

BURNS

Burn Emergencies

Slide Presentation prepared by
Randall Benner, M.Ed., NREMT-P



Learning Objectives

- Understand the **various burn classifications** and how they relate to the anatomy of the skin.
- Identify the **characteristics of superficial, partial-thickness, and full-thickness burns.**
- **Calculate the extent of burns** using the **Rule of Nines.**
- Explain **how to assess the severity of burns.**

Learning Objectives

- Describe appropriate **burn management** for thermal and radiant burns.
- Identify the **signs and symptoms of inhalation injuries.**
- Describe **first aid care for inhalation injuries.**
- Describe first aid care for **chemical burns.**
- Understand how **electrical energy and lightning can injure the body.**
- Describe first aid care for **electrical shock.**
- Describe **first aid care for injuries inflicted (imposed) by lightning.**

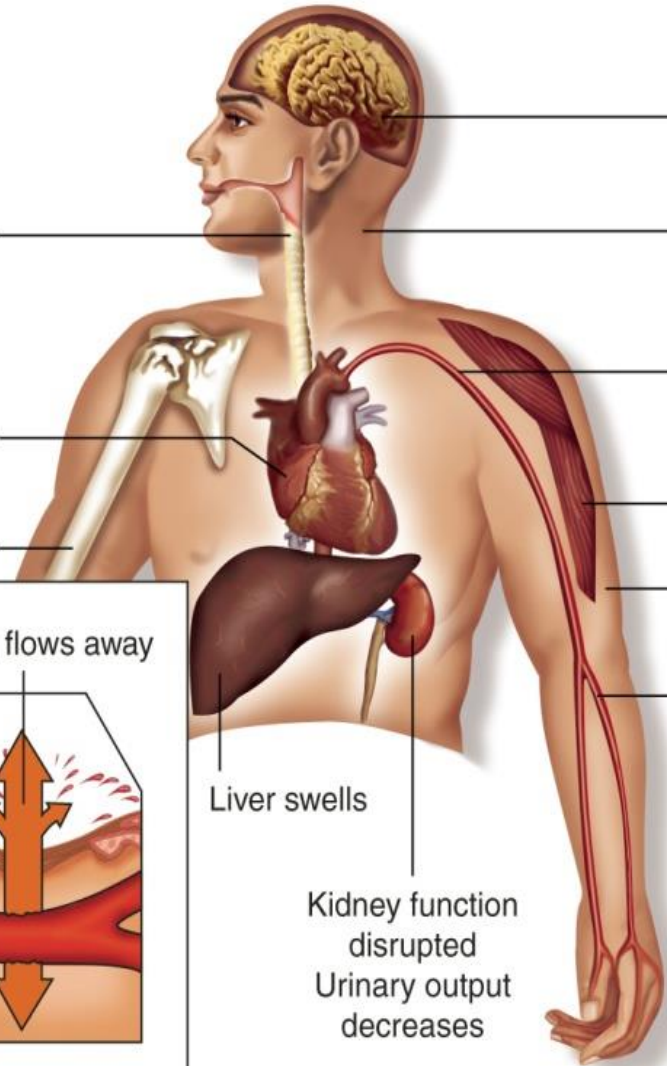
Introduction

- More than 500,000 burn victims per year with about 4,000 deaths.
- Burns obviously injure the skin, but they can also disrupt the normal fluid and electrolyte balance of the body.
- Burns are also associated with trauma, most often internal injuries, blunt trauma, head trauma, fractures, and lacerations.

• **Assessment of Burns**

- **Seriousness of a burn is determined by**
 - Depth of the burn
 - Percentage of body area burned
 - Severity of the burn
 - Location of the burn
 - Accompanying complications (e.g., preexisting physical or mental conditions)
 - Age of the victim

HOW BURNS AFFECT THE BODY



Hormones are disrupted

Fluids accumulate in upper airways

Proteins clot, enzymes break down

Heart rate increases, then plunges

Bones soften

Fluids accumulate in body

Red blood cells die (causing anemia)

Platelets destroyed (blood can't clot)

