Hearing Exposures

The Next Three Seconds Protects Your Life, Your Loved Ones, Your Livelihood®

The N3L3 philosophy:

our approach to protecting workers from fatal and life-changing events.

Eastern Alliance is here to help. To learn more about Eastern's N3L3 program and access other safety resources, sign in and visit the Safety Tools on www.easternalliance.com, or contact your Risk Management Consultant for assistance

1.855.533.3444

The Centers for Disease Control estimate that twenty-two million workers are exposed to potentially damaging noise at work each year **and over 50% of them are not wearing hearing protection**[1]. This handout will explain how hearing works and the benefits of protecting workers against hazardous noise.

Health Effects

Loud noise can create physical and psychological stress, reduce productivity, interfere with communication, concentration, and contribute to workplace accidents and injuries by making it difficult to hear warning signals. The effects of noise induced hearing loss can be profound, limiting your ability to hear high frequency sounds, understand speech, and seriously impairing your ability to communicate. Noise exposure can also cause irreversible ringing in the ears, known as Tinnitus.

How it Affects the Ear

When sound waves enter the outer ear, the vibrations impact the ear drum and are transmitted to the middle and inner ear. In the middle ear, three small bones called the malleus (or hammer), the incus (or anvil), and the stapes (or stirrup) amplify and transmit the vibrations generated by the sound to the inner ear. The inner ear contains a snail-like structure called the cochlea which is filled with fluid and lined with cells with very fine hairs.

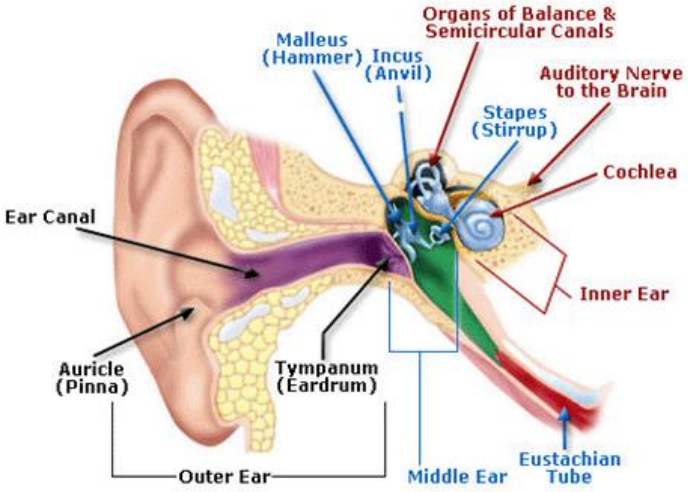

Image Source: https://www.osha.gov/otm/section-3-health-hazards/chapter-5#auditory

These microscopic hairs move with the vibrations and convert the sound waves into nerve impulses–the result is the sound we hear. They react much like tall grass moving in wave like patterns in a field on a windy day. These hairs can be damaged due to high noise exposures and over time do not fully recover from repeated injury. Equate this to grass growing under a child's swing set – use the swing a little and let the grass recover for a few days, it is not permanently affected; use it a lot every day and grass never recovers. Please remember, Hearing loss is very serious and just like the grass under the swing set that is used a lot, exposure to loud noise can irreversibly destroy these hair cells in your cochlea. Over time, more and more hair cells may become damaged and cannot recover which may lead to a permanent hearing loss. Once hearing loss occurs it is NOT REVERSIBLE.

fresh outlooks. eastern ALLIANCE better outcomes.®

[1] https://www.cdc.gov/niosh/updates/upd-10-07-21.html

Updated October 2023

Hearing Exposures

The Next Three Seconds Protects Your Life, Your Loved Ones, Your Livelihood®

The N3L3 philosophy:

our approach to protecting workers from fatal and life-changing events.

Eastern Alliance is here to help. To learn more about Eastern's N3L3 program and access other safety resources, sign in and visit the Safety Tools on www.easternalliance.com, or contact your Risk Management Consultant for assistance

1.855.533.3444

Noise Can Hurt More Than Your Ears

In addition to damaged hearing, loud noise can cause other physical stress as well as mental stress. Often the short-term effects of such stress go unnoticed or are blamed on other things. These symptoms can range from feeling tired and/or irritable to having temporarily high blood pressure or muffled hearing. Over time, with repeated exposure to loud noise, more lasting conditions can develop, such as hearing loss (a permanent condition), and it is unknown if these exposures may also lead to more lasting cardiovascular conditions, such as high blood pressure.

So How Loud is Too Loud?

OSHA sets legal limits on noise exposure in the workplace. These limits are based on a worker's time weighted average over an 8-hour day. With noise, OSHA's permissible exposure limit (PEL) is 90 dBA for all workers for an 8-hour day. The OSHA standard uses a 5 dBA exchange rate. This means that when the noise level is increased by 5 dBA, the amount of time a person can be exposed to a certain noise level to receive the same dose is cut in half.

Conversely, The National Institute for Occupational Safety and Health (NIOSH) has recommended that all worker exposures to noise should be controlled below a level equivalent to 85 dBA for eight hours to minimize occupational noise induced hearing loss. Similar to the OSHA standard, NIOSH recommends using a 3dB exchange rate; which they believe is more firmly supported by scientific evidence.

