

AMERICAN  
SAFETY &  
HEALTH  
INSTITUTE

WILDERNESS EMERGENCY CARE

# WELCOME.....



PRE-004



# Introductions/Information

- Punctuality
- Bathrooms
- Breaks
- Refreshments
- Dress/Attire
- Cell Phones
- Notes
- Pictures
- Handouts
- Instructor Cadre

**A&J TRAINING SOLUTIONS**

**CPR and FIRST AID classes**

*for you, your family, AND your pet*



# Mary Frayser

- MSN, CCRN, NREMT-P
- VCU Medical Center – Neuroscience ICU
- DHS-HHS-VA-1 DMAT – Nursing Supervisor
- Forest View VRS – Life Member
- Hanover Fire-EMS
- Va. Department of Fire Programs Instructor
- Va. Association of VRS Instructor



# Mary Riding Officer.....



# Dan Wilbert

- US Navy - US Coast Guard Served – 30 years
- Master Chief Gunner's Mate –Retired
- York Co Fire & Life Safety – FF/EMT
- Tidewater Search and Rescue
- ASHI Level 7 Instructor



# Janet Daniels

- Mission Operations for 5 in-orbit satellite instruments
- Senior Science Analyst at NASA Langley
- Va Dept. Of Emergency Management FTM Certified
- Greater Atlantic Rescue Dogs K9 Handler for K-9 Griffon
- ASHI Level 9 Instructor
- Mother of 3 Boys!!!!!!!





# V.M. “Max” Frayser

- Career – Lieutenant, York Co Fire Rescue, Tech Rescue Team
- Volunteer – Lieutenant, Hanover Co FEMS, Training Division
- Central Va. USAR Team Disaster K-9
- Tidewater Search & Rescue – Disaster K-9
- Tactical Care Combat Certified Paramedic
- Nationally Registered EMT-Paramedic
- ASHI Level 9 Instructor
- 35 Years in EMS



# Course Objectives

- Recognize and respond to injury and illness in a remote setting
- Use knowledge to prevent emergencies
- Knowledge and skill objectives for each segment of the course
  - Demonstrate knowledge competency by scoring 77% or better on written exam
  - Demonstrate skill competency by performing all skills without assistance



# Wilderness Emergency Care

- Recognition, assessment and care of an ill or injured person in a remote environment where EMS, transport and definitive care are not readily available
- ***Time and resources and equipment are the difference from standard emergency care***



# Statement

- First, there are pictures in this presentation that some may consider distasteful.
- ***I in no way give you permission or authority to violate your local EMS Practices or Protocols.***
- ***Sometimes Extreme Situations, call for extreme actions.....***



# What is Wilderness?



# Wilderness.....



# Wilderness....



# Wilderness.....





# Wilderness Medicine.... Where did the ideas come from?



# Wilderness Emergency Care

- Assess scene for hazards, victims, clues, bystanders
- Assess the victim(s) if safe to approach
- Treat immediately life-threatening problems (ABC's), as taught in CPR courses
- Prevent further damage (bandaging, splinting, spinal precautions) to the extent of our training
- Provide psychological support and treat for shock
- Determine need and urgency for evacuation
- Provide continued care until hand off to EMS or physician



# WEC Provider Attributes

- Personal health and safety
- Physical fitness
- Comfort in the Environment
- Wilderness survival skills to take care of ourselves as well as our patients
- Higher level of training for extended care and difficult working conditions
- Improvisation skills to work with limited equipment and resources
- Ability to assess and cope with wilderness stresses and hazards



# Unique Wilderness Aspects

- Environmental stress: heat, cold, wet, altitude
- Biological hazards: bugs, snakes, animals, harmful plants, or contaminated water
- Difficult or dangerous terrain
- Long distance from help
- Limited resources
- Psychological impact of an isolated and dangerous situation
- May need to do long-term care in difficult circumstances



# Roles/Responsibilities

- Team Leader
  - Plan ahead
  - Clear instructions
  - Decision making
  - Team safety
  - Strategy
- Team Member
  - Follow instruction
  - Contribute as needed
  - Back up leader
  - Tactics
- Communication and teamwork are essential
- NO “I” in TEAM
- “One Team, One Fight!”



# What emergencies have you experienced or witnessed?

- Injury
- Environmental stress (heat, cold, altitude)
- Biological (bugs, snakes, etc.)
- Medical condition
- Trauma
- Military
- Work Related
- Psychological
- Personal
- Disaster
- Combination



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WILDERNESS EMERGENCY CARE



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# Dealing with Wilderness Emergencies

- Avoid or prevent them if possible
- Recognize them when they happen
- Assess the problems
- Treat injuries
- Treat medical problems
- Treat environmental problems
- Deal with psychological stress



# In Class Preparation for Emergencies

- Practice physical skills until they are reflexive
- Practice mental skills: Making causal and logical connections, figuring things out
- Scenarios: Get into the role – like rehearsing for a play
- Scenarios: Develop assessment, communication, and psychological skills



# Patient Assessment



# Patient Assessment

- Assessment of a wilderness patient includes:
  - Initial assessment for life-threatening conditions
  - Physical assessment to identify all injuries and/or conditions
  - Vital signs
  - Medical history
  - Documentation



# Initial Assessment

- First step in providing care
  - Establish Leadership
  - Whole picture
  - Scene safety
  - Check for life-threatening or disabling conditions
    - **Airway**
    - **Breathing**
    - **Circulation**
    - **Disability**
    - **Environment/Expose**



# Initial Assessment Steps

## Unresponsive vs. Responsive

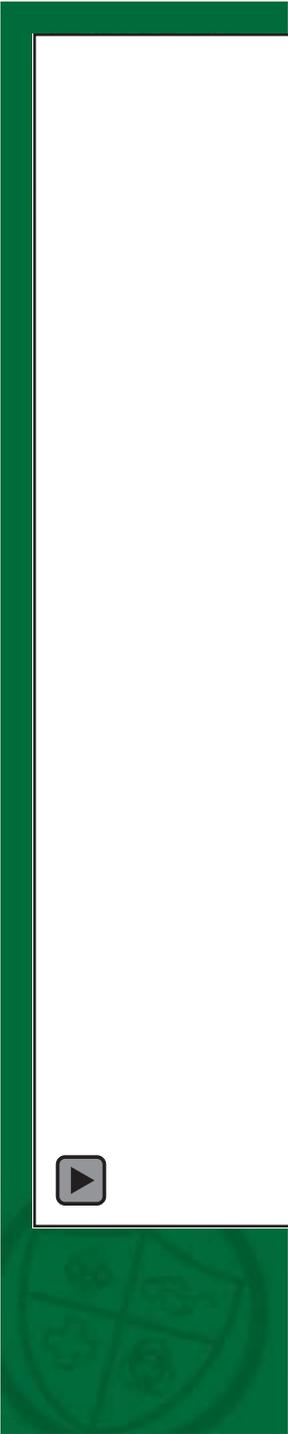
- Order of steps depends on level of responsiveness
- After assuring scene safety and donning BSI, assess responsiveness and breathing
  - Unresponsive, not breathing?
    - Begin CPR
  - Unresponsive breathing?
    - Maintain airway and continue assessment
  - Responsive?
    - Assess ABCDE



# Physical Exam

- Head to toe assessment to identify hidden injuries or conditions
- Done on all patients with significant MOI or decreased LOC
- Performed after initial assessment is completed
- Should be systematic – starting at head
- Blood Sweep.....Rub-Smell





photosx\_2

Feel the  
skull - top



# Feel the skull - back



# Check ears and mouth



# Check the eyes



# Check cervical vertebrae



# Shoulders: Press in



# Shoulders: Press down



# Check the clavicles



# Check the sternum



# Ribs: Take a deep breath



# Check the abdomen



# 4 quadrants



# Pelvic bones: Press in, then down



# Check lumbar spine



# Check each leg



# Feel every inch



# Check sensation and movement





Check  
Strength:  
Have  
patient  
push down  
on hand





Push up  
on hand



# Check the arms



# Check capillary refill



# Check sensation and movement



# Check and compare hand strength



# Check the pulse





Check  
the back



# Cervical Spine Precautions



# Cervical Spine



# Vital Signs

- Used to assess basic body functions and includes:
  - Level of responsiveness (LOR)
  - Pulse/heart rate
  - Capillary refill
  - Respiratory rate
  - Tissue color/temperature
- Monitoring vitals over time can indicate changes in patient condition



# Level of Responsiveness (LOR)

Use **AVPU**

**A**lert – patient alert and answers questions

**V**erbal – patient responds to verbal stimulus

**P**ain – patient responds to painful stimulus

**U**nresponsive – patient unresponsive to all stimuli



# Pulse

- Surge of blood in an artery under your fingers
- Driven by contraction of left ventricle
- Dilates the artery – that's what you feel
- Need an artery near the skin to feel the pulse
- Lay as many fingers on the artery as possible
- **Faint pulse?** Put more pressure on the distal (downstream) finger to strengthen the pulse under upstream fingers.



# Pulse

- Measure at radial artery (wrist)
- Use carotid artery (neck) if radial weak or not present
  - Rate per minute (count for 15 seconds, multiply by four)
  - Rhythm (regular or irregular)
  - Strength (weak or thready, full, bounding)
  - Symmetry (equal strength in both limbs?)
  - Changing in strength or rate (check regularly)



# Pulse v/s Pressure

- if only the patient's carotid pulse is palpable, the systolic blood pressure is 60-70 mm Hg;
- if carotid and femoral pulses are palpable, the systolic blood pressure is 70-80 mm Hg;
- and if the radial pulse is also palpable, the systolic blood pressure is more than 80 mm Hg



# What is a normal pulse?

- Depends on age, physical condition, and pregnancy
- Infants have small hearts, rapid pulses
- Young adult average 70-80 per minute
- Aerobic athlete, e.g. distance runner, may have resting pulse as low as 40
- Pregnant woman (circulating blood for two) has up to 50% more blood
- Resting pulse up to 100 is normal in pregnancy
- Increased blood pressure is NOT normal in pregnancy



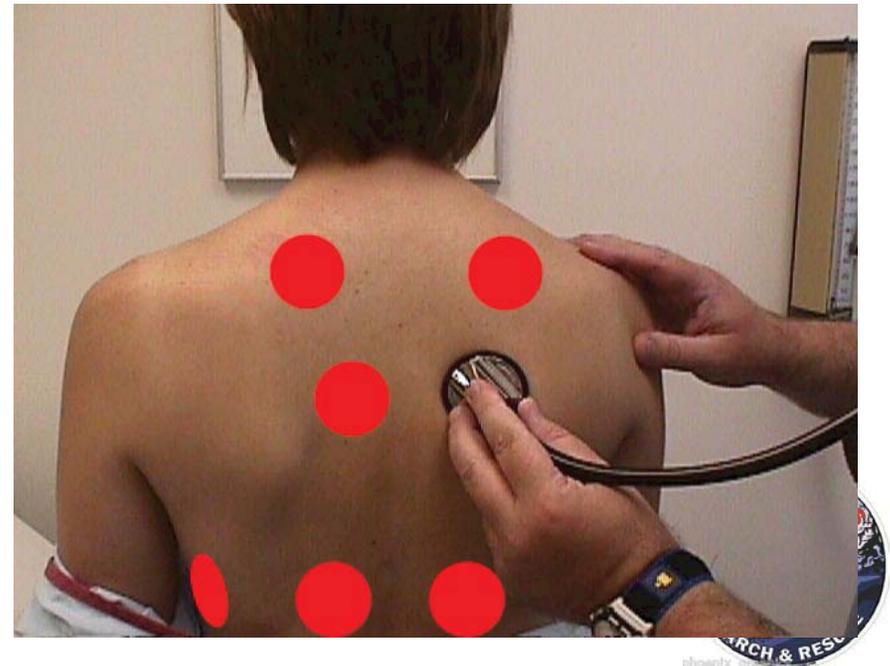
# Capillary Refill

- Indication of how well circulatory system is working
- Press on nail and release
- Less than 2 second refill is normal



# Respirations

- Breaths per minute (15 seconds X 4)
- Rhythm and quality of respirations
- Normal 12-20 breaths per minute, regular and unlabored
- Unusual noises associated with breathing
  - Wheezing
  - Gurgling



# Tissue Color/Temperature

- Tissue color is pink in non-pigmented areas (inside lips, eyelids)
  - Blue, pale or red are abnormal
- Temperature is usually combined with skin moisture
  - Normal is warm and dry
  - Abnormal is hot and dry or cool and wet



# SAMPLE History

- Obtain a history by asking specific questions.
- Use SAMPLE
  - **S**igns and Symptoms
  - **A**llergies
  - **M**edications
  - **P**ast medical history
  - **L**ast oral intake
  - **E**vents leading up to the emergency



# Signs and Symptoms

- Sign: something abnormal that you observe (see, feel, smell, hear)
- Symptom: Something abnormal that the patient feels and communicates
- Patients may use words, body language, or facial expressions to indicate signs and symptoms



# Allergies/Medications

- Does the patient have allergies?
  - Medication
  - Food
  - Environment
- What medicines do they take?
  - Focus on why they take, not names
  - This will often tell you what pre-existing conditions they have
  - Have they taken their meds?
  - Do they have them?



# Medical History/Oral intake

- Pertinent (relevant) history most important
  - What medical conditions do they have?
  - Is there pre-existing injury or illness?
  - Have they had this before?
- When was their last meal? Last fluids?
- Are they urinating normally.....
- What color is their Urine?



# AM I HYDRATED?

## Urine Color Chart

1		
2		If your urine matches the colors 1, 2, or 3, you are properly hydrated.
3		Continue to consume fluids at the recommended amounts.
<hr/>		
4		If your urine color is below the <b>RED</b> line, you are
5		<b><u>DEHYDRATED</u></b> and at risk for cramping and/or a heat illness!!
6		<b><u>YOU NEED TO DRINK MORE WATER!</u></b>
7		
8		

GOOD



## Events

- What were they feeling before the emergency?
- What happened that could have caused this?
- Look at the Big Picture
- Mechanism of injury (MOI) if un-witnessed



# Documentation

- Important to document your findings and care until patient is handed off to EMS or physician.
  - Patient complaint and history (SAMPLE)
  - What you observed/assessed, such as vital signs, physical findings
  - What was the problem to treat
  - Treatment you provided
- Subjective findings, objective findings, assessment and plan (SOAP) format may be helpful



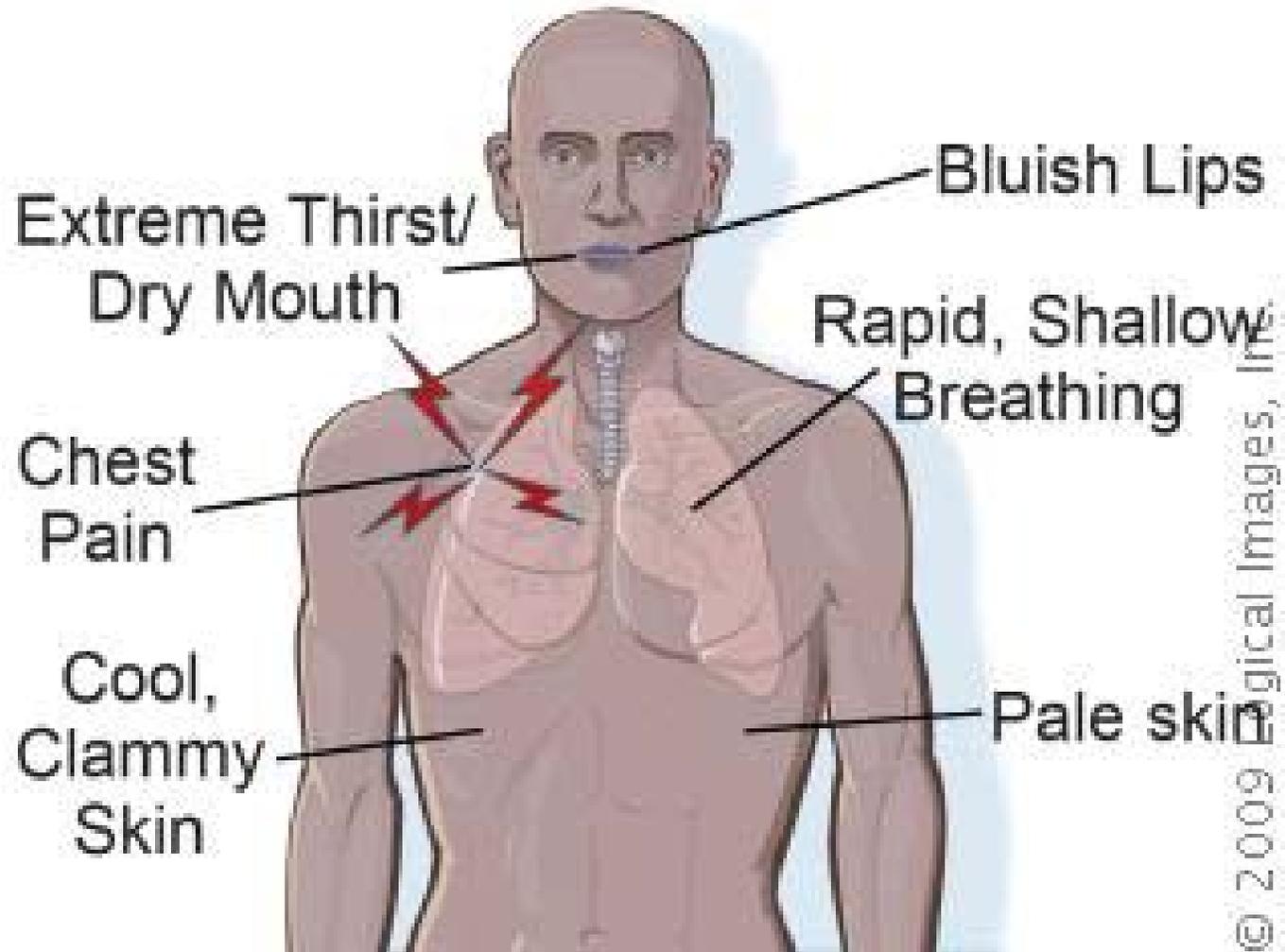
# General Approach to Patient



- Survey Scene
  - Scene safe?
  - MOI
- BSI
- Initial Assessment
  - Treat life threats
- Physical exam
- Vital Signs
- SAMPLE history
- Treat specific injury or illness
- Evacuation decision
- Document with SOAP, Subjective, Objective, Assessment, Plan



# Shock



# Shock

- Definition: not enough oxygen delivered to vital organs by the blood
- Vital organs start to die
- Mechanisms (and therefore Signs and Symptoms) may vary, but effect is the same



# Causes of Shock

- Loss of blood volume (hypovolemic)
  - External/internal bleeding
  - Dehydration
- Spinal injury (neurogenic)
- Heart attack/failure (cardiogenic)
- Allergic reaction (anaphylaxis)
- Infection (septic)



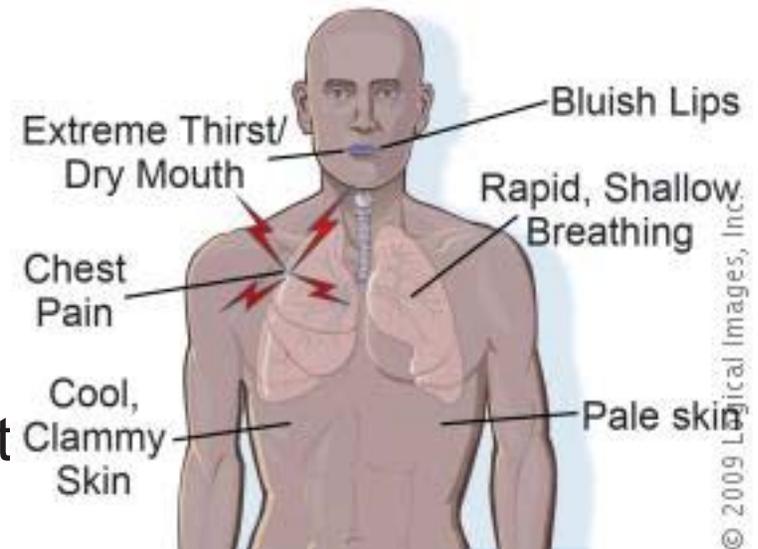
# Shock Signs and Symptoms

- Anxiety or agitation
- Decreased LOR
- Cool and pale skin
- Rapid, weak pulse
- Slow capillary refill
- Increased breathing rate
- Nausea and thirst
- Weakness, trembling



# Treatment for Shock

- Treat the cause
- Give oxygen if you have it
- Monitor ABCs
- Maintain body temperature
- Provide psychological first aid
- Place patient in supine position if possible
- Raise the legs if not contraindicated



## Advanced Shock

- Mottled, cold skin
- Weak or absent radial pulse
- Labored respirations
- Decreased LOR – unconscious
- Evacuate rapidly – go fast –  
any patient with:
  - Prolonged shock
  - Advanced shock



# Wilderness Wound Care



# Bleeding

- Controlling serious bleeding first priority in wound care
- Most external bleeding can be controlled with direct pressure.
- Internal bleeding is difficult to detect and control
  - Look for Signs and Symptoms of shock
- Both can rapidly cause shock

