

WORKPLACE SOLUTIONS

From the National Institute for Occupational Safety and Health

Reducing Noise Hazards for Call and Dispatch Center Operators

Summary

Workers at call and dispatch centers may suffer health risks associated with high noise levels from their headsets. The National Institute for Occupational Safety and Health (NIOSH) has developed recommendations for prevention.

Description of Exposure

Millions of workers at call and dispatch centers in the United States use headsets during most of their workday. They mainly include dispatchers, medical transcriptionists, air traffic control specialists, customer service representatives, switchboard operators, reservationists, and bill collectors. Many work in high-pressure, stressful environments with noisy surroundings and poor ergonomic conditions. [NIOSH, 1997, 2005, 2007, 2008; Gavhed and Toomingas 2007; Patel and Broughton 2002]. Although these other factors can pose additional health risks to workers, the scope of this document is limited to providing recommendations for reducing noise hazards.

NIOSH research shows that workers at call and dispatch centers may face several hazards: (1) Acoustic trauma from a

sudden spike in noise levels (e.g., from feedback into the headsets or a sudden change in volume) (2) background noise from the incoming call, and (3) background noise and other stressors in the workplace.

Background noise in the workplace (radios played by other workers, conversations, noise from heating and air conditioning systems) or from the callers' locations may cause workers to turn up the headset volume, resulting in sudden increase in noise levels transmitted into their ears. Some communication systems may experience feedback or interference that could cause spikes or squeals from the headset. Some workers complain of fluctuations in noise levels in the headset or having little control over headset volume.

The NIOSH recommended exposure limit (REL) for occupational noise exposures is 85 decibels, A-weighted, as an 8-hour time-weighted average (85 dBA as an 8-hr TWA). Exposures at or above this level are considered hazardous.

NIOSH Health Hazard Evaluations

NIOSH [1997, 2007] has conducted several Health Hazard Evaluations (HHE) on workers who wear headsets for most of the workday, including Federal

Aviation Administration air traffic control specialists, emergency call center operators, and police station dispatchers. Figure 1 shows the typical work environment of a 911 call dispatch center. NIOSH has also conducted evaluations at several locations where medical transcriptionists work and at one fire department where emergency dispatchers work [2005, 2008]. Researchers interviewed workers, measured workers' noise exposures, conducted area noise measurements, and measured sound levels from headsets using an artificial head fixture.

With the medical transcriptionists, the sound levels of the transcription recordings often varied even within a single dictation, forcing the transcriptionists to manually adjust the volume higher or lower. In some instances, the transcriptionists adjusted the volume to a higher or maximum setting to hear a low or quiet dictation, then the dictation levels or background noise spiked suddenly and was transmitted into their ears at those maximum levels. Researchers found that sound levels and high-frequency tones played at maximum volume resulted in equivalent sound levels under the headsets that were 4–18 dBA higher than the NIOSH recommended limit of 85 dBA. Thirteen of 21 transcriptionists (62%) interviewed reported having problems with



Figure 1. New York Police Department 911 dispatch center with an open floor plan and crowded work environment

the fluctuation in sound levels from the transcription communication equipment and headsets [NIOSH 2005].

As for the 911 Fire Department dispatchers, background noise in the work area did not exceed the NIOSH REL (The median value of overall full-shift noise levels was 60 dBA). However, noise from loud alarms, visitors, and other distractions did cause the dispatchers to increase the volume on their headsets to mask the noisy environment. Although an examination of actual 911 recordings played through the headsets produced peak levels as high as 100 dB SPL at maximum volume, a review of the dispatchers' audiograms showed no evidence of noise-induced hearing loss. However, repeated and prolonged exposure to such levels can cause hearing loss and ringing in the ear [NIOSH 2008].

Laboratory research on the communication headsets used in the HHEs showed that if the volume controls of the headset and associated communication equipment were placed in the middle position or lower, the noise exposures through the headsets would be at a safe level for an 8-hour workshift [NIOSH 1997, 2005, 2007, 2008]. Figure 2 shows the laboratory testing of the various communication headsets and equipment using an acoustic head fixture.

Overall, the NIOSH evaluations did not reveal hearing loss problems among call center operators and dispatchers that can be directly attributed to noise exposures from their headsets or the surrounding environment. However, most workers interviewed reported various symptoms often associated with prolonged exposure to high noise levels. Symptoms included ringing in their ears, headaches, irritability, increased tension, and fatigue.

Other Studies

Research by the United Kingdom's Health and Safety Executive examined noise exposures of 150 call center employees. Background noise levels were measured to be 62 ± 2 dBA. Individual noise levels generated by the headsets did not exceed 84 dBA while the mean daily noise exposures ranged from 68–77 dBA [Patel and Broughton 2002].

Researchers in Australia have examined 123 incidents of acoustic shock among 103 call center operators. Acoustic shock is described as a sudden and unexpected increase in noise levels transmitted through the headsets into the operator ears. Operators described being shocked by the incidents and experienced a range of symptoms including pain in the ear (81%), tinnitus (ringing in the ears) (50%), vestibular (balance) disturbance (48%) and hyperacusis (sensitivity to noise) (38%). Although hearing loss was not a commonly reported symptom (18%), hearing tests showed atypical hearing loss patterns [Westcott 2006].

