Soft Tissue Injuries

Skin-the single largest organ of body

Three major functions:

Protection- protects the body from the environment

- Watertight
- Invasion of infectious agents

Temperature Regulation

- Blood vessels constrict to keep heat in
- Blood vessels dilate to let heat out
- Evaporation releases heat energy

Sensation

- Sensory nerves begin in the skin

Layers of the skin

Epidermis

- Outermost layer of the skin
- Several layers thick
- Top layer of cells are dead and held together by an oily substance
- Sebum -oily substance that gives the skin its water tight seal
- Germinal layer- between the epidermis and the dermis, produce new skin cells
- Different thickness throughout the body

Dermis

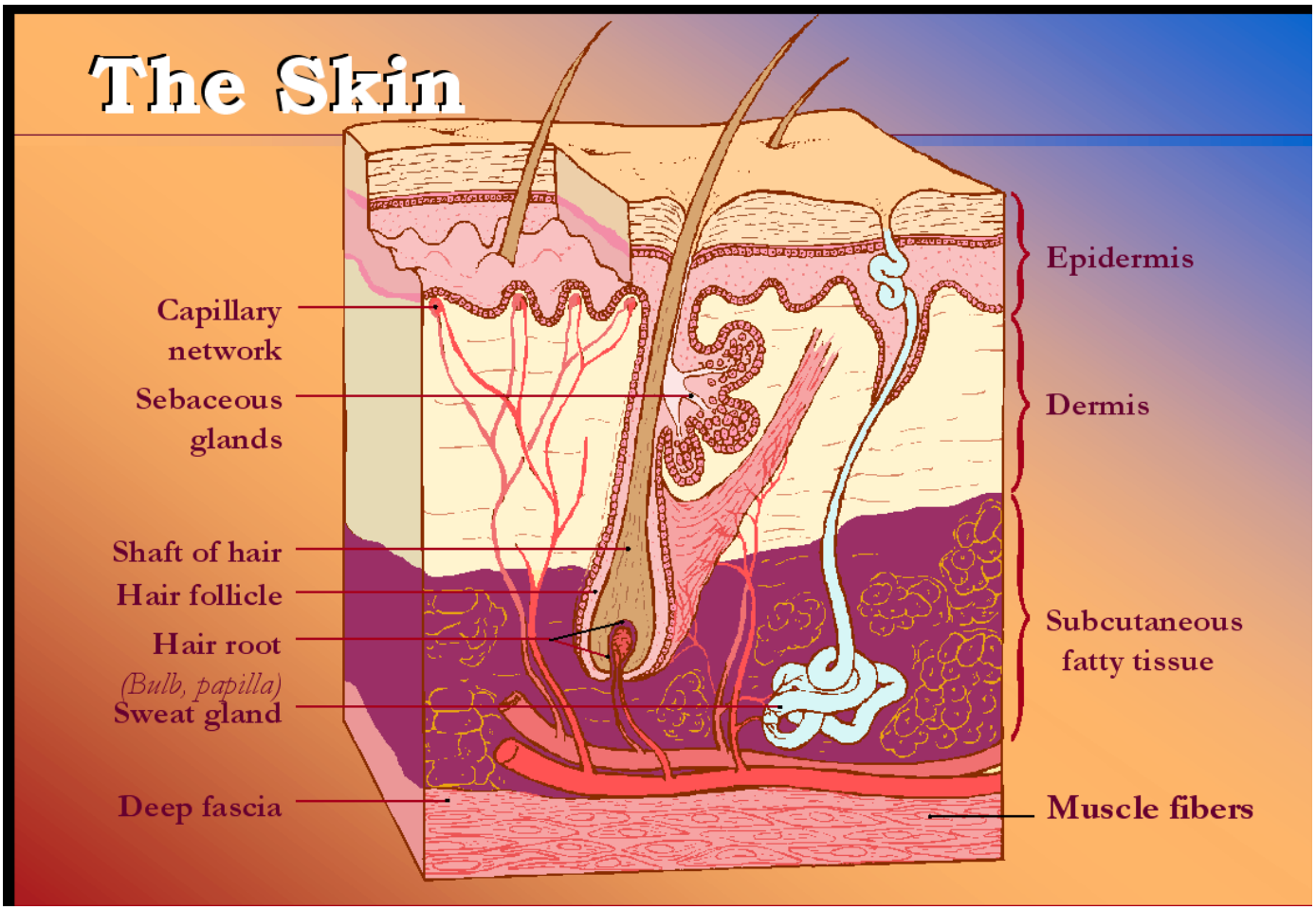
- Contains the specialized structures of the skin
- Sweat glands- produce sweat for cooling
- Sebaceous glands- produce sebum
- Hair follicles- produce hair
- Arrector pili muscle- pulls the hair into an erect position