Muscles degenerate

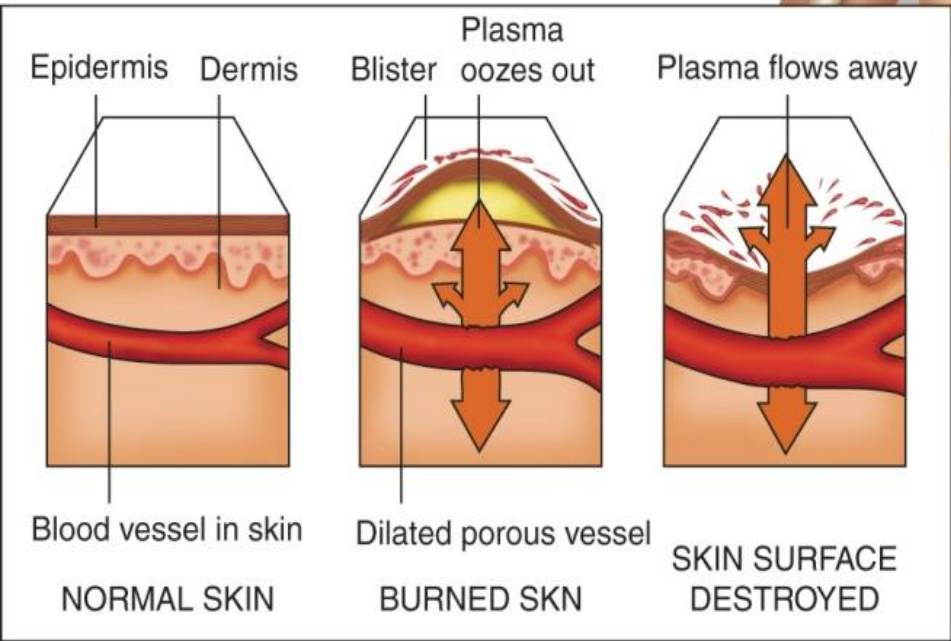
Body cells die

Arteries dilate

Liver swells

Kidney function disrupted
Urinary output decreases

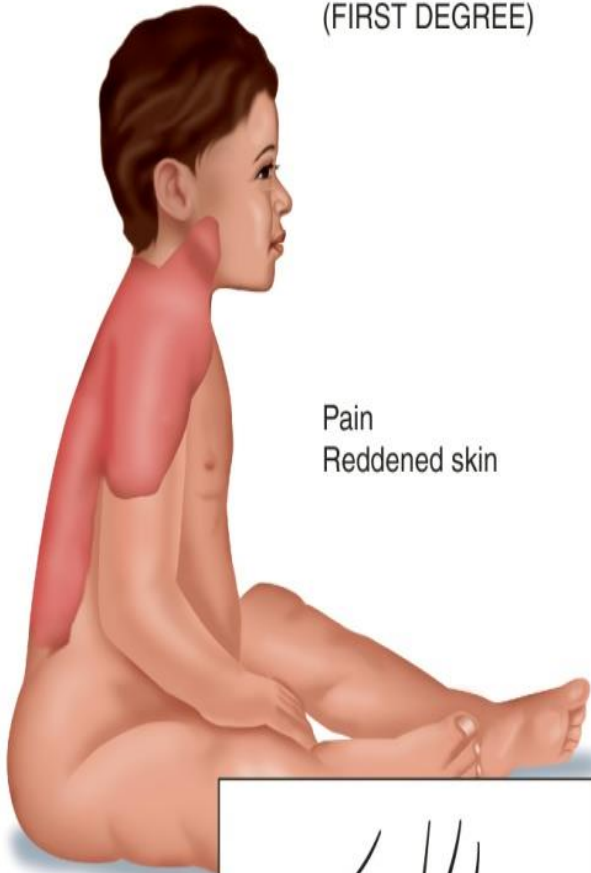
Fluids leak from capillaries



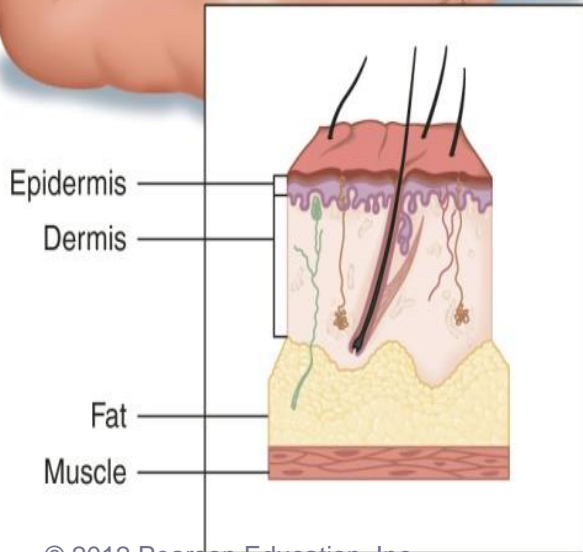
Degrees of Burn

- **Superficial burn (first degree)**
- Involves only outermost layer of skin, the epidermis; burned area is **painful** and appears red (reddened) and dry
- **Partial thickness burn (second degree)**
 - Typically is red or white, moist, **painful**, and may produce **blisters**
- **Full thickness burn (third degree)**
 - **No pain/** Most severe type; damages all layers of skin and may affect subcutaneous tissue, muscle and bone. Dry leathery, charred or white skin.

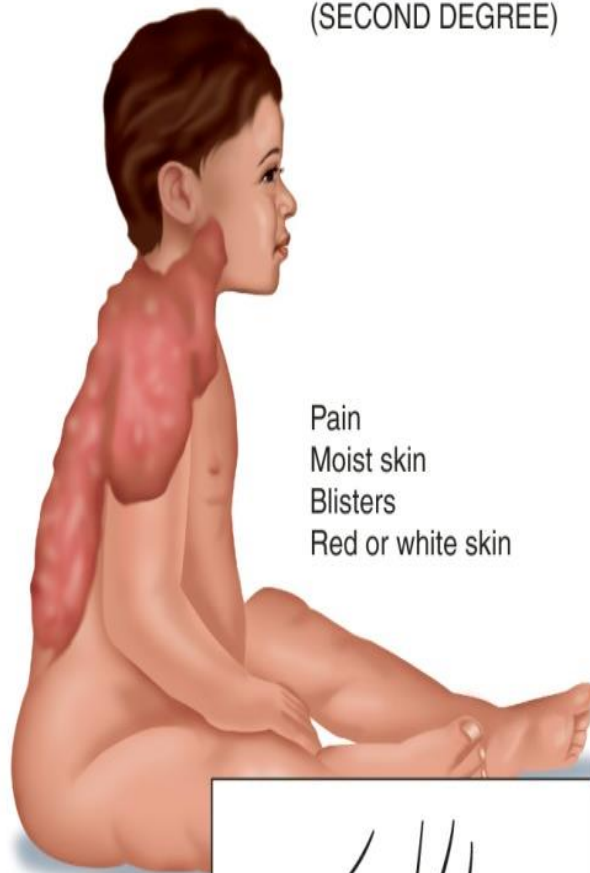
Superficial
(FIRST DEGREE)



