

## **Instructor Guide for PowerPoint Presentation**

### **Presentation Format**

Included on the CD is a 34-slide presentation targeted for adult audiences who specifically work around or directly with electricity. An instructor guide in Microsoft Word format that shows each slide with information about the picture and suggestions for instructor comments is included. Additional comments may be taken from within the campaign kit or from other references. The purpose of the presentation is to stress the importance of safety when working with electricity to prevent bodily injury as a result of electric shock.

### **Opening Comments**

Set the stage for *Look Up and Live* presentation with a minimum of opening remarks. Stress the importance of audience participation. Allow a discussion period following the slide presentation for audience questions and comments. This presentation is designed for adult audiences and is not appropriate for children. It should also be explained prior to the presentation that graphic images are included in the presentation. The better you know your audience, the easier it will be for you to make your opening remarks.

A minimum of background information can be helpful. For example, discuss any current injury trend you may have seen with regards to electrical injuries. Ask for any pertinent information that the audience may be able to contribute.

The following could serve as a guide for your introductory comments:

Good (morning, afternoon, evening). Today we're talking about the prevention of electrical injuries. Electrical burns can be a devastating injury requiring long-term rehabilitation and may result in permanent disfigurement. (Include a sentence of statistics from your local hospital if available).

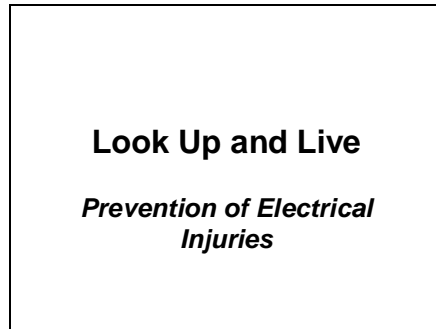
At the conclusion of this presentation, I hope each of you will be reminded of the need for extra caution in working with electricity to prevent electrical burns.

### **Planning the Program**

Who will want to see this program? Because this is geared toward those who work with electricity there are many businesses that would benefit from this presentation. Most companies welcome topics for safety meetings. First, put together a list of those industries and utility companies in your local area and obtain the names of the safety officers. Approach them with an offer to give a presentation for their safety meeting. If you are going to present the presentation become familiar with the slides and the information provided. Make sure that you are ready and comfortable with the materials before you try to give it to an audience. Ask others to review the materials with you to make sure that you have covered all of your bases.

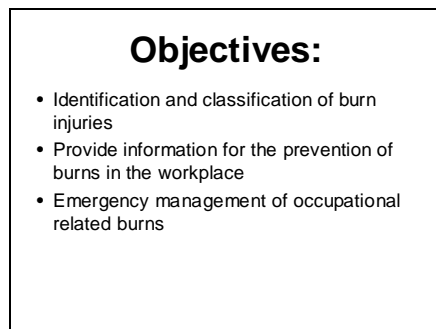
## SCRIPT FOR POWERPOINT PRESENTATIONS:

Slide 1



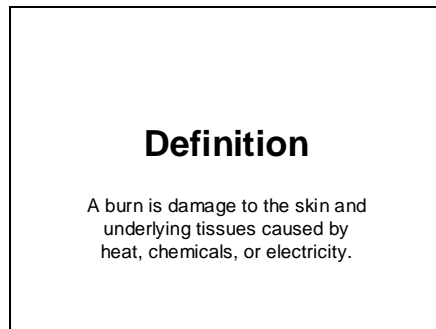
This is a presentation to increase awareness of electrical injuries in the workplace. It should be noted here that some of the pictures are of a graphic nature and that electrical injuries cause grave damage to the body when it comes in contact with electricity. The audience should be chosen carefully and will usually include those workers who are involved in electrical work.

Slide 2



To better understand what electricity does to the body it is helpful to understand what a burn is and how it is classified on the basis of superficial (1<sup>st</sup> degree), partial thickness (2<sup>nd</sup> degree), and full thickness (3<sup>rd</sup> degree) injury. Information on the most common type of work injuries will be explained and how to prevent them. Emergency care of burn injuries will be described.

Slide 3



This definition describes a burn injury as damage to the skin and underlying tissues such as the subcutaneous tissues, muscle and even bone in the case of electrical injury. Burn injuries can be caused by heat (thermal injury), chemicals or by contact with electricity. The only type of burns we will be discussing will be those caused by electrical injuries

Slide 4

**Types of Burns**

- **Thermal**
  - Contact
  - Scald
  - Tar
  - Flame
  - Frostbite
- **Chemical**
  - **Electrical**

The purpose of this slide is to show the different type of burn injuries. In terms of causes, electrical injuries are most severe because instead of just having skin burns, electricity follows the paths of least resistance and involves more internal structures than the other types of burns.