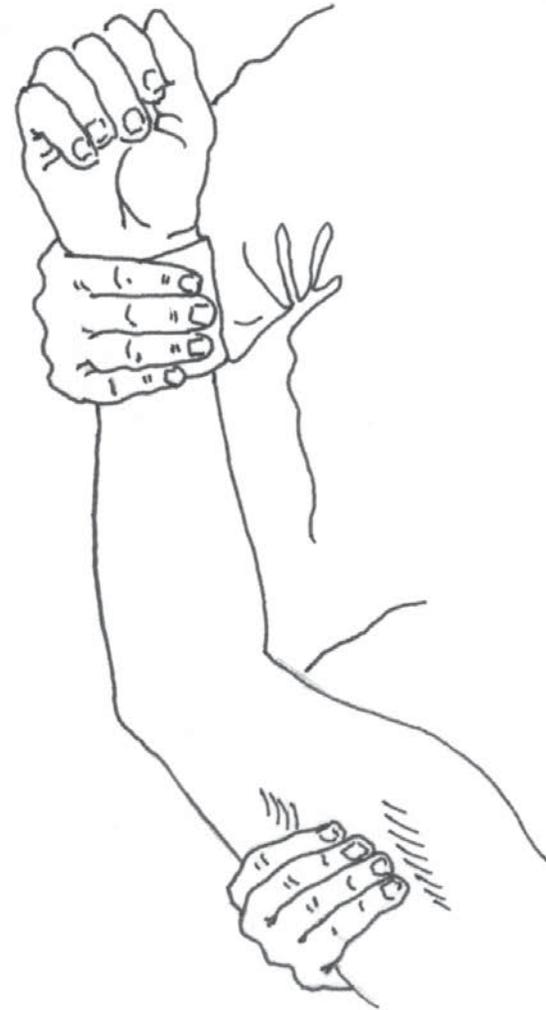


# Bleeding Control

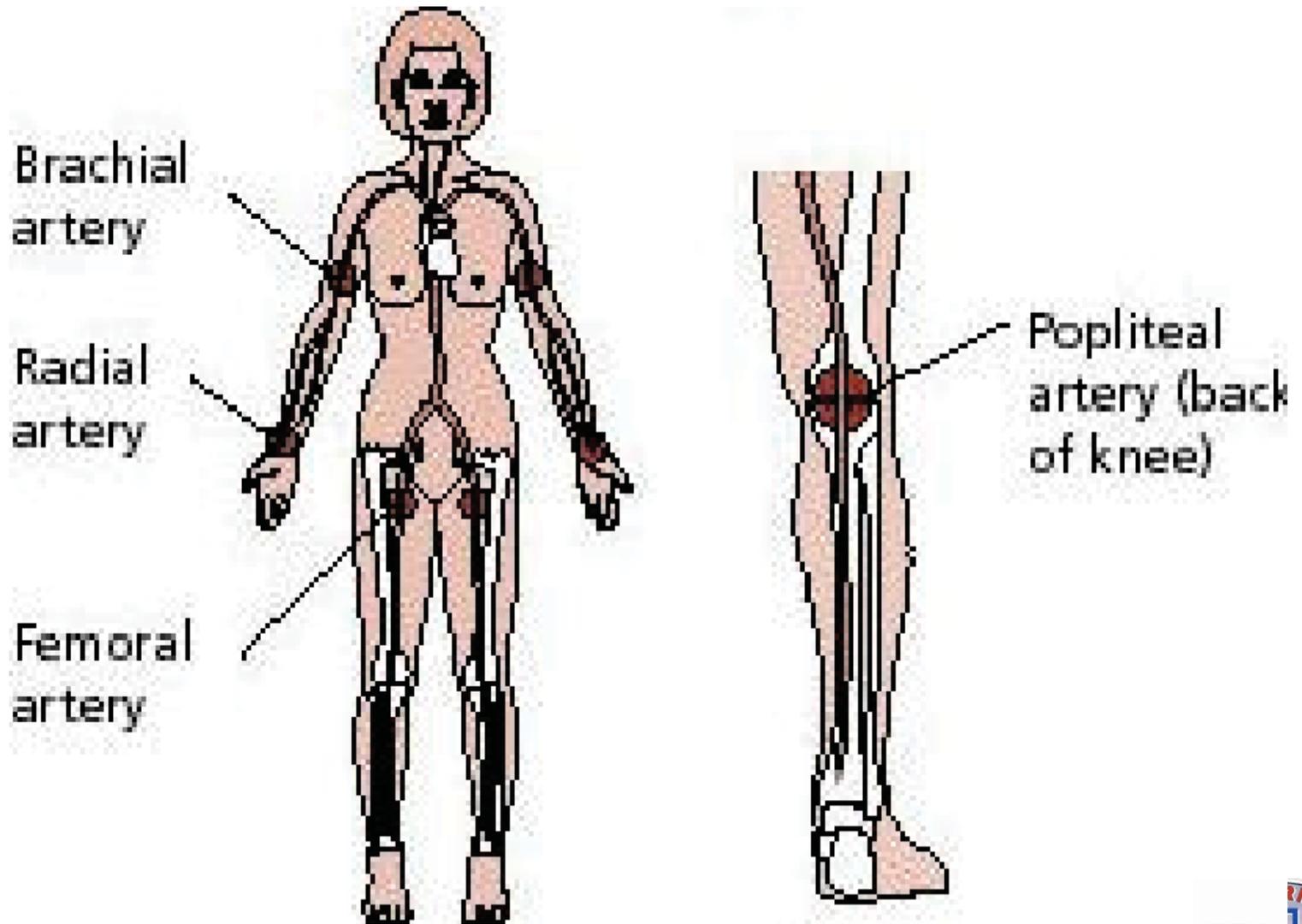
- Start with direct pressure on the wound with your hand
  - If possible place a clean dressing on wound
  - If the wound is large or a puncture pack it
- Continue to apply pressure and dressings until bleeding controlled
- A tourniquet is rarely needed and is a life or limb decision



# Direct Pressure, Elevation, Pressure Point



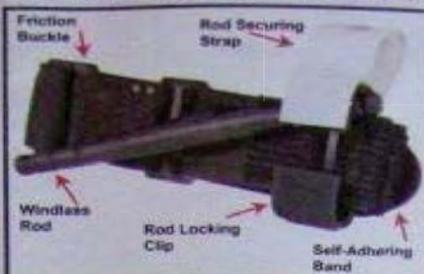
# Pressure Points





## Instructions for Use: One-handed Application

The C-A-T is delivered in its one-handed configuration. This is the recommended storage configuration.



- 2** Pull the band tight and securely fasten the band back on itself.



- 4** Twist the rod until **bright red** bleeding has stopped and the distal pulse is eliminated.



- 6** Adhere the band over the rod, inside the clip, and fully around the limb.



- 1** Insert the wounded limb through the loop formed by the band.



- 3** Adhere the band around the limb. Do not adhere the band past the rod clip.



- 5** Place the rod inside the clip locking it in place. Check for bleeding and distal pulse.



- 7** Secure the rod and band with the strap. Prepare for transport and reassess.



## Storing in the One-Handed Configuration

- 1** Pass the red tip through the inside slit in the buckle.

Pull 6" of band through, fold it back and adhere the band to



- 2** Flatten the loop formed by the band. Place the buckle in the middle of the flattened band.

Place the buckle in the middle of the flattened band.



- 3** Fold the C-A-T in half placing the buckle at one end.

The C-A-T is now ready to be placed in your medical kit.



# Factors That Slow Healing

- Hard to protect parts of body that you need to use and/or get dirty, e.g. hands, feet
- Inadequate equipment for wound care
- Time for infection to develop
- Probably lack resources for treating infection
- Many wound pathogens in environments favorable to life, e.g. tropical
- Healing slows at high altitude, stops at 18,000 feet (if not using supplemental oxygen)



# How to Prevent Infection

- Clean hands/wear gloves if available
- Irrigate forcefully with reasonably clean water
- Use diluted povidone-iodine in last rinse if available
- Scrub skin around wound (wipe away from wound)
- AVOID hydrogen peroxide and tincture of iodine – damages tissues
- AVOID alcohol – does not clean or disinfect
- Protect wound with sterile dressings/bandages – change dressings at least once a day if possible
- Hot soaks may help if signs of infection are seen



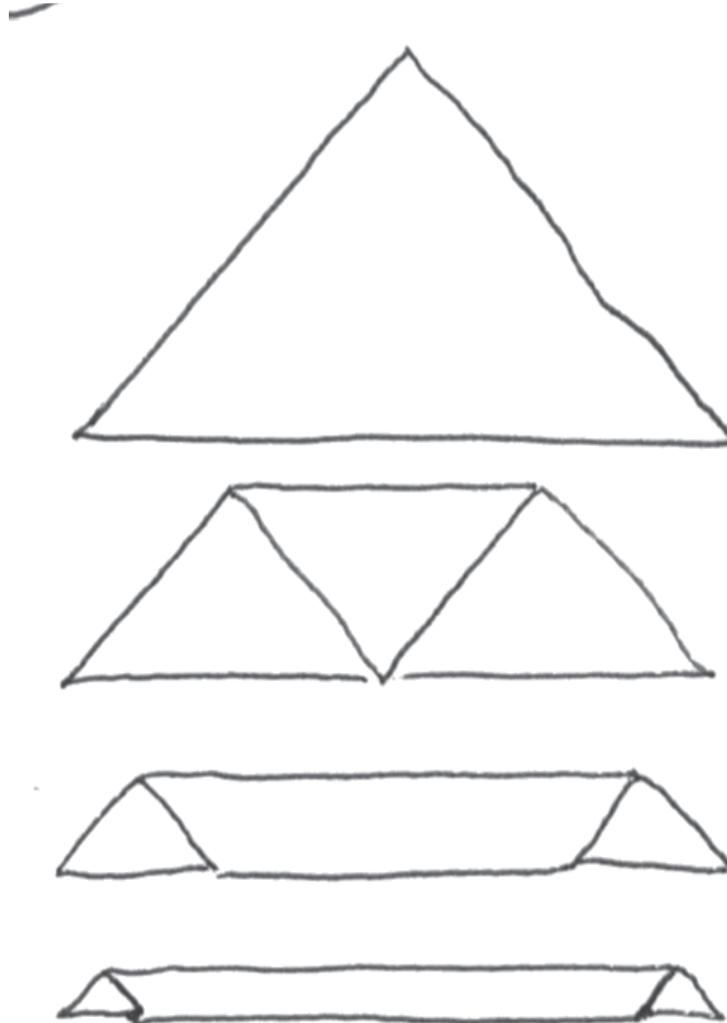


# Wound Care Priorities

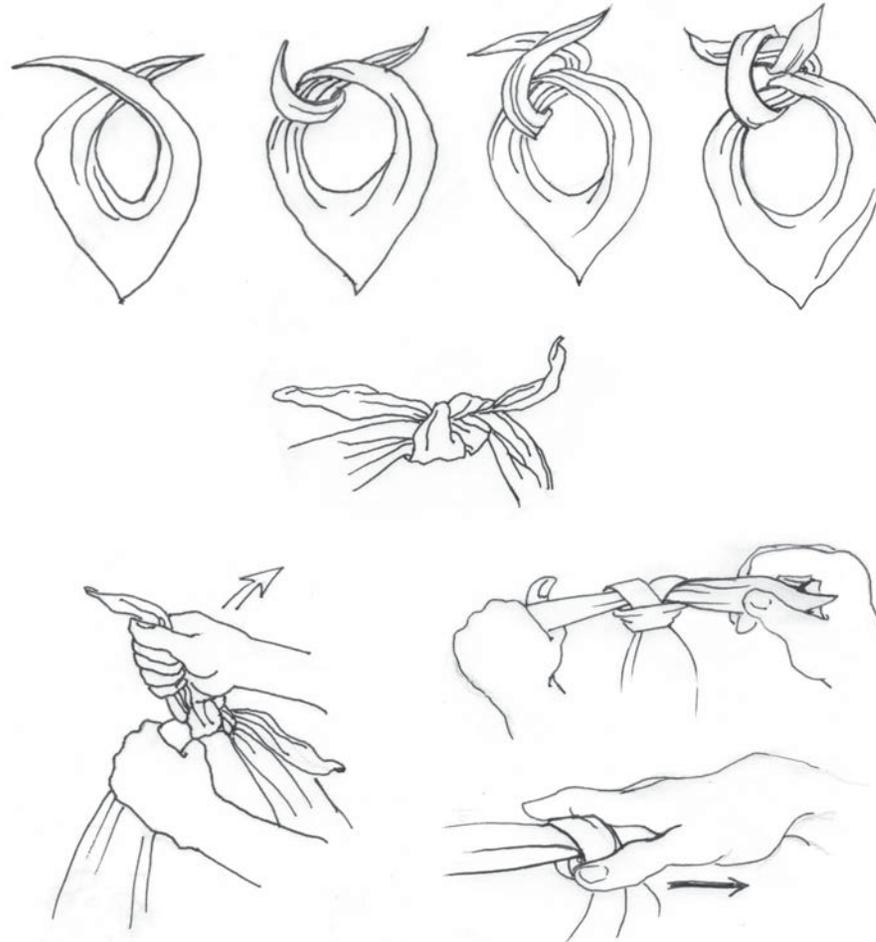
- Stop severe bleeding and treat for shock
- If bleeding is not severe, clean the wound
- Need forceful irrigation to remove debris
- Protect the wound with sterile dressings secured by bandages or tape
- Evacuate any patient with a wound that:
  - Is heavily contaminated
  - Involves a joint space, ligaments or tendons
  - Animal bite
  - Deep facial cut
  - Impalement or crushing injury



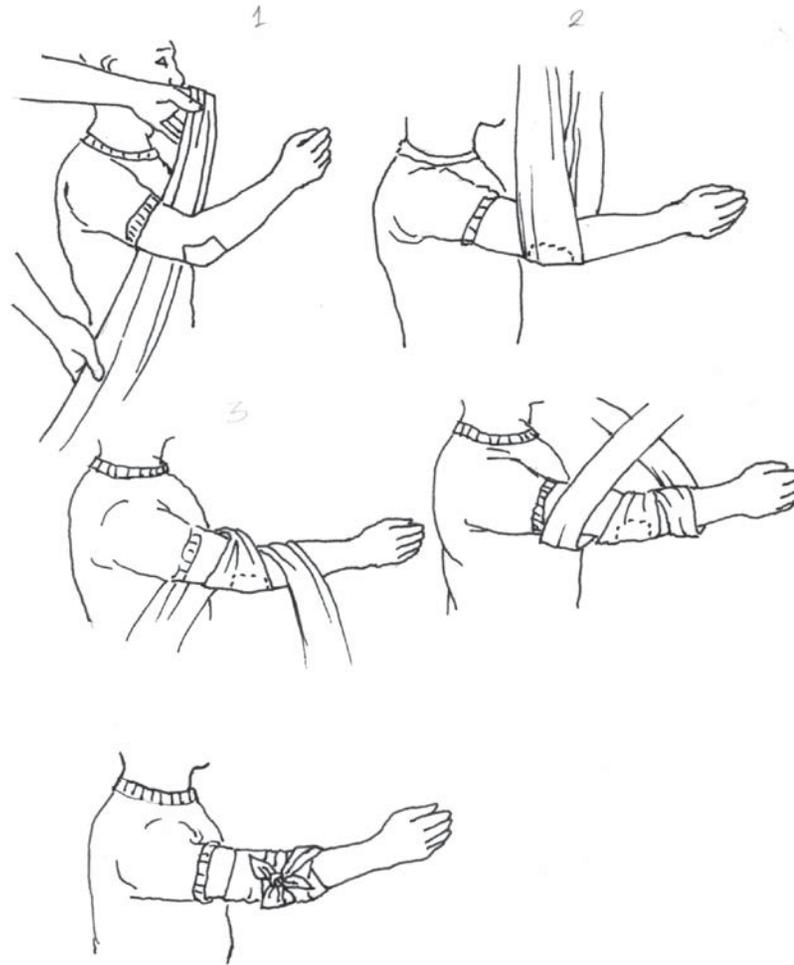
# Folding a Cravat Bandage



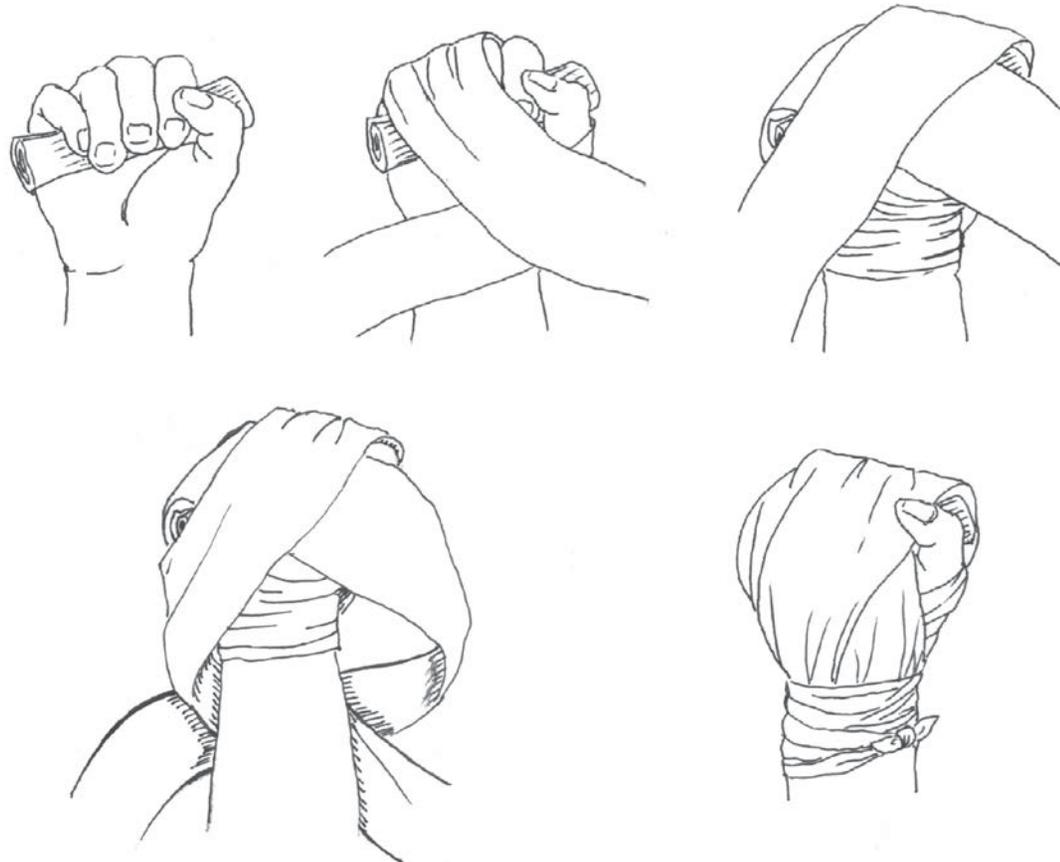
# Square Knot and Quick Release



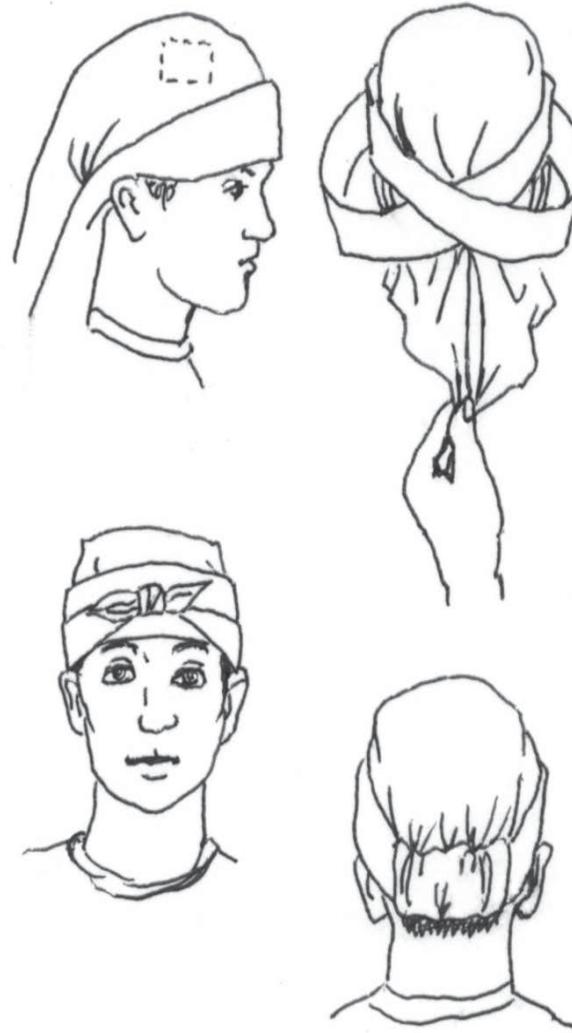
# Figure 8 Bandage



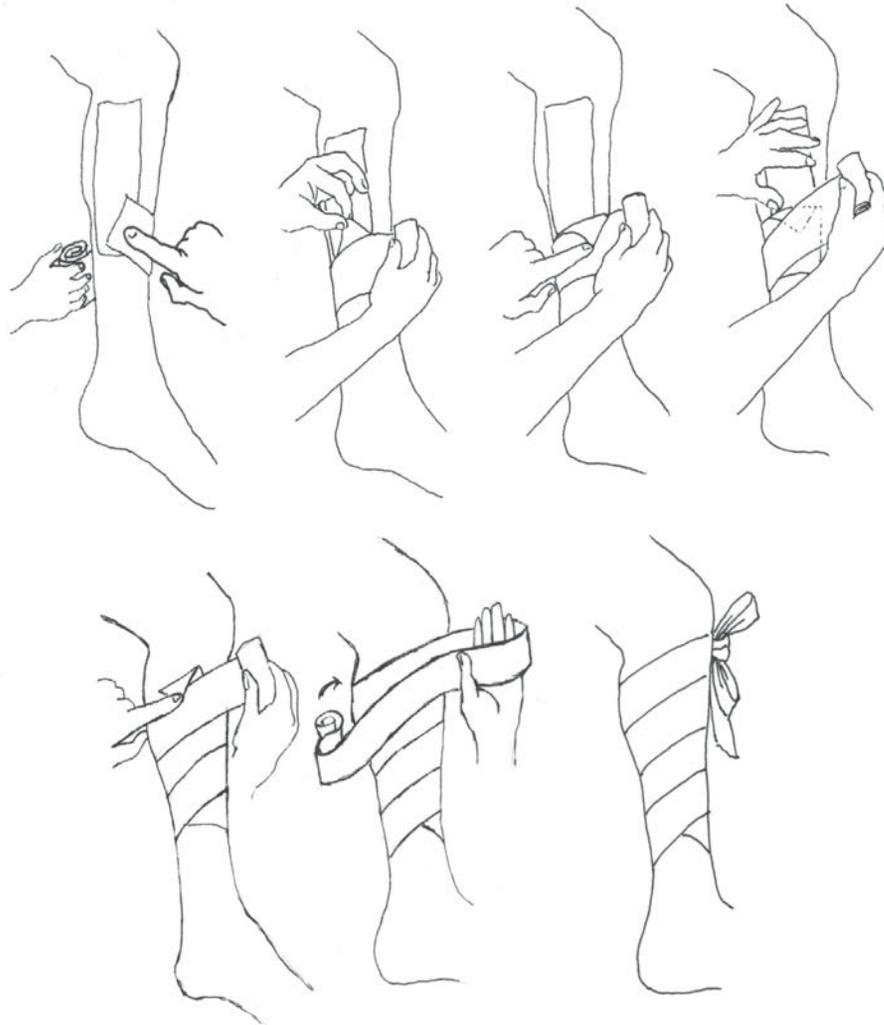
# Cravat Bandage



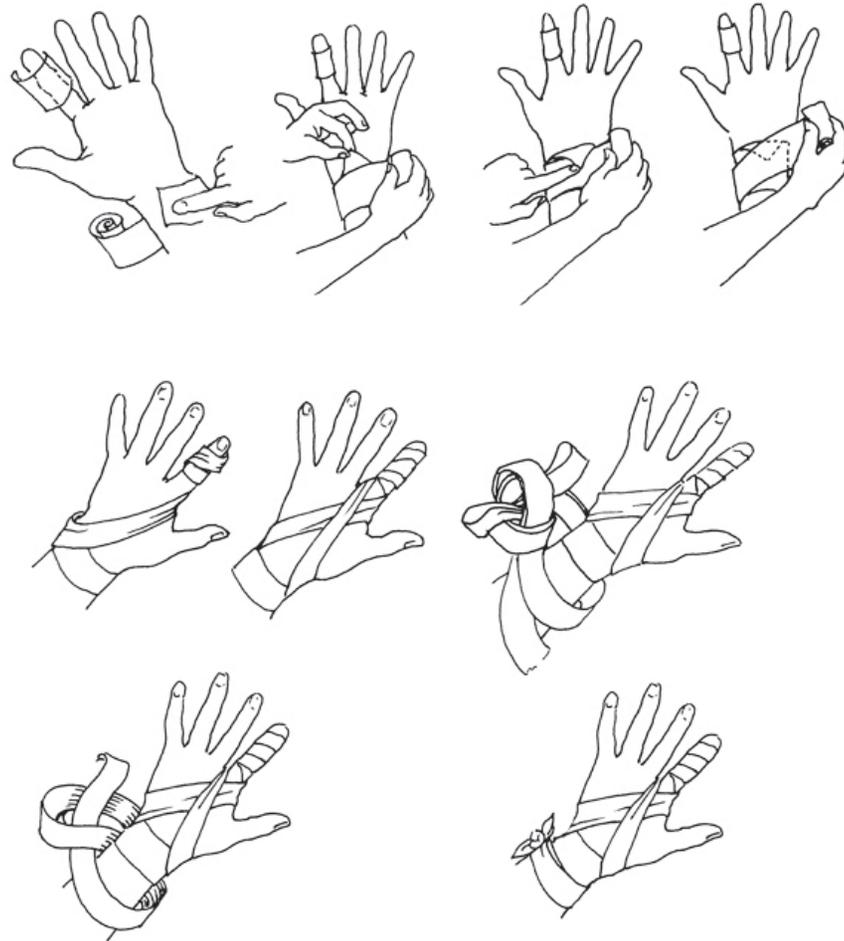
# Head Bandage



# Gauze Roller Bandage



# Finger Bandage



# New Ideas...

## High Strength Pressure Bandage

Immediate direct pressure

Quick and easy self-application

Vacuum-sealed packaging

Significant time, space and cost saving



firststar.en.alibaba.com

Size:

