Does Noise Increase the Risk of Accidents?

Loud noise is one of the most common and pervasive hazards in industry today. The risk of hearing loss due to excessive noise is well known and has long been studied. But other risks from noise have not been so clear. Is excess noise also to blame for accidents in the workplace? Are all workers at higher risk, or perhaps just those individuals who are hard of hearing?

Identifying Listening Challenges

In recent years, there has been growing concern that noise in the workplace may increase a worker's risk of occupational injury. Many accident investigations now include consideration of any possible noise interference with the detection of warning signals, moving vehicles, or speech communications. The National Institute for Occupational Safety and Health (NIOSH) maintains a **central index of investigation data** that includes NIOSH reports and data available from state programs. This Fatality Assessment and Control Evaluation (FACE) Program tracks details of the conditions and series of events that led to a deadly incident, including information about workplace noise and hearing status when available.

For most listeners, the level of a speech signal must be significantly higher than background noise in order to be intelligible (understandable). In industry, achieving an adequate signal-to-noise ratio can be a challenge in many work areas. There is a physiologic limit to how loud and how long talkers can raise their voice, or shout, to be heard. Simply making sounds louder through amplification may not make those sounds easier to understand. At high sound levels (typically over 85 dB), signals within the inner ear become distorted and auditory function can be diminished. Just as music can lose its quality if played through a stereo speaker on full volume, speech and other acoustic signals become distorted when entering the ear at very high levels. Worse yet, cranking up the volume on a traditional radio or PA system may actually add to workers' noise exposures.

As if there weren't enough challenges to listening in noise, of special concern is when a worker is hard of hearing. There are many types and severities of hearing loss. Some people have difficulty hearing at all times, even in quiet situations. Others get by fine in quiet, but experience significant trouble distinguishing sounds, particularly speech, in the presence of competing background noise. Through interviews with noise-exposed and hearing-impaired workers and their supervisors, a team of researchers at The National Institute for Occupational Safety and Health (NIOSH) took an early step toward identifying job safety concerns (Morata et al, 2005). On the whole, the research team found workers and managers in agreement about reduced ability to hear important sounds in a noisy workplace. In particular, concerns were expressed about impaired capacity to monitor equipment, detect warning sounds, and understand speech. Especially for workers with hearing loss, there was the added worry that hearing protection devices can exacerbate listening difficulties. Some workers even commented that working in noise with a hearing loss was stressful and tiring, more potential risk factors for workplace mishaps.

Is There a Link to Accidents?

First and foremost, it is important to point out that drawing clear conclusions about "cause-effect" relationships is not easy. Historically, research has looked for associations, or links, between various risk factors and accidents. In addition, in the real world, research is often limited by unavailable or insufficient data on workplace noise levels and worker hearing status. One group of Canadian researchers (see

studies listed under team leaders Girard and Picard in our References section below) has been able to systematically test the connection between noise and accidents by analyzing registry information available from the Quebec National Institute of Public Health and the Quebec Workers' Compensation Board. The group has completed a number of retrospective studies by reviewing records for over 50,000 occupational workers. They concluded that injuries were associated with both high noise exposure and worker hearing loss. Exposure to extremely noisy environments (equivalent 8-hour noise exposures of 90 dBA and above) and hearing loss were associated with higher risk of accidents. Overall, they attributed 12% of workplace accidents to a combination of noise exposure and hearing loss. Furthermore, the risk of multiple accidents/injuries was three times higher for severely hearing-impaired workers. Seriousness of injury was associated with noise exposure as well. The researchers found an association between injuries severe enough to require hospitalization and noise exposures of 100 dBA and above. And for each dB of hearing loss, a statistically significant increase in hospitalization was observed.

The Canadian researchers have also studied traffic accidents by reviewing data available from the Quebec state agency responsible for motor vehicle insurance and the compensation of victims of traffic accidents. These results revealed that occupational noise exposure and hearing loss were linked to traffic accidents, similar to associations they found for industrial accidents.

This type of research is also ongoing in the United States. In 1996, NIOSH established the National Occupational Research Agenda (NORA) as a framework to guide research and focus efforts to prevent work-related illness and injury. Occupational hearing loss has been included among the top research priority areas. NORA recognizes that a diminished ability to communicate with co-workers or monitor sounds in the work environment can reduce productivity and place workers at increased risk for accidents. NIOSH has continued to place emphasis on answering unresolved questions regarding the effects of noise and determining best practice prevention programs. For more information on NIOSH's noise and hearing loss research, see the topic webpage: **http://www.cdc.gov/niosh/topics/noise/**.

Options for Reducing Risk

There are two basic tasks an employer can undertake to reduce the potential risk of accidents associated with noisy environments: 1. address jobs and work areas where background noise may interfere with warning signals, vehicle detection/alarms, or speech communication and 2. identify and assist workers who have significant hearing loss. If communication is required, and miscommunication could cause an accident, the situation should be evaluated and addressed.

If companies are concerned that noise may be interfering with communication and warning sounds, then a detailed noise evaluation should be conducted. Engineering controls may be needed to reduce noise at its source. When noise control is not possible, consider visual cues, pre-coded messages, redesign of warning systems, and employing specialty communication devices that block out background noise without compromising communications. Usually these systems consist of a standard hearing protection device (earplug or earmuff) that attenuates or blocks the noise, in combination with a small speaker embedded in the earplug or earmuff to deliver the communication signal directly to the ear. Keep in mind that binaural (both ear) listening systems typically provide a significant advantage over monaural (one ear listening). Options for limiting output of electronic systems are also important for safe listening.

Next, workers with significant hearing loss can be identified through audiometric evaluation and consultation with your hearing conservation program audiologist. As needed, develop job-specific protocols for hearing-critical jobs, and create individualized plans for hearing-impaired workers. Emergency preparedness, alerting device options, training accommodations, and specialty hearing protection are all important considerations.

Contact CavCom to discuss options for improving your company's productivity, safety, and communication capabilities.

References

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