Slide 5

**Skin Functions**

- Largest organ of the body
- Acts as an immune and mechanical barrier
- Important for water and heat regulation
- Largest sensory organ
- Appearance

The skin is our largest body organ. It is important as a barrier to infection and it is our first line defense against mechanical injury. When there is a break in the integrity of the skin, bacteria may enter. In addition, skin is also important in helping the body maintain water balance and heat regulation. If a victim has a burn injury they may not be able to maintain their own body temperature. Blankets may be needed to keep the victim warm. Skin is also important as a sensory organ in regard to personal appearance.

Slide 6

**Depth of Burn**


- Temperature of heat source
- Duration of contact with heat source

The depth of a burn injury is dependent on the temperature of the heat source and the length of time the victim is in contact with the heat source. For electrical injury, factors determining depth of burn injury are voltage, current, and duration of contact with the electrical source.

Slide 7

**Burn Characteristics**

- **Superficial** (first degree) burns
  - Causes: sunburn, minor scalds
  - heals in 3-5 days with no scarring
- **Characteristics**
  - minor damage to the skin
  - pink to red
  - painful
  - skin is dry without blisters




A superficial burn only involves the epidermal layer of the skin. This layer of skin readily heals itself and no permanent damage will occur. It can appear pink to red but will not exhibit blistering. Sometimes an electrical flash burn will be very minor. This burn should heal within 3-5 days.

Slide 8

**Burn Characteristics**


- **Partial thickness (second degree) burns**
  - damages, but does not destroy, top two layers of skin
  - heals in 10-21 days
- **Characteristics**
  - skin: moist, wet and weepy
  - blisters present
  - bright pink to red



Slide 9

**Burn Characteristics**

- **Full thickness (third degree) burns**
  - destroys all layers of the skin
  - may involve fat, muscle or bone
  - will require skin grafts
- **Characteristics**
  - bright red
  - dry - no blisters
  - waxy white
  - tan or brown
  - insensate



Partial thickness burns involve both the epidermis and dermis layers. There is usually blistering and blisters may have already broken as pictured. Appearance varies from light pink to red. The burn is painful, as the nerve endings are found in the dermal layer and are irritated by the damage. Uncomplicated partial thickness burns heal in several weeks.

Full thickness injury will destroy both layers of skin and can damage the underlying tissues including fat, muscle or bone. This injury may appear white, as shown here, or can even look charred. Because all of the nerves in this area have been destroyed, full thickness burns are not painful. Full thickness burns are often surrounded by partial thickness burns, which are painful. Full-thickness burns will require surgical intervention for healing to take place.

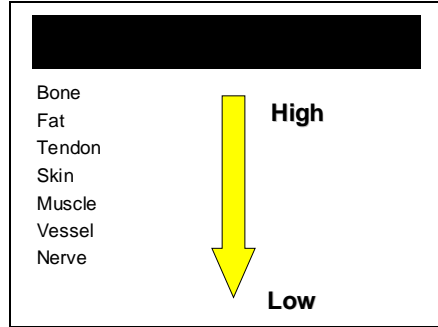
Slide 10

**Severity of Injury**

- Amount of energy delivered
- Type of current - Direct or Alternating
- Duration of contact
- Resistance to the current flow

The severity of electrical injuries is dependent on the amount of energy delivered (voltage and amperage) and the type of current (alternating versus direct). Household current is alternating. Direct current includes car batteries and medical equipment. When a shock occurs from a direct source it can throw the victim back away from the source, whereas with alternating current the victim may stick to the source until it is turned off. The resistance to flow refers to how easily the electricity is able to flow through a substance. Wet skin has less resistance than dry skin.

Slide 11



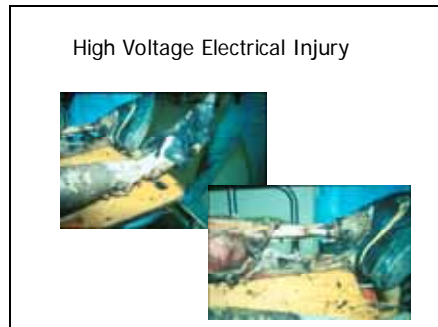
Within the body, skin is only a fair conductor of electricity. Nerves and blood vessels are much better conductors because they have charged particles within them which help conduct electricity. Both are found in muscle tissue. Muscle is at high risk for injury in electrical shock. Bone has high resistance and may heat when current passes through it.

