Safety Training Topics

March 2024

Injury Prevention – Back Injury

Prevention – Ears Injury

Protection – Eyes Injury

Protection – Hands

SAFETY TRAINING TOPIC

Injury Prevention – Back

THE BASICS OF THE BACK

The back is essentially a collection of small bones stacked one on top of the other. These bones stay in place because of connective tissues and muscle contraction. Not all of the protective muscles are in the back itself, though.

Computer models have shown the spine, its connective tissues, and the back muscles working together cannot support lifting the kinds of loads electricians lift during the course of their work. The force that prevents the spine from snapping is intra-abdominal pressure, which comes from the abdominal muscles.

Of all the abdominal muscles, it is the *transversus ahdominus* that makes the most contribution to preventing back injury. For this muscle to do that job, however, you must follow the traditional boot camp admonition to "suck in your gut." When lifting something heavy, you should contract this muscle. If this muscle is relaxed, the load typically shifts to the lower back muscles and overloads them.

Another muscle that keeps the spine safe is the *recti ahdominis*. This is the muscle that allows you to rotate your trunk. When doing heavy lifting, don't rotate your trunk; rotating reduces the contribution that the *recti ahdominus* makes to support your spine. The lower back usually has to make up for what the *recti ahdominus* can't do.

PROPER LIFTING

Assess the load. If it is too heavy or awkward to lift safely, ask for help to lift it. This may include using lifting equipment.

Assess the terrain. Don't try to lift a heavy object if you must do so on an unstable or slippery surface. The presence of gravel, water, oil, metal chips, saw dust, or other debris is a good indication that lifting is unsafe until the location is cleaned or you can move the object to a safe location for lifting.

Look for handholds. If there aren't any, consider using a lifting strap. ff

Lift the object by opposite corners, rather than opposite sides, whenever possible. This reduces the likelihood the load will tilt on you.

Always keep your back straight when lifting. Remember: stomach in, shoulders back. You should feel your abdominal muscles tighten.

To lift an object off the ground, squat down. Allow your legs to do the work. Position yourself so your knees are not past your toes, to avoid knee injury. Position your feet on either side of the load so you are straddling the load.

Under ideal conditions, a male electrician in good physical condition should be able to safely lift a box weighing half his lean body weight. Subtract twice the poundage of your body fat from the amount of your weight to dete1mine the maximum you should attempt to lift under ideal conditions. The average 30-year old male American has 25% body fat. *Example:* if you are 6 feet tall and weigh 170 pounds, you likely have 45 pounds of fat. Subtract 80 pounds from 170. You should safely be able to lift a 45 pound box from the ground to chest height under ideal conditions, but don't assume you always can. Keep in mind that lifting involves many variables and you may not be able to safely lift something even if it isn't very heavy. Pay attention to the lift.

Do not lift and twist. It is better to lift the object, set it down, rotate it, and lift it again rather than tap those *recti abdominus* muscles for rotation during the lift. They may not have the horsepower you need to protect your spine. If you must move the object during a lift, do so by pivoting on your feet and leaving your hips and back straight. This is a motion used in military drills and basketball- you may wish to practice it.

Start each lift slowly. If something doesn't feel right, stop. If lifting with a partner, tell the partner you can't do the lift, and then set the weight down. Re- assess the situation and get help if in doubt.

Lift as close to the body as possible.

Remember that you are being paid for your ability to apply electrical knowledge, not for how much you can lift. There is wisdom, not shame, in knowing your limits.

DEMONSTRATION

Have a crewmember lift the box with spine bent, stopping in mid-motion- have another crewmember help support this person's back during the demonstration. Have the other crewmembers take note of where the stress must go during the lift, looking along the spine.

Have a crewmember lift the box properly. Have crewmembers take note of where the stress is now. Point out that the body is essentially a spring between the load and the earth.

REVIEW AND DISCUSSION

- Can the spine and back muscles support heavy loads?
- Where does intra-abdominal pressure come from, and what does it do?
- What is the boot camp admonition you should remember when lifting?
- What should you do if you must rotate a load during a lift?
- Does it matter what you're standing on when you lilt? What does this mean?
- What if the object doesn't have handholds?
- If you calculate your maximum safe lift, is it always safe to lift that much?
- What should you do if something doesn't feel right in the lift?
- Where should the load be in relation to the body?
- What is it you are really being paid to do?

SAFETY TRAINING TOPIC

Injury Prevention – Ears

WHY THIS IS IMPORTANT

Hearing loss is a major preventable health problem.

Damaged hearing reduces your ability to communicate on the job, and it results in social and marital problems.

There is no sense in leaving yourself open to a personal loss.

