Chapter 24

Soft-Tissue Injuries

Introduction (1 of 3)

- Soft-tissue injuries are common.
  - Simple as a cut or scrape
  - Serious as a life-threatening internal injury
- Do not be distracted by dramatic open wounds.
  - Do not forget airway obstructions.

Introduction (2 of 3)

- Soft tissues of the body can be injured through a variety of mechanisms:
  - Blunt injury
  - Penetrating injury
  - Barotrauma
  - Burns

Introduction (3 of 3)

- Soft-tissue trauma is the leading form of injury.
- Death is often related to hemorrhage or infection.
- EMTs can teach children and others preventive actions.

The Anatomy and Physiology of the Skin (1 of 8)

- Skin is first line of defense against:
  - External forces
  - Infections
- Skin is relatively tough, but still susceptible to injury.
  - Simple bruises and abrasions to serious lacerations and amputations

The Anatomy and Physiology of the Skin (2 of 8)

- In all instances you must:
  - Control bleeding.
  - Prevent further contamination to decrease the risk of infection.
  - Protect wounds from further damage.
  - Apply dressings and bandages to various parts of the body.

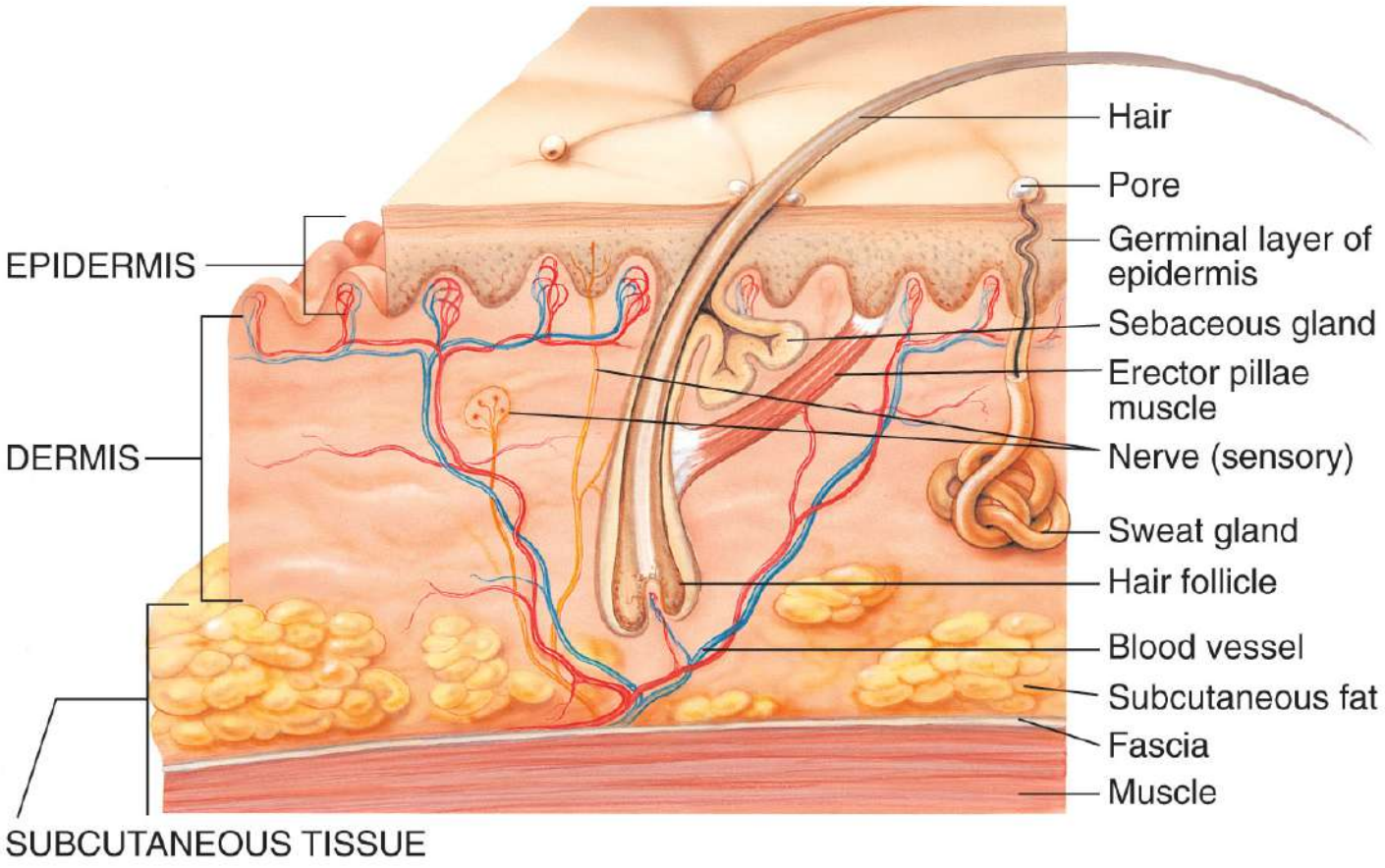
The Anatomy and Physiology of the Skin (3 of 8)

