

NIOSH Criteria Document Effectiveness Measures

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When we put together the NIOSH *Occupational Noise Exposure Criteria Document*, we included hearing loss prevention effectiveness evaluation as Component 8. I want to discuss Component 8 and what we recommend people consider doing to evaluate programs. There are two levels in our Component 8 concerning evaluation of effectiveness. The first is evaluation of effectiveness at the individual level and the second is evaluation at the program level.

Before you can measure the success or failure at either of these levels, you must have an environment where achieving success is possible. This depends on the workers and the employers. We want workers to adhere to corporate policies, participate in noise control and abatement programs, wear hearing protection devices, show up for hearing tests, and attend training.

What Does Management Need to Do?

It has to enforce its policy all up and down the line. A buy-quiet policy is necessary. Barriers to get to quiet work areas and to hearing protection must be removed so workers and managers don't have to fight the system. Management needs to stress the importance of the hearing testing and provide relevant, interesting training.

Effectiveness measures: In the 1990s the corporate safety culture is retiring and new corporate members are entering who are not part of the system as partners. One of the consequences of this is that new workers are receiving injuries, acquiring illnesses, and, in a few cases, being killed because of failure to use safe work practices that are second nature to the older workforce.

Evaluation

Individual effectiveness: A hearing loss prevention program's effectiveness is best demonstrated by having no workers suffer occupational hearing loss. To reach this end at the individual effectiveness level, NIOSH recommends that audiometry be conducted at the end of the work shift. The search is for temporary shift, and the immediate goal is to prevent it. If you find temporary threshold shift and prevent this, then permanent threshold shift is much less of a problem than it would be otherwise. Once temporary threshold shift is identified, the person should come back for an additional test to determine that temporary shift is not there. In this situation, while the loss is still temporary, you can respond to the problem before the worker experiences a permanent threshold shift. It is also necessary to search for common errors; retesting helps to rule these out and to assure accuracy. In addition, to do anything with individual effectiveness, audiograms must be reviewed. Workers need to get instant feedback to make the program important. If these steps are not followed, the company will have a big hearing loss program instead of a prevention program. Each audiogram is a marker of how effective the program is for an individual and the audiogram must be managed aggressively if occupational hearing loss is to be prevented.

Programmatic effectiveness: In terms of overall evaluation, data must be collected to identify trends in the workers and then to identify problems in the system before permanent threshold shift develops due to problems in the work setting. The evaluation has two parts: (1) coming back and looking at the database already collected to make sure it is accurate

and (2) comparing the data to existing other standards as external verifiers of effectiveness. As an example, Draft ANSI standard S12.13 uses existing databases, does year to year comparisons, and charts comparison percent of audiograms in year to year for the same people. It also calculates the percent of workers with a 15 decibels (dB) change in hearing threshold for a frequency range of 500-6000 Hz. We look in the older group for the percent that have gotten better or worse. The standard says whether your program is acceptable or not. It gives you confidence.

We also are looking at the internal integrity for a person. We are trying to find unconfirmed threshold shifts, unsupported baseline audiograms, noise levels in audiometric tests booths that are too high, large differences between the good and bad ear, and large adjacent frequency differences. In this case we are calculating the external comparator. This is done using sequential audiograms to calculate standard threshold shifts (STS). Company employees who are not exposed can also be used as the comparison group. Another way is to compare your data to standards that provide statistical populations. The

one we have in the United States is ANSI S3.44, an embodiment of the ISO standard with the addition of one database to round it out. Database A is highly screened with audiograms for males and females with no hearing problems collected by Robinson. Database B has audiograms for unscreened (noise exposure) males and females. It is more like a population database. Database C has audiograms for black and white males and females and is a domestic database with different prevalence rates.

Conclusions

Basically, for these kinds of effectiveness measures, you must start first with the right kind of corporate culture, one that has zero tolerance for occupational hearing loss. Subsequently, we can look at individual effectiveness and provide instant feedback of audiogram results and prevent permanent threshold shift by identifying and responding to temporary threshold shift. We can look at program effectiveness by assessing the integrity of data and the use of comparison to external criteria such as local non-exposed workers or to statistical populations.



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