To reduce the possibility of hearing loss, a combination of feasible workplace controls, ongoing monitoring of changes in production, process and equipment combined with a hearing conservation program should be utilized together to protect the worker. The effect will be a reduction in workplace noise through engineering and administrative controls plus, the employees will have knowledge regarding the limitations and proper use of hearing protection devices to conserve their hearing and avoid the effects of permanent hearing loss.

Average Sound Exposure Levels Needed to Reach the Maximum Allowable Daily Dose of 100% According to NIOSH and OSHA

Time to reach 100% noise dose	Exposure level per NIOSH REL	Exposure level per OSHA PEL
8 hours	85 dBA	90 dBA
4 hours	88 dBA	95 dBA
2 hours	91 dBA	100 dBA
1 hour	94 dBA	105 dBA
30 minutes	97 dBA	110 dBA
15 minutes	100 dBA	115 dBA

Note: Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level.

fresh outlooks. eastern ALLIANCE better outcomes.®

Updated October 2023

Hearing Exposures

The Next Three Seconds Protects Your Life, Your Loved Ones, Your Livelihood®

The N3L3 philosophy:

our approach to protecting workers from fatal and life-changing events.

Eastern Alliance is here to help. To learn more about Eastern's N3L3 program and access other safety resources, sign in and visit the Safety Tools on www.easternalliance.com, or contact your Risk Management Consultant for assistance

1.855.533.3444

Controls to Reduce Noise Exposure

- Use noise curtains.
- Use barriers to reduce noise levels.
- Sound room enclosures/isolation.
- Job rotation.
- Modified work hours.
- Properly wear appropriately rated hearing protectors.

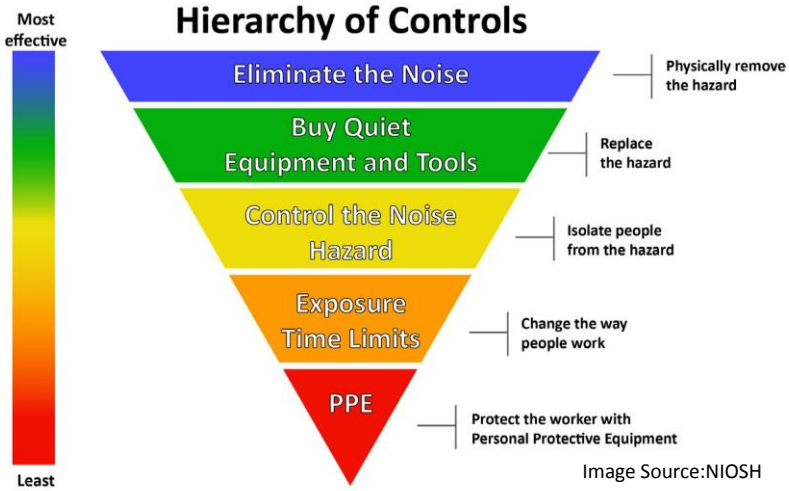

Image Source:NIOSH
https://www.cdc.gove/niosh/topics/hierarchy/default.html

The use of this material does not imply endorsement by CDC ATSDR, HHS, or the US Government.

Note: Headphones, earbuds and bone conduction headphones are not hearing protectors and can cause hearing loss, distractions, and lead to other potential fatal or life changing injuries.

Noise Levels for Common Tools

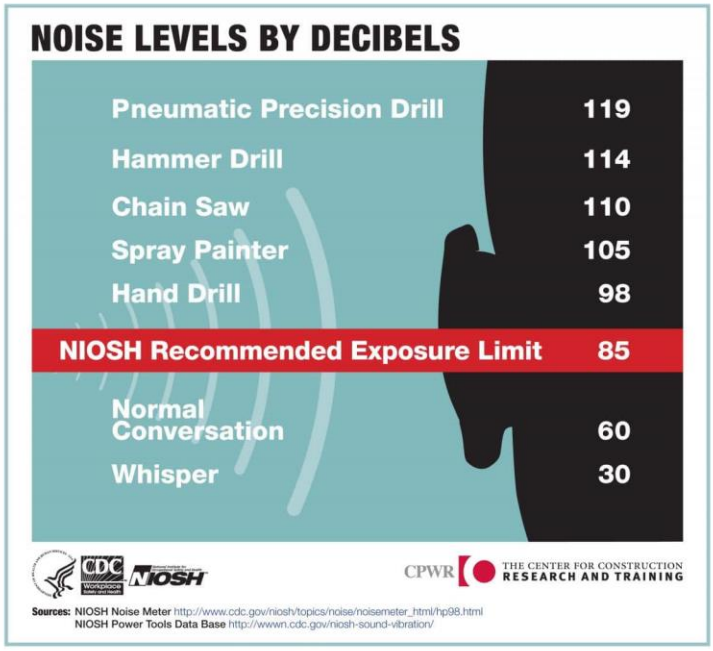

Image Source: CPWR.com

fresh outlooks. eastern ALLIANCE better outcomes.®

Updated October 2023