Subcutaneous tissue- fat

- Insulator
- Energy reservoir

Mucous membrane- lines the body orifices

- Secretes mucus to lubricate the opening



Tissue Injuries

Closed wound- injury in which the soft tissue is damaged below the surface of the skin but the surface of the skin remains intact

Contusion- bruise, injury to the cells and blood vessels contained within the dermis

- Damage to the small blood vessels
- Blood and edema leak into the area
- Ecchymosis- discoloration (blue/black) of the damaged area caused by blood from damaged vessels leaking into surrounding tissue
- Swelling, pain

Hematoma- a pool of blood that collects within the damaged tissue causing swelling, Characterized by a large lump with a bluish discoloration

- Damage to larger blood vessels
- May result with fractures
- Lump the size of the patient's fist can equal a 10% blood loss

Treatment for closed soft tissue injuries (ICES)- usually within the first 24 hours

I - Ice -slows bleeding
C - Compression - slows bleeding
E- Elevation — reduces swelling
S- Splinting — decreases pain and bleeding

Open wound- injury in which the surface of the skin is broken

Abrasion- loss of part of the dermis and the epidermis as a result of rubbing, scraping or shearing away of the epidermis, painful but not usually life threatening

- Road Rash
- Scraped knees, etc.
- Oozing blood-capillary bleeding

Laceration- cut produced by a sharp object

- May be jagged or smooth
- Can go as deep as the muscle

Avulsion- loose flap of skin and underlying soft tissue, torn loose or pulled completely off

- May be severe bleeding
- Blood vessels may tamponade -compress and shut off blood flow
- Severity directly related to blood loss

Puncture- wounds resulting from a sharp or pointed object forced into the skin

• Knife, bullet, ice pick, arrow, pencil, etc.

Crush injury- severe blunt trauma, both open and closed injury

• May not appear severe, can decompensate rapidly when object removed

• A body part is crushed between to objects

• Car falling onto a subject, etc.

Amputation- "Lacerations gone Bad" disruption of the continuity of an extremity

- Cutting, ripping or tearing forces
- May be massive bleeding
- Elasticity of vessels usually tamponade the bleeding

Treatment of open soft tissue wounds

- Control bleeding
- Prevent further contamination
- Immobilize

Special treatments

Avulsion

- Fold flap of skin back in place
- Control bleeding
- For complete avulsed parts:
  - O Place part in dry sterile dressing
  - o Place in plastic bag
  - o Place bag in cool container

Impaled objects

- Do not remove the object unless it is obstructing the airway
- Control bleeding

- Stabilize the object
- Shorten the object if needed

Gunshot wound (GSW)