- Skin varies in thickness.
  - Thinner in the very young and very old
  - Thinner on the eyelids, lips, and ears than on the scalp, back, soles of feet
  - Thin skin is more easily damaged than thick skin.

The Anatomy and Physiology of the Skin (4 of 8)

- Skin has two principal layers: the epidermis and the dermis.
  - Epidermis is the tough, external layer.
  - Dermis is the inner layer.

The Anatomy and Physiology of the Skin (5 of 8)



The Anatomy and Physiology of the Skin (6 of 8)

- Skin covers all the external surfaces of the body.
- Bodily openings are lined with mucous membranes.
  - Mucous membranes secrete a watery substance that lubricates the openings.
  - These are wet, whereas skin is dry.

The Anatomy and Physiology of the Skin (7 of 8)

- Skin serves many functions.
  - Keeps pathogens out
  - Keeps water in
  - Assists in temperature regulation
  - Nerves in skin report to brain on environment and sensations.

The Anatomy and Physiology of the Skin (8 of 8)

- Any break in the skin allows bacteria to enter and raises the possibilities of:
  - Infection
  - Fluid loss
  - Loss of temperature control

Pathophysiology (1 of 6)

- Three types of soft-tissue injuries:
  - Closed injuries
    - Damage is beneath skin or mucous membrane.
    - Surface is intact.
  - Open injuries
    - Break in surface of skin or mucous membrane
    - Exposes deeper tissues to contamination

Pathophysiology (2 of 6)

- Three types of soft-tissue injuries (cont'd):
  - Burns
    - Damage results from thermal heat, frictional heat, toxic chemicals, electricity, nuclear radiation

Pathophysiology (3 of 6)

- Pathophysiology of closed and open injuries
  - Cessation of bleeding is the primary concern.
  - The next wound healing stage is inflammation.
  - A new layer of cells is then moved into the damaged area.

Pathophysiology (4 of 6)

- Pathophysiology of closed and open injuries (cont'd)
  - New blood vessels form.
  - Collagen provides stability to the damaged tissue and joins wound borders.

Pathophysiology (5 of 6)

- Pathophysiology of burns
  - Severity of a thermal wound correlates directly with:
    - Temperature
    - Concentration
    - Amount of heat energy possessed by the object or substance
    - Duration of exposure

Pathophysiology (6 of 6)

- Pathophysiology of burns (cont'd)
  - The greater the heat energy, the deeper the wound.
  - Exposure time is an important factor.
  - People reflexively limit heat energy and exposure time.
    - But cannot if unconscious or trapped

Closed Injuries (1 of 4)

- Characteristics of closed injuries
  - History of blunt trauma
  - Pain at the site of injury
  - Swelling beneath the skin
  - Discoloration

Closed Injuries (2 of 4)

- A contusion (bruise) causes bleeding beneath the skin but does not break the skin.
  - Caused by blunt forces
  - Buildup of blood produces blue or black ecchymosis.
- A hematoma is blood collected within damaged tissue or in a body cavity.

Closed Injuries (3 of 4)

- A crushing injury occurs when a great amount of force is applied to the body.
- Extent of damage depends on:
  - Amount of force
  - Length of time force is applied
- When an area of the body is trapped for longer than 4 hours, crush syndrome can develop.

