2021 OVERVIEW SERIES: HEARING CONSERVATION
FACT SHEET

LENGTH: 17 MINUTES

PROGRAM SYNOPSIS:
Our ability to hear is dependent on the delicate structures of the inner ear. Sound waves cause these tiny structures to vibrate, sending messages to our brain, which interprets these signals into the sounds we hear. Exposure to excessive levels of noise can damage these delicate structures and cause permanent hearing loss. To help prevent ***work-related*** hearing loss, OSHA has enacted regulations for general industry and construction workers that regulate occupational noise exposure.

PROGRAM OBJECTIVES:
After watching the program, the participant should be able to explain the following:
- How noise can damage one's hearing;
- Industry permissible exposure limits set by OSHA;
- How to choose the correct PPE;
- How to use and properly care for earplugs and earmuffs;
- The testing and monitoring process of checking hearing levels.

INSTRUCTIONAL CONTENT:

HEARING CONSERVATION: OVERVIEW
- Our ability to hear is dependent on the delicate structures of the inner ear.
- Sound waves cause these tiny structures to vibrate, sending messages to our brain, which interprets these signals into the sounds we hear.
- Exposure to excessive levels of noise can damage these delicate structures and cause permanent hearing loss.
- To help prevent ***work-related*** hearing loss, the Occupational Safety and Health Administration, OSHA, enacted regulations for general industry and construction workers that regulate occupational noise exposure.
- These regulations define "permissible noise exposure" based on the duration of exposure AND the amplitude or "intensity" of the noise, measured in decibels.
- Employees must be protected from noise exposures that exceed these permissible levels. To do this, employers must first use administrative or engineering controls to reduce workplace noise levels, when feasible.
- Then, if necessary, employees will be required to use personal protective equipment or "hearing protection" to reduce noise exposure to permissible levels.
- Personal protective equipment that is designed to reduce noise exposure includes canal caps, earplugs and earmuffs. The amount of noise reduction each device provides is measured in decibels and is referred to as the "Noise Reduction Rating."
- Hearing protection devices must be installed correctly and fit properly to achieve their designed level of noise reduction.
- General industry employees who are exposed to noise levels of 85 decibels averaged over an 8-hour work period will be enrolled into a "Hearing Conservation Program."
- Employees enrolled in a hearing conservation program will receive an initial hearing test or "audiometric test" to establish their hearing baseline. The results of a hearing test are referred to as an "audiogram."
- Employees will be re-tested annually to determine if any hearing loss has occurred. If hearing loss of 10 decibels or more is documented, as compared to the employee's baseline audiogram, then additional measures must be taken to prevent the employee from experiencing further hearing loss.

- Hearing loss can also occur away from work. Hearing protection should be used anytime you may be exposed to high levels of noise, both on and off the job.

HEARING CONSERVATION: HOW NOISE CAN DAMAGE OUR HEARING

- For many of us, our lives revolve around the sounds we hear. These sounds travel in waves and are channeled through our ear canal and into the inner ear where they strike the eardrum.
- The eardrum vibrates against three delicate bones which carry these sound vibrations to a fluid-filled structure called the cochlea. These vibrations cause waves within the cochlea's fluid to flow over tiny "hair-like" nerve endings called cilia.
- This movement of the cilia sends electrical pulses to the brain through the auditory nerve. Our brain then interprets these signals into the sounds we hear.
- When noise levels are excessive, the delicate components of the inner ear can be damaged by the amplitude of the sound waves and vibrations that flow through it.
- Specifically, the tiny "hair-like" cilia can be damaged or destroyed, preventing the efficient transmission of electrical signals to the brain, leading to permanent hearing loss.
- Some symptoms of hearing loss include finding it hard to understand what others are saying in a group setting or when background noise is present, having trouble hearing voices in the higher frequency ranges, such as those of women and children and increasing the volume of the television to a level uncomfortable for others.
- People suffering from hearing loss often feel isolated and struggle to participate in conversations. They may become withdrawn or depressed.
- Hearing loss caused by noise exposure is not curable and can have a negative impact of the quality of life.
- If you suspect that you may have hearing loss, talk to your supervisor about your concerns and redouble your hearing conservation efforts to prevent further damage.

