce the argument that hearing loss prevention interventions at work should focus on technical measures to control noise exposure.

Regrettably, the Cochrane review found no field studies that evaluated the impact of engineering controls on reducing noise levels, except for one study that indirectly measured the effect of legislation on noise level reduction in the U.S. mining industry. At press time, the review is being updated and is expected to be published later this year.

Several references provide guidance toward planning and conducting a systematic review and meta-analysis, such as the Cochrane's regularly updated [handbook](#). But here's the bottom line when seeking advice from experts on effective noise control and hearing loss prevention strategies: Ask for evidence that demonstrate the efficiency of their recommendations, and consider the quality of the evidence supporting their recommendations. [\[1\]](#)