Closed Injuries (4 of 4)

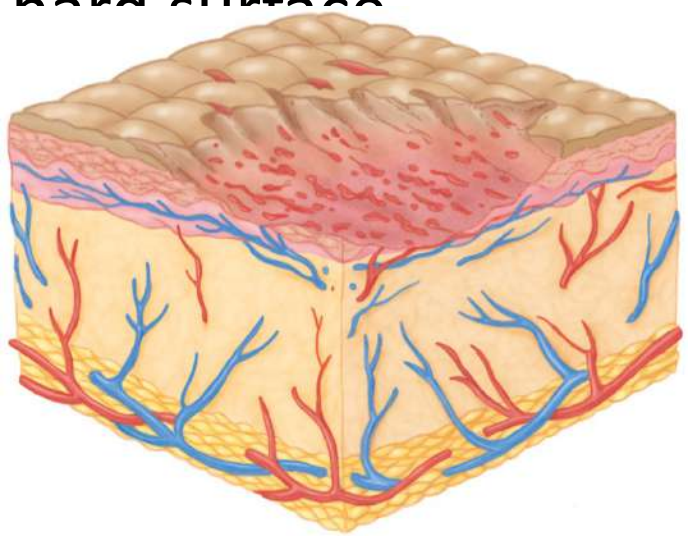
- Compartment syndrome results from the swelling that occurs whenever tissues are injured.
- Severe closed injuries can also damage internal organs.
  - Assess all patients with closed injuries for more serious hidden injuries.

Open Injuries (1 of 7)

- Protective layer of the skin is damaged.
- Wound is contaminated and may become infected.
- Four types:
  - Abrasions
  - Lacerations
  - Avulsions
  - Penetrating wounds

Open Injuries (2 of 7)

- An abrasion is a wound of the superficial layer of the skin.
  - Caused by friction when a body part rubs or scrapes across a rough or hard surface



Open Injuries (3 of 7)

- A laceration is a jagged cut.
  - Caused by a sharp object or blunt force that tears the tissue
- An incision is a sharp, smooth cut

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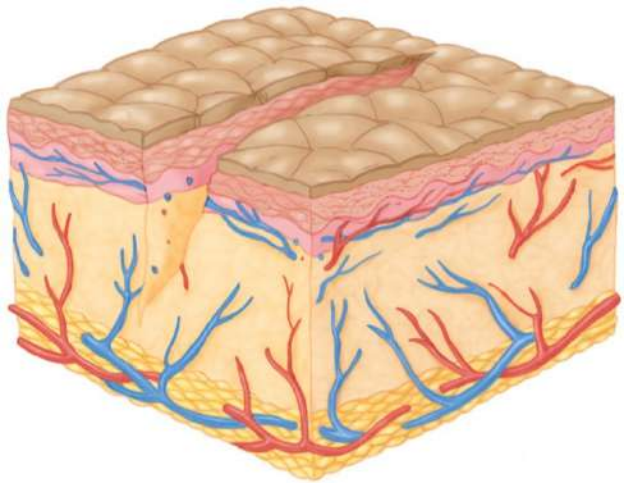
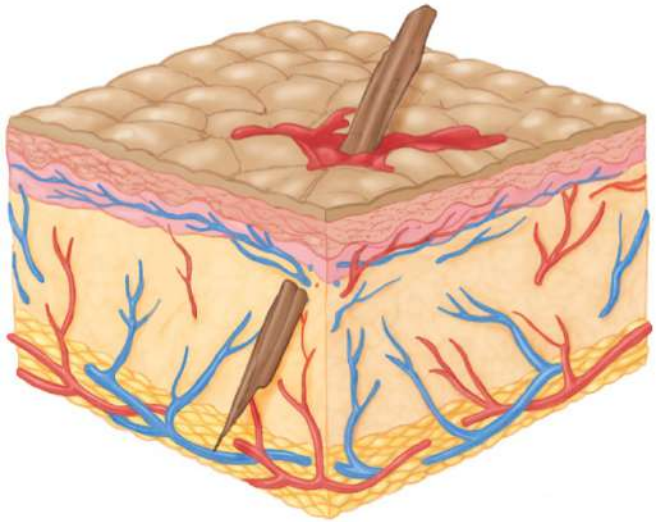


Open Injuries (4 of 7)

- An avulsion separates various layers of soft tissue so that they become either completely detached or hang as a flap.
  - Often there is significant bleeding.
  - Never remove an avulsion skin flap.
- An amputation is an injury in which part of the body is completely severed.