A-4 4" \* 5yds (10cm \* 450cm)

A-6 6" \* 5yds (15cm \* 450cm)

# Types of Wounds

- Puncture – high risk of infection
- Incision – can easily cut blood vessels, nerves
- Laceration – tearing action leaves ragged edges, crushed tissue (hard to heal, risk of infection)
- Abrasion – large area of damaged skin, hard to clean and protect
- Avulsion – flap of tissue may die
- Amputation – need to protect and preserve severed body part



# Deep Abrasion



# Laceration



# Thumb Amputation



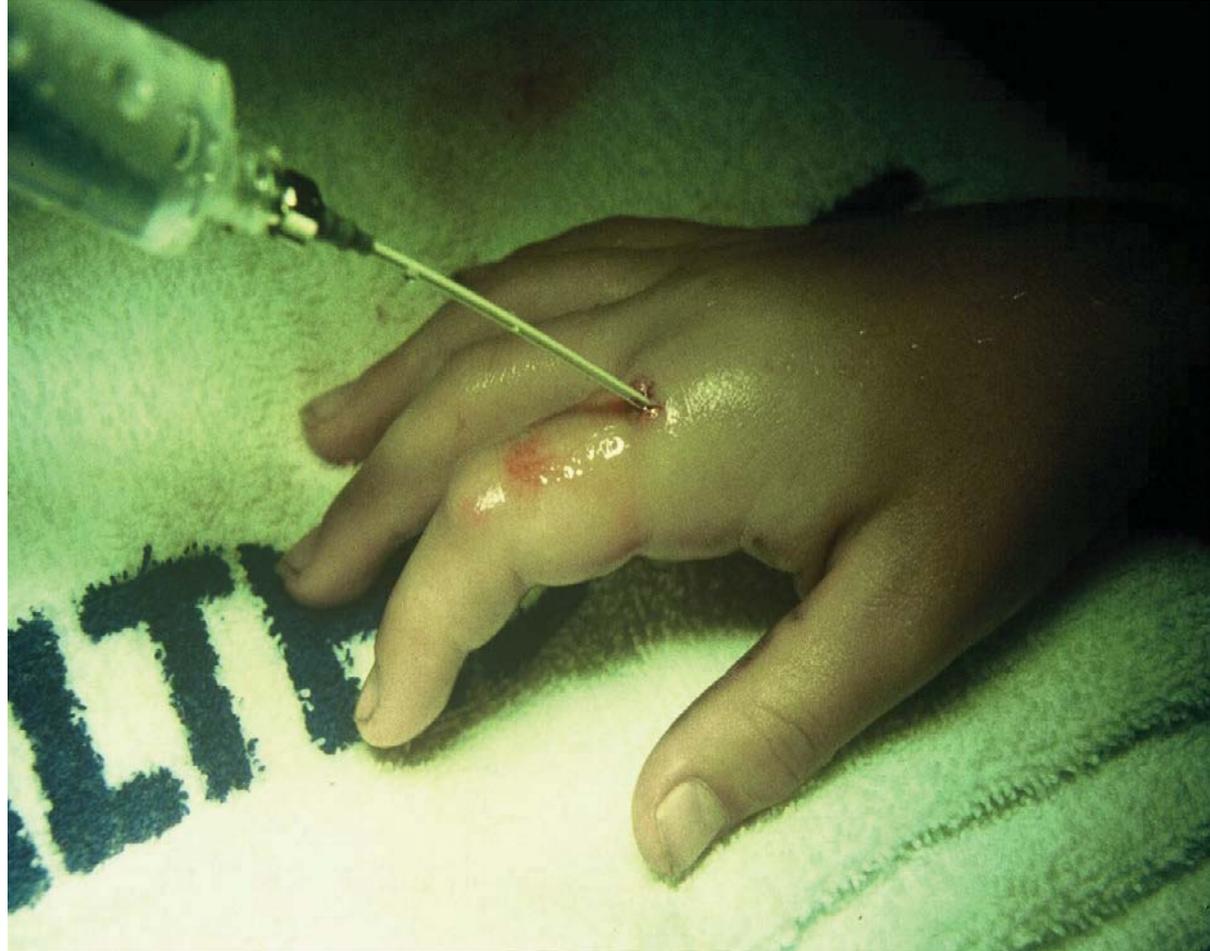
# Amputated Thumb



# Thumb Re-attached



# Irrigating a Wound



# Impaled Objects

- In an urban situation, do not remove
- Immobilize with bulky dressings
- Exception: impaled through cheek, endangering airway - must remove
- Wilderness situation – may need to remove from limb, especially if loose
- Never remove if penetrating vital organs



# Impaled Object: Immobilize



# Neck and Scalp Wounds

- Neck Wound
  - Pull or pinch wound edges together if possible
  - If pressure is needed, use a figure-8 bandage: around the neck, cross on shoulder, secure under armpit
- Scalp wound with possible skull fracture
  - Avoid pushing bone into brain
  - Use hair to pull wound edges together if possible
  - Not enough hair? Use tape
  - Use bulky dressings and light pressure



# Wound Treatment Checklist

- Be sure you've found all wounds
- Remove foreign matter: Irrigation, tweezers
- For wounds on extremities, check distal functions (circulation, nerve functions) regularly
- Immobilize and elevate severe wounds on extremities
- For head wounds, check for Signs and Symptoms of brain injury



# Preventing Blisters

- Proper fitting of boots
- Pad boots with mole Foam/Skin to fill gaps
- Apply tape or moleskin over hot spots before they blister
- Cover heels before going uphill
- Tighten laces and tape vulnerable toes before going downhill



# Heel Blisters



# Treating Blisters

- Protect with Mole foam/skin™ donut
- Spenco® 2<sup>nd</sup> Skin® in donut hole
- Cover with moleskin or tape
- If you puncture blister, similar treatment



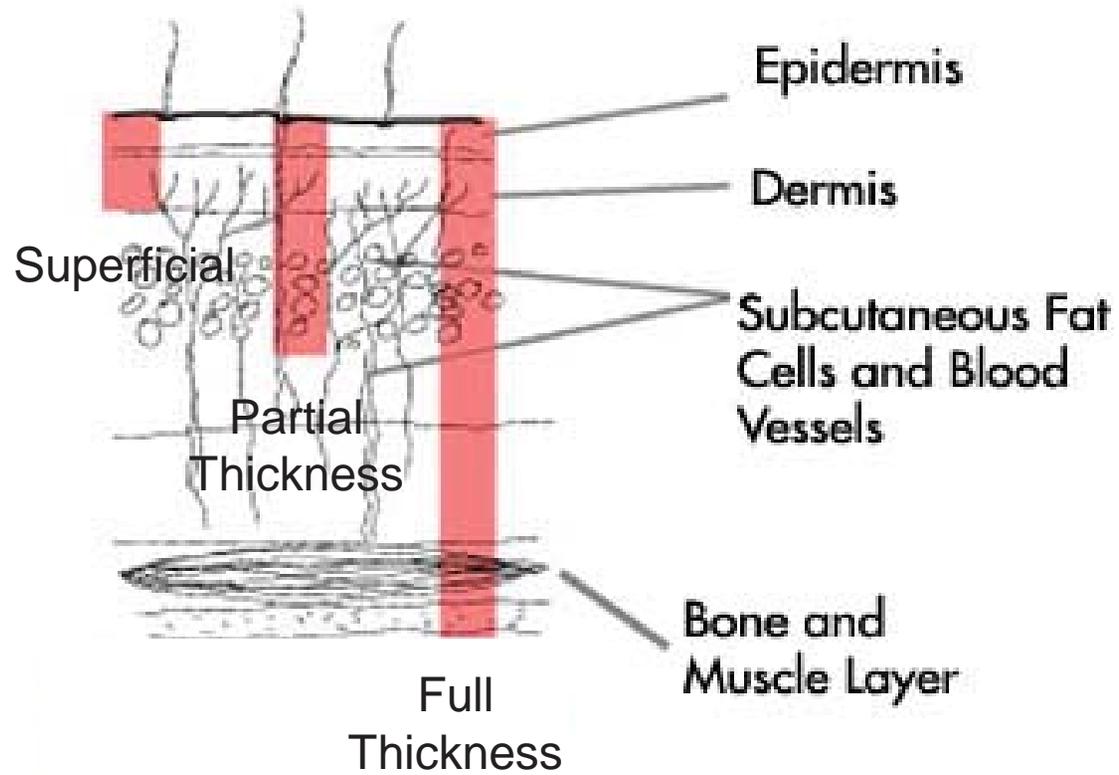
# Preventive Taping



# Donut to Protect Blister



# Burns



## BURNS



# Burn Causes

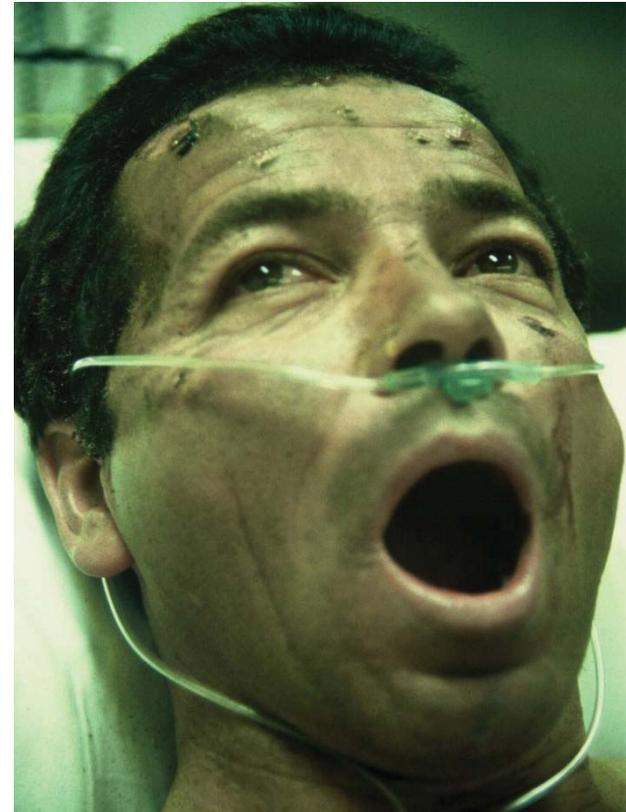
- Heat (fire, hot surfaces)
- Chemical reactions
- Electricity (including lightning)
- Radiation (including solar)

Cooking accidents most  
common wilderness cause



# Inhalation Injuries: Signs and Symptoms

- Facial burns
- Hair loss
- Sooty tongue or mucus
- Swelling around larynx
- Difficulty breathing or swallowing
- Coughing or wheezing

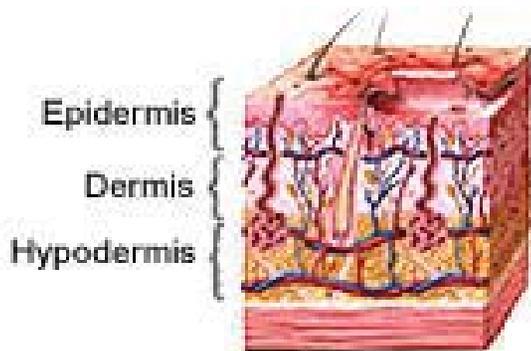


# Assessing Burns

- Assure ABCs
- Determine type and extent of burn
- Critical areas?
- Airway involved?
- Rule of Palmar Surface
  - Patient's hand = 1% of patient's skin
  - Easier to use in most cases



# Burns



Superficial



Partial  
Thickness



Full  
Thickness



# Superficial Burns

- Skin is red
- Pressure turns skin pale as blood is squeezed out
- Color comes back when finger pressure is removed



# Partial Thickness Burns

- Several layers of tissue damaged
- Extremely painful
- Wet from tissue fluid leakage
- Usually forms blisters or scabs



# Full Thickness Burn

- May be charred, white, or red (scald)
- Area usually dry
- No pain (nerves destroyed)
- May have partial thickness burn around it, which will be painful



# Critical Burn Locations

- Burns to eyes, ears, hands, feet, genitals - Always serious (loss of function)
- Circumferential (neck, trunk, limbs) - Swelling can cut off breathing, circulation



# Burn Treatment - Immediate

- Remove victim from heat source
- Clothes burning? Smother
- Remove loose clothes, especially if saturated with boiling liquid
- Do NOT remove clothes stuck to skin
- COOL burn with water immediately
- Extensive burns: danger of hypothermia, cool only burned area
- Irrigate with diluted povidone-iodine solution



# Burn Treatment - Extended

- Apply a DRY sterile dressing, non-stick if available
- Hydrate with electrolytes
- Consider pain medication
- Treat for SHOCK
- Do NOT use ointment, butter etc
- Determine if evacuation is necessary



# Musculoskeletal Injuries



# Bone and Joint Injuries

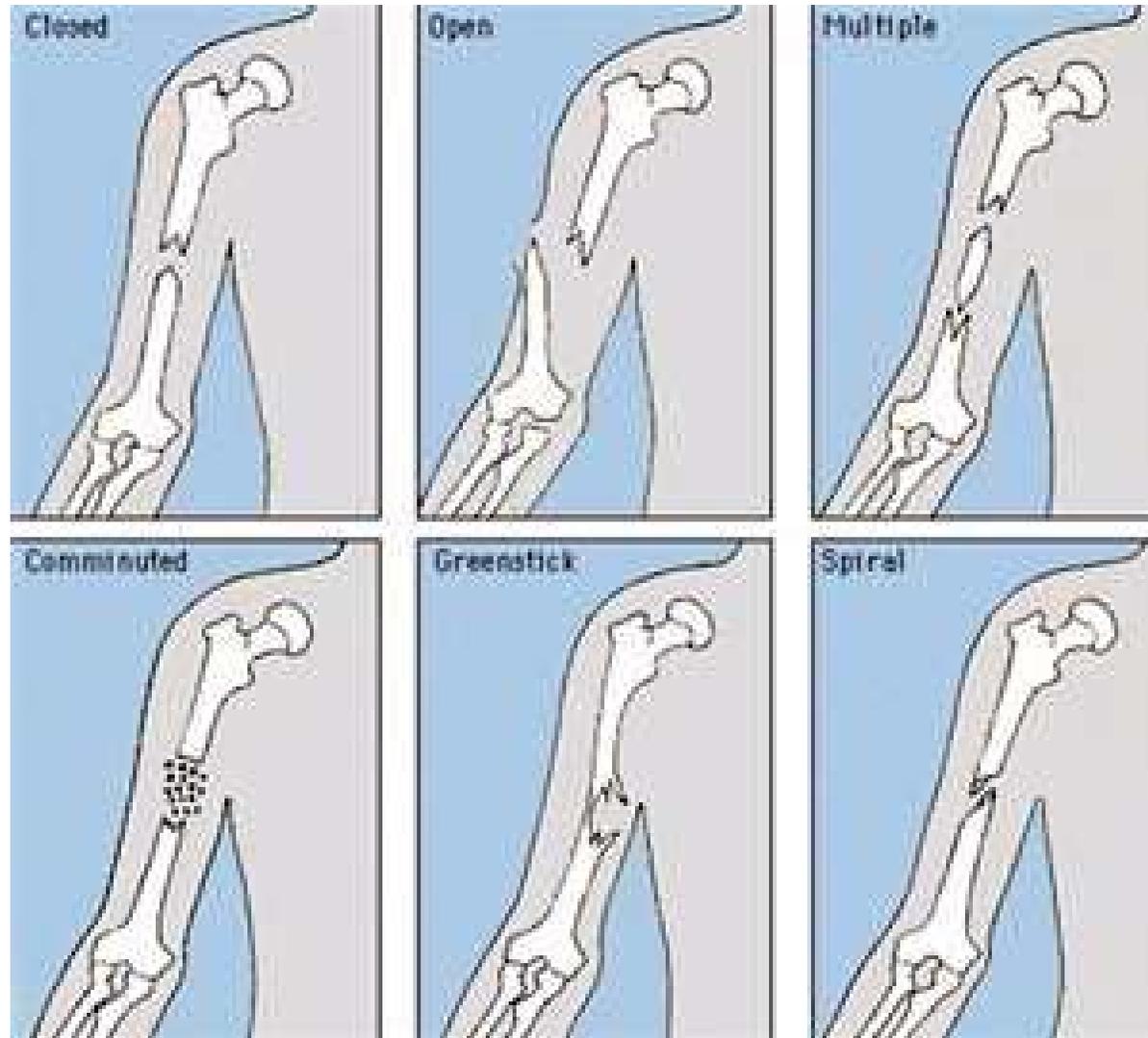
- Fractures
  - Complete or partial break of a bone
  - Open or closed
- Dislocation
  - Bones in a joint become displaced or misaligned
- Sprains
  - Partial or complete tear of a ligament
- Strains
  - Muscle tear
- Sometimes difficult to determine which type of injury and they can occur together.
- If in doubt, treat as a fracture



# Mechanism of Bone or Joint Injury



# Type of Fractures



# Assessing Bone and Joint Injuries

- Initial assessment – treat life threats
- Reconstruct the mechanism of injury
- Ask where it hurts
- Look for
  - Swelling
  - Deformity/angulation
  - Point tenderness
  - Loss of function
  - Discoloration
  - Grating (crepitus)
  - Exposed bone ends
- Check CMS



# Fractures

- **Closed** = enclosed by skin
- **Open** wound near fracture = open path for infection to the marrow of the bone
- Bleeding can be severe due to breaks near large arteries and veins (brachial, femoral)
- Both are painful with point tenderness in most cases



# Open Ankle Fracture



# Open Humerus Fracture



Wound not so obvious, but note deformity

# Fracture: Signs and Symptoms

- Pain doesn't stop
- Point tenderness
- Guarding/loss of use in injured limb
- Deformity
  - Angulation
  - Shortening
  - Rotation
  - Tenting (bone pushing up under skin).
  - Extra joint/false motion
- Other Signs and Symptoms
  - Blood under skin or swelling
  - Patient (bystanders) heard bone snap
  - Grating sound (crepitis)



# Goals of Splinting

## When in doubt – Splint!

- Immobilize broken bone ends
- Immobilize adjacent joints
- Clean and dress open wounds before splinting
- Provide padding
  - Fill gaps to give firm, even support
  - Prevent pressure on bone, nerves
- Check CMS before and after splinting



# Handling a Fractured Limb

- Position splint without moving limb if possible
- Measure splint on uninjured limb
- If you must move a fractured limb before splinting
  - Support it fully, e.g. using pants leg
  - OR apply gentle inline traction
  - Do NOT just pick limb up by one or both ends



# Lifting a Fractured Leg



# When to Align a Bone Fracture

Wilderness situation: >2 hours from help

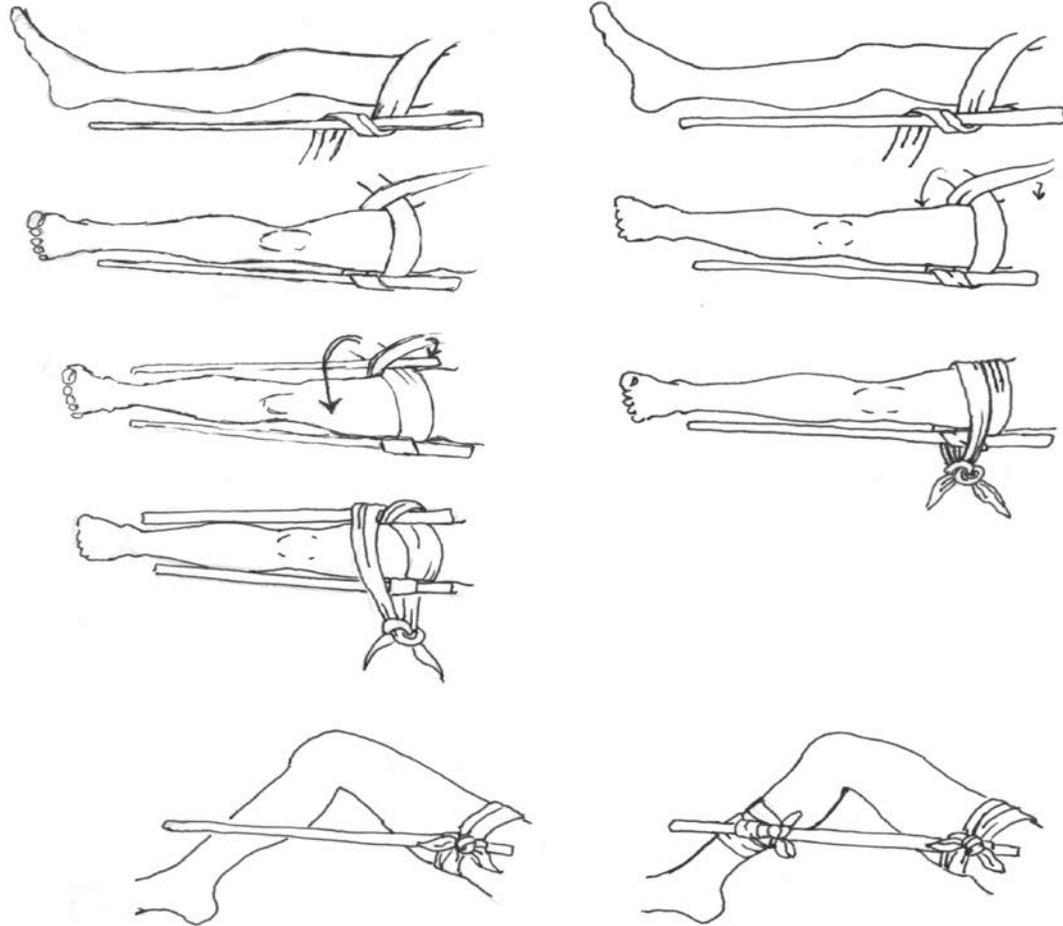
- Restore normal distal pulse
- Restore nerve function
- Get bone into a stable splinting position
- Alignment is not the same as setting the bone