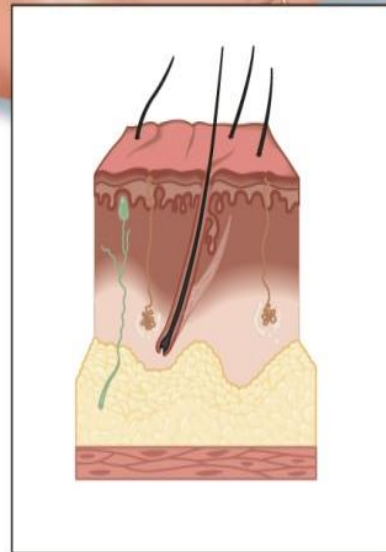
Pain
Reddened skin



Partial Thickness
(SECOND DEGREE)



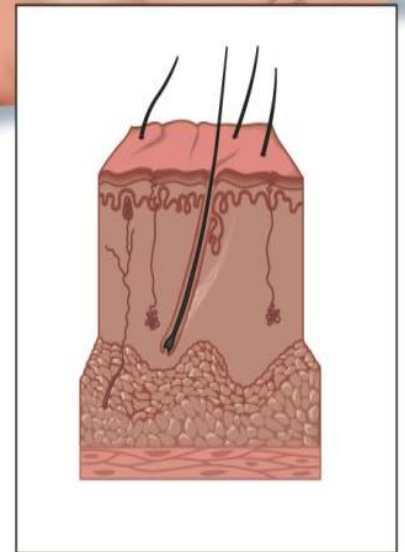
Pain
Moist skin
Blisters
Red or white skin



Full Thickness
(THIRD DEGREE)



Dry leathery skin
Charred or white skin
No pain



Calculating Percentage of Body Burned

- **Two methods are used to determine percentage of body burned.**

1. Palmar surface method

- Palm of victim's hand is equal to **roughly 1% of the victim's body surface area**
- Use with irregular burns or “patchy” burns

2. Rule of Nines

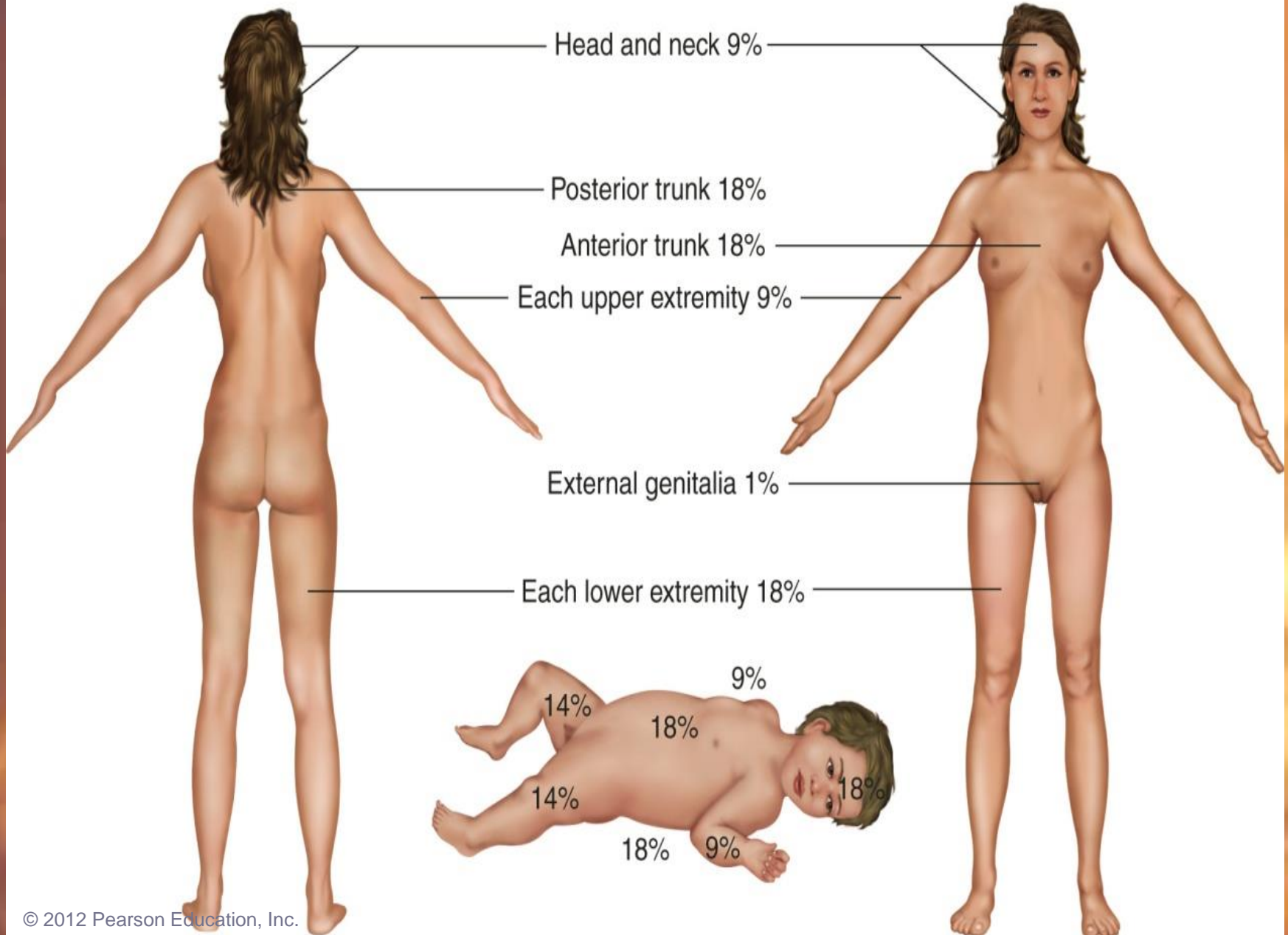
Calculating Percentage of Body Burned

- **Two methods are used to determine percentage of body burned.**

2. Rule of Nines

- Divides the body into key regions
- Different area assessment is used for infants