Open Injuries (5 of 7)

- A penetrating wound is an injury resulting from a sharp, pointed object.
  - Can damage structures deep within the body



Open Injuries (6 of 7)

- Stabbings and shootings often result in multiple penetrating injuries.
  - Assess the patient carefully to identify all wounds.
  - Count the number of penetrating injuries.
  - Determine the type of gun and rounds fired, and document your care.
  - You may have to testify in court.

Open Injuries (7 of 7)

- Blast injuries
  - Primary blast injury
    - Damage caused by pressure of explosion
  - Secondary blast injury
    - Damage results from flying debris
  - Tertiary blast injury
    - Victim is thrown by explosion, perhaps into an object

Patient Assessment of Closed and Open Injuries (1 of 2)

- More difficult to assess a closed injury
  - You can see an open injury.
- Consider the possibility of a closed injury when you observe:
  - Bruising
  - Swelling
  - Deformity
  - The patient reporting pain

Patient Assessment of Closed and Open Injuries (2 of 2)

- Patient assessment steps
  - Scene size-up
  - Primary assessment
  - History taking
  - Secondary assessment
  - Reassessment

Scene Size-up (1 of 2)

- Scene safety
  - Observe the scene for hazards to yourself, your crew, and the patient.
  - Assess for the potential for violence.
  - Assess for environmental hazards.
  - Take standard precautions.
  - Determine the number of patients.
  - Consider if you need additional resources.

Scene Size-up (2 of 2)

- Mechanism of injury/nature of illness
  - Look for indicators of the MOI as you assess the scene.
  - The MOI may provide indicators of safety threats.
  - If the scene is unsafe, request additional help early.

Primary Assessment (1 of 4)

- Form a general impression.
  - Look for indicators to alert you to the seriousness of the patient's condition.
  - Do not be distracted from looking for more serious hidden injuries.
  - Check for responsiveness using the AVPU scale.

Primary Assessment (2 of 4)

- Airway and breathing
  - Ensure that the patient has a clear and patent airway.
  - Protect the patient from further spinal injury.
  - Assess the patient for adequate breathing.
  - Inspect and palpate the chest for DCAP-BTLS.

Primary Assessment (3 of 4)

- Circulation
  - Assess the patient's pulse rate and quality.
  - Determine the skin condition, color, and temperature.
  - Check the capillary refill time.
  - You may need to treat for shock.
  - If visible significant bleeding is seen, you must begin the steps to control it.

Primary Assessment (4 of 4)

- Transport decision
  - Immediately transport in these cases:
    - Poor initial general impression
    - Altered level of consciousness
    - Dyspnea
    - Abnormal vital signs
    - Shock
    - Severe pain

History Taking (1 of 2)

- Investigate the chief complaint.
  - Obtain a medical history.
  - Obtain a SAMPLE history.
    - Using OPQRST may provide some background on isolated extremity injuries.
  - If the patient is unresponsive, attempt to obtain the history from other sources.

History Taking (2 of 2)

- Typical signs of an open injury include:
  - Bleeding
  - Break(s) in the skin
  - Shock
  - Hemorrhage
  - Disfigurement or loss of a body part

Secondary Assessment (1 of 4)

- Physical examinations
  - Is the patient in a tripod position?
  - What is the skin's color and condition?
  - Are there any signs of increased respiratory efforts?
    - Retractions
    - Nasal flaring
    - Pursed lip breathing
    - Use of accessory muscles

Secondary Assessment (2 of 4)

- Physical examinations (cont'd)
  - Listen for air movement and breath sounds.
  - Assess pulse rate and quality.
  - Determine the skin condition, color, and temperature.
  - Check the capillary refill time.

Secondary Assessment (3 of 4)

- Physical examinations (cont'd)
  - Assess the neurologic system.
  - Assess the musculoskeletal system with a full-body scan.
  - Assess all anatomic regions.

Secondary Assessment (4 of 4)

- Vital signs
  - You must reassess the vital signs to identify how quickly the patient's condition is changing.
  - Use appropriate monitoring devices to quantify:
    - Oxygenation
    - Circulatory status
    - Blood pressure

Reassessment (1 of 3)

- Repeat the primary assessment.
- Reassess vital signs and the chief complaint.
- Assess all bandaging frequently.
- Identify and treat changes in the patient's condition.