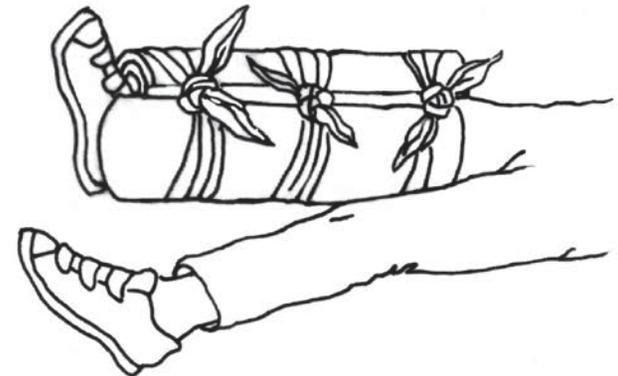
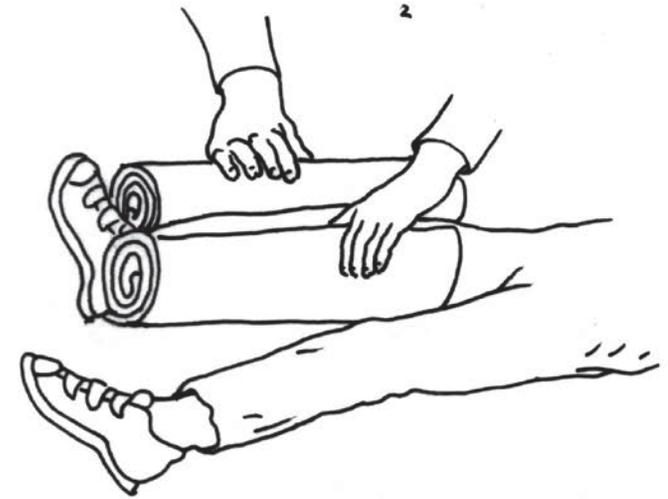
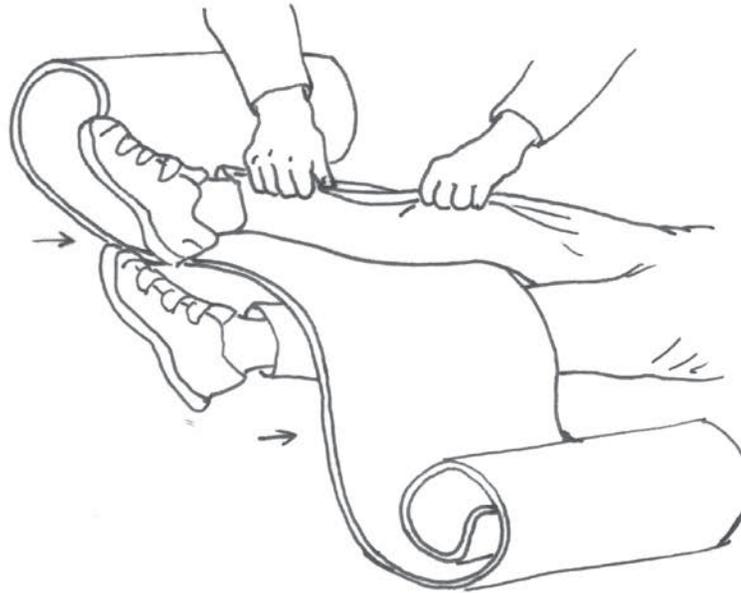
# Using Inline Traction



# Improvised Leg Splint



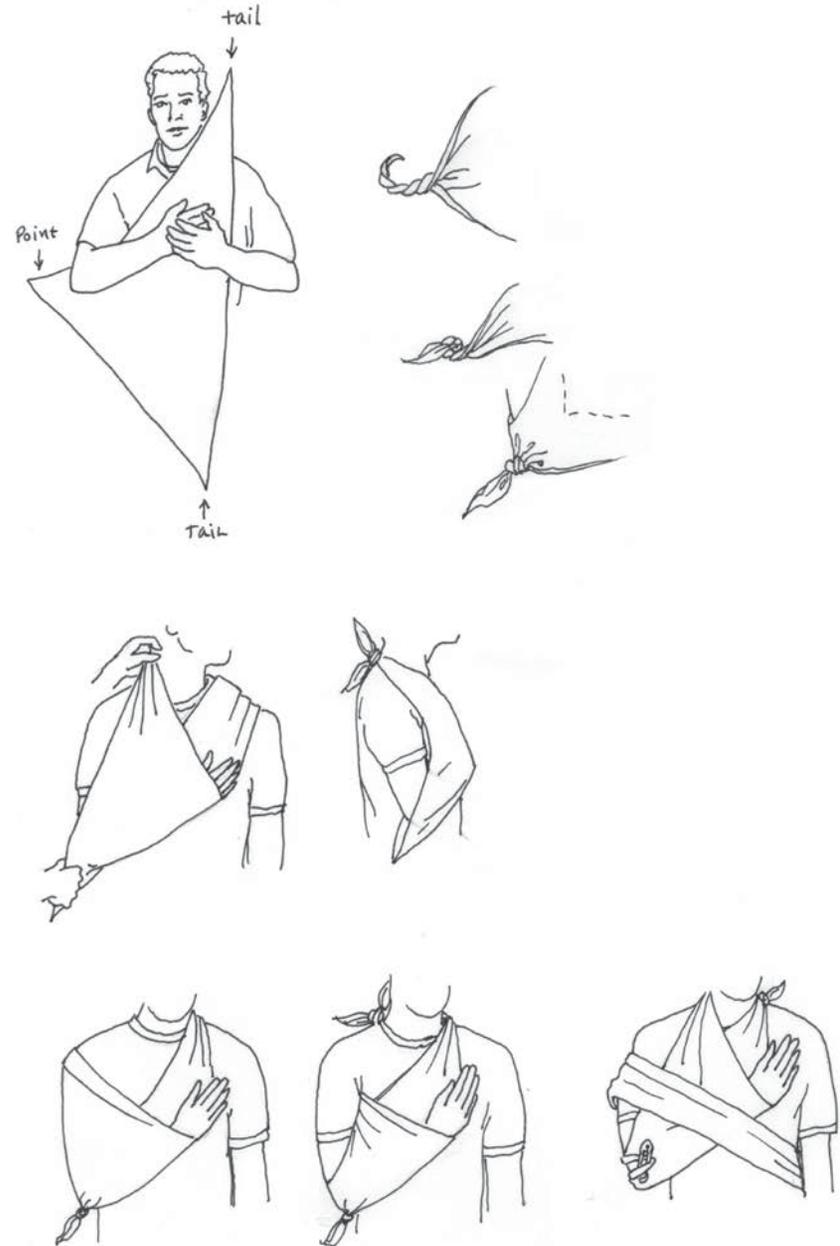
# Leg Splint with Foam Pad



# Wire Splint for Wrist Fracture



# Arm Sling



# Sprains

- Partially or completely torn ligament that connects bones at joint
- Damage to surrounding tissues causes swelling that results in pain
- Goal is to provide Immediate assessment to determine sprain or fracture.
- If sprain, reduce swelling immediately using RICE ie Rest, Immobilize, Cold, Elevate

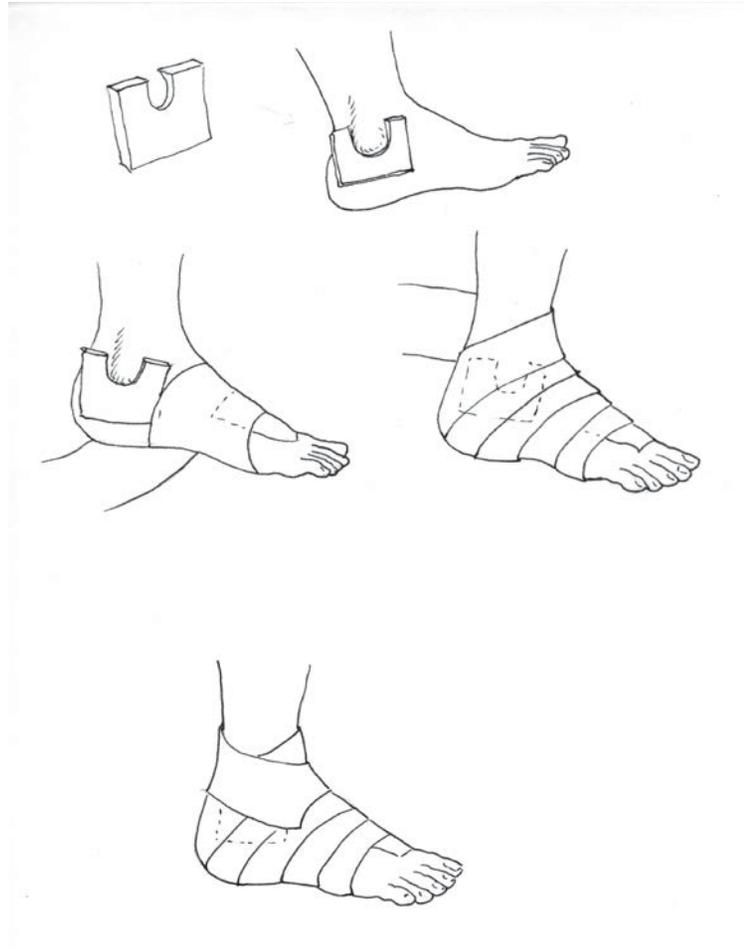


# RICE

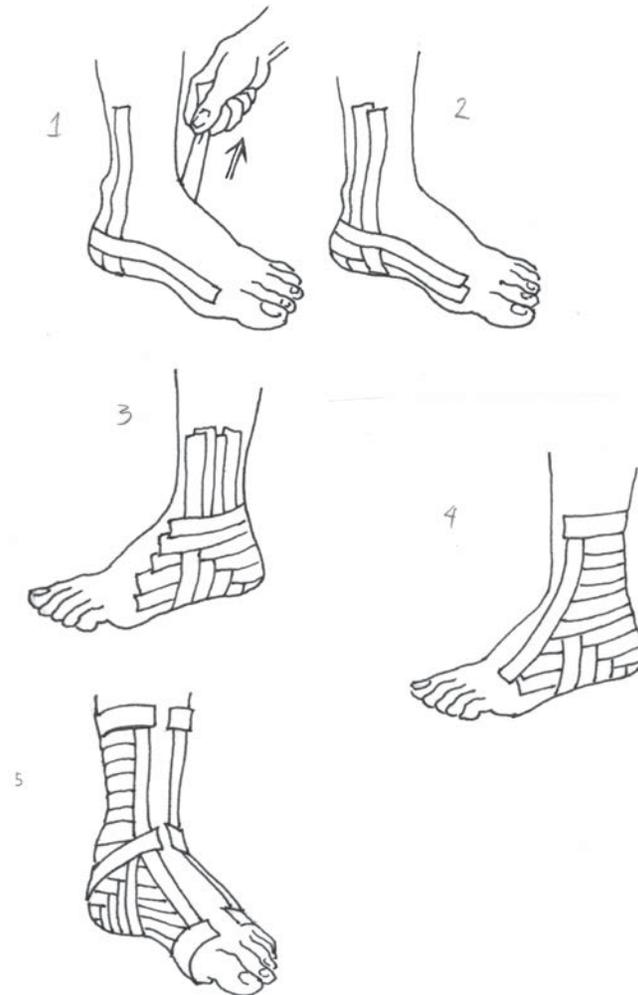
- **R**est injured joint
- **I**mmobilize
- **C**old
- **E**levate



# Compression to Reduce Swelling



# Ankle Taping: If Patient Must Walk

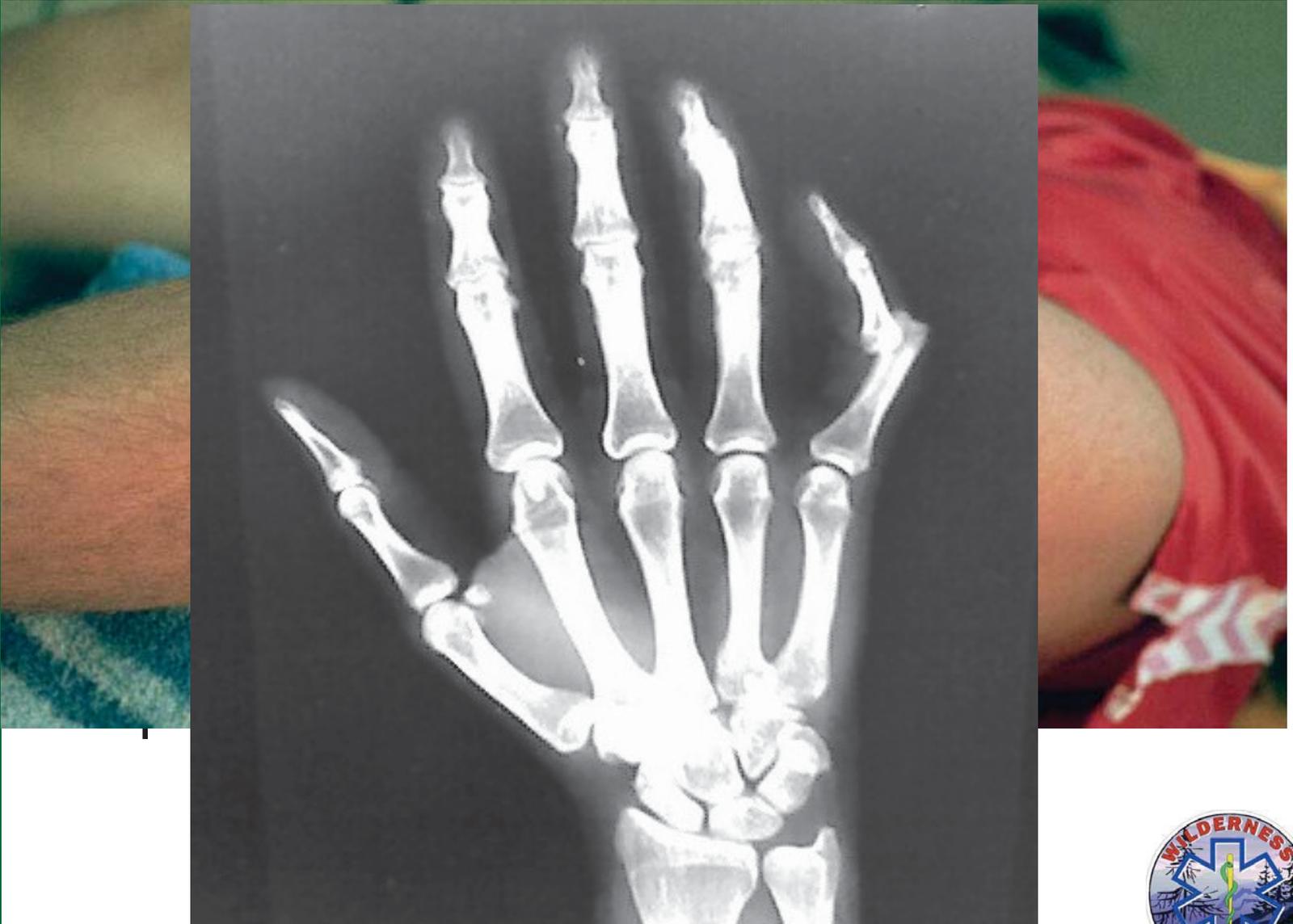


# Ankle: Sprain or Fracture?

- **Sprain:** Pain usually comes on with swelling
- **Fracture:** Pain starts immediately and continues
- **Tap test:** Impact radiates, causes sharp pain at point of fracture
- **Point tenderness** at top of ankle knob (no ligament attachments) suggests fracture
- Test before swelling makes whole ankle hurt - after that, hard to tell the difference



# Dislocations



# Strain

- Muscle tear
- Immediate treatment – reduce swelling with ice pack
- Then stimulate circulation with hot packs
- Slight tear – may heal in days
- Severe tear – weeks or months

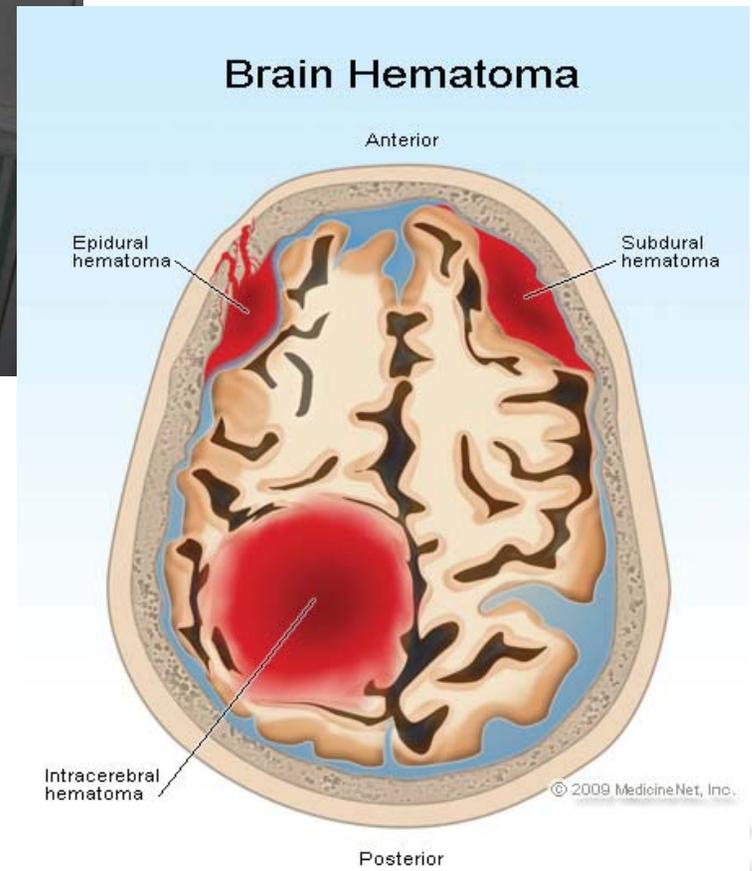


# Joint Injuries

- Can be difficult to differentiate
  - When in doubt treat as a fracture
- Splinting requires ingenuity in the wilderness
- Evacuate rapidly – go fast – any patient with:
  - Angulated fractures
  - Open fractures
  - Fractures in the pelvis, hip or femur (thigh)
  - Any injury that causes a decrease in CSM below the injury site



# Head and Spinal Injuries



# Head Injury

- MOI
  - Impact from fall, collision or blow
  - Contra coup – brain rebounds inside skull
- Injuries
  - Concussion (bruising without skull fracture)
  - Brain injury
  - Skull fracture and possible torn membranes
  - Bleeding between membranes and skull
- Always suspect a spine injury with a head injury



# Signs of Head/Brain Injury

- Visible or palpable skull fracture
- Disorientation
- Confusion
- Shock signs/symptoms
- Unequal or dilated pupils
- Raccoon eyes (common)
- Battle's sign (bruised tissue behind ears)
- Blood and/or CSF from nose or ear
- Blood: Use ring test for CSF



## Signs of Head/Brain Injury

- Diminished or falling LOR (relate to bleeding inside skull)
- Possible “lucid interval”
- Impaired sensation/motor function, usually on one side of body
- Possible effects on speech
- Compare to effects of stroke
- **TRUE EMERGENCY!!!!!!**



# Skull Fracture: Fallen climber



# Skull Fracture: Raccoon eyes



# Effects of Brain Injury

- When the brain is injured, swelling and bleeding within a closed space create increased pressure on the brain
- Cushing's Triad
  - Increasing blood pressure (hypertension)
  - Abnormal respiration
  - Decreasing heart rate (bradycardia)
- Indicates serious injury to the brain that could result in death



# Assessing Head/Brain Injuries

- Initial Assessment
  - LOR
  - Protect ABCs
  - Spinal precautions
  - Control serious bleeding
- Physical Exam
  - Deformity
  - Unequal pupils
  - Raccoon eyes, battle sign
  - Bleeding/CSF from nose or ears
- Monitor LOR and vitals for changes



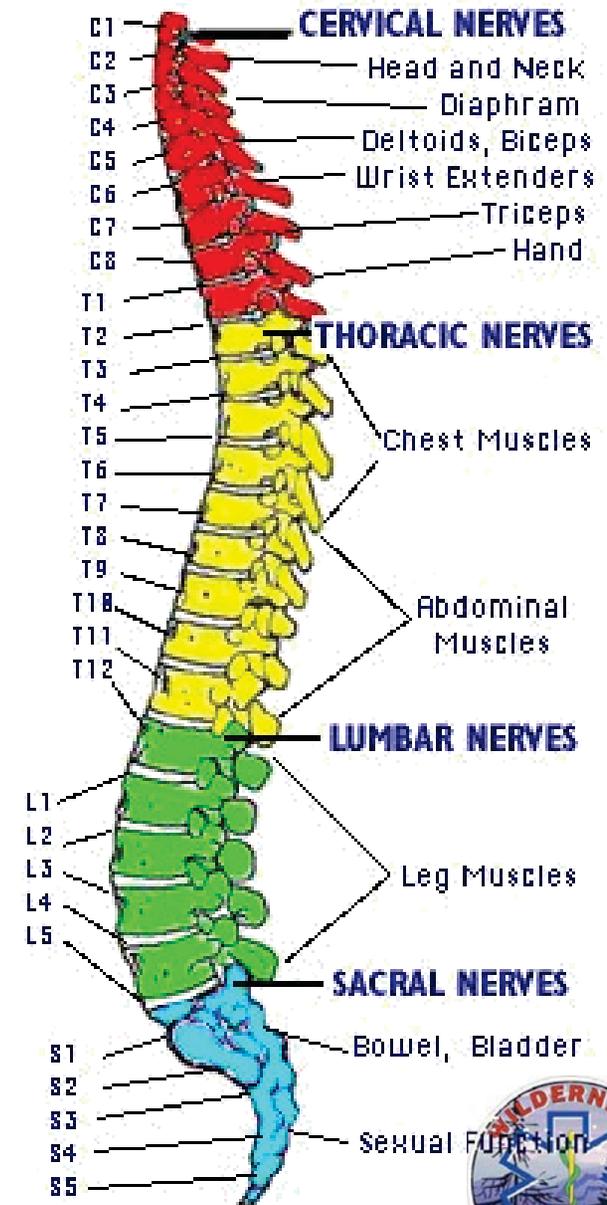
# Treatment of Head/Brain Injury

- Protect ABCs
- Consider spinal injury
- Check for other injuries
- Head up position
- Treat for shock
- Provide oxygen if available 6-10 Lpm
- Check and record vital signs regularly
- Abnormal or changing vitals – urgent evacuation
- Document changes!!!!!!