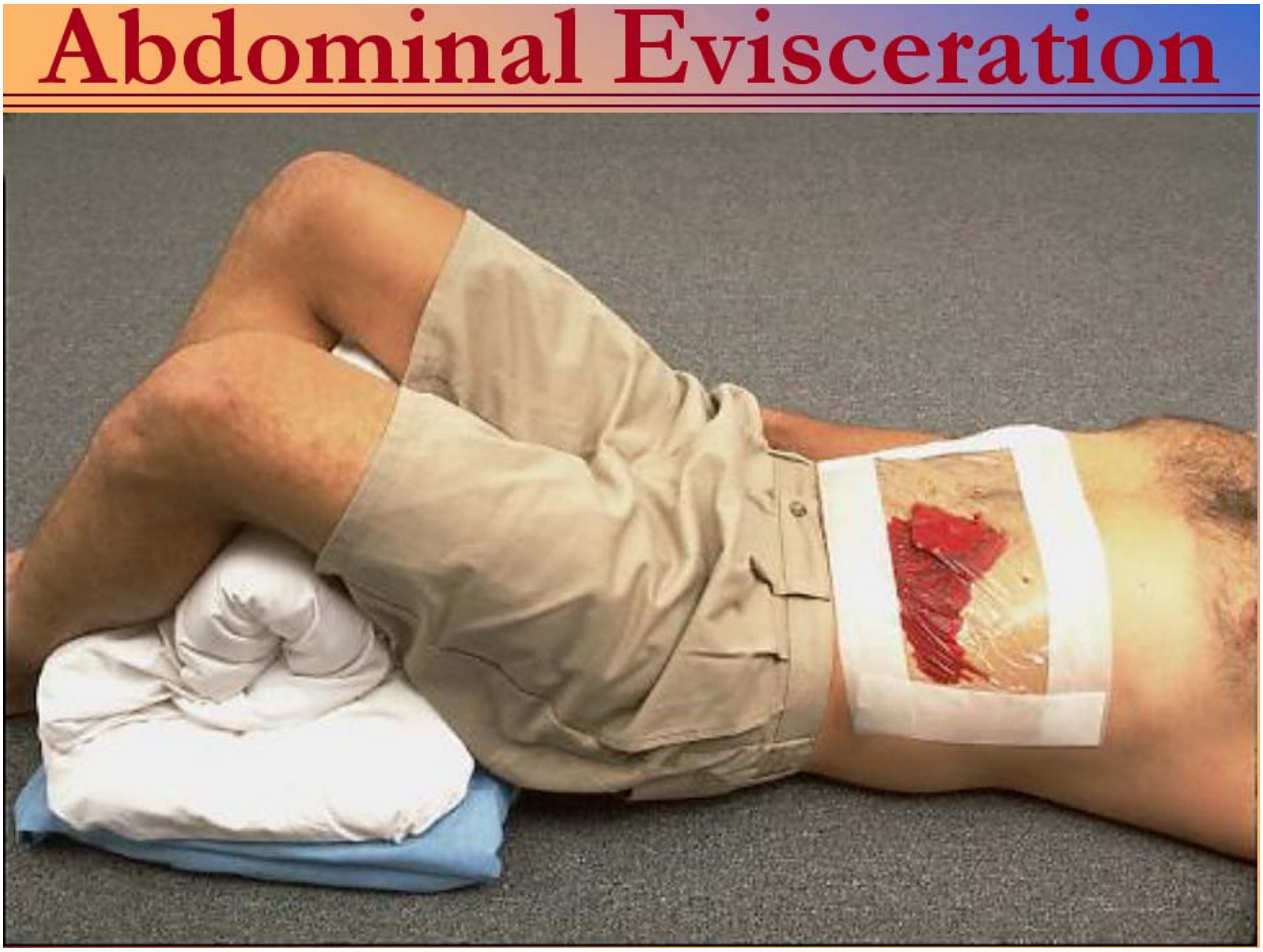
- Entry and exit wounds
- Multiple wounds
- Caliber of weapon
- Suspect spinal injury in GSW involving the trunk, neck, or head