Reassessment (2 of 3)

- Interventions
  - Assess and manage all threats to the patient's airway, breathing, and circulation.
  - Expose all wounds, cleanse the wound surface, control bleeding, and be prepared to treat for shock.
  - Extremities that are painful, swollen, or deformed should be splinted.

Reassessment (3 of 3)

- Communication and documentation
  - Description of the MOI
  - Position in which you found the patient
  - Amount of blood loss
  - Location and description of any soft-tissue injuries or other wounds
  - Size and depth of the injury
  - How you treated the injuries

Emergency Medical Care for Closed Injuries (1 of 3)

- No special emergency care for small contusions
- Soft-tissue injuries may look rather dramatic.
  - Still focus on airway and breathing first
  - You may have to assist ventilations with a bag-mask device.

Emergency Medical Care for Closed Injuries (2 of 3)

- Treat closed soft-tissue injury using the RICES mnemonic:
  - Rest
  - Ice
  - Compression
  - Elevation
  - Splinting

Emergency Medical Care for Closed Injuries (3 of 3)

- Signs of developing shock:
  - Anxiety or agitation
  - Changes in mental status
  - Increased heart rate
  - Increased respiratory rate
  - Diaphoresis
  - Cool or clammy skin
  - Decreased blood pressure

Emergency Medical Care for Open Injuries (1 of 12)

- Before caring for the patient, follow standard precautions.
- Wear gloves and eye protection.
  - Wear a gown and a mask if necessary.
- Make sure the airway is open and administer high-flow oxygen.

Emergency Medical Care for Open Injuries (2 of 12)

- Control life-threatening bleeding using:
  - Direct, even pressure and elevation
  - Pressure dressings and/or splints
  - Tourniquets
- Follow the steps in **Skill Drill 24-1** to control bleeding from an extremity.

Emergency Medical Care for Open Injuries (4 of 12)

- All open wounds are assumed to be contaminated and present a risk of infection.
- Often, you can better control bleeding from an open soft-tissue wound by splinting the extremity, even if there is no fracture.

Emergency Medical Care for Open Injuries (5 of 12)

- Abdominal wounds
  - An open wound in the abdominal cavity may expose internal organs.
  - The organs may even protrude through the wound, an injury called evisceration.

Emergency Medical Care for Open Injuries (6 of 12)

- Abdominal wounds (cont'd)
  - Cover the wound with sterile gauze.
  - Secure with an occlusive dressing.

Emergency Medical Care for Open Injuries (7 of 12)

- Impaled objects
  - To treat an impaled object, follow the steps in **Skill Drill 24-2.**
  - Only remove an impaled object when:
    - The object is in the cheek and obstructs breathing.
    - The object is in the chest and interferes with CPR.

Emergency Medical Care for Open Injuries (8 of 12)

- Neck injuries
  - Open neck injuries can be life threatening.
  - Open veins may suck in air and cause cardiac arrest.
  - Cover the wound with an occlusive dressing.
  - Apply pressure but do not compress both carotid arteries at the same time.

Emergency Medical Care for Open Injuries (9 of 12)

- Small-animal bites
  - A small animal's mouth is heavily contaminated with virulent bacteria.
  - Wounds may require:
    - Antibiotics
    - Tetanus prophylaxis
    - Suturing
  - Bites should be evaluated by a physician.

Emergency Medical Care for Open Injuries (10 of 12)

- A major concern is the spread of rabies.
  - Acute, potentially fatal viral infection of the central nervous system
  - Can affect all warm-blooded animals
  - Transmitted through biting or licking an open wound
  - Prevented by a series of special vaccine injections

Emergency Medical Care for Open Injuries (11 of 12)

- Human bites
  - The human mouth contains an exceptionally wide range of virulent bacteria and viruses.
  - Regard any human bite that has penetrated the skin as a very serious injury.
  - Can result in a serious, spreading infection

Emergency Medical Care for Open Injuries (12 of 12)

- Emergency treatment:
  - Apply a dry, sterile dressing.
  - Promptly immobilize the area with a splint or bandage.
  - Provide transport to the ED.

Burns (1 of 2)

- Account for over 10,000 deaths a year
- Among the most serious and painful of all injuries
- A burn occurs when the body receives more radiant energy than it can absorb.
  - Sources of this energy include heat, toxic chemicals, and electricity.