# Mechanisms of Spinal Injury

- Compression/axial loading
- Flexion – chin to chest
- Extension or rotation
- Sudden deceleration (whiplash)
- Blunt trauma
- Penetrating trauma



# Assessing Spinal Injury

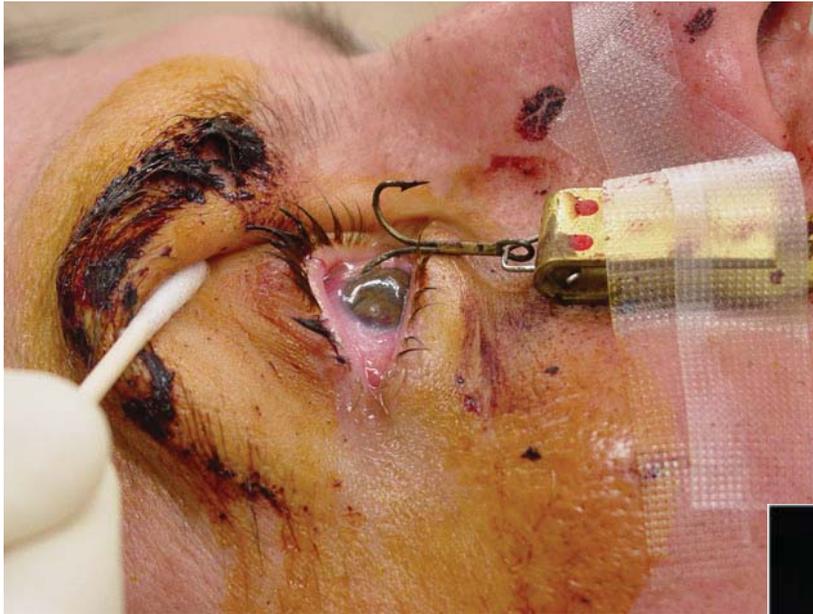
- Protect spine while assessing
- Deformity → possible displacement:  
1/3 diameter severs spinal cord
- Point tenderness
- Paralysis
- Function in extremities
  - Sensation (Which finger/toe?)
  - Movement (Wiggle fingers, toes)
  - Strength (squeeze/push and compare)



# Treatment of Spinal Injury

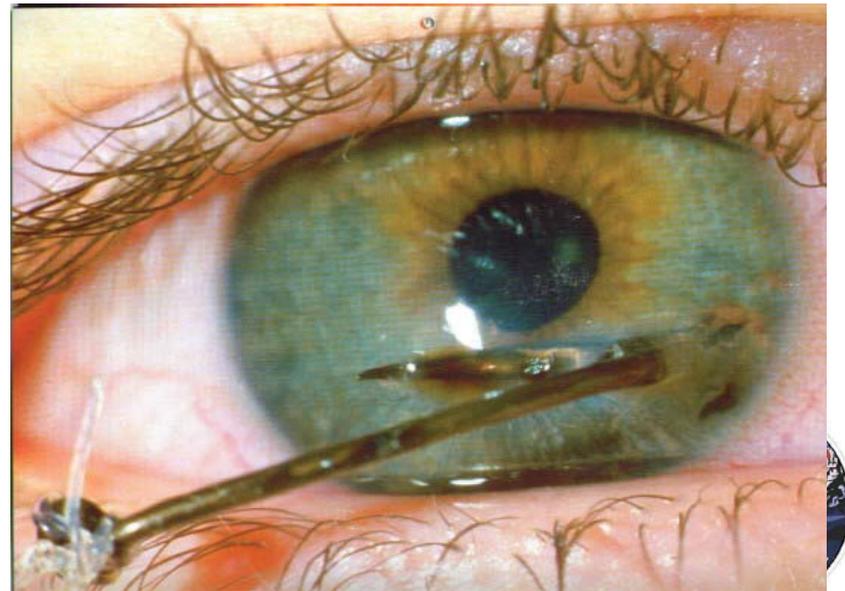


# Eye and Facial Injuries



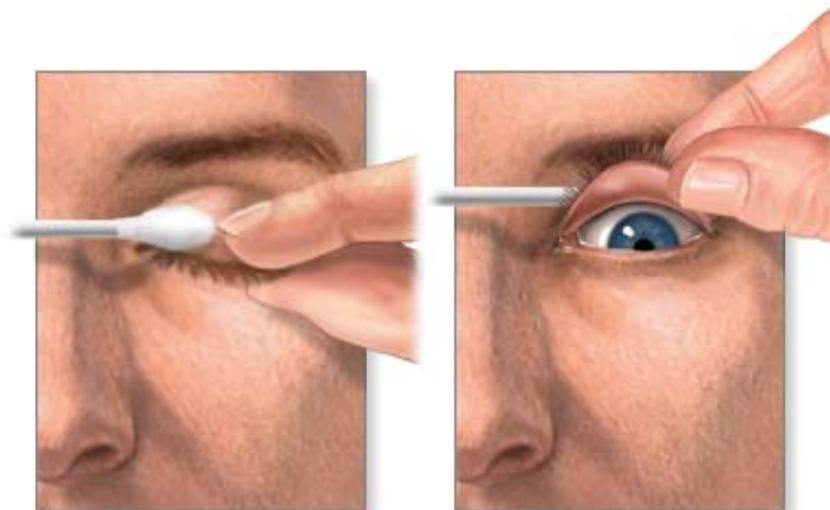
# Assessing Eye Injuries

- Physical signs of injury
- Injury to orbit (bones around the eye)
- Pupils: Equal? Dilated? Constricted?
- Light response: Slow? Absent?
- Vision: How many fingers?
- Movement: Follow my fingers without moving head (4 corners)



# Eye: Removing Foreign Bodies

- Irrigation: Sterile saline
- Pull upper lid over lower lid
- Roll upper lid over swab, capture speck with moist swab
- Embedded? Eye patch and evacuate



Twist cotton-tipped  
swab upward

Look downward

# Contact Lenses

- Unresponsive? Remove and preserve lenses
- Methods: Hard lenses
  - Manipulating eyelids
  - Suction cup
  - Mini-marshmallow (works for soft lens too)

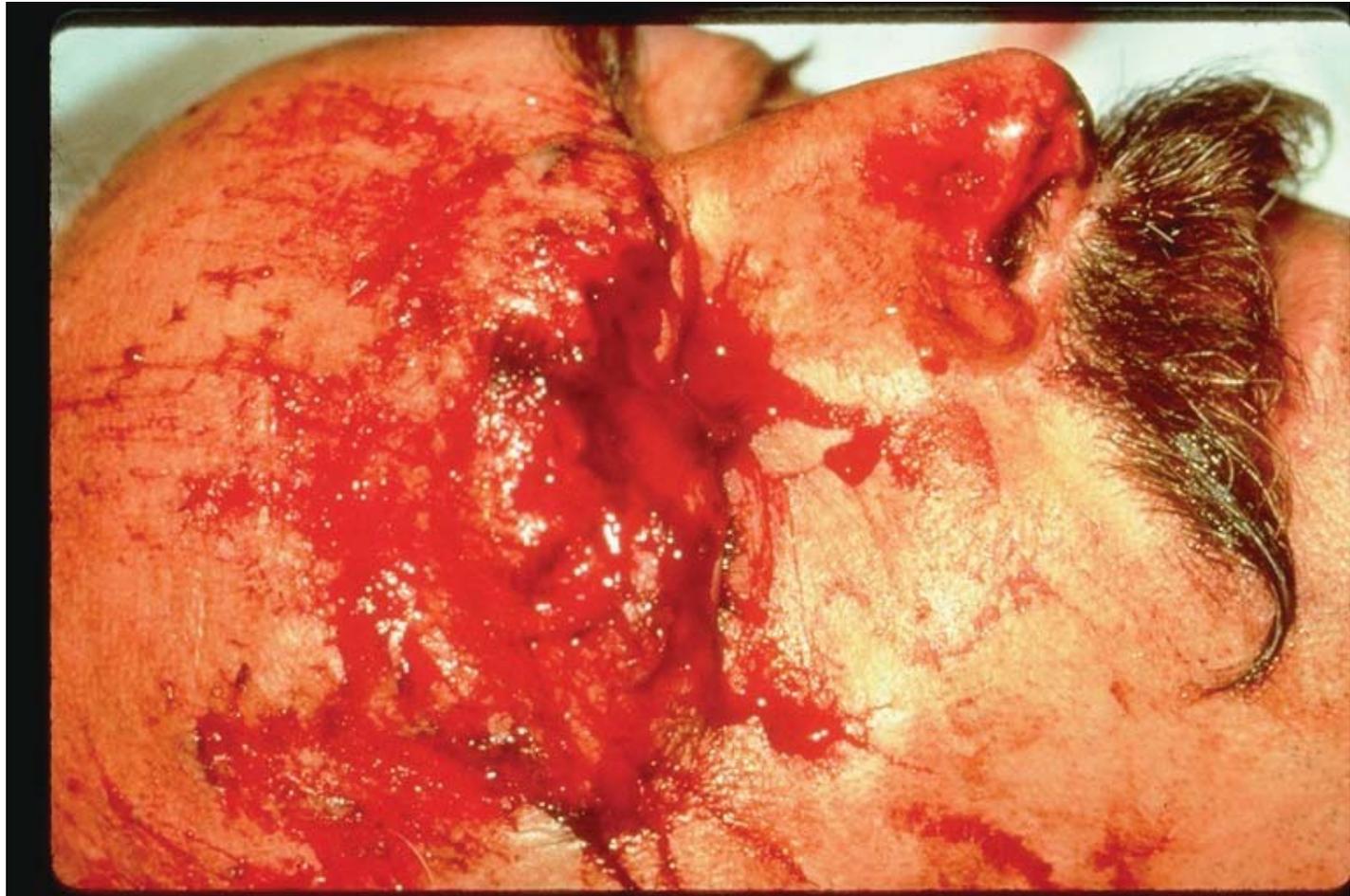


# Serious Eye Injuries

- Use an eye patch with pinhole in center
  - Embedded objects
  - Penetrating wounds
  - Blunt trauma – bleeding in anterior chamber
- Lid injury, can't blink: Keep eye moist
- Is there an associated head or spine injury?
- Evacuate any serious eye injury



# Eye injury



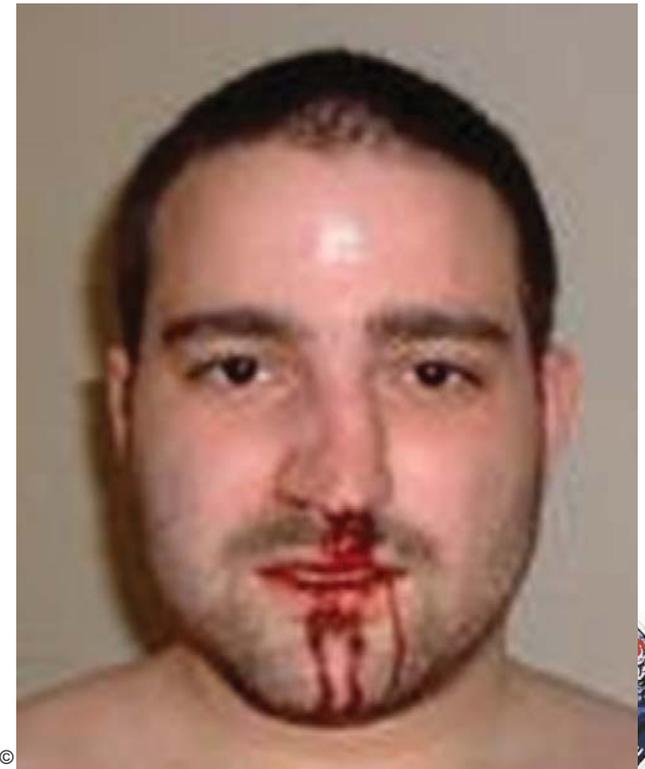
# Ear Injuries

- Damage to outer ear, treat as other soft tissue
- Objects in ear – rinse out if possible
  - Use cooking oil for insects
- Ear infection – requires physician attention



# Nose Bleed

- From nose
  - Lean forward (protect airway)
  - Pinch just below bone
  - Clothespin with spring can maintain pressure
- From sinus behind nose
  - Hard to stop
  - Packing is risky
  - Protect airway – lean forward
  - Evacuate if necessary



# Dental Injuries

- Chipped enamel – sharp edge?
- Broken/exposed dentin – pain, sensitivity
- Exposed root – severe pain
- Lost filling
- Impacted tooth
- Knocked out tooth
- Check for associated injuries
  - Head, neck and jaw
  - Bleeding or airway problems
  - Aspirated tooth



# Temporary Filling

- Pain control (Eugenol, cold pack to cheek)
- Zinc oxide powder
- Dental filling paste
- Sugar-free gum
- Candle wax



# Knocked Out Tooth

- Handle by crown
- Irrigate with sterile saline (do not scrub)
- Alert patient? Re-implant, splint with strong thread to adjacent teeth
- Save-A-Tooth preserves 24 hours
- Other options: 20 minutes maximum



# Chest and Abdominal Injuries



# Mechanisms of Chest Injury

- Blunt impact to chest
  - Cracked rib pierces lung
  - Air gets between lung and chest wall
  - Lung starts to collapse like punctured balloon
- Hole in chest wall (air bubbling through)
  - Air pressure outside lung exceeds inside
  - Lung collapses



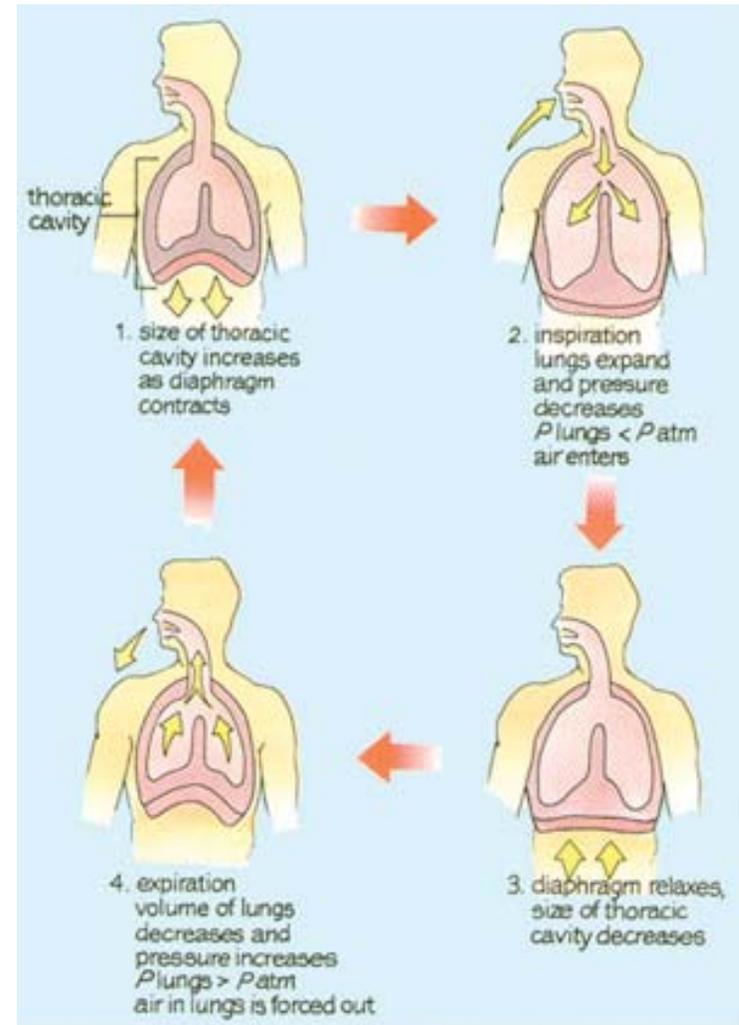
# Assessing Chest Injuries

- Initial assessment
  - Protect ABCs
  - Spine injury?
  - Control bleeding
- Physical exam
  - Open wound?
  - Bruising?
  - Tenderness?
  - Crepitis?
  - Shallow or difficulty breathing?



# Mechanism of Breathing

- Lungs stay pressed against chest wall by positive air pressure
- No air between lungs and chest wall
- Air flows from higher to lower pressure
- Expand chest cavity – air flows in
- Contract chest cavity – air flows out



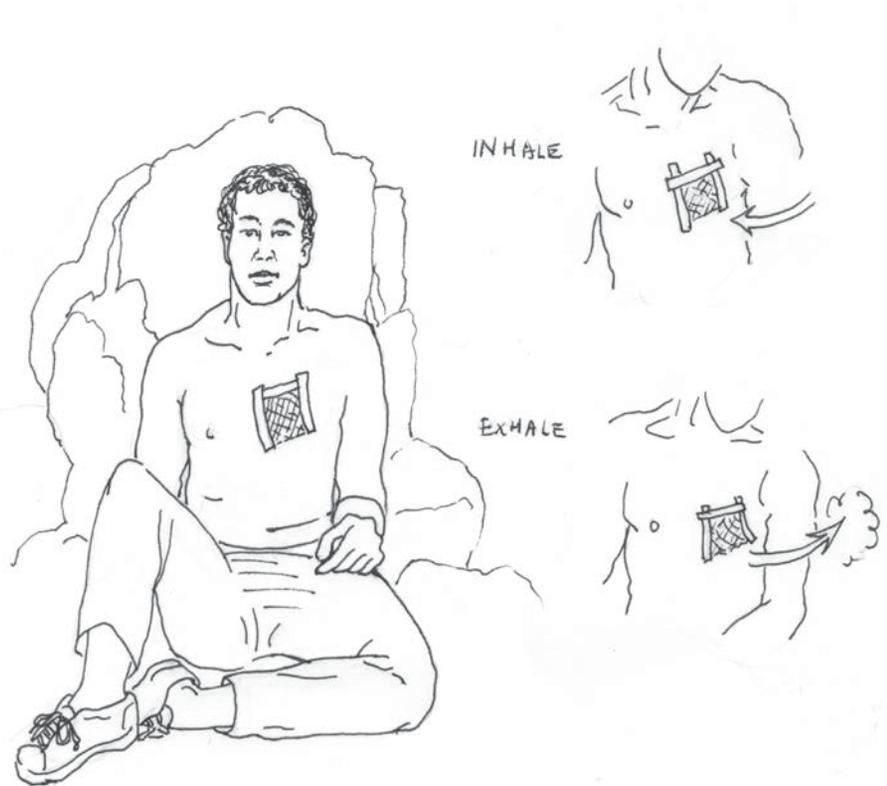
# Injuries Affecting Breathing

- Hole in chest (sucking chest wound)
- Punctured lung (collapses)
- Bleeding in chest cavity (compresses lung)
- Rib fracture (pain limits chest movement)
- Multiple rib fractures (flail chest): paradoxical motion.



# Sucking Chest Wound

- Penetrating injury of chest wall
- Air bubbling through the blood
- Breathing difficulty
- Treatment - Patch the leak



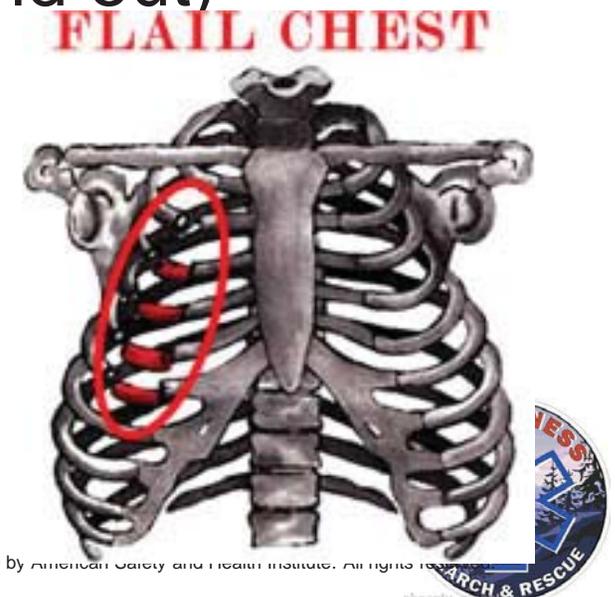
# Collapsed Lung

- Caused by air or blood collecting in space between chest wall and lung
- Signs and Symptoms
  - Bruising around rib cage – suspicious
  - Less chest movement on injured side
  - Rapid, shallow breathing/respiratory distress
  - Cyanosis due to lack of oxygen
  - Deviated trachea
  - Chest hyper-resonant on side of injury (air)
  - Injured side sounds dull when tapped (blood)



# Flail Chest

- Multiple fractures to multiple ribs causing a segment to break free
- Paradoxical motion - Segment moves in when inhaling, out when exhaling
- Reduces tidal volume (amount of air moved in and out)
- Treatment
  - Splint
  - Place on injured side



# Cardiac Tamponade

- Bruised heart muscle due to impact to chest or penetrating injury
- Blood fills pericardium (“around the heart”) causing reduced blood flow as heart is squeezed
- Signs and Symptoms
  - Rapid, weak pulse
  - Hypotension
  - Weakness and signs/symptoms of shock
  - Respiratory distress
  - Muffled heart sounds



# Treatment for Chest Injuries

- Protect ABCs
  - Airway and breathing problems common
- Consider spinal injury
- Treat for shock
- Provide oxygen if available
- Place patient on injured side to splint and/or reduce pressure on good lung
- Check and record vital signs regularly
- Evacuate – go fast – any patient with a serious chest injury



# Mechanisms of Abdominal Injury

- Blunt impact due to fall or collision to abdomen
  - Injury to solid and hollow organs beneath
  - Internal bleeding can cause shock
  - Blow can split abdominal wall resulting in open wound and exposed organs
- Penetrating injury
  - Internal and external bleeding
  - Can also result in exposed organs



# Assessing Abdominal Injuries

- Initial assessment
  - Protect ABCs
  - Spine injury?
  - Control bleeding
- Physical exam
  - Open wound?
  - Bruising?
  - Pain/tenderness on palpation?
  - Rigid abdomen?
- Signs and Symptoms of shock?