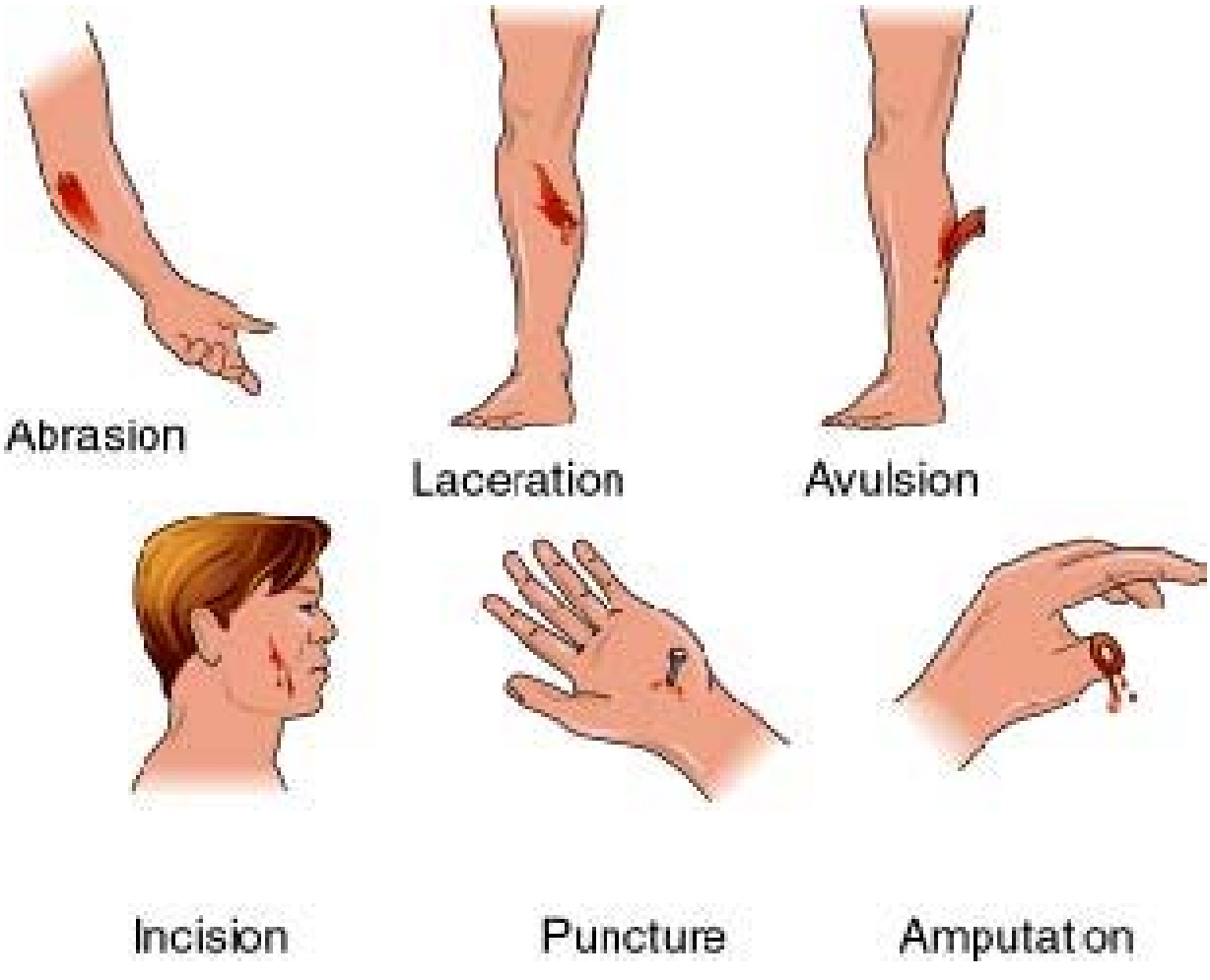
Amputations

- Control bleeding
- Put a tourniquet in place, only tighten if necessary
- Wrap the stump with sterile dressings
- Wrap the amputated part in sterile dressings
- Place the part in a plastic bag
- Place the plastic bag in ice (regular ice NOT dry ice)
- Transport the severed part with the patient

Abdominal Eviscerations-part of the abdominal contents protrude through the abdominal wall

- Do not touch organs, do not try an replace organs
- Cover the organs with a moist sterile dressing
- Cover with an occlusive dressing to prevent heat and moisture loss




Abrasion
Laceration
Avulsion
Incision
Puncture
Amputation

Dressings- sterile, placed directly against the wound

- Controls bleeding
- Protects the wound
- Prevents contamination

Bandage- used to keep a dressing in place

Chest injuries-Signs and symptoms

- Pain at site of injury
- Pain aggravated by increased respirations
- Dyspnea
- Hemoptysis
- Failure of the chest to expend normally
- Rapid, weak pulse
- Low Blood pressure
- Cyanosis