A survey of 1,183 call center operators in Sweden found unsatisfactory conditions at many workstations, including high noise levels. Seventy-four percent of the operators reported dissatisfaction with their work environments and the background noise levels. The highest sound level known to not disturb speech comprehension, 55 dBA, was exceeded at 72% of the workstations studied. The most common noise sources reported were other operators' voices and the ventilation system [Gavhed and Toomingas 2007].

Recommendations

NIOSH recommends that workers and employers at call centers take the following steps to protect against hearing damage and other adverse health effects:

Workers

- Notify your supervisor and take protective action if you experience tinnitus (ringing in the ears), a dulled sense of hearing, or a fullness in the ears after a workshift or exposure to noise (that was not present before the exposure or workshift). This indicates an overexposure that, if repeated, will likely cause permanent effects.
- Do not set the volume control above the middle point. The lower the better.
- Ask to try different headsets with improved protection or noise-cancelling features.
- Clean and maintain your headset periodically. Replace them when you notice damage or decreased performance.
- Take advantage of breaks (in quiet areas) whenever possible.

- Communicate with your supervisor when noise levels are high and ask co-workers to use low volume on sound-generating devices.

Employers

- Consider supplying communication systems with noise-limiting features.
- Install noise controls to reduce background noise levels in the work environment, such as barriers between workstations or sound-absorbing materials on hard surfaces in the room [NIOSH 2008].
- Provide workers with a variety of communication headsets that offer adjustable volume controls, noise-limiting or cancelling features, and improved comfort and protection from ambient noise.
- Establish a regular training program and educate workers about the proper use of headsets, communication equipment, and maintaining a quiet workplace environment.
- Evaluate workplace exposure for noise levels above the NIOSH REL of 85 dBA and establish a hearing conservation program for exposed workers, including yearly hearing tests. The NIOSH Criteria Document on Occupational Noise Exposure (<http://www.cdc.gov/niosh/docs/98-126/>) provides useful information about implementing a program to prevent hearing loss. In addition, the basic elements of a hearing conservation program must meet the requirements of the Occupational Safety and Health Administration (OSHA) hearing conservation amendment [29 CFR 1910.95]. Specific guidelines on implementing effective hearing conservation programs can be found at <http://www.osha.gov/dts/osta/otm/noise/hcp/index.html>

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References

BLS [2009] Occupational outlook handbook, 2010–2011. Washington, DC: Bureau of Labor Statistics [<http://www.bls.gov/oco/ocos280.htm>].

CFR. Code of Federal regulations. Washington, DC: U.S. Government Printing Office, Office of the Federal Register.

Gavhed D, Toomingas A [2007]. Observed physical working conditions in a sample of call centres in Sweden and their relations to directives, recommendations and operators' comfort and symptoms. *Int J Ind Ergonomics* 37:790–800.

* Code of Federal Regulations. See CFR in References

† Formerly with NIOSH References



Figure 2. Laboratory testing using the KEMAR acoustic head fixture

NIOSH [1997]. NIOSH Health Hazard Evaluation Report, Federal Aviation Administration, Bradley Airfield Windsor Locks, CT. By Tubbs R, Franks J. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. NIOSH HETA Report No. 96–0814–2663 [<http://www.cdc.gov/niosh/hhe/reports/pdfs/1996-0184-2663.pdf>].

NIOSH [1998]. Occupational noise exposure. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health, DHHS (NIOSH) Publication No. 98–126 [<http://www.cdc.gov/niosh/docs/98-126/>].

NIOSH [2005]. NIOSH Health Hazard Evaluation Report, Kaiser Permanente, California. By Tubbs R, Kardous C. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. NIOSH HETA Report Nos. 2003–0273, 2003–0280, 2003–0287–2974 [<http://www.cdc.gov/niosh/hhe/reports/pdfs/2003-0273-2974.pdf>].

NIOSH [2007]. NIOSH Health hazard evaluation report, New York City Police Department, Police Communications Section, New York. By Driscoll R, Tubbs R, Habes D. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. NIOSH HETA Report No. 1997–0137–3026 [<http://www.cdc.gov/niosh/hhe/reports/pdfs/1997-0137-3026.pdf>].

NIOSH [2008]. Evaluation of potential noise hazards to mechanics and 911 dispatchers at a fire department, Anchorage, AK. By Achutan C, Kardous C. Cincinnati, OH: U.S. Department of Health and Human Services, Centers for

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Disease Control and Prevention, National Institute for Occupational Safety and Health. NIOSH HETA Report No. 2007-0235-3064 [http://www.cdc.gov/niosh/hhe/reports/pdfs/2007-0235-3064.pdf].

Patel J, Broughton K [2002]. Assessment of the Noise Exposures of Call Centre Operators. *Ann Occup Hyg* 46:653-661.
Westcott M [2006]. Acoustic shock injury (ASI). *Acta Otolaryngologica* 126:54-68

For More Information

For more information about hearing loss prevention or stress, visit the NIOSH Web site:

<http://www.cdc.gov/niosh/topics/noise/>
<http://www.cdc.gov/niosh/topics/stress/>

To obtain information about other occupational safety and health topics, contact NIOSH at

Telephone: 1-800-CDC-INFO (1-800-232-4636)
TTY: 1-888-232-6348 ■ E-mail: cdcinfo@cdc.gov
or visit the NIOSH Web site at www.cdc.gov/niosh

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