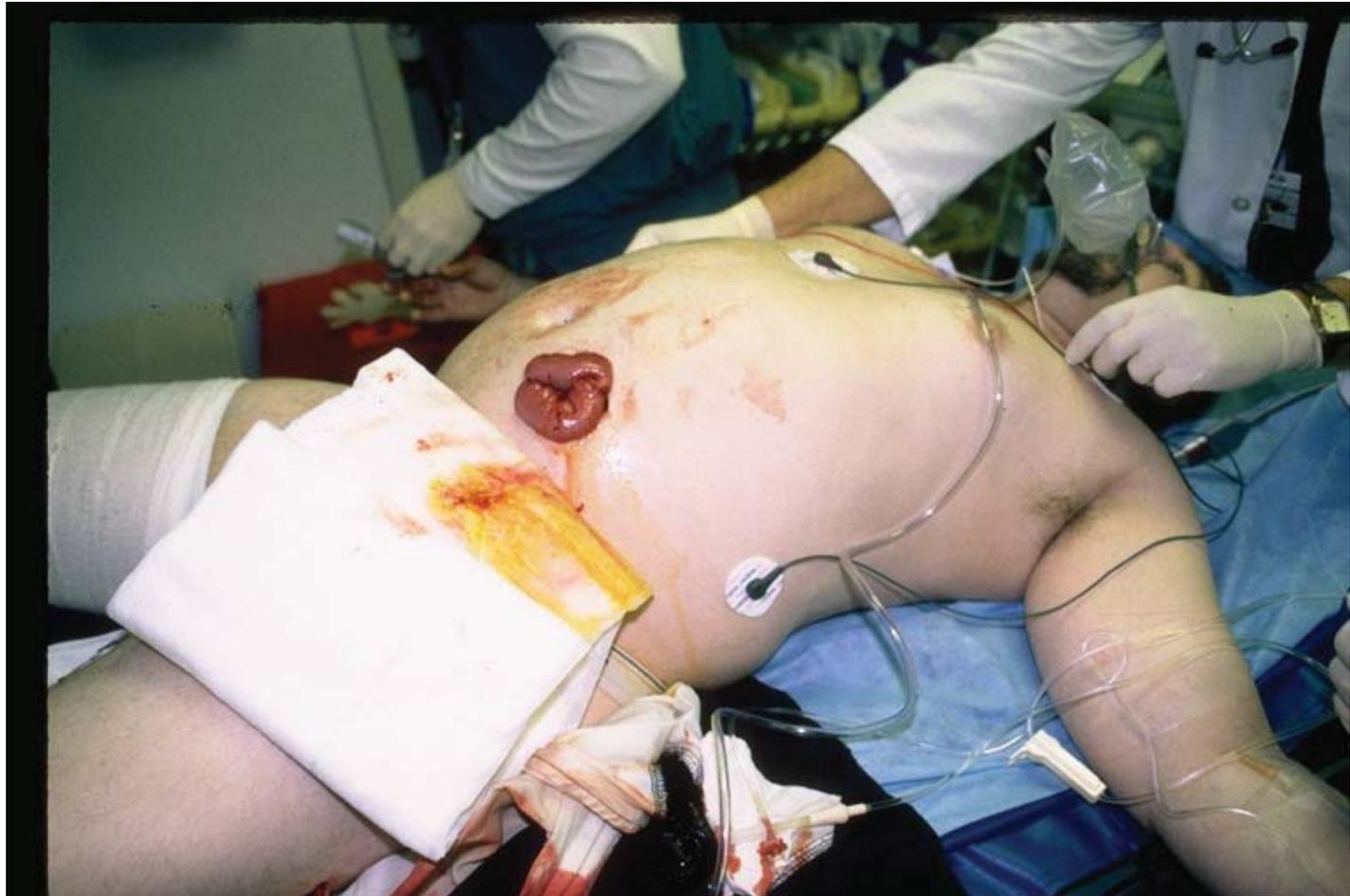


# Abdominal injuries

- Open: Protect and keep moist
  - Loose sterile dressing
  - Cover loosely with plastic and tape down.
- Closed: Look for Signs and Symptoms
  - Bruised appearance
  - Pain: When, where, quality, how much?
  - Effects on circulation, e.g. shock.



# Abdominal Injury with Protruding Organs



# Injury to Hollow Organs

- Stomach, intestines, bladder
  - Releases digestive juices and food
  - Inflammation
  - Gas and fluid – may distend abdomen
  - Possible guarding, rigidity of abdominal muscles
  - Spreading pain and tenderness
  - Possible blood in feces
  - Urinary bladder may rupture or detach from urethra



# Injury to Solid Organs

- Liver, spleen, kidneys
  - Blood-filled
  - Can bleed enough to cause shock and become life-threatening
  - Pain (may be referred)
  - Possible blood in urine (kidney injury)



# Treatment for Abdominal Injuries

- Protect ABCs
  - Control external bleeding
- Consider spinal injury
- Cover and keep moist open wounds or exposed organs
- Treat for shock
- Provide oxygen if available
- Check and record vital signs regularly
- Evacuate – go fast – any patient with a serious Abdominal injury



# Exposure to Heat



# Heat Illness

- Several problems associated with very warm to hot air
  - Hyponatremia (Low Sodium in the blood)
  - Heat syncope
  - Heat cramps
  - Heat exhaustion
  - Heat stroke
- Most can be easily corrected when recognized early
- Heat stroke is a life-threatening emergency
- Heat illness can occur down to 70° F



# Heat Illness Risk Factors

- High humidity
- Overweight
- Very old or young
- Unaccustomed to heat
- Poor conditioning
- Drugs such as antihistamines
- Pre-existing medical condition
- Dehydration

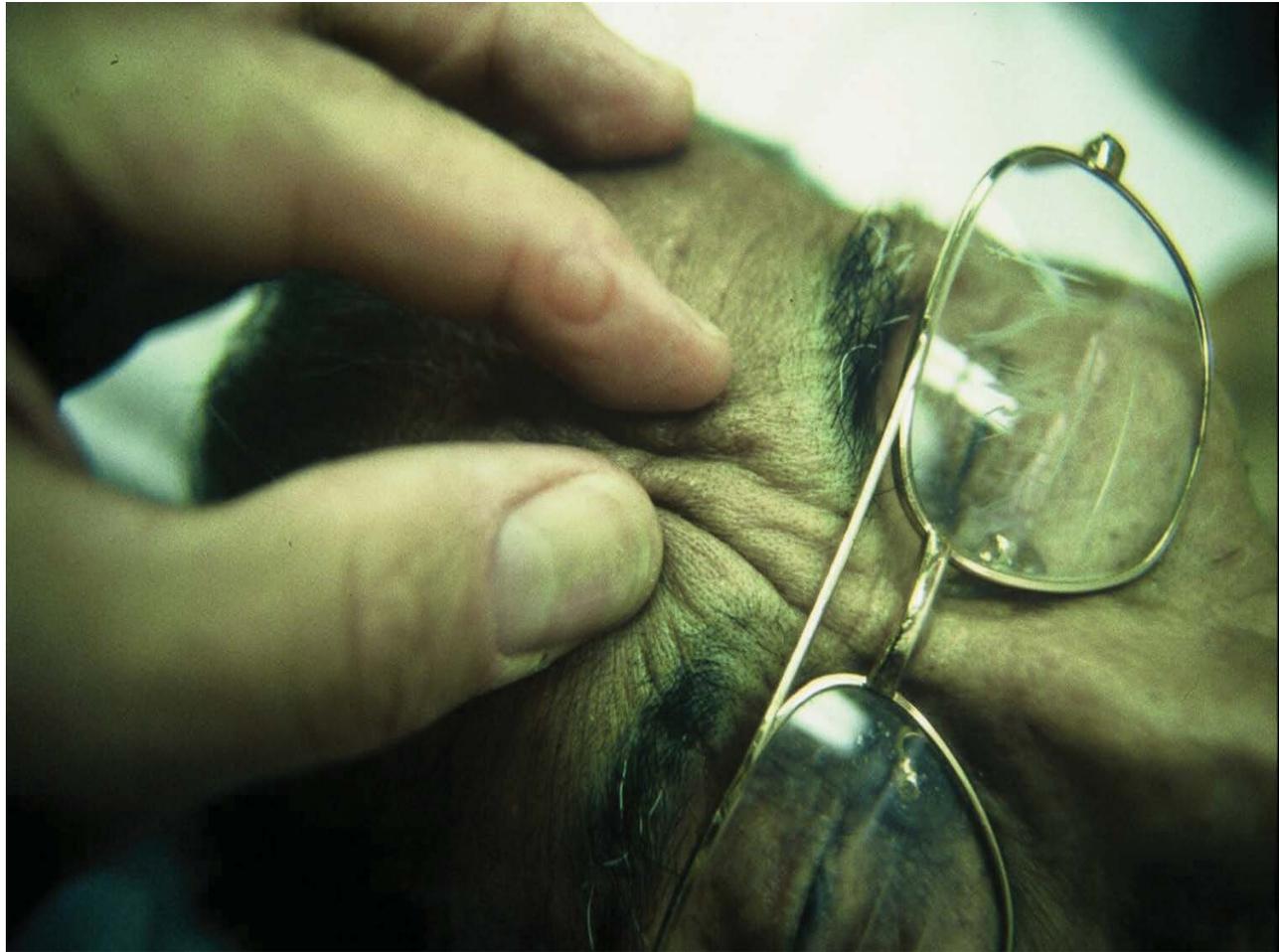


# Heat Illness and Dehydration

- Acclimatized person sweat 3 liters per hour working in warm atmosphere
  - After 1 to 2 liters, the body stops shunting blood to the skin
- Thirst often doesn't occur until 2 liters lost
  - Drinking when thirsty is too late
  - Drink before you are thirsty
  - Average adult can drink up to three liters but only absorbs a little more than 1 liter per hour
- Urine color a good indicator of hydration



# Test for dehydration



# Skin does not smooth out



# Hyponatremia

- Low level of sodium in the blood and cells
- Initial Signs and Symptoms
  - Headache
  - Anxiety
  - Weakness/fatigue
  - Nausea/vomiting
  - Sweaty skin
  - Normal temperature
  - Normal or elevated pulse



# Hyponatremia

- Patient appears dehydrated
- Claims to have drank large volume of water
- Not thirsty
- Clear urine
- Advanced Signs and Symptoms
  - Disorientation
  - Irritable and combative
  - “Water Intoxication”



# Treating Hyponatremia

- Rest in the shade
- No fluids
- Gradual intake of salty foods
- Monitor vitals, LOR
- Evacuate – go fast – any patient with altered mental status. Go slow – any patient who does not fully recover from hyponatremia.



# Heat Syncope (fainting)

- Standing or walking in heat
- Blood drawn to skin to dissipate heat
- Blood pools in limbs (example: military, standing at attention)
- Brain starved of blood, fuel, oxygen
- Usually self-correcting when victim falls



# Heat Cramps

- Sodium deficiency (dehydration)
- Spasm seems to move along muscle that was in use, e.g. legs in running, hiking, cycling
- Treatment
  - Remove from source of heat
  - Stretch out cramped muscle
  - Rehydrate with electrolyte drink or 1% salt solution
  - Avoid salt tablets



# Heat Exhaustion

- Dehydration and loss of blood volume
- Signs and Symptoms
  - Similar to hypovolemic shock
  - Pale skin (blood withdrawn from skin)
  - Pulse rapid and weak
  - Headache, faintness, confusion
  - Nausea and possible vomiting
  - Possible cramps and diarrhea
  - Weakness
  - Pupils may be dilated
  - Body temperature may be “normal” or slightly elevated



# Treating Heat Exhaustion

- Remove from source of heat into shade
- Rehydrate slowly but steadily – plain water first; if not palatable, electrolyte drink
- Rule out hyponatremia
- Monitor LOR and other vital signs
- Evacuate – go slow – if patient doesn't fully recover



# Heat Stroke: What's Happening

- Body's cooling system has failed and vital organs (especially brain) are over-heating
- Brain and other organs over about 106° F:
  - Cell membranes become more permeable
  - Sodium ions accumulate inside cells – increase heat production (vicious circle)
  - Fluid leaks into tissues – less blood back to heart
  - Shortage of blood to vital organs causes damage



# Mechanisms of Heat Stroke

- Classic Heat Stroke (slow)
  - May take hours to days
  - Elderly and sick (esp. CV, diabetes) at risk
  - Hot weather/can't get out of heat to cool off
  - Dehydrate, eventually stop sweating – skin red, hot, dry
- Exertional Heat Stroke (fast)
  - Can happen in 15 minutes especially in athletes
  - May not be dehydrated yet - pulse may be rapid and bounding
  - BP may vary or be low (if dehydrated)
  - Skin usually still pale and sweaty
  - Focus on LOR: heat stress + abnormal behavior – assume heat stroke



# Heat Stroke: Signs and Symptoms

- Skin signs are not reliable – may still be pale and sweaty before becoming hot and dry
- May have many Signs and Symptoms of heat exhaustion
- Effects on brain and behavior distinguish heat stroke from heat exhaustion
  - Irrational, sometimes bizarre behavior
  - May be aggressive
  - May have seizure
  - Will go into coma if not cooled



# Treating Heat Stroke

- Get out of heat into shade
- Cool fast and aggressively
  - Cool water baths (as effective as ice bath if stirred – cool 0.3° F/min.)
  - Fans and aerosol
  - Wet clothes, fanning
  - Immersion in stream or lake – monitor vitals, do not over-cool
- Cold water if able to drink
- Evacuate – go fast – any heat stroke patient with altered mental status. Go slow – any patient that does not fully recover.

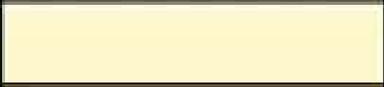
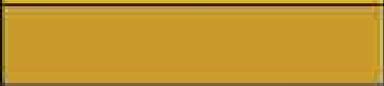


# Protect Yourself

- Start drinking before heat exposure – watch urine production/color
- Drink small quantities (1/4-1/2 L) frequently, e.g. every 20 minutes for serious heat stress
- Can't catch up if you get behind
- Avoid diuretics (caffeine, alcohol)

## AM I HYDRATED?

Urine Color Chart

1		
2		If your urine matches the colors 1, 2, or 3, you are properly hydrated.
3		Continue to consume fluids at the recommended amounts.
4		If your urine color is below the <b>RED</b> line, you are
5		<b>DEHYDRATED</b> and at risk for cramping and/or a heat illness!!
6		<b>YOU NEED TO DRINK MORE WATER!</b>
7		
8		



# Stay Cool

- Cool down in water before/between heat exposure if possible (stream/lake)
- Shade mid-day, extend activities to early morning/evening
- Drink water regularly
- Electrolytes: Munch salty snacks, e.g. trail mix
- Or electrolyte drink (per L.): ½ t. salt, ½ t. bicarbonate of soda, ¼ t. salt substitute (potassium chloride).
- Drink prior to Exercise.....!!!!!!!!!!!!!!!!!!!!!!!!!!!!



# Surviving Hot Weather

- When you go out in warm weather:
  - Stay cool (shade, dips, clothing)
  - Be physically fit
  - Acclimate
  - Keep drinking water and munching salty snacks
  - Watch your friends and be alert for risk factors
  - Treat heat illness promptly



# Exposure to Cold



# Hypothermia

- Lowering of the body's core temperature until brain and muscle function is impaired
  - May be mild to life-threatening



# Body Core and Shell

- Blood to shell – dumps heat
- Blood pulls back to core – conserves heat for vital organs
- Internal climate: varies with location in body, time of day (circadian rhythm)



# Circulation and Heat Exchange

- Vessels constrict/dilate – control distribution of blood
- Blood vessels in skin can increase/decrease blood flow X 10
- Blood absorbs/carries heat quickly (conduction through tissues slow)
- Cold weather – blood withdraws from surface to conserve heat (skin cool, pale)



# Heat Production

- Hypothermia = “Too little heat”
- Heat loss faster than heat production
- 1 Kilocalorie heats 1 L. water 1°C.
- 60 – 80 Kcal/hr. at rest (average adult)
- Strenuous exercise – X6
- Shivering – X6
- Extreme exercise – X10
- Need FUEL to produce heat
- Need WATER to maintain blood volume



# Heat Loss Mechanisms

- Radiation – head 40% on a clear day
- Convection (wind chill)
- Conduction – e.g. wet clothes, sitting/lying on cold ground or snow
- Evaporation (insensible sweating)
- Respiration - convection + evaporation *inside* body
- Alcohol dilates blood vessels in skin.  
Makes you feel warm as body dumps heat.  
Lowers thermostat in brain.
- Exercise produces heat, but brings blood near skin surface causing heat loss



# Water Loss in Cold Weather

- Sweating inside clothes, sleeping bag
- Dry air – insensible/evaporates
- Cold weather diuresis
- Respiration: air must be 100% humidified for lungs, vapor exhaled
- Above snow line – hard to replace water, easy to get dehydrated
- Gastric emptying limit – hard to catch up



# Thermoneutral Zone

- Humans evolved in tropics (homeotherms)
- Internal climate 96.5° – 100° F (but temperature varies with location in body, time of day, physical activity)
- If internal temperature drops, vital processes get less efficient
- TNZ: Air temperature 82°-93° F (at rest) – thermal equilibrium



# Clothing Creates Microclimate

- Insulation = enclosed air spaces
- Reduces heat loss by radiation
- Wind barrier reduces loss by convection
- Water barrier reduces loss by conduction
- But must let sweat evaporate and pass through clothing
- Requires right clothing materials, design



# Hypothermia Effects

- Nervous system
  - Brain: judgment/thinking affected
  - Loss of fine coordination slurred speech, uncoordinated, clumsy
- Muscles
  - Weakness, increased oxygen consumption
- Breathing
  - Increased CO<sub>2</sub> , ketones on breath (fruity)
- Digestion
  - Diuresis/dehydration, slowed metabolism causes decrease in heat production



# Stages of Hypothermia

Core Temp	Signs and Symptoms	Treatment
>95° F	Chilly, minor coordination problems, shivering	Dry/warm clothes, rehydrate, eat
93° - 95°	Slurred speech, impaired coordination (fingers), confusion, apathy	May need to re-warm
90° - 93°	Failing coordination, muscle weakness, mentally sluggish	Shelter, re-warm
86° - 90°	Can't stand, semi-conscious, may be rigid	Maintain body temperature and evacuate
<86°	Vitals faint or imperceptible – cannot re-warm in field	Maintain body temperature and evacuate



# Severe Hypothermia

- Altered mental status
  - Semi-conscious or unconscious
- Treatment
  - Handle gently
  - Initial assessment
    - Care for life threats – Rescue breathing/CPR
  - Remove clothing, bundle and insulate
  - Warm aggressively by available means
- Evacuate – go fast – any patient with severe hypothermia to a hospital for re-warming and advanced life support



# Re-warming Techniques

- Hot packs in strategic areas (total heat small)
- Heated water bottles (well wrapped) sides of neck, armpits, groin – most effective
- Warm bodies in sleeping bag
- Heated oxygen
- Hot IV's
- Forced air
- Warm bath



# CPR and Hypothermia

- Oxygen demand drastically slowed, another minute will not make a difference
- Check breathing and then pulse 30 – 60 seconds
- May have a pulse too faint to feel
- Chilled heart very irritable and easy to send into V-fib – HANDLE GENTLY
- If heart is chilled to pulselessness, defibrillation WON'T WORK until heart is re-warmed
- Can't re-warm deep hypothermia in field – physically impossible and dangerous
- High altitude – rescue breathing less effective, doesn't work over 14,000 feet



# CPR Considerations

- Obviously hopeless, e.g. fatal wounds, rigid, lividity?
- Physically possible to do effective CPR where you are?
- Heavy clothes hinder movement, rescuer probably chilled – muscles less efficient
- Can you continue without interruption until patient is in helicopter or hospital?



# Immersion Hypothermia

- TNZ in water 91.4° F
- Water conducts heat 25 X as fast as air
- Huge heat capacity
- Result: chills thin (and unprotected) victim 100 X as fast as in air
- Chills fat victim 10 X as fast as in air.
- In cold water, blood vessels in skin paralyzed, dilate – rapid heat loss



# Water Temperature Effect

- In water < 60° F
  - Reflex gasp – may aspirate water
  - Hyperventilation for several minutes, flushes CO<sub>2</sub>
  - Confusion and dizziness
  - Possible muscle tetany
  - Reduces breath-holding time to 1/3
- In water < 50° F
  - Muscles weakened
  - May not be able to swim more than 15 minutes



# Preventing Hypothermia

- Dressing for survival
  - Layering
  - Avoid cotton
- Fuel intake
- Hydration
- Prevent overexertion
- Avoid alcohol
- Watch members in group



# Frostbite Mechanism

- Circulation first sends surges of blood to chilling area to warm it (tingling, false sense of warmth)
- If skin remains cold, circulation withdraws (capillary shunt)
- Skin goes numb at 50° F skin temperature
- Fluid between cells freezes first (less salty), ice crystals draw out water from cells
- Ice crystals also can pierce cell membranes



# Frostbite Description

- Superficial
  - Skin white or gray and waxy,
  - Indents, stays dented
- Deep
  - Solid, can't indent
- After re-warming
  - Swelling, blistering, pain (like serious burn)



# Frostbite Treatment

- Do **NOT** rub with snow
- Re-warm in water 98-110° F for 20 minutes
- Loose sterile dressings
- Elevate
- Superficial
  - Warm in field with body heat
- Deep (In field)
  - Prevent further heat loss
  - Re-warm in hospital



# Re-warming and Disinfecting



# Swelling After Re-warming



# How to Freeze Your Flesh

- Air temperature below freezing
- Get hypothermia first – then your body won't protect skin, extremities
- Get wet – water will conduct heat away fast!
- Expose bare skin to freezing wind
- Cut off circulation to feet (tight boots) and hands
- Ignore warning signs (tingling, numbness)
- In a hurry? Grab cold metal or spill super cooled gas on your skin – instant contact frostbite!



