

Deafening Silence

Hearing Loss in the Fire Industry



How it Happens

Firefighters are exposed to numerous elements on the job that pose risks to their health and safety. Hearing loss, however, presents a unique danger in that its effects are cumulative and largely silent. Because the everyday tasks of a firefighter involve a variety of high-noise equipment, it is important to understand how continued unprotected exposure to that noise could result in hearing damage.

“Firefighters use a lot of specialized tools and equipment, such as sirens and air horns on the apparatus used to respond to calls,” says Fire Chief Sam DiGiovanna with the Verdugo Fire Academy and Training Center in Glendale, California. “We use chainsaws to ventilate roofs, rotary saws to cut metal and force entry, power fans to remove smoke from buildings, and hydraulic power plants to run hydraulic tools for vehicle extrication purposes. All are extremely dangerous and harm our hearing.”

A recent Korean study published in the *Journal of Exposure Science & Environmental Epidemiology* described the importance of hearing on a fire scene. Firefighters need to be able to hear victims’ cries for help, SCBA warnings, or the noise associated with shifting fire patterns.¹ The study reviewed 912 male firefighters in whom researchers found a significantly lower hearing threshold (the level at which sound is detectable at a particular frequency) than the non-industrial-noise exposed individuals. The study utilized “a standard pure-tone audiometric testing [that] was conducted at frequencies at 0.5 kHz, 1 kHz, 2 kHz, 3 kHz, 4 kHz, and 6 kHz for both ears” and evaluated males ranging 24-59 years old. These results were compared with data from audiometric testing conducted with 2,492 non-industrial-noise exposed males and females, finding that 16.3% of firefighters had hearing loss vs. 3.4% in the group of individuals without noise exposure.¹

An American study published in *Journal of Occupational & Environmental Medicine* found that more than 40% of the 425 firefighters studied had “signs of noise-induced hearing loss (NIHL) as a result of their line of work.”² This conclusion is further validated in a study published in the *Journal of Audiology & Otology* that measured the noise exposure levels of 141 firefighters. Researchers measured siren sound levels inside and outside of an ambulance, the first fire truck, and the second fire truck. The results were 99.3 dB, 108.9 dB, 92.3 dB, 108.3 dB, 78.8 dB, and 99.0 dB respectively. In the same study, 90% of firefighters surveyed believed hearing was essential to their job.³

NIOSH conducted studies in New York State, New York City, Memphis, Pittsburgh, and Hamilton, Ohio to measure noise levels. Although the noise level often exceeded 120 dB instantaneously, the environment did not exceed 90 dB for 8 hours, or 85 dB, as OSHA and NIOSH dictate, respectively.³



Hearing Damage

Elevated noise levels in the fire service are well documented, as is the potential for hearing damage or loss. The National Emergency Management Agency compared hearing loss in 750 firefighters with age-matched general population to find a high correlation with siren noise and hearing loss in firefighters. A separate 1991 NIOSH study conducted in Texas found that 51% of firefighter (333-person sample size) reported showing hearing loss in on or both ears.³

NHL can happen because of a single noise incident or through prolonged exposure. Although normal conversation has an average decibel rating of 60dB, a busy street is about 85 dB, sirens are nearly 120 dB, and firearms measure 150 dB.⁴

Hearing damage occurs most frequently in the tiny hair cells—or cilia—of the inner ear. Sound travels from the outer ear, through the ear canal, and to the eardrum. The eardrum vibrates and sends sound waves to bones in the middle ear, which then turns sound vibrations to fluid vibrations in the cochlea of the inner ear. This fluid ripples, and the wave moves across the basilar membrane, which is covered with hair cells.⁴ It is these hair cells that get damaged or die and can never grow back, resulting in hearing loss.

Hearing loss or damage usually occurs gradually over time. Individuals may notice that normal sounds seem muffled or distorted, or they could have difficulty understanding someone speaking to them.⁴ Hearing damage is often further exacerbated by the normal aging process, and over time it can become so severe that a medical device such as a hearing aid is required.