Pneumothorax-the presence of air in the chest cavity but outside the lungs

- May be caused by an open or closed wound
- The normal fluid adhesion is lost
- Increasing pressure may cause the lung to collapse

Signs and symptoms

- Decreased or absent lung sounds on the affected side
- Increased respiratory effort

Treatment:

- Maintain ABC's
- Seal any open wounds to the chest with a gloved hand at first followed by an occlusive dressing
- High flow oxygen
- Support ventilations
- Transport immediately

Spontaneous Pneumothorax- caused by a blow out of the lung from a congenitally weak area

- Sudden sharp chest pain followed by worsening dyspnea
- Absent or decreased breath sounds in the affected side

Treatment

- Maintain ABC's
- High flow oxygen
- Rapid transport

Tension Pneumothorax-pressure in the chest cavity rises, causing pressure to be put on the opposite lung, the heart, and major vessels in the myocardium Signs

- Progressively worsening dyspnea
- Weak pulse (compression of the heart)
- Falling blood pressure
- Bulging of the chest
- Distension of the neck veins
- Tracheal deviation
- Cyanosis

Treatment

- ABC's With supplemental high flow oxygen
- Decompression of the chest (ALS skill)
- Call for ALS backup
- Rapid transport to the ED

Hemothorax- blood in the chest cavity within the pleural space

Signs

- Similar to Pneumothorax
- Hypovolemic shock- bleeding may be concealed within the chest cavity

Treatment

- ABC's with supplemental high flow oxygen
- Treat for shock
- Rapid transport to the ED

Sucking Chest wound- wound in which air from the outside enters from the wound upon each inhalation and exhalation

Treatment

- Seal the wound with occlusive dressing
- Support the ABC's
- Provide high flow oxygen
- Rapid transportation to the ED

Subcutaneous emphysema- air trapped within the soft tissue

Signs

- Crackling sound upon palpation
- Air leaks from the lungs and/or bronchi
- Found in the chest and neck

Treatment

- Support the ABC's with supplemental high flow oxygen

Rib fracture

- Common in the elderly
- May lacerate the surface of the lungs
- Patients will avoid taking deep breaths
- Respirations will be rapid and shallow
- Patient will often hold the affected side to minimize discomfort

Flail chest- 3 or more ribs fractured in 2 or more places, or when sternum fractures along with a rib

- Paradoxical movement of the chest
- Breathing is extremely difficult and painful
- Patient will not receive adequate oxygenation

Treatment

- Maintain airway
- High flow oxygen
- Provide respiratory support
- Immobilize flail segment with bulky dressings or a pillow splint

Traumatic asphyxia

- Sudden, severe compression of the chest
- Produces rapid increase in pressure in the chest
- Neck vein distension
- Cyanosis
- Bleeding into the eyes

Treatment

- High flow oxygen
- Ventilatory support
- CPR if needed
- Rapid transportation

Pulmonary Contusion- bruise to the lung

*Swelling of the tissue decreases the exchange of oxygen and *CO-2*

Signs

- Blunt trauma injuries (mechanism of injury)

Treatment

- Support the ABC's with supplemental high flow oxygen

Myocardial Contusion- bruise on the heart

*Affects the function of the heart

Signs

- Pulse becomes irregular (arrhythmia)
- Blunt trauma to the chest (mechanism of injury)

Treatment

- Support the ABC's with supplemental high flow oxygen

Pericardial Tamponade- Pressure on the heart caused by blood in the pericardium
*The pericardium is a tough sac that does not stretch
*As the sac fills the heart's capacity decreases

Signs

- Faint heart sounds
- Weak pulse
- Narrowing pulse pressures
- Distended neck veins

Treatment

- Support the ABC's with high flow supplemental oxygen
- Rapid transportation

Laceration of the great vessels

Signs

- Hypovolemic shock
- Mechanism of injury- blunt or penetrating trauma to the chest

Treatment

- Support the ABC's with supplemental high flow oxygen
- Prepare for CPR
- Rapid transportation

Burns

- Second most common cause of death in the United States, over 10,000 deaths/ year