Slide 12



Although low voltage injuries are more common in household accidents such as this where the child chewed on an electric cord, this picture is used to contrast those that will follow showing the devastating results of high voltage electrical injuries. The accepted dividing point between high and low voltage injuries is 1000volts. **If you had not previously reminded the audience about graphic pictures you should explain that some pictures will be very graphic in nature.**

Slide 13



This high voltage injury shows the loss and destruction of calf muscles to both legs. Although this picture is very graphic it is very important for persons working in the electrical field be aware of the dangers.

Slide 14




The most common way in which an electrical injury can occur is by direct contact with an electrical source. If you look at the wrist you will note two small areas where contact with a high voltage power lines occurred. In a case study later in this presentation this victims other burn areas will be shown.

Slide 15

**Types of Electrical Injuries**

- Contact
- Flash
- Arc
- Lightning




This victim, seen in the previous picture, also sustained a flash burn to the face. The neck burn was sustained because his clothing caught on fire and caused thermal injury from flame to his body. Flash burns denote an external flash of energy and usually are not associated with a significant internal transmission of energy or injury. In this particular case the victim sustained both internal and external injury.

Slide 16

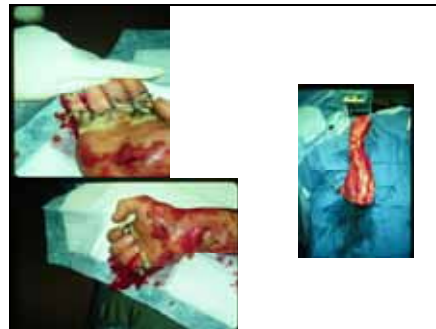
**Types of Electrical Injuries**

- Contact
- Flash
- Arc
- Lightning



Arc burns have a characteristic white center with a rim of congestion or erythema (redness). Arc burns commonly are associated with significant internal transfer of energy and related injury. In this picture you can see that significant damage was sustained to the muscle tissue as indicated by the cross-section of muscle.

Slide 17



Frequently when there is significant muscle damage, the entire limb will be lost. If there is any possible chance for the muscle tissue to survive, extensive surgery including fasciotomy (release of the fibrous tissue surrounding the muscle) is necessary as soon as possible after admission to the hospital. If the limb survives there may be significant nerve and muscle damage, which will require long-term rehabilitation.

Slide 18

**ELECTRICAL INJURY- lightning**



Lightning is also of concern when persons are working outdoors. Thermal injuries are uncommon in lightning injury unless the clothing catches fire. Flash burns associated with lightning result from an intense impulse of energy occurring for an extremely brief period of time and may cause characteristic distributions of injury. Linear superficial burns may occur where sweat had accumulated, presumably because of brief steam production. Feathering may occur and is believed to be the result of an electron shower causing

transient cutaneous markings. This is not considered a true burn but is pathognomonic for lightning injury.

Slide 19

ELECTRICAL INJURY- lightning

- 70% occur June - August
- 50 - 300 fatalities per year
- Fatality rate 20 - 32 %

Most lightning strikes occur in the summer months with 70% occurring between June and August. Lightning strikes have the highest fatality rate of any natural occurring hazard, with 50 to 300 fatalities per year. The chance of dying from a lightning strike varies from 20 to 32%. Frequently, the victim of a lightning strike will suffer respiratory and cardiac arrest and CPR should be the first intervention.

Slide 20

**Protection for the worker**

- Use proper equipment when working with electricity
- Wear personal protective equipment
- Taking short cuts puts you at risk
- If working with electricity use the lock out principle (know the electricity is really off)
- If not grounded, not dead

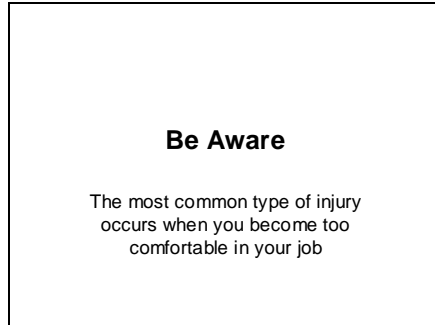
When working with electricity it is important for the worker to use proper equipment and keep it in proper working order. Personal Protective Equipment should include eye protection, special boots, gloves and hard hats. Make sure they are properly cared for and that they are always worn. When working on electrical equipment always use a lock-out tag to prevent someone else from turning on the electricity while you are working. Remember that if it is not grounded, it's not dead. Your safety and the safety of your co-workers should be the primary concern.