Rule of Nines



Assessment of Burns

- **Severity of burn**
 - Based on depth of burn, extent of burn, and location of burn
 - **Burn severity is classified as**
 - Minor
 - Moderate
 - Critical

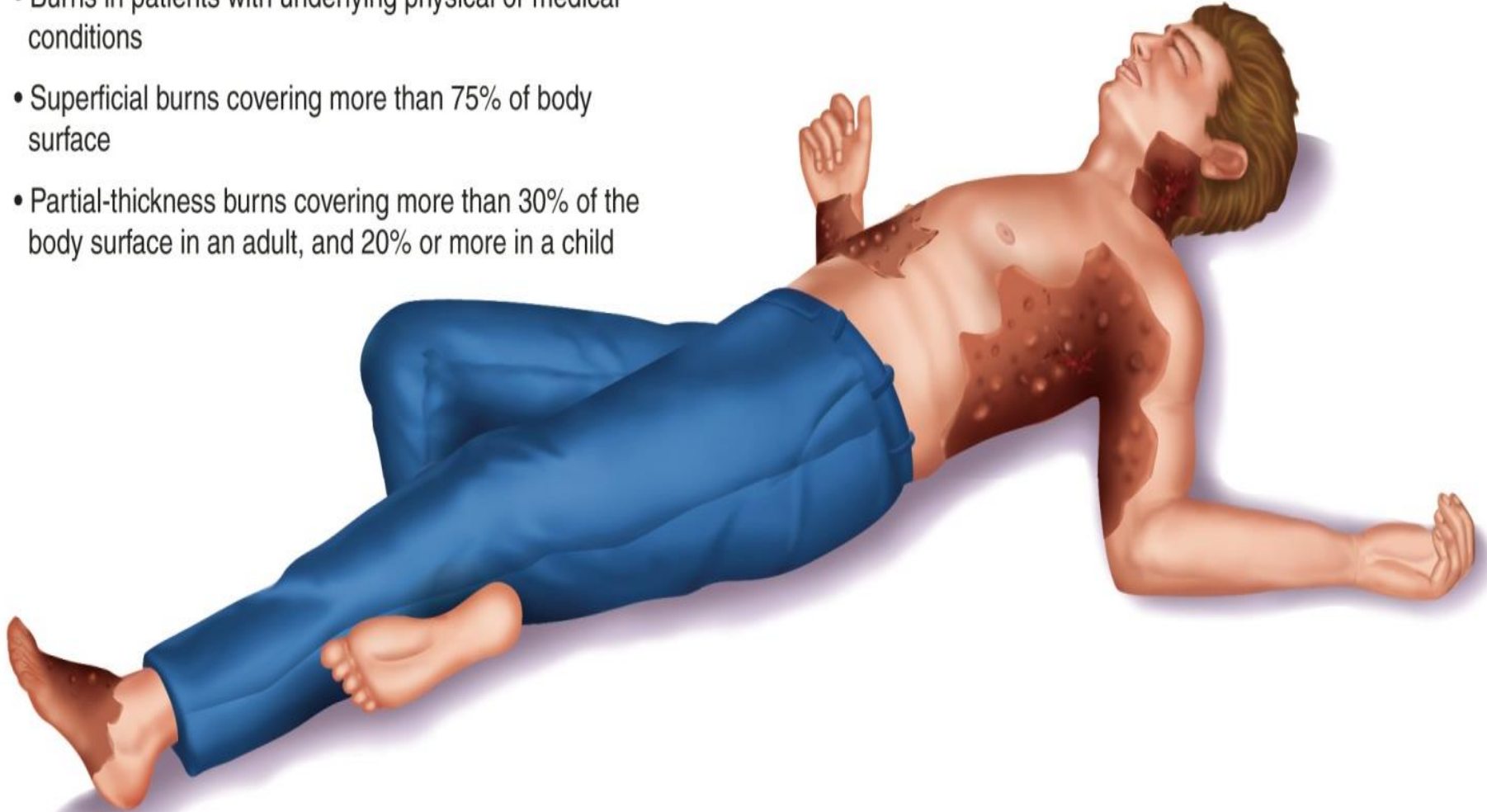
Assessment of Burns

- **Location of burn**
 - **Certain areas are more critical than others**
 - Face, neck
 - Hands, feet
 - External genitalia
 - Circumferential burns to neck or chest

Critical burns include:

Critical Burn

- All inhalation injuries
- Electrical burns
- Deep acid burns
- Burns in patients with underlying physical or medical conditions
- Superficial burns covering more than 75% of body surface
- Partial-thickness burns covering more than 30% of the body surface in an adult, and 20% or more in a child
- Full-thickness burns covering more than 10% of body surface in an adult, and 2% to 3% in a child
- Partial-thickness or full-thickness burns involving the face, eyes, ears, hands, feet, or genitalia



Burn Management

- **Problems most often associated with burns are**
 - Airway or respiratory difficulties
 - Toxic inhalations
 - Musculoskeletal injuries
 - Loss of body fluids
 - Pain and swelling
 - Anxiety
 - Infection

• **Management of Thermal and Radiant Burns**

- Activate EMS, take **standard precautions**.
- Prevent further injury if you can do so safely.
- Eliminate cause of burn – extinguish إطفاء fire, immerse scald or grease burns حرق الدهون in cold water.
- Remove victim from source of burn; eliminate chance for smoke inhalation.