Thermal Burns- burns caused by heat

Depth of burn

Superficial (1st degree)- the upper part of the epidermis has been injured

- Red skin (erythematous) (sun burn)
- No blisters

Partial-Thickness (2nd degree)- the epidermis and part of the dermis are involved

- Blisters present

Full-Thickness (3rd degree)- through the dermis and into or beyond the subcutaneous tissue

- Dry, leathery, discolored skin
- Charred Skin

Rule of nines- system of grading the surface area of a burn that divides the body into areas of 9%
The palm of the patient's hand equals 1% body surface area (BSA)*

2nd Degree Burns

Skin red; dry

Superficial or
first degree

Blistered; skin moist, pink or red

Partial thickness
or second degree

Charring; skin black, brown, red

Full thickness
or third degree

Seriousness of Thermal burns

- Depth
- Surface area- rule of nines
- Critical areas-hands, feet, face, throat, and genitalia
- Patient's age-very old or young
- Patient's general health-other injuries or illness

Critical burns

- Burns with fractures
- Burns of the respiratory system
- Full thickness burns of the critical areas
- Full thickness burns greater than 10% BSA
- Partial thickness burns greater than 30% BSA
- Burns of the elderly or critically ill
- Any Full thickness burn in children
- Partial thickness burns greater than 20% BSA in children

Moderate burns

- Full thickness burns 2-10% BSA
- Partial thickness burns 15-30% BSA
- Superficial burns less than 50% BSA
- Partial Thickness burns 10-20% BSA in children

Minor burns

- Full thickness burns, 2% BSA
- Partial thickness burns <15% BSA
- Superficial burns < 50 % BSA Emergency Care of thermal burns
- Stop the burning process
- Cover the burn with dry sterile dressing, Prevent contamination, Conserve body heat
- Support vital functions
    - Ventilation
    - Oxygen as needed
    - **Toxic gases**-may block the hemoglobin from carrying oxygen to the body
        - **Carbon Monoxide-** colorless and odorless
        - **Cyanide-**smells of burnt almonds, given off by burning plastics
- Rapid transport to proper facility

Chemical burns

pH scale-scale that goes from 1-14 that measures the amount of hydrogen ions present

*The bodies normal pH is 7.35 - 7.45

Acid- substance with pH lower than 7.35

Alkali- substance with pH greater than 7.45

*Chemical burns occur when the body comes in contact with a strong acid or alkali

Treatment of chemical burns

Stop the burning process

- Flush the burned area with large amounts of water
- Remove the patient's clothing that may have the chemical on them
- Continue to flush the area even after the burning process has stopped
- With dry chemicals brush off the powder before flushing the burned area Support vital functions

Transport to proper facility

****While treatment is being done have someone obtain as much information on the chemical as possible****

Chemical burns to the eye

- Flush the eye protecting the uninjured eye
- Hold the eyelid open
- Flush for 15-20 minutes
- Cover both eyes for transport

Electrical burns

A complete circuit must be formed from source to ground

Insulator-substance that will not allow current to pass

Conductor- substance that allows a current to flow through

*Look for entrance and exit points

*The amount of damage seen is not all of the damage

Complications of electrical burns

- Cardiac arrest
- Fractures or dislocations
- Trauma from a fall

Precautions

- Do not touch power lines or the patient until power is turned off
- Do not get tunnel vision
- Patients in cars will be safe in the car with lines on them

Lightning injuries

Direct strike- lightning hits the person

Flashover- the lightening travels over the surface of the body

Side flash- splash of lightening from nearby

Stride potential- lightening coming from the ground

- Lightening burns are spidery ion appearance
- Patient will not have residual electricity

Treatment of lightening burns

- Protect C-Spine when opening the airway
- Support the ABC's with supplemental high flow oxygen
- CPR if necessary

Neck injuries

- Can be life threatening
- Air embolism
- Control bleeding
- Cover with occlusive dressing
- Pressure dressing loosely

Eye injuries

- Can produce sever complications
- Examine pupil for shape and reaction

Foreign objects in the eye

- For small objects lying on the surface of the eye, irrigate with saline
- Pull the lid upward and outward
- Never attempt to remove an object on the cornea