Slide 21



Not wearing Personal Protective Equipment can have devastating results. If someone exposes their head to electrical current, it is very likely that some damage will occur to the brain. Emergency care would include stabilizing the individual until help arrives.

Slide 22



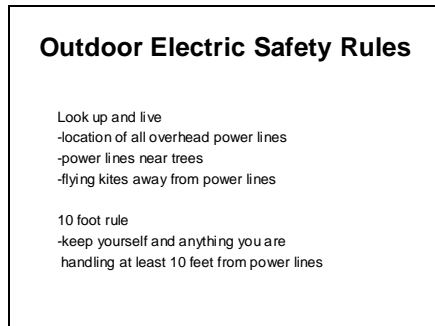
Unfortunately when we allow ourselves to become so familiar with our jobs, accidents are more likely to happen. Never take short cuts when working with electricity. Make sure that you are alert and able to make good decisions when at work. Always work with a “buddy” when possible.

Slide 23



This electrical injury occurred when an electrician backed into an open breaker box. In this case the electricity followed the path from shoulder across the axis of the body to the opposite hand. When this occurs frequently the electricity passes through the heart muscle causing potential problems with the heart rate and rhythm. In addition all voluntary muscles contract when the electrical shock occurs. Violent muscle contraction can result in fractures or dislocations.

Slide 24



When working outdoors remember to watch for overhead power lines. Use the concept of “Look Up and Live” to remind yourself of the dangers. Be careful of power lines hidden by tree branches and leaves. Use the 10-foot rule to keep yourself safe.

Slide 25



Make sure that ladders and scaffolding are secure and made of materials that are not good conductors of electricity. This individual was 40 feet off the ground when he touched an electrical line. Falls or fractures can occur. The associated injuries may result in death after electrical shock.

Slide 26

**Outdoor Electric Safety Rules**

Call 48 hours before you dig

- installing fence posts
- planting trees
- installing lawn sprinkler systems
- doing major excavation

If it is necessary for you to dig in any area where there may be underground power lines, make sure to call the power company so that underground systems can be identified before you dig. This includes any time you are digging holes for any purposes.

Slide 27



Coming in contact with underground wires could cause a debilitating injury or even death.

Slide 28

**Outdoor Electric Safety Rules**

Stay away to stay safe

- stay away from downed power lines
- call 9-1-1 or utility company
- keep everyone away until utility company arrives

Remember these rules to stay safe out of doors:

Stay away from power lines to stay safe  
Stay away from downed power lines  
Call 9-1-1 or utility company  
Keep away until the utility company arrives

Slide 29



This is the case study alluded to earlier. Contact points are on both sides of the wrist. Notice there are minor flash burns to the rest of the hand and neck. The victim fell a distance of approximately 20 feet after touching a high power line.

Slide 30



An electrical contact point on the scalp, resulting in damage to the bone underneath. This injury required extended care to heal and was eventually closed by a flap procedure. This type of injury usually brings a certain amount of cognitive problems that have to be overcome by the survivor.

Slide 31



This victims' clothing caught fire, resulting in a combined electrical and thermal burn. As seen in earlier pictures, this person had stabilization for his neck and back until x-rays were performed. When someone is injured on a power pole or ladder, always consider the possibility of a fall with associated injuries.

Slide 32



When a victim falls while sustaining an electrical injury certain procedures should be taken in the field. First of all the airway should be secured while stabilizing the spine. Next, check for breathing. Circulation is then assessed and CPR performed if necessary.

Slide 33

### Emergency Care

- **Protect self**
  - don't touch until the power is off
- **Stop the Burning Process**
  - Smother the fire
  - Remove any burning clothing, unless imbedded
- **Assess airway, breathing and circulation**
  - Stabilize spine if fallen
  - CPR if needed
- **Prompt medical treatment could save a life**
  - Contact EMS (Emergency Medical System), Call 911

Always remember that if you are the first responder to someone who has sustained an electrical injury, you must protect yourself. Never touch someone until you know the electrical source is turned off. Once the source is off, you can stop the burning process by smothering any fire on the clothing, then assess ABC's, protect the spine, and perform CPR if necessary. Notify the EMS system immediately.

Slide 34

### Conclusions

- Electrical injuries are preventable
- Always use proper care when working with electricity
- Do not take short cuts
  - It could be your last!

Remember that all electrical injuries are preventable. Always use extreme care when working with electricity. Do not take short cuts.

**IT COULD BE YOUR LAST!**