Burns (2 of 2)

- Always perform a complete assessment to determine whether there are other serious injuries.

Complications of Burns (1 of 2)

- When a person is burned, the skin that acts as a barrier is destroyed.
- The victim is now at high risk for:
  - Infection
  - Hypothermia
  - Hypovolemia
  - Shock

Complications of Burns (2 of 2)

- Burns to the airway are of significant importance.
- Circumferential burns of the chest can compromise breathing.
- Circumferential burns of the extremity can lead to neurovascular compromise and irreversible damage.

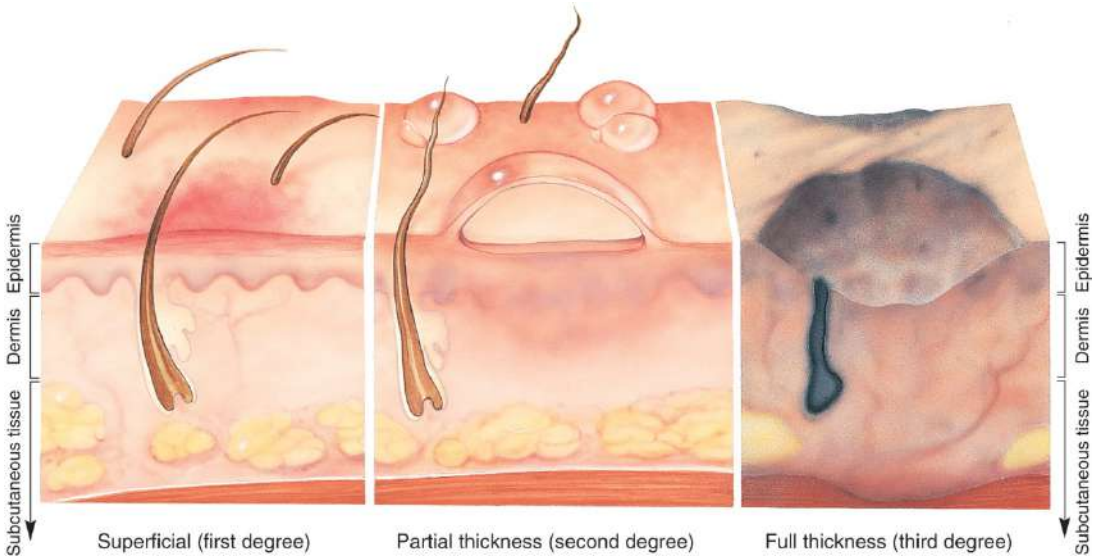
Burn Severity (1 of 5)

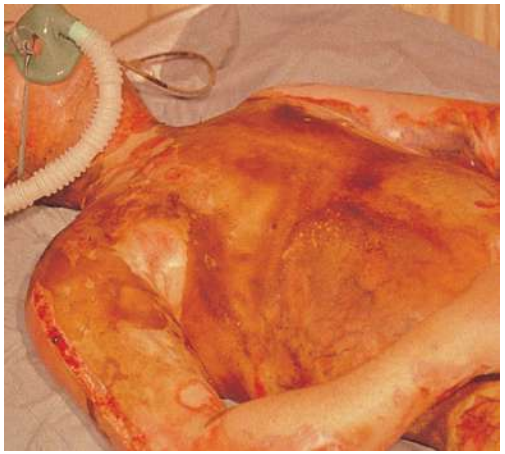
- Burn severity depends on:
  - Depth of burn
  - Extent of burn
  - Critical areas involved
    - Face, upper airway, hands, feet, genitalia
  - Preexisting medical conditions
  - Patient younger than 5 or older than 55

Burn Severity (2 of 5)

- Depth
  - Superficial (first-degree) burns
    - Only the top layer of skin
  - Partial-thickness (second-degree) burns
    - Epidermis and some portion of the dermis
    - Blisters are present.
  - Full-thickness (third-degree) burns
    - Extend through all skin layers.

Burn Severity (3 of 5)





Burn Severity (4 of 5)

- Extent
  - Can be estimated using the rule of nines
  - Divides the body into sections, each representing approximately 9% of the total body surface area
  - Proportions differ for infants, children, and adults

Burn Severity (5 of 5)