• **Care of Thermal and Radiant Burns**

- Assess airway, breathing, and circulatory components (ABCs) and support any lost function.
- Continue to assess the vital signs until help arrives.
- **Never break any blisters;** apply dry sterile dressings to burned areas.
- Dress with wet **sterile dressing** if burn covers less than 10% of body surface area.

- **Inhalation Injuries**

- **More than half of fire related deaths are caused by smoke inhalation.**

- **Three main causes of inhalation injuries**

- Heat inhalation

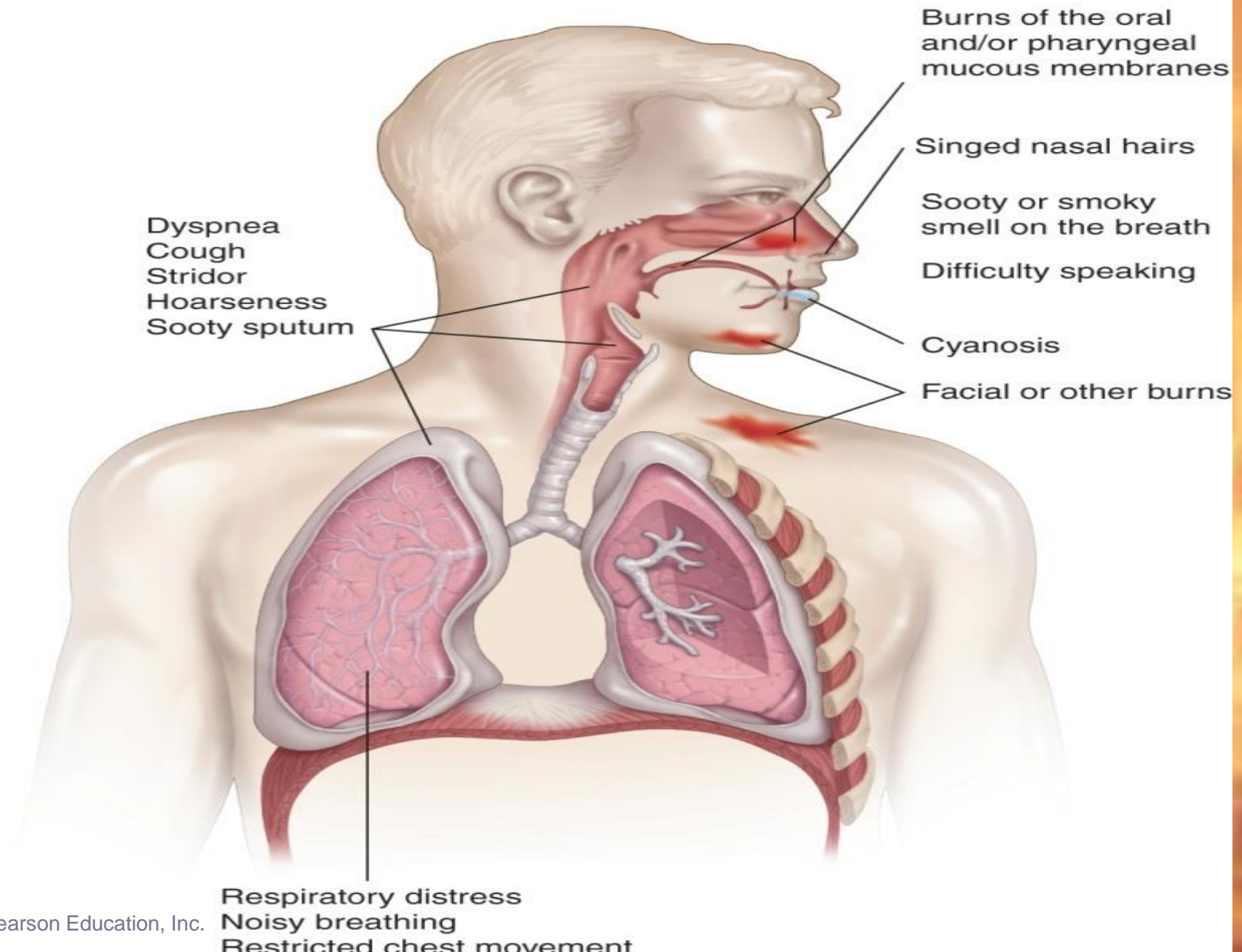
- Inhalation of toxic chemicals or smoke

- Inhalation of carbon monoxide

Signs and Symptoms of Inhalation Injuries

- Stridor (high-pitched sound on inhalation)
- Facial burns
- Singed nasal hair
- Specks (dots) of carbon in saliva/mouth
- Sooty (black/ dirty) or smoky smell on breath
- Dyspnea, cyanosis, restlessness (resp. distress)
- Chest tightness, hoarseness, noisy breathing
- Burns of the mucous membranes in nose or mouth
- Coughing

Signs and Symptoms of Inhalation Injuries



Toxic Fumes Inhalation

- **Carbon monoxide symptoms**
 - Altered mental status
 - Headache
 - Weakness
 - Nausea or vomiting
 - Cyanosis
 - Loss of manual dexterity.