Impaled objects in the eye

- Do not remove
- Immobilize the object in place
- Place moist sterile dressings on the injured eye
- Cover the both the injured and uninjured eye
- Support ABC's

Chemical burns

- Chemicals, heat, light rays can burn the eye
- Flush with saline or sterile water
- Force eye open if necessary
- Bandage both eyes with dry sterile dressings
- Transport to proper facility

Thermal burns

- Cover both eyes with moist, sterile dressings
- Transport to proper burn facility

Light burns

- Infrared rays, eclipse light, direct sunlight and laser beams can damage the eye
- Cover both eyes with sterile pads and eye shield
- Transport to proper burn center

Lacerations

- Require very careful care
- Never exert pressure on or manipulate the eye
- If part of the eyeball is exposed, apply moist, sterile dressings
- Cover the injured eye with a protective shield
- Transport to burn center

Eye injuries following head injuries

- One pupil larger than the other
- Eyes not moving together or point in different directions
- Failure of the eyes to follow equally
- Bleeding under the conjunctiva
- Protrusion or bulging of the eye

Contact lenses or artificial eyes

- Keep in the eyes unless there is a chemical burn
- Do not attempt to remove a lens from a injured eye
- If no pupil reaction ask if artificial eye is present

Face and Throat injuries

- Can lead to upper airway obstruction
- Bleeding from the face can be profuse
- Loosened teeth may lodge in the airway

Treatment

- BSI
- Monitor airway- blood draining into the throat can cause vomiting
- Administer oxygen as needed
- Suspect C-Spine injury, take appropriate action
- Control bleeding/ dress wounds

Abdominal and Genitalia injuries

Peritonitis

- Abdominal pain
- Tenderness
- Muscle spasm
- Diminished bowl sounds
- Nausea/vomiting
- Abdominal distension

Signs and symptoms

- Pain
- Tachycardia
- Decreased blood pressure
- Pale, cool, moist skin
- Bruising on the abdomen
- Firm Abdomen

Blunt abdominal wounds

- Severe bruising of the abdomen
- Laceration of solid organs
- Rupture of hollow organs
- Severe abdominal hemorrhage
- Peritoneal irritation and inflammation

Treatment

- Back board C-Spine precautions
- Protect airway
- Administer high flow oxygen
- Rapid transport

Evisceration- wound in which an organ protrudes through the abdomen

- Do not touch organs
- Do not try and replace the organs
- Cover organs with moist sterile dressings
- Cover dressings with occlusive dressing (foil or plastic wrap) to conserve heat and moisture
- High flow oxygen
- Rapid transport

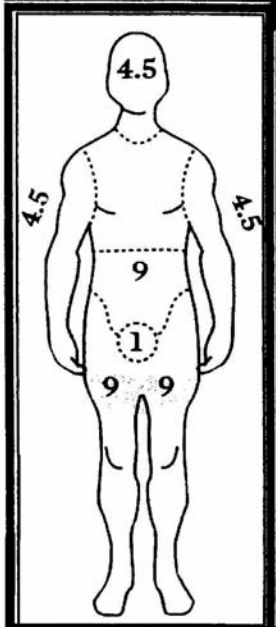
Care for male genitalia injuries

- Painful
- Embarrassing- make patient comfortable
- Sterile, moist dressing to cover areas of striped skin
- Direct pressure to control bleeding
- Never manipulate any impaled object
- Identify and transport any avulsed parts to ED

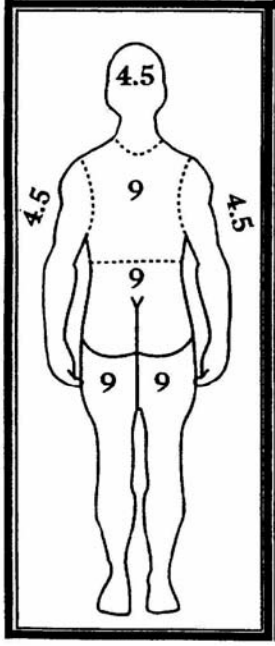
Care of Female genitalia injuries

- Internal genitalia is well protected and usually not injured
- The exception is the pregnant patient, the uterus is vulnerable to both blunt and penetrating trauma
- Keep in mind the unborn child
- Expect to see signs and symptoms of shock
- Rapid transport
- Injuries to the external genitalia are extremely painful, but not usually life threatening
- Treat avulsions and abrasions with moist sterile dressings
- Use diaper type bandage to hold dressings in place
- The urgency of transport will be dictated by the amount of injury and amount of Hemorrhage