HEARING CONSERVATION: PERMISSIBLE EXPOSURE LIMITS

- Employee exposure to noise is regulated by the Occupational Safety and Health Administration, OSHA, as part of their standards for general industry and construction, each titled "Occupational Noise Exposure."
- As part of these regulations, OSHA provides a table titled "Permissible Noise Exposures." This table uses hours of duration per day and decibels to describe the maximum allowable noise exposure levels.
- For example, the maximum duration of exposure to noise levels of 90 decibels is 8-hours, the maximum duration of exposure to noise levels of 100 decibels is 2-hours and the maximum duration of exposure to noise levels of 115 decibels is 15 minutes. In addition, exposure to impulsive or impact noise should not exceed 140 decibels.
- Employers must prevent employees from exposure to noise levels in excess of these permissible exposure limits.
- Administrative and engineering controls should be implemented to reduce noise exposure to permissible levels, when feasible.
- For example, restricting access to certain work areas is an example of administrative controls and installing sound barriers around loud equipment is an example of engineering controls.
- When sound levels cannot be sufficiently reduced using these methods, employees will be required to use personal protective equipment, commonly called "hearing protection," to reduce noise exposure to permissible levels.
- Here are some examples of common sound levels:
  Normal conversation: 60 decibels
  The sound of heavy traffic: 80 decibels
  Welding: 90 decibels
  A circular saw: 100 decibels
  A jackhammer: 125 decibels

A jet engine between 120 to 140 decibels
A shotgun blast: 160 decibels

- Here's a good rule of thumb: if you have to raise your voice to be heard from a distance of three feet, then you should be wearing hearing protection.

HEARING CONSERVATION: SELECTION OF PERSONAL PROTECTIVE EQUIPMENT

- Personal protective equipment designed to reduce noise exposure is generally referred to as "hearing protection."
- Hearing protection is available in many forms including canal caps, earplugs and earmuffs.
- Each different type and style of hearing protection has a "Noise Reduction Rating" which indicates, in decibels, the noise reduction provided with proper use.
- The employer must select and provide, at no cost to the employee, hearing protection with a noise reduction rating sufficient to reduce noise exposure to permissible levels.
- Employees should understand the advantages and disadvantages of each type of hearing protection.
- Canal caps are designed to cover the entrance to the ear canal and are held in place by a flexible band. The average noise reduction of canal caps is around 18 decibels.
- Some advantages of canal caps are they do <u>not</u> have to be inserted into the ear canal. They are easy to take on and off. Proper installation is easily achieved.
- One disadvantage of canal caps is they typically provide less noise reduction than other forms of hearing protection.
- Earplugs are made of flexible material and are designed to be inserted into the ear canal. The average noise reduction of earplugs is around 31 decibels.
- Some advantages of earplugs are they are available in a wide variety of materials and sizes. They can be disposable or renewable. They provide high levels of noise reduction when properly installed.
- Some disadvantages of earplugs are the need to have clean hands before installation, some people find them to be uncomfortable or disorienting and improper installation will result in less protection.
- Earmuffs consist of two padded cups and are typically connected by a headband.
- The average noise reduction of earmuffs is around 28 decibels. Some advantages of earmuffs are one size fits all. They are easy to install properly. They can be shared between employees after proper cleaning. It is easy to visually verify their use.
- Some disadvantages of earmuffs are some people find the tight fit uncomfortable. They may cause sweating in hot environments. They may interfere with the use of other protective equipment.
- When earplugs are combined with earmuffs, known as "dual hearing protection," the amount of total noise reduction is increased by around 5 decibels as compared to wearing earplugs alone.
- When selecting hearing protection, it's important to choose a type and style that fits comfortably, provides adequate noise reduction and is compatible with other required protective equipment.

HEARING CONSERVATION: THE PROPER USE AND CARE OF EARPLUGS

- Hearing protection devices will not provide their rated noise reduction unless they are used and installed properly.
- To properly install foam, disposable earplugs, first, make sure your hands are clean. Then, compress the earplug in your fingers and roll it into a thin, elongated shape.
- Next, reach over your head with your free hand and gently pull the top of your ear up and slightly outwards.
- This motion helps to align and open the ear canal, allowing the earplug to be inserted more easily. The compressed earplug should then be inserted fully into the ear canal with only a small amount protruding.
- You must hold the earplug in place while it slowly expands to fill the ear canal. Failing to fully insert the earplug into the ear canal or failing to hold it in place while it expands will result in an improper fit and a reduction in its effectiveness.

- After the earplug fully expands, repeat the process on the other ear.
- Reusable earplugs come in many styles and typically have a tapered shape with flanges, ridges or spiral protrusions. This type of earplug does not require compression.
- To install this type of earplug, grip the earplug at its stem and, after opening the ear canal by pulling up on the top of your ear, insert the earplug fully into the ear canal with a slight twisting motion.
- Again, for maximum noise reduction the earplug must be fully inserted into the ear canal. Then, repeat the process on the other ear.
- Reusable earplugs should be cleaned frequently with soap and warm water. Reusable earplugs should be stored in a clean, dry container when not in use.
- All earplugs should be inspected before use and discarded if they are hard, deformed, brittle, torn or excessively soiled.
- One way to test the effectiveness of earplugs is to cup your hands over your ears in a loud environment and then remove them. You should not be able to perceive a difference in the sound level.
- Also, properly installed earplugs should not be obviously visible from the front. If the earplugs can be seen sticking out of the ears, then they are <u>not</u> installed properly.
- Be sure to ask for help if you are unsure about the fit, comfort or proper installation of earplugs.