Another serious concern reported by some firefighters is tinnitus, or a constant ringing in the ears. One firefighter quotes Randy L. Tubbs, Ph.D., retired from the Hazard Evaluation and Technical Assistance Program at NIOSH. Tubbs explains his experience with tinnitus as “a screaming inside our heads that never stops.”⁵

Retired Battalion Chief Sean W. Stumbaugh describes the difficulty of hearing conversations in noisy rooms and living with the constant ringing in his ears from tinnitus. “I was diagnosed with significant hearing loss in my left ear due to industrial noise exposure. The hearing loss is bad enough, but the worst part is the tinnitus. This constant noise in my head is loud, and it drowns out other sounds. There is no place that I can go where it is quiet; I hear this noise all the time,” says Stumbaugh.⁶ These consequences of life in the fire service aren’t ones all firefighters are willing to live with.



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Following Suit

Some firefighters are not aware of the potential long-term damage from prolonged noise exposure, but others are fighting back. In 2015, nearly 1,500 FDNY firefighters filed suit against a siren manufacturer due to a failure to install redirect devices that would have mitigated the near 120 dB noise levels.⁷ OSHA's safe limit of exposure is 90 dB, and the fire sirens on fire trucks can reach 120 dB, with the potential for hearing loss to occur at 85 dB.⁸ And hearing experts claim individuals shouldn't be exposed to sound levels of 120 dB for more than a few seconds at a time. The siren manufacturer countered that any change in design would have compromised the firefighters' safety and make them less effective.⁹

The City of Seattle settled for \$495,000 after a veteran firefighter was exposed to sirens standing near the firehouse doors. The fire captain at the time violated station policy by activating the siren with the veteran firefighter just four feet from the truck's bumper, but it still resulted in a lawsuit when the firefighter felt "knifelike pain in his ears."¹⁰

Hear-it.org cites a mere 34% of firefighters reported use of hearing protection devices in the fire service.² It's clear that decibel levels associated with the fire industry are difficult to control, and the potential for hearing damage is extreme. The only path to a safer work environment for firefighters lies with prevention and protection.

Prevention & Protection

With increasing potential for exposure, firefighters need the right equipment to protect against the possibility of hearing loss. Firecom's products are designed to protect against occupational noise exposure. The UHW505 radio transmit under-helmet DECT7 wireless headset boasts a 20 NRR (noise reduction rating) amongst many other features, including a 24-hour battery; rugged, weatherproof design; and direct-wire two-way radio integration. The UHW507 radio transmit under-helmet DECT7 Bluetooth wireless headset also provides 20 NRR in addition to wireless Bluetooth connectivity. Both headsets feature Listen-Through microphones for situational awareness.

It's important to equip firefighters with dependable brands that are rugged and durable. One of the key components to consider in hearing loss prevention is the constant noise exposure firefighters endure. With high call volumes and repeated runs throughout the day, equipment must not only be durable but worn diligently. FDNY alone ran 1,727,080 calls in 2015, and Chicago was not far behind with 771,648 calls.¹¹ High call volumes mean high risk for repeated exposure to damaging decibel levels that may cause irreversible harm to the firefighter.

"Creating innovative equipment that keeps firefighters protected on the job and promoting a culture of safety is paramount at Firecom."

- Tim O'Brien, Director of Sales

About Firecom

Since 1989, Firecom has led the industry in providing advanced communications technology to the men and women on the front lines of first response. Through innovation and outstanding customer service, Firecom has built a name for itself in fire and rescue, working closely with departments to develop the products they need to do their jobs.

You don't get to be the most trusted name in quality apparatus communication systems without listening. At Firecom, we've been hearing our customers loud and clear since 1989. Using customer feedback, we advance technology and innovation to set new standards for rugged, mission-critical wireless systems that improve first responder safety and effectiveness.

We know what matters to you -- being able to reach an expert when you pick up the phone, quick turnaround on repairs, and getting the support you need when you need it.

Communication isn't just what we do; it's who we are. Tell us what you need. We're all ears.



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