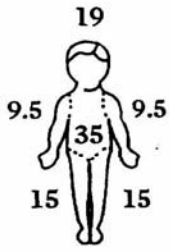
ADULT BODY SURFACE AREA: AGE 15 AND OVER IN PERCENT



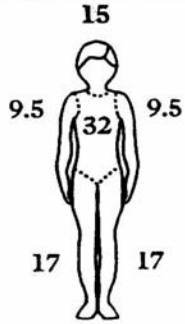
Estimate spotty areas by using the size of the patient's palm as 1%



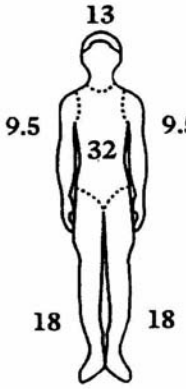
CHILD BODY SURFACE AREA: BY AGE GROUP IN PERCENT



1-4 YEARS



5-9 YEARS



10-14 YEARS

THE AMERICAN BURN ASSOCIATION HAS IDENTIFIED THE FOLLOWING INJURIES AS REQUIRING REFERRAL TO A BURN CENTER AFTER INITIAL ASSESSMENT AND TREATMENT AT AN EMERGENCY DEPARTMENT:

1. Second /third degree burns greater than 10% TBSA in patients younger than 10 or older than 50

2. Second /third degree burns greater than 20% TBSA in patients between the ages of 10 and 50

3. Third degree burns greater than 5% TBSA in patients of any age

4. All second/ third degree burns with threat of cosmetic impairment to face, hands, feet, genitalia or perineum and major joints

5. Electrical burns -- including lightning injuries

6. Chemical burns with threat of functional or cosmetic impairment

7. Burns involving inhalation injury

8. Circumferential burns of the extremities and/ or chest

9. Burns involving concomitant trauma in which the burn poses greatest risk of morbidity or mortality

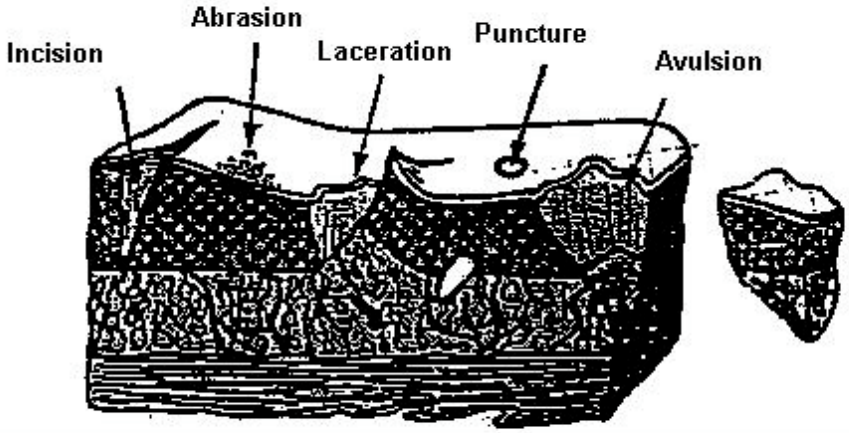
10. Burns in patients with preexisting medical conditions that may complicate management and /or prolong recovery e.g. diabetes, COPD, coronary artery disease, etc

The Evans-Haynes Burn Center
The Medical College of Virginia
Virginia Commonwealth University
(804) 828- BURN

MCV HOSPITALS
Virginia Commonwealth University

Wounds & Bleeding

WOUNDS - THE FIVE TYPES



PRESSURE POINT LOCATIONS