# Preventing Frostbite

- Stay warm
- Stay fueled and hydrated
- Maintain circulation in hands and feet
- Heed warning signs – re-warm and protect tingling or numb skin
- Cover bare metal e.g. fuel bottles with duct tape
- Wear glove liners when handling metal
- Use pour spout or funnel to pour fuel in stove and wear nitrile or vinyl gloves over glove liners



# Submersion Injury



# Submersion Accidents

- Drowning is one of the most common causes of accidental death
  - Half are children
- Contributing factors
  - Watercraft
  - Spinal injuries
  - Trauma
  - Alcohol and drugs



# Drowning

- Immersion in water
- Cold water (<70° F) reflex
  - Involuntary constriction of upper airway muscles
  - Laryngospasm
  - Results in asphyxia and unconsciousness
  - Result is respiratory arrest that progresses to cardiac arrest



# Water Rescue

- Don't become another victim
- Reach, Row, Throw, Go
- **Reach** - with a paddle/oar, pole, branch or anything that extends your reach
- **Throw** - a float or line to the victim
- **Row** - use a boat, personal watercraft to access victim
  - Use caution with propeller driven watercraft
- **Go** - if unable to rescue with other methods and you are trained



# Treatment for Submersion

- Scene Safety – Don't become a victim!
- Rescue
- Initial assessment
  - Responsive?
    - Physical exam – treat trauma, hypothermia, monitor ABCs
  - Unresponsive
    - Maintain airway
    - Breathing absent – provide rescue breaths
    - Pulse absent - provide CPR
    - Spinal precautions based on MOI



# Evacuation Guidelines

- A conscious submersion victim (Near Drowning) should be closely monitored and should seek medical care same as that of the Drowning patient
- Evacuate – go fast – any patient who:
  - Was unresponsive for even a brief period
  - Has signs/symptoms of respiratory problem
  - Has serious trauma or suspected spinal injury



# Prevention

- Provide supervision for all swimming activities
- Participant screening
- Confirm area is safe for swimming
- Personal floatation devices while boating
- Helmets for whitewater activities
- Feet first in shallow water
- Don't participate when under the influence of alcohol or drugs



# Altitude Illness



# Oxygen and Altitude

- Humans work best at sea level where combination of oxygen and atmospheric pressure keep lungs well supplied
- Air and oxygen pressure decrease with altitude
- 16,000 feet: one-half of pressure at sea level
- Top of Mt. Everest: one-third of pressure at sea level
- Altitude effects body function



# Effects of Altitude

- Increased heart rate
- Work of breathing increases
  - Hypoxic ventilatory response
  - Rate and depth increases
- Increased frequency of urination
- Peripheral and periorbital edema
- Poor sleep
- Breathlessness with exercise
- Dehydration



# Acclimatization

- Give it time: sleep at high trailhead
- Climb gradually
- Climb high, sleep low
- Drink water regularly
- Stay warm
- Avoid respiratory depressants (alcohol, sleeping pills)
- Don't climb with cold or flu



# Altitude and Vision

- Night vision dims
- Eye surgery (RK) and altitude: cornea distorts
- Lasik surgery: Few problems
- Contact lenses and dry eyes
- Retinal hemorrhages (usually clear up on descent)



# Acute Mountain Sickness (AMS)

- Starts at altitudes above 6,000 – 8,000 feet, usually after 6-8 hours
- Studies show that 25%-50% get AMS
- Symptoms include headache and:
  - Shortness of breath
  - Weakness and lassitude
  - Nausea and loss of appetite
  - Insomnia (AMS often starts with sleep)
- Sudden onset of headache is AMS until proven otherwise



# AMS Treatment

- Stop ascending, let body catch up
- Non-narcotic pain relievers
- Rehydrate
- If no improvement, go down until symptoms clear
- 1,000-2,000 feet may be enough
- Acetazolamide (Diamox)
- *Ginkgo biloba* and other herbal remedies may help
  - Mixed study evidence



# High Altitude Pulmonary Edema (HAPE)

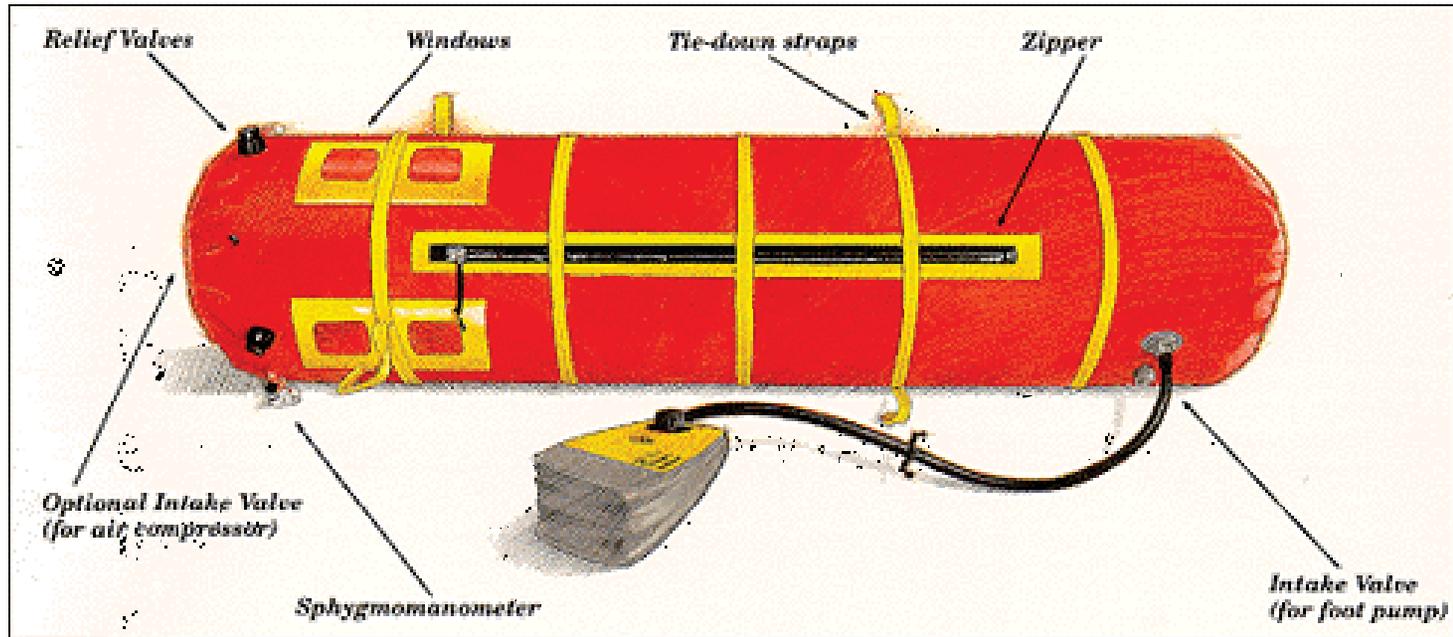
- Much less common than AMS, may be seen above 8,000 feet
- Risk begins 2-5 days after ascent without preceding AMS
- Symptoms
  - Early – decreased exercise performance, dry cough, fatigue
  - Late – dyspnea at rest or with normal activity, profound fatigue, cough with frothy sputum, cyanosis



# HAPE: Treatment

- Descent
- Gamow bag if descent delayed
- Supplemental oxygen (helps but doesn't cure)
- Upright position
- Physician may prescribe nifedipine (Procardia) (lowers pulmonary arterial pressure)
- Evacuate any patient who does not improve with descent. Be cautious about ascending again.





# High Altitude Cerebral Edema (HACE)

- Usually seen in patients with preceding AMS or HAPE
- Typically occurs at altitudes over 10,000 feet
- Signs and Symptoms
  - Confusion and irritability
  - Possible mild amnesia
  - Possible hallucinations
  - Possible irrational behavior
  - Ataxia (balance problems)
  - Somnolence (sleepy) progressing to coma



# HACE Assessment and Treatment

- **Test** - Have patient walk straight line, heel to toe or stand with eyes closed
  - Swaying: Mild to moderate HACE
  - Loss of balance (ataxia): Severe HACE
- **Treatment**
  - Descent (even if Gamow bag relieves symptoms)
  - Supplemental oxygen
  - Dexamethosone (Decadron) and Acetazolamide (Diamox) with physician order
  - Evacuate – go fast – any patient with HACE to a lower altitude and then to hospital even if patient gets better



# Other Effects of Altitude

- Danger of blood clots at very high altitude
  - Stroke
  - Pulmonary embolism
- Wound healing slow (stops at 18,000 feet)
- HAFE (high altitude flatus expulsion)
- Mental and physical efficiency reduced
  - Increases risk of accidents



# Altitude Illness Prevention

- Most critical factor is to gain altitude no faster than body can acclimatize
- High carbohydrate diet may help while at altitude
- Avoid overexertion
- Stay hydrated
- Look for early signs of altitude illnesses



# Lightning Injury



# Lightning Strike

- 100-300 deaths per year in U.S.
- Mortality rate 30%
- Mechanism
  - Direct hit
  - Splash over (some current jumps from primary target to you)
  - Ground current (step voltage) from nearby strike
  - Transmitted by conductor (wire fence, water)



# Lightning: How, When, Where

- Difference in electrical potential (ground/air)  
- path of least resistance
- Millions of volts, thousands of amps, DC
- Very short duration (1/1,000 second)
- Strikes earth 100 times per second (somewhere)
- Most common in mountains and over large bodies of water



# Lightning Strike Injuries

- Nervous system (best conductor)
  - Can knock out respiratory center in brain
  - Heart runs out of oxygen - VF
  - Electrical activity of the heart may also be interrupted
- Blunt trauma from sledgehammer effect
  - Muscle spasms
  - Blast wave can throw victim long distance
- Burns
  - Usually superficial, not the problem
- Other effects
  - ½ victims have burst eardrums – hearing loss!
  - May be temporarily blind
  - May be temporarily paralyzed



# Punctate Burns from Lightning



# Lightning Strike: Treatment

- Scene safety
- May need to triage if multiple victims
- Initial assessment
  - Treat life-threats
  - Provide rescue breathing and CPR as necessary. Use defibrillator if available.
- Physical exam
  - Expose limbs
  - Treat trauma
- Evacuate – go fast – any patient who has been struck by lightning



# Lightning Avoidance

- Keep track of weather and storms
- Know local conditions
  - Storm patterns
  - Areas with frequent lightning
- Don't be a point of least resistance
- Stay away from prominent P.O.L.R.s
- Position/posture: Don't be a bridge for ground current
- Avoid exposed position during storms



# Sunburn, Skin and Eye Protection



# Sun Exposure

- Can cause burns, eye damage, and increases risk of skin cancer
- 12,000,000 new skin cancer cases in U.S. next 50 years
- EPA: Ozone erosion causing 4,000 more skin cancer deaths per year in U.S.
- 1 in 5 U.S. citizens born this year will get skin cancer. In Australia, 3 in 5
- Protection is the best treatment



# Exposure Factors

- Altitude
  - 50% greater exposure at 10,000 feet than sea level
- Choppy water can double exposure
- Clouds don't block UV rays
- Wet skin burns faster than dry
  - Salt water makes skin even more susceptible to burning
- Some medications cause photosensitivity



# Altitude + reflecting snow multiply UVB exposure



10 minutes exposure at 14,000 feet



# Vitamin C and Sun Damage

- Vitamin C can reduce sun damage when applied to skin
- Dissolve vitamin C crystals in water
- Rub into skin
- Retain 10 X as much as with ingestion
- Stays in skin 10-20 days
- NOT a sunscreen, but reduces UVB damage to skin



# Eye Damage

- Eyelids sunburned – reddened, swollen, painful: apply cool, wet dressings
- Cornea sunburned (“snow blindness”) – very painful, unable to tolerate light: shade from light with eye patch
- Retina damage – loss of visual acuity, especially center of visual field



# Sun Damage Prevention

- Recognize intensity of the sun and effects of water and altitude
- Use quality sunscreens
  - See student text for more info
- Wear protective clothing/hats and sunglasses
- Limit your exposure to direct sunlight
- Watch other group members for problems



# Contaminated Water



# Causes of GI illness

- Contaminated water
- Contaminated or spoiled food
- Contaminated hands (on food and/or utensils)
- Soap (on pots, dishes not thoroughly rinsed)
- Reaction to iodine in disinfected water: 7% of population sensitive, especially with prolonged use



# Contaminated Water Diseases

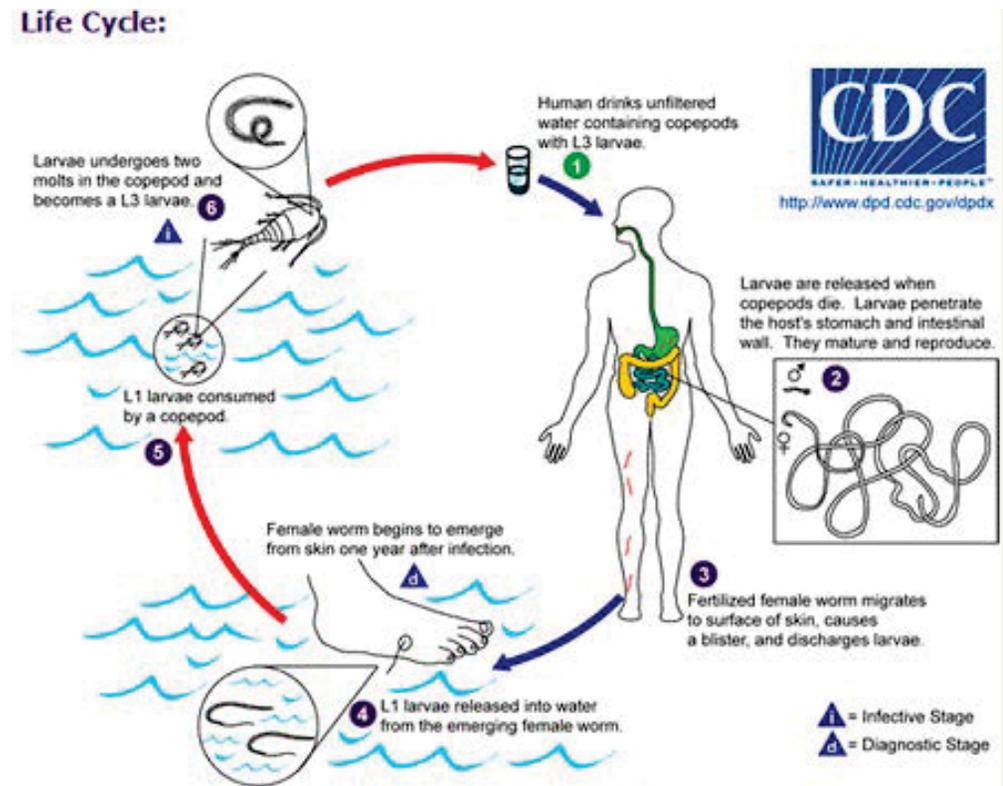
- Bacteria
  - E- coli
  - Salmonella
- Protozoan parasites
  - Giardia
  - Cryptosporidium
- Viruses
  - Hepatitis A
  - Norwalk

*\*See student handbook for specific information*



# General Signs and Symptoms

- Nausea
- Vomiting
- Diarrhea
- Abdominal pain and/or cramping
- Dehydration



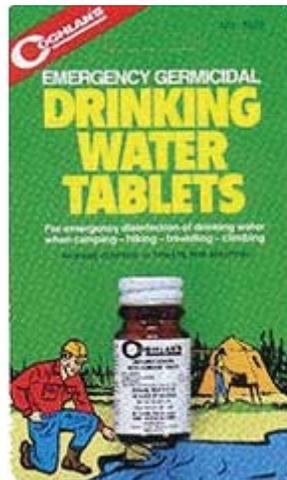
# GI Distress Treatment

- Fluids replacement
- Rest
- Over the counter meds for nausea/ vomiting and diarrhea may be helpful
- Monitor for signs of severe dehydration
- Most patients can recover without evacuation
- Evacuate – go slow – any patient with vomiting and diarrhea for more than two days or signs of severe dehydration



# Prevention of GI Diseases

- Disinfect water
  - There are several acceptable methods
- Clean hands with soap or disinfectant after defecating and before handling food
- Pre-wash and dry fresh vegetables and fruit
- Dehydrated food: bacteria usually can't grow without water



# Mosquitoes, Ticks, and Disease



# Blood-sucking arthropods

Worldwide: mosquitoes #1 vectors of human disease

But in U.S.:

- Ticks 99.2%
- Mosquitoes 0.4%
- Fleas 0.4%



# Mosquitoes

- 3,000 species in world, 150 in U.S.
- Need water to breed
- Active spring to summer, some species into fall
- Active above 60° F, some at 50°, especially in early spring
- In woodland, usually feed by day.
- Some feed at dusk or night
- Higher altitude/colder temperature = fewer active at night



# Mosquito senses

- Long-range: Odors
- Mid-range: CO<sub>2</sub> (triggers random flying reflex)
- Visibility and movement
- Short range: Heat and moisture
- “Repellents” jam senses, make it hard for mosquito to find you.
- Folklore repellants do not work



# Mosquito feeding

- Inserts mouthparts (like hypodermic needle)
- Probes, finds capillary
- Injects saliva: Anti-coagulant
- Anesthetic in some species that carry human disease
- Antigens (itching or sometimes worse)
- Excretes liquid to concentrate blood protein in gut



# Mosquito-borne Disease

- Malaria
- West Nile Virus
- Bubonic plague
- Pneumonic plague
- Yellow fever
- Dengue fever

\* *See your student handbook for specific information on these diseases. Information is also available on the internet and at [www.cdc.gov](http://www.cdc.gov)*



# Ticks

- 80 species in U.S.
- Soft ticks
  - In burrows
  - In U.S., relapsing fever only human disease carried
- Hard ticks (80%)
  - Flat (unfed), tough cuticle
  - Adult 1/10" unfed
  - In vegetation (adults)
  - In leaf litter (nymphs)
  - 80-90% at ecotones (boundary between two types of vegetation, e.g. meadow and forest)



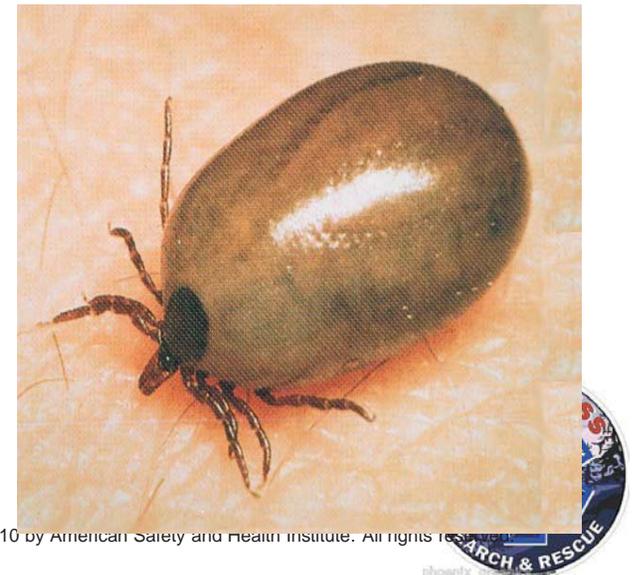
# Ticks: Senses

- Most reside along game trails
- CO<sub>2</sub> sensors in forelegs
- Triggers crawling 10-15 feet or dropping on host
- Heat and moisture attract (close range)



# Tick feeding

- Teeth on hypostome (like short, barbed harpoon) cut skin
- Barbs anchor it (some species also secrete cement)
- Injects saliva with anti-coagulants
- Regurgitates liquid part of blood to concentrate protein in gut
- Hard ticks feed days to weeks



# Favorite host of adult tick that carries Lyme disease, but you'll do



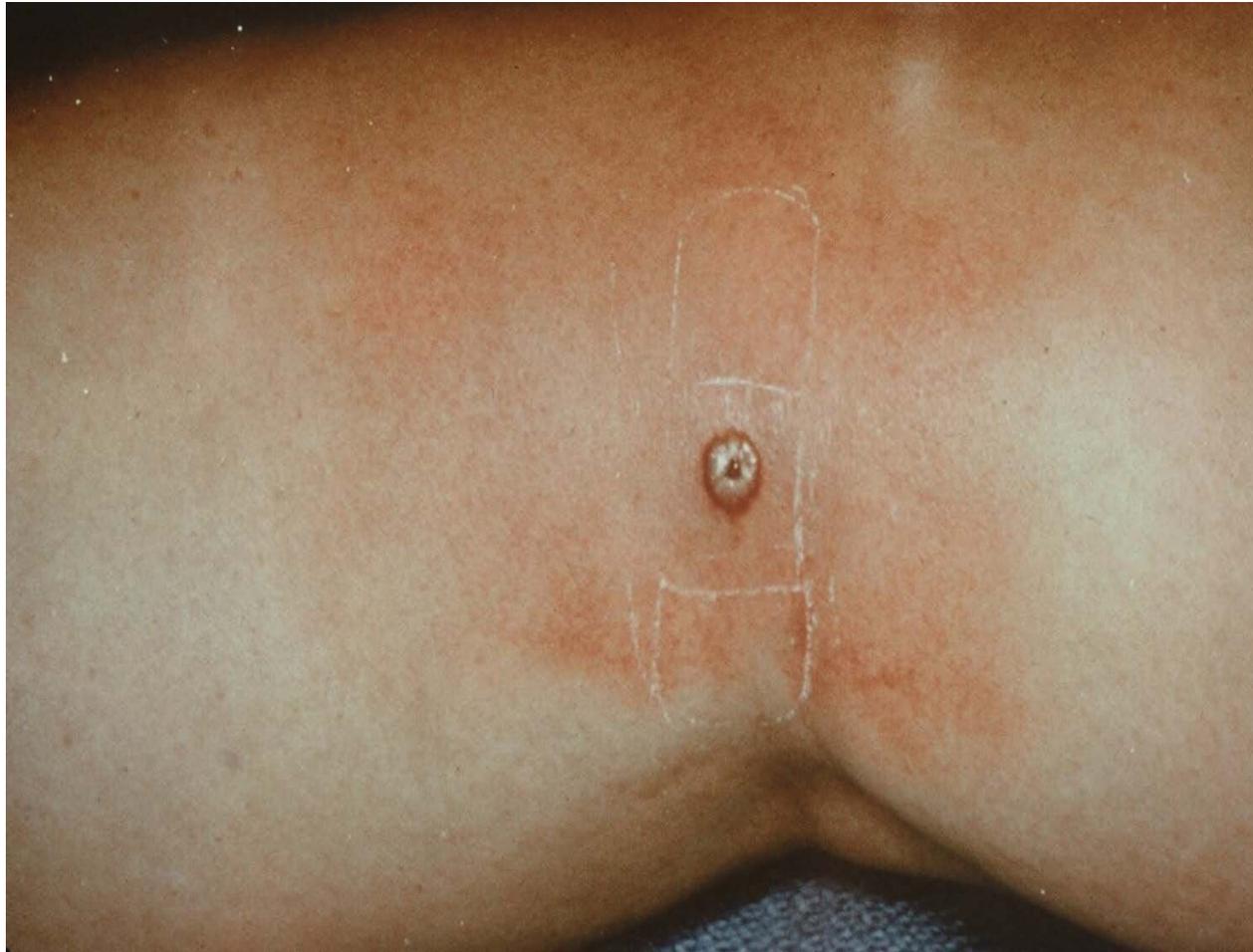
# Tick Transmitted Diseases

- Lyme Disease
- Rocky Mountain Spotted Fever
- Tick Paralysis

*\*See student handbook for additional information on these diseases*



# Tick Bite with Spreading Rash



# Rocky Mountain Spotted Fever



# Tick Removal

- Remove with fine-tipped tweezers or other tool
- Use magnifying glass
- Grip against skin, do not squeeze tick
- Pull straight out, slowly and steadily
- Bring it back alive for identification and testing (Public Health Dept. or Entomology Dept.) if it has been feeding.