HEARING CONSERVATION: THE PROPER USE AND CARE OF EARMUFFS

- Earmuffs are a popular form of hearing protection and are available in different styles and configurations.
- In order for earmuffs to provide their rated noise reduction, there must be an uninterrupted seal completely around each ear.
- Users of earmuffs must be aware that some items can interfere with the proper seal of earmuffs.
- These items can include hairnets, hoodies and other head coverings, hardhats, welding shields, face shields and respirators and safety goggles and safety glasses.
- If any of these items are placed under the padding of the earmuffs, or they interfere with a proper fit or seal, then the effective noise reduction of the earmuff will be reduced.
- This type of impact can be minimized by selecting earmuffs designed to work properly with a specific type of PPE, such as hardhats or by selecting a back-banded earmuff rather than an over-the-head style.
- If earmuffs must be worn with safety glasses, selecting glasses with very thin temple bars will minimize the seal disruption, but be aware that the earmuff's effectiveness may still be reduced.
- Various types of specialty earmuffs are available and may be selected to provide a proper seal when used in conjunction with specific equipment or PPE.
- Earmuffs should be inspected before use and repaired or replaced if any of the following are discovered cracked cups, hardened, flattened or deformed cushions, leaking liquid-filled cushions or loose securing bands.
- Earmuffs should be cleaned regularly according to the manufacturer's instructions and stored in a clean, dry place when not in use.
- Seek assistance if you have any questions or concerns about the selection, use or fit of earmuffs.

HEARING CONSERVATION: AUDIOMETRIC TESTING AND MONITORING

- The Occupational Safety and Health Administration, OSHA, requires that an employer in general industry implement a hearing conservation program when employee noise exposure is greater than or equal to 85 decibels averaged over an 8-hour period.
- This level of noise is referred to as the "action level."
- One important part of a Hearing Conservation Program is workplace noise monitoring.
- Measuring the noise levels to which employees are exposed allows for the proper selection of hearing protection devices and also identifies those employees who should be enrolled into the Hearing Conservation Program.
- When an employee's exposure to noise reaches the "action level," that employee will be enrolled into the hearing conservation program.

- Employees who are enrolled into the hearing conservation program will receive an initial hearing test or "audiometric test" to establish their hearing baseline. The results of a hearing test are referred to as an "audiogram."
- Employees will be re-tested annually to determine if any hearing loss has occurred as compared to their baseline audiogram.
- If hearing loss of 10 decibels or more is documented, as compared to the employee's baseline audiogram, a "standard threshold shift" has occurred and additional measures must be taken to prevent the employee from experiencing further hearing loss.
- These measures may include retraining the employee in the proper use of hearing protection, creating administrative controls to further limit the employee's duration of exposure or reassigning the employee to less noisy work areas.
- By incorporating noise monitoring and audiometric testing, the hearing conservation program identifies exposures to harmful noise and implements measures to prevent hearing loss.

ANSWERS TO THE REVIEW QUIZ

1. b
2. a
3. b
4. b
5. b
6. a
7. a
8. b
9. b

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REVIEW QUIZ

Name_____Date_____

The following questions are provided to determine how well you understand the information presented in this program.

1. General industry employees who are exposed to noise levels of _____ averaged over an 8-hour work period will be enrolled into a Hearing Conservation Program.
a. 90 decibels
b. 85 decibels
c. 80 decibels

2. The delicate components of the inner ear can be damaged by the amplitude of the sound waves and vibrations that flow through it.
a. True
b. False

3. Hearing loss caused by noise exposure is easily curable and has minimal impact of the quality of life.
a. True
b. False

4. When sound levels cannot be reduced to permissible levels, employees will be required to _____.
a. Use hand signals to communicate
b. Use hearing protection
c. Change work locations

5. Hearing protection devices have a(n) _____which indicates, in decibels, the noise reduction provided with proper use.
a. Audiometric limit
b. Noise reduction rating
c. Impact indicator

6. For earplugs to be effective they must be _____.
a. Fully inserted into the ear canal
b. The correct color
c. Replaced every two hours

7. For earmuffs to provide their rated noise reduction, there must be an uninterrupted seal completely around each ear.
a. True
b. False

8. The results of a hearing test are referred to as an _____.
a. Audiophile
b. Audiogram
c. Audio-spectrum

9. Hearing loss of 10 decibels is referred to as _____.
a. Minimal audio loss
b. Standard threshold shift
c. Noise reduction rating