Toxic Fumes Inhalation

- **Carbon monoxide symptoms**
 - Confusion, lethargy, irrational behavior
 - Don't wait for appearance of cherry-red skin; this is a very late sign that might not appear until after death occurs.

First Aid Care for Toxic Inhalation

- Activate EMS, take standard precautions.
- Remove victim from the fumes source.
- Clear the victim's airway.
- Provide artificial ventilations if needed.
- Place in **upright position**, **unless** other **injuries contradict this**.
- Remove restrictive clothing.
- Monitor respiration and airway until EMS arrives.

Chemical Burns

- Difficult to assess depth and severity
- Chemicals continue to burn as long as in contact with body
- Chemical Burns are critical; treat immediately.



First Aid Care for Chemical Burns

- Activate EMS, take standard precautions.
- Brush dry powder from skin, then flush with water for at least 20 minutes (or until EMS arrives).
 - Brush off all lime powder prior to flushing.
 - **Phenol** should be washed off with **alcohol first**.
 - **Sulfuric acid** should be flushed with **copious water**.

First Aid Care for Chemical Burns

- Brush dry powder from skin, then flush with water for at least 20 minutes (or until EMS arrives).
 - Remove clothing, shoes, stockings, and jewelry.
 - Use soap and water if possible after irrigation.
 - When finished flushing, cover burned area with dry sterile dressing.

Electrical Burns

- **Protecting yourself and the victim**
 - Be alert for tingling sensation as you approach.
 - Look for downed wires with auto accidents.
 - Do not touch vehicle if downed wire is touching it.
 - Instruct victim in a car to stay inside if it is in contact with a downed wire.

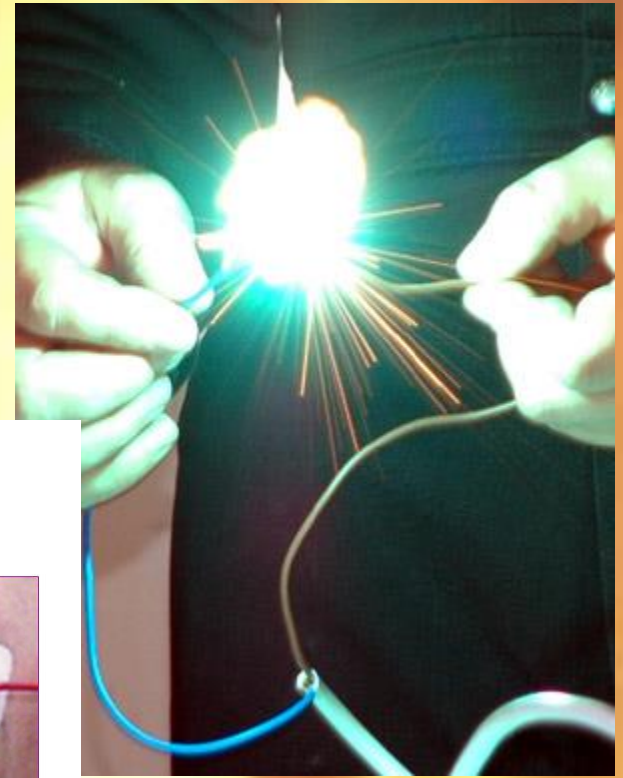
Electrical Burns

- **Protecting yourself and the victim**
 - Instruct victim to jump from the vehicle if it catches fire.
 - Ensure electrical equipment is unplugged.
 - Shut down power if victim is found in a pool.
 - If electrical item is in a bath tub with victim, unplug device before reaching for victim.

Electrical Burns

- **Three types of electrical burns**
 - **Thermal:** fire is present, but electricity does not touch the victim
 - **Contact:** victim touches electrical point, causes source and ground injuries
 - **Arcing or flash burns:** current jumps from one surface to another and burns skin, but electricity does not flow through body

Severe Burns from Arc Flash



up to 35,000°F

9,900°F

Occupational Safety and Health Association of Ontario

PB/RH -- March 3, 2009



Electrical flash burns. Mills, Morton, Page.
A Color Atlas of Accidents and Emergencies, 1984.



WARNING

Arc Flash and Shock Hazard Appropriate PPE Required

Arc Flash Protection

- Flash Protection Boundary: _____
- Hazard Risk Category: _____
- Incident Energy at 18" (cal/cm²): _____

Shock Protection

- Shock Hazard when cover is OPENED or REMOVED: _____
- Limited Approach: _____
 - Restricted Approach: _____
 - Prohibited Approach: _____

Required PPE

- | | |
|---|---|
| <input type="checkbox"/> Hard Hat | <input type="checkbox"/> T-shirt |
| <input type="checkbox"/> Safety Glasses | <input type="checkbox"/> FR Shirt |
| <input type="checkbox"/> Safety Goggles | <input type="checkbox"/> FR Pants |
| <input type="checkbox"/> Face Shield | <input type="checkbox"/> FR Coverall |
| <input type="checkbox"/> Flash Hood | <input type="checkbox"/> Flash Suite |
| <input type="checkbox"/> Ear Protection | <input type="checkbox"/> Leather Shoes |
| <input type="checkbox"/> Long Pants | <input type="checkbox"/> Leather Gloves |
| <input type="checkbox"/> Long Sleeve Shirt | |
| <input type="checkbox"/> Cotton Underwear | |
| <input type="checkbox"/> Voltage Rated Gloves | |