FALSE ASSUMPTIONS

Many of us assume that wearing foam ear plugs when the sign tells us to "wear hearing protection" is all we need to do to protect our ears. This isn't true. Ear plugs are just one form of ear protection, and areas with signs requiring hearing protection are just one situation where yon should wear ear protection.

Many of us assume hearing protection and ear protection are the same. This isn't true. Ear protection is more inclusive than hearing protection, but ear protection equipment doesn't necessarily provide hearing protection and vice-versa.

Many of us assume hearing loss is a natural result of aging. This isn't particularly true. Hearing loss due to excessive noise is preventable.

Many of us assume we can always get a hearing aid, so hearing loss isn't important. This isn't true. Hearing aids do not provide the same quality of hearing that undamaged ears do.

Many of us assume that if we have passed a hearing test we don't need to worry about our hearing. This isn't true. Hearing tests don't catch damage until it has happened, and standard hearing tests are not comprehensive enough to catch all damage that does occur.

HEARING PROTECTION

Wear hearing protection whenever you must raise your voice to carry on a normal conversation.

Wear hearing protection whenever you are around machinery that could start without notice and alarm systems that are likely to go off.

You should wear hearing protection whenever the noise levels exceed OSHA limits on or off the job. Damage can occur even when you are having fun.

Wear hearing protection any time you operate a firearm.

Personal hearing protection includes rollable foam plugs, molded plugs, over the ear muffs, or other devices.

Do not wear ear plugs if yon are at risk for an arc blast. The concussion could drive those plugs into your ears and render you permanently deaf.

Environmental hearing protection includes noise shields, soundproofing, restricted access, and closed doors. If you find any of this hearing protection damaged or not functioning properly, report that to your foreman.

Noise isn't the only thing that can damage the inner ear.

Be careful when blowing your nose. In addition to damaging your inner ear, excess pressure can rupture your nasal membranes. There isn't much between them and your brain.

If you are congested, drink plenty of water. Also, take a decongestant to alleviate ear pressure. Because antihistamines have a hangover period, you should take them early enough that the medication's effective time ends two hours before you start work or operate a motor vehicle. For example, take a 4-hour antihistamine no less than 6 hours before you must be alert.

OUTSIDE EAR PROTECTION

Your outer ear does not have great blood flow, and is in an exposed location if your hair isn't growing over it. It is prone to both sunburn and frostbite. It's a prime location for the start of skin cancer, as well.

In summer, apply sunscreen to your ears and nose to prevent sunburn and to reduce the likelihood of skin cancer. Even if you are a person of color, sunscreen will help you in this regard.

A winter hardhat liner provides added cold weather protection for your outer ear.

You may need to supplement your winter liner with a cotton headband around your ears. Do not wear polyester or other synthetic fabrics.

Do not wear a winter knit cap unless you expand your suspension system to allow room for it and the hardhat is still secure with the hat under it. Never wear anything between your suspension and your liner.

REVIEW AND DISCUSSION

- What are some reasons ear protection and hearing protection are important?
- Are hearing protection and ear protection the same?
- Is hearing loss a consequence of aging, or is it preventable?
- Should you preserve your hearing or just plan on getting a hearing aid?
- If you passed a hearing test, are your ear protection worries over?
- When should you wear hearing protection?
- What are forms of personal hearing protection?
- What are forms of environmental hearing protection?
- What are steps you can take to prevent hearing loss?
- How can you protect your outer ears?

SAFETY TRAINING TOPIC

Injury Protection – Eyes

BACKGROUND

Electrical work is highly visual. Without your eyesight, you cannot do the job you were trained for.

It is the rare eye injury that wasn't preventable.

Eye injury prevention is painless, easy, and inexpensive. Eye injuries are painful, difficult, and expensive.

EYE HAZARDS AND PREVENTION

Flying particles, shrapnel from striking an object, grinding dust, elbows, tools, and other objects can easily destroy one or both eyes. You can easily protect your eyes by wearing standard safety glasses as soon as you arrive on the job site. A face shield may also be necessary.

Vapors, paint, chemicals, acids, caustics, splashing hazards and the like can easily cost you your eyesight. You can easily prevent this by wearing goggles.

Arcs from welding can burn your retina, and such damage is permanent. You can prevent such damage by averting your gaze and leaving the area or wearing the proper lenses if you must watch the weld.

PPE is a last line of defense, but one you should always use. Other methods of eye protection include machine guards, distance requirements, and work methods that reduce the likelihood of eye dangers.

When using a multimeter, connect and disconnect it one lead at a time to prevent an arc flash or arc blast.

IMPROPER PPE

Wearing night vision lenses during the day increases the damage from an arc flash.

Wearing dark lenses in normal lighting simply reduces your ability to see what you are doing or where you are going, thus making you a hazard to yourself and others.

A face shield is not a substitute for safety glasses, nor is a pair of safety glasses face protection.