tickbitesonhumanspictures.com



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photo123

# Bees, Wasps, and Spiders



# Bees, Wasps, and Spiders

- Bees, wasps, and spiders are venom producing arthropods
- Their venom may contain neurotoxins as well as flesh destroying digestive enzymes
- Bee, wasp, and ant stings can cause allergic reactions
- Spider bites can cause more systemic reactions



# Bees and Wasps

- Usually sting only in defense of nests or territory
- Honeybee leaves stinger/venom sack embedded
- Scrape or pull it out immediately – still injecting venom
- Danger of anaphylaxis



# Allergic Reaction

- Most reactions to stings are non-life threatening
  - Hay fever symptoms
  - Red and itchy skin
  - Hives
  - Localized swelling



Hives from Allergic Reaction

# Anaphylaxis

- Life threatening
  - Allergic reaction Signs and Symptoms
  - Swelling of the face, lips and tongue that results in difficulty breathing
  - Drop in blood pressure (shock)
  - Onset may be minutes to 1 hour
  - Can result in respiratory arrest due to airway obstruction
  - Requires epinephrine administration



# Treatment

- Allergic reaction
  - Provide antihistamine such as diphenhydramine (Benedryl)
  - Monitor to assure that the reaction does not become severe
- Anaphylaxis
  - Administer epinephrine
    - Epi-Pen, Twin-Ject
  - If airway clear, give antihistamine
  - Keep hydrated
  - Evacuate – go fast – any patient with anaphylaxis to emergency care



# Using an EpiPen®



- Remove device from storage tube
- Grasp device with black tip pointing away from you
- Remove gray safety cap



- Hold black tip near outer thigh.
- Firmly swing and jab device at right angle into thigh until it clicks. EpiPen® is designed to work through clothing.
- Hold device firmly against thigh for about 10 seconds



- Pull device straight away, massage injection area for at least 10 seconds
- Carefully place used device somewhere to prevent accidental needle stick, such as pushing needle into ground.
- Inform EMS providers for help in proper disposal



# Scorpions

- Reside in the desert southwest
- Stings painful, but not usually lethal
- Venom is a neurotoxin
  - Local parenthesis and pain
  - Can cause systemic reaction



# Scorpion Sting Treatment

- Level I and II – Localized reaction
  - Ice packs in cloth (30 minutes/hour), oral pain killers
- Level III and IV – Jerking/twitching, airway compromise, seizure like activity
- Antivenom
  - Risk of anaphylaxis
  - Does not relieve pain
  - Only prescribed for serious case
- Evacuate – go fast – any patient with level III or IV envenomation



# Spiders

- 30,000 species
- Most have venom glands, but not dangerous to humans because:
  - Not enough venom
  - Can't penetrate skin
- Few dozen species harmful to people: potent venom + large dose + powerful fangs



# Spiders of Concern

- Black Widow
- Brown Recluse
- Tarantulas
- Banana
- Hobo
- Running Sac



Black Widow



Brown Recluse



# Black Widow

- Distribution
  - 5 species in U.S.
  - At least 1 in every state except Alaska
- Habitat
  - Sheltered corners of fields, gardens
  - Under stones, logs, vegetation, wood piles
  - Crevices in walls
  - In unoccupied buildings, e.g. barns, garages



# Effects of Bite

- Usually painful, pinprick, or burning sensation
  - Local pain getting worse within 1 hour
- Severe envenomation
  - Worst pain ever felt
  - Local sweating
- Within hours
  - Possible muscle cramps and abdominal rigidity
  - Spasms
  - Patchy paralysis
- Usually recover within days



# Black Widow - Other Possible Effects

- Abdominal or back pain
- Extremity pain
- Hypertension
- Malaise
- Nausea
- Vomiting
- Headache
- Fever
- Possible seizures in elderly
- Tremor
- Respiratory muscle weakness + pain may cause respiratory arrest
- Pregnancy: premature contractions/delivery possible



# Black Widow Treatment

- Clean wound
- Cold packs
- Check tetanus immunization
- Calcium gluconate for pain
- Antivenom – physician may use if:
  - Respiratory arrest
  - Seizures
  - Uncontrolled hypertension
  - Pregnancy



# Brown Recluse Spider

- Found worldwide
- 5 species in U.S.
- Native to southern states
- In Mississippi Valley, as far north as southern Wisconsin
- But found in colder states as indoor spider
- Habitat - Likes warm, undisturbed environments:
  - Vacant buildings
  - Storage sheds
  - Closets, attics



# Effects of Recluse Venom

- Destroys cells, including red blood cells
- Causes clotting
- May feel sharp stinging from bite or not notice
- Mild envenomation – skin irritation
- Progression
  - 0-2 hours: Blister formation
  - 2-6 hours: Local vasospasm/ischemia
  - 6-8 hours: Stinging stops, aching and itching start
  - 5-12 hours: Cyanosis
  - 12 hours: Tissue destruction



# Other Effects

- Pain
- Swelling and joint pain
- Itching and elevated skin temperature
- Malaise
- Nausea
- Systemic
- More frequent in children:
  - Urine in blood
  - Anemia
  - Fever and chills
  - Weakness, nausea, vomiting



# Damage from Recluse Venom



# Treatment

- Elevate
- Cold compresses
- Immobilize loosely
- Make sure tetanus immunization is up to date
- Evacuate – go fast – any patient with signs of a systemic reaction



# Spider Bites - General

- Spiders are usually timid creatures
- Like to hide in darkened places
- The bites cause a variety of Signs and Symptoms including respiratory problems and necrosis
- Your student text has additional information on spider bites
- Evacuate rapidly – go fast – any patients with: Signs and Symptoms of a severe reaction to a spider bite



# Venomous Snakes



# Venomous Snakes

- United States
  - 20 species of venomous snakes
  - At least 1 in every contiguous state except Maine
  - 8,000 reported bites/year, many unreported
  - Only 10-20 deaths - but high morbidity (tissue destruction)
- Most snakes timid and will flee unless cornered
- Pit vipers responsible for 98% of bites
  - Rattlesnake, cottonmouth, copperhead



# Coral Snakes

- Related to cobras
- <1% of bites
- Shy and only found in South and Southwest
- Fixed fangs: cannot strike - chew to inject venom
- Small, with small mouth
- Potent venom: paresthesia, paralysis, possible death from respiratory and CV failure 8-12 hours

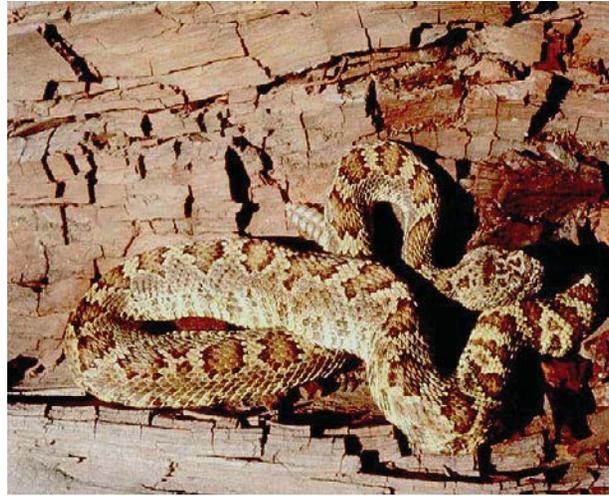


# Pit Vipers

- Long hollow fangs in front of mouth
  - Efficient at injecting venom
- Other traits
  - Slit pupils, triangular heads shared by some other snakes
- Copperheads
  - many bites, painful but not dangerous
- Cottonmouths
  - Limited range
- Rattlesnakes
  - Most of the dangerous bites in U.S.



# Pit Vipers



Rattlesnake



Copperhead



Rattlesnake fangs

# Venom Injection

- Fangs in large rattler up to 7/8" (replaced every 6-10 weeks)
- Glands and ducts
- Contracted by external jaw muscle
- Independent of striking/biting action
- Amount determined by size of prey (humans: 25%-75% of venom)
- 20% of bites - no venom (dry bite), 30% mild envenomation, 50% moderate to severe



# Viper Venom

- Venom serves two purposes
  - Immobilize prey
  - Digestion
- Most are neurotoxins
  - Some are very potent – Mojave Green
- Expect rapid swelling and tissue destruction



# Signs and Symptoms

- Weakness and numbness (scalp, face, lips) due to neurotoxin
- Nausea and vomiting
- Pain
- Metallic taste in mouth
- Fang marks
- Swelling, blisters, tissue destruction
- Twitching
- Hypotension
- Respiratory distress



# Fang Marks and Swelling



# Effects of Bite



# Progressive Swelling



# Venomous Snake Bite Treatment

- Evacuate – go fast – any patient with venomous snake bite
  - Call ahead for anti-venom
- Apply pressure bandage if on extremity
- Keep calm and limit activity
- Watch for Signs and Symptoms
  - No swelling after 20 minutes, no venom
- Have patient drink fluids if possible
- Take to hospital with anti-venom ASAP
  - Time is important!



# What NOT To Do

- Cut
- Suck with mouth (infection)
- Apply tourniquet
- Apply ice (frostbite, further tissue damage)
- Apply electric shock
- Try to kill the snake



# Hazardous Mammals



# Wild Animal Attacks

- Attacks on humans by cougars and bears are rare
- Bears cause about one death per year
- <150 injuries in all U.S. and Canadian parks over 50 years
- Many attacks provoked
- More information on avoiding bear attacks in student text



# Rabies

- In U.S., only a few deaths per year (rabies control among dogs)
- Major problem in developing countries (e.g. 50,000 deaths per year in India)
- Any unnatural behavior in animals may be caused by rabies (foaming at mouth in only 1/3 of cases)



# Rabies Carriers

- Dogs
- Skunks (#1 in U.S.)
- Raccoons
- Cats
- Monkeys (especially in Asia)
- Foxes and wolves
- Bats (aerosol in caves – saliva from roof)



# Rabies Treatment

- Check CDC site ([www.cdc.gov](http://www.cdc.gov))
- Prophylactic vaccination expensive, not very effective
- After exposure (during incubation period) best vaccine 100% effective
- Incubation period averages 2-12 weeks but can be shorter, e.g. severe bites on head
- Once virus reaches central nervous system, patient cannot be saved



# Rabies Signs and Symptoms

- Pain and numbness spreading from bite
- Malaise and fatigue
- Fever and/or chills
- Respiratory effects
  - Sore throat, cough, breathing difficulty
- Digestive effects
  - Nausea, vomiting, diarrhea, abdominal pain
- Nervous system effects
  - Headache, vertigo, anxiety, irritability
  - Hydrophobia



# Animal Bite Treatment

- Treat bites like any open wound
- Take extra time to clean the wound if possible
- Be aware of secondary problems such as rabies (rare) and infection (likely)
- Make evacuation decisions based upon severity of wounds and risk of infection or transmitted disease



# Hazardous Marine Animals



# Marine Animal Injuries

- There are a variety of animals in the marine environment that can harm you
- Most inflict a painful sting after coming in contact with them
- With the exception of large sharks and certain jelly fish, few are life threatening
- Any wound inflicted in water has a high potential for infection



# Sharks and Others with Large Teeth

- Only 15 attacks and 6-10 deaths per year reported worldwide
- Very few attacks by barracuda, moray eels
- Most shark attacks on surfers or swimmers entering shark infested waters
  
- Sharknado Hits Virginia!



# Marine Wounds

- Causes: barnacles, coral, etc.
- Irrigate thoroughly, protect with sterile dressing
- Use clean water (not seawater)
- Do not close wound
- More bacteria that can infect wound than on land



# Jellyfish Stings

- Pricking or burning pain, then throbbing and radiating
- Possible blistering and swelling
- Possible allergic reaction (anaphylaxis) if patient is sensitized
- Evacuate – go fast – any patient with anaphylaxis or vital functions affected to emergency care



# Jellyfish Stings



# Jellyfish Sting Treatment

- Flush with seawater if vinegar is not immediately available (fresh water activates stinging cells)
- Soak skin with vinegar to inactivate stinging cells
- Use baking soda slurry if vinegar is not available
- Scrape off any remaining tentacles
- Immerse affected area under hot water to relieve pain
- Local remedies such as meat tenderizer and papaya extract not as effective



# Venomous Puncture Wounds

- Pull out small spines with tweezers
- Immerse limb in hot water 30-90 minutes (breaks down the venom)
- Immobilize large spines with bulky dressings



# Stingrays

- Estimated 2,000 stings per year in U.S.
- Tail with 1 or more barbed stingers
- Usually stings when stepped on (in surf)
- Scuff feet wading in breeding season (warns stingray away)
- Spike can penetrate shoes or wet suit
- Often breaks off in wound



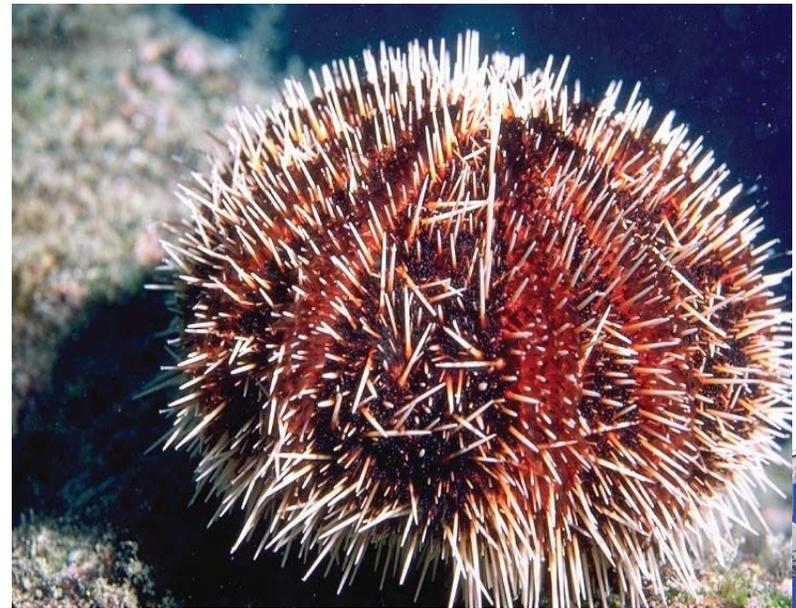
# Stingray Venom Effects

- **Local Signs and Symptoms**
  - Pain spreads through extremity
  - Wound swells, reddens, sometimes turns blue
- **Systemic Signs and Symptoms (may vary)**
  - Nausea, vomiting
  - Fever and chills
  - Weakness and fainting
  - Tremors, muscle pains
  - Cramps



# Sea Urchins and Starfish

- Wading injuries
- Hollow, venom-filled spines
- Remove with tweezers
- Use paste to scrape off stinging pincers from skin
- Submerge limb in hot water



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# Marine Wounds and Stings

- There are a variety of creatures that can inflict stings causing minor to severe reactions. Anaphylaxis is possible
- Your student text contains information on specific Signs and Symptoms as well as treatment
- Be familiar with the inhabitants of the environment you are in
- Make evacuation decisions based upon the severity of the reaction or wound



# Hazardous Plants



# Hazardous Plants

- Three ways they can get you
  - May be poisonous to eat
  - Contact can cause reaction if you're sensitized
  - Needles or spines can sting or stab
- Poisonous plants
  - Don't eat strange plants
  - Don't rely on book for identification
  - Learn from experienced mentor before eating wild plants



# Hazardous Plants

- Three plants responsible for most wilderness problems
  - Poison Ivy
    - Most of the U.S. except Pacific Coast
  - Poison Oak
    - East, South and Pacific Coast
  - Poison Sumac
    - Wet, swampy areas of Eastern U.S.
- All three contain Urushiol



# Poison Ivy, Poison Oak, Poison Sumac



Poison Ivy



Poison Oak



Poison Sumac

# Urushiol

- Urushiol can cause allergic reaction
- Milky looking oil is in all parts of plant
- Bare shrubs in winter – broken twigs
- Can pick up from dogs, cats
- Burning – can inhale urushiol (smoke jumpers)
- About one-half U.S. population moderately allergic
- About 10% very sensitive



# Poison Oak Rash



# Protection and Treatment

- Remove oil from skin
- Cool shower, strong soap
- Specialized product, e.g. Tecnu cleanser
- Isolate and wash contaminated clothes
- Baking soda, lotions etc. may relieve itching
- Severe reaction: Steroid injection



# Plants That Sting or Stab

- Stinging nettles, cactus etc.
- Peel off fine hairs or needles (rubber cement or tape)
- Pull out larger spines with tweezers
- Irritation is usually localized



# Medical Problems



# Medical Problems

- There are many medical problems that people deal with every day
  - Usually can control their activity and environment
  - Have medicines close by
  - EMS is readily available
- In the wilderness, these problems can be more serious or even life-threatening due to distance from medicines and EMS



# Respiratory Infections

- Upper respiratory infections
  - Congestion from mucus production
  - Decongestants – pros and cons
  - No treatment except traditional: fluids, stay warm
- Middle respiratory infections
  - Infection of bronchi (“bronchitis”) more serious
  - 90% caused by viruses – antibiotics don’t help
  - Deep, racking cough (yellow or green mucus)
  - May struggle for breath
  - Evacuate



# Pneumonia

- Caused by bacteria, viruses, or aspirated vomitus.
- Results in fluid accumulation in lungs
- Signs and Symptoms
  - Shaking chills
  - Chest pains (sharp, not dull)
  - Shortness of breath
  - Fever with hot, dry skin
- Treatment
  - Encourage coughing, place sitting up
  - Evacuate to physician for antibiotic treatment



# Asthma

- Mechanism similar to anaphylaxis
  - Respiratory system over-reacts to irritant, allergen, or stress
  - Histamines constrict air passages
  - Respiratory difficulty may be minor to severe
- Treatment
  - Keep patient calm
  - Asthma inhaler (epinephrine or albuterol)
  - Antihistamines



# Allergic Reaction

- Variety of causes
  - Insect sting or bite
  - Plants
  - Food
  - Latex (gloves)
- See section on Bees, Wasps, and Spiders for additional information



# Gastro-Intestinal Illness

- Variety of causes usually related to bacteria or virus
  - Gastroenteritis (stomach ache)
  - Dysentery
  - Diarrhea
- Use good personal and camp hygiene practices to prevent spread



# GI Illness Assessment and Treatment

- Most GI problems pass within two days
- Provide fluids to prevent dehydration
  - Alternate electrolyte drinks with water
- Rest
- Over the counter meds for nausea/vomiting and diarrhea may be helpful
- Monitor for signs of severe dehydration
- Most patients can recover without evacuation
- Evacuate – go slow – any patient with vomiting and diarrhea for more than two days or signs of severe dehydration



# Diabetic Emergencies

- Hypoglycemia “too little sugar” (in blood)
- Possible causes
  - Out of fuel
  - Took too much insulin (insulin shock)
  - Rebound hypoglycemia (too much sugar triggers insulin reaction)



# Hypoglycemia: Signs and Symptoms

- Hunger
- Pale, cool, sweaty skin
- Irritability, confusion, moodiness
- Faintness, dizziness, weakness
- Tremors
- Rapid pulse
- Headache
- Seizures
- Decreased LOR



# Hypoglycemia: Treatment

- Conscious patient with clear airway
  - Give small amount of sugar via fruit juice, syrup, sugared soft drink, or sugar dissolved in water.
  - If sugar improves condition, have patient eat a meal high in carbohydrates and protein
- Reduced LOC
  - Give glucagon injection if available
  - If glucagon not available
    - Place patient in position to protect airway
    - Rub oral glucose, syrup or other high sugar liquid substance on inside of cheeks and gums
    - Do not allow fluid to drain into throat



# Hyperglycemia

- Means “too much sugar” (in blood)
- Caused by lack of insulin
- Slow onset usually several days
- Signs and Symptoms
  - Thirst and frequent urination
  - Signs of dehydration
  - Warm, dry skin
  - Confusion, disorientation
  - Vomiting and abdominal pain
  - Fruity odor on the breath



# Hyperglycemia: Treatment

- If not treated, the patient will eventually lapse into coma
- Insulin is what the patient needs
  - If possible, have them check their blood sugar prior to taking insulin
  - If patient improves, monitor closely
- If patient does not improve or insulin is not available Evacuate as quickly as possible
  - Provide copious clear, unsweetened liquids, preferably water



# Seizures: Possible causes

- Heat stroke or fever
- Head injury
- Hypoglycemia (suspect diabetes)
- Meningitis (several types carried by mosquitoes)
- Not enough oxygen to brain, e.g. from HAPE (see Altitude Illness section)
- Drug or alcohol abuse
- Chronic condition (epilepsy)



# Seizures: Treatment

- Protect head and spine if victim falls
- Protect airway if patient vomits
- Clear away obstacles
- Is patient carrying medication for seizure condition?
- Identify and treat cause
- A seizure without cause or history, multiple seizures or continuous seizures should be evacuated rapidly



# Heart Problems: Angina

- Shortage of oxygen to heart muscle caused by partially blocked coronary artery
- Causes pain in the chest
  - May be described as discomfort, heaviness, pressure, aching, burning, fullness, or squeezing. May radiate to neck, shoulders or arms
  - Often mistaken for indigestion
  - Patient may also complain of shortness of breath
- Usually relieved by rest and nitroglycerine



# Heart Problems: Heart Attack

- Shortage of oxygen to heart muscle caused by blocked coronary artery
- Chest pain as in Angina, but may last longer or more severe
- Other Signs and Symptoms
  - Weakness, nausea, dizziness
  - Cool, pale and sweaty skin
  - Anxiety, feeling of impending doom, denial
  - Shortness of breath
- Can rapidly result in cardiac arrest



# Heart Problems: Treatment

- Angina
  - Rest, nitroglycerine if prescribed for patient
  - Restrict activity and consider evacuation if no previous history
- Heart Attack
  - Keep calm, position of comfort, restrict activity
  - Aspirin (baby or regular) and nitroglycerin if prescribed