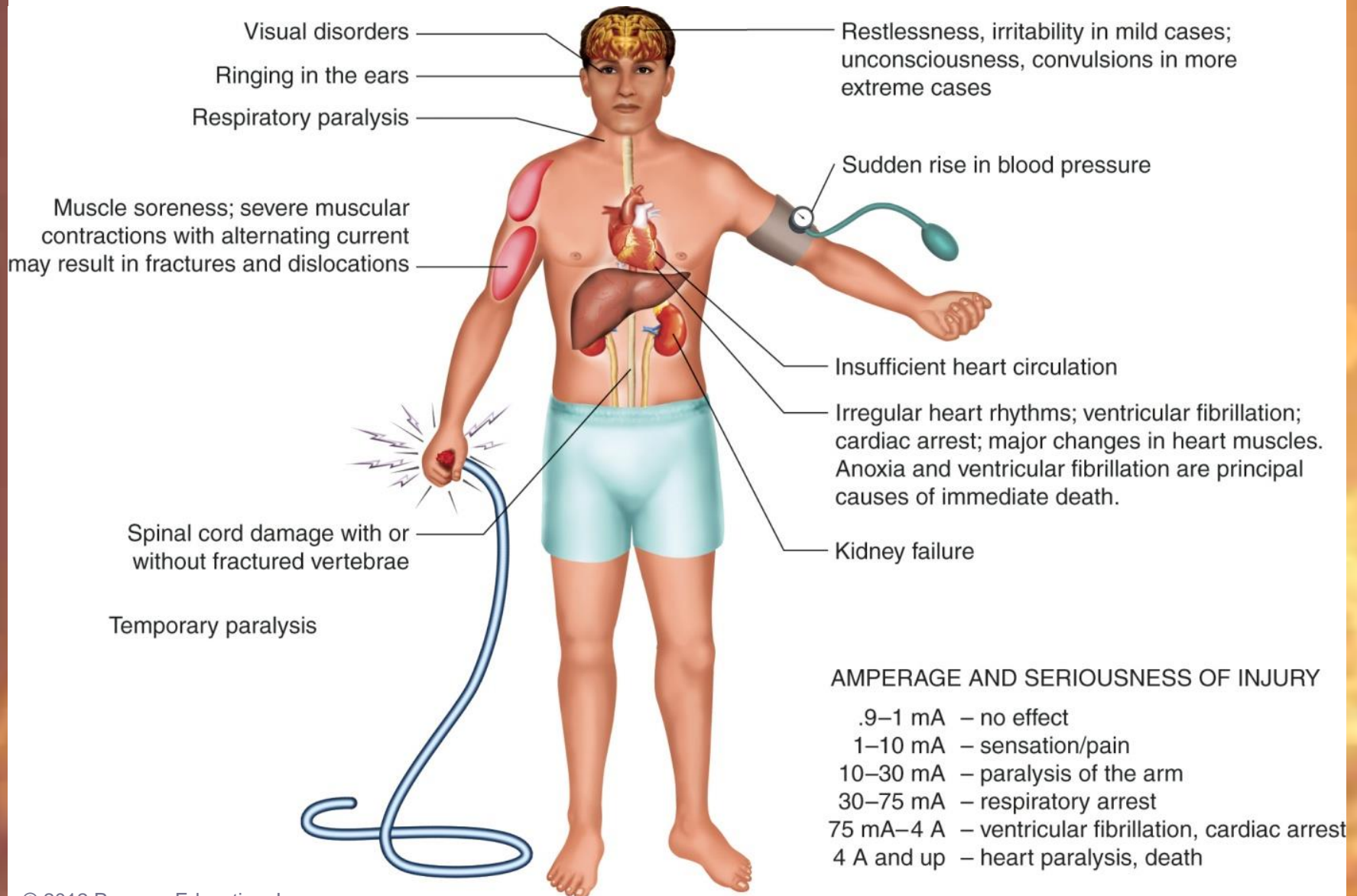
Equipment ID: _____

Date: _____

Electrical Burns

- **Severity of electrical shock depends on**
 - Voltage and amperage of the current
 - Amount of time exposed to electricity
 - Amount of moisture on the skin
 - Body surface area in contact with electricity
 - Amount of insulation (protection) worn by the victim
 - Areas of the body electricity passes through
 - Type of current (AC or DC)

Possible Effects of Electrical Shock



Electrical current severely damages tissue at the point of entry. The current then proceeds along nerves and blood vessels, leaving behind a core of tissue death deep beneath the skin.

- **Separate Burn Sites from Electrical Sources**

The current converges at the exit point and explodes through subcutaneous tissues and skin.

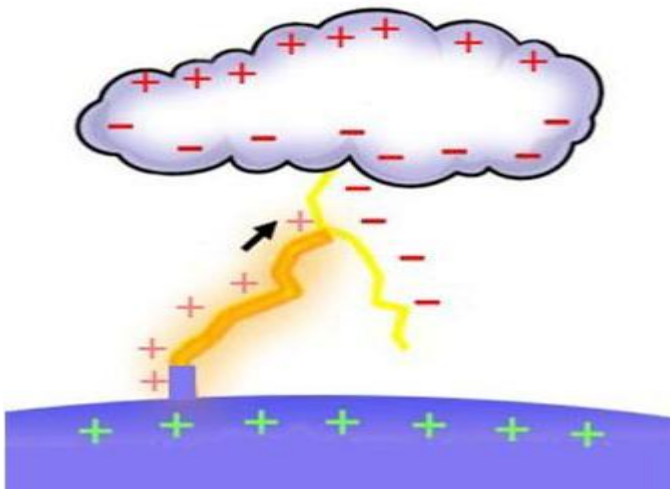
First Aid Care for Electrical Burns

- Activate EMS, take standard precautions.
- Check airway, breathing and pulse, support lost function.
- Use AED (Automated External Defibrillator) if patient is in cardiac arrest.
- Treat for spinal injuries if victim fell or was thrown (see Chapter 13).
- Provide specific care for any soft tissue trauma.
- Treat the patient for shock (see Chapter 6).