Glasses without side shields provide front-on protection, only. If you are walking through an area with eye hazards, these glasses are insufficient.

SAFETY GLASS CARE

Many people remove their safety glasses "to see better" or "because I'm doing panel work." The implication here is that the glasses inherently reduce visual capacity. They do not. A projectile into the eye does reduce visual capacity. Any loss of visual capacity with the glasses on is due to improper care of the glasses.

Do not take your glasses on and off during the day. Leaving them on means they won't be rubbing on table tops, floors, and other abrasive surfaces. It also means they will be protecting your eyes full-time.

Clean lenses with lens cleaning papers, only. Wiping a lens on your shirt can easily scratch it.

When you are finished using your glasses for the day, put them in a glasses case - not in your toolbox where they can get scratched.

REVIEW AND DISCUSSION

- Can safety glasses provide very much protection to hard-boiled eggs?
- Can safety glasses provide *very* much protection to your eyes?
- How important is your eyesight to doing the job you were trained to do?
- Are most eye injuries unpreventable?
- Just as eye injury prevention is painless, easy, and inexpensive, what are eye injuries?
- How can you easily prevent injury from flying particles?
- How can you easily prevent injury from chemical splash?
- How can you prevent injury from arc flash?
- What are some issues with improper PPE?
- What are some concerns about caring for your safety glasses?

SAFETY TRAINING TOPIC

Injury Prevention – Hands

WHY THIS IS IMPORTANT

The type of work you do requires dexterity and coordination with your hands.

Your hands need strength to climb, hold tools, and carry materials.

Hand injuries are often debilitating, disfiguring, and painful.

The hand is made up of connective tissue and many small bones. It is a true marvel of nature, but easily damaged.

IMPACT INJURIES

To prevent smashing your fingers when using a hammer, use needle-nose pliers to hold the nail or other object you are hammering.

Never put your hand in front of the business end of a power tool, pneumatic tool, or powder-actuated tool unless it is disconnected from its energy source.

Don't use the heel of your hand for striking a chisel, screwdriver, or other tool. You are likely to bruise your hand and strike something-perhaps your other hand-with the tool.

CRUSHING INJURIES

To prevent crushing your hand when moving a cabinet or other heavy object (such as a control cabinet) into position, place a 2x4 between the object and the wall.

When setting a heavy object into place, do not put your fingers under it for lifting purposes. If you find this unavoidable, put a 2x4 or several 2x4s on the surface where the object will sit. For example, if you are lifting a motor onto a pedestal, use boards to allow your fingers somewhere to go.

ELECTRIC ARC

Wear appropriate rubber gloves and outer gloves appropriate to the voltage you are working on.

Do not grab a ground rod with your bare hands-it may be carrying fault current. If you grab it, you become a parallel circuit and the electricity will follow Kirchoff's Law.

Observe clearances based on voltage level.

Use insulated tools when working in or near live circuits. One little slip is all it takes.

PUNCTURES AND SLICES

Wear work gloves when working with sheet metal.

Wear work gloves when using punches, knockouts, and drills.

Clean metal shavings with a brush, rag, or vacuum, not with your hand.

De-burr any holes you make. De-burr any raceway you cut, even if it's plastic.

Follow this simple rule: "Don't put your hands where they shouldn't be."

REPETITIVE MOTION

Change up the way you perform tasks. For example, don't always use your right hand when you plug things in. Use your left hand to operate a computer mouse.

Vary your tasks throughout the day.

Stretch your hands. Grasp all the fingers of one hand and gently pull them back toward your wrist. Then, do the other hand.

The primary risk factor for repetitive motion disorder is not repetitive motion. It is poor physical condition. Most electricians have above average upper body development, but if you are experiencing pain in your hands and arms consider a program of exercise directed toward improving your overall physical condition.

GENERAL HAND CARE

Keep your skin moisturized. Dry skin tends to crack and let bacteria in. However, use moderation. You don't want to be doing electrical work with hands that are wet with skin conditioner. See your doctor or a dermatologist if you need clarification.

Keep your nails trimmed, but not cut to the root. You can remove grease from under your nails by soaking-don't do so by digging or yon can cause an infection.

Wear gloves to keep your hands warm when the ambient temperature is low. Frostbite can permanently diminish the use of your hands. So can weather that is cold but above freezing.

REVIEW AND DISCUSSION

- Why is it important to take care of your hands?
- How can you prevent the old hammer and thumb game from playing out?
- Why should you not use your hand as a makeshift hammer?
- How can you prevent crushing injuries?
- What should you wear to prevent arcing injuries?
- Why should you never grab a ground rod?
- When should you use insulated tools?
- What are some rules for preventing cuts?
- What are some tips on preventing or taking care of repetitive motion injuries?
- What are some general tips for hand care?