Lighting Injuries

- 300 deaths yearly from lightning strikes
- **Two main types:** direct strikes and splash strikes
- Burns from lightning are usually superficial and not a primary concern
- Deeper burns occur from heat created by metal objects
- **Injuries from lightning typically involve**
 - Nervous system
 - Skin
 - Heart and vascular system

- **Splash** hits occur when lightning jumps to a person (lower resistance path) from a nearby object that has more resistance, **striking** the person on its way to the ground.
- In ground **strikes**, the bolt lands near the person and is conducted by a connection to the ground ...



Lightning Injuries



First Aid Care for Lightning Injuries

- Activate EMS, take standard precautions.
- Ensure **scene is safe** for you and the victim.
- Assess the **airway, breathing, and circulation, support lost function** if needed.
- Use AED if victim is pulseless.
- Provide **cervical and spinal immobilization**.
- Assess any response to **pain** in extremities.
- **Treat any other soft tissue trauma** as needed.

Summary

- Burns not only affect the skin, but based on the burning mechanism, there may also be internal injuries.
- Use the Rule of Nines or palmar surface method to determine the extent of a burn.
- Assess, support, and monitor the victim's airway, breathing, and circulation functions.
- Assume an inhalation injury is present in any victim with head/neck burns, or with dyspnea.

Thermal Burns



Chemical Burn



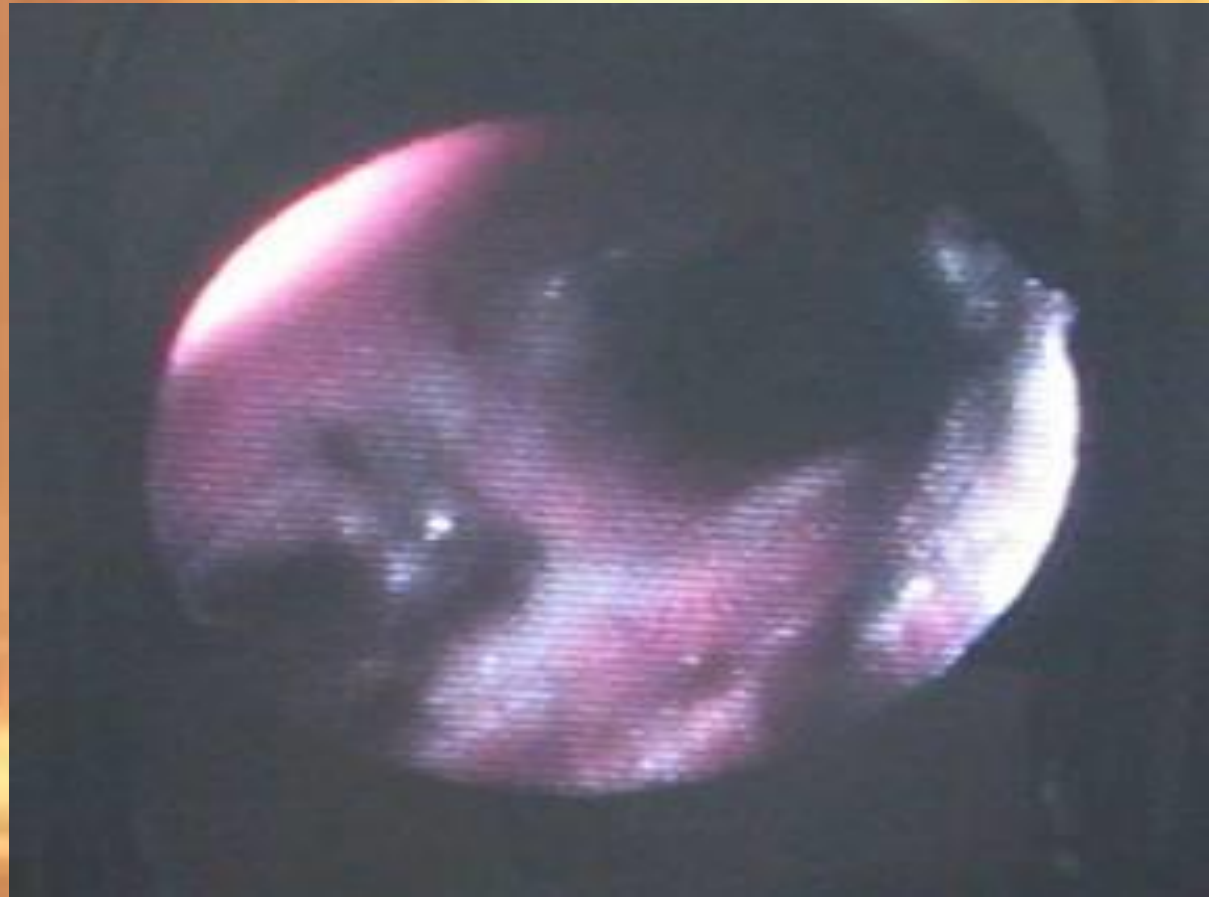
Scald Burns



Electrical Burns



Smoke and Inhalation Injury





Cold Thermal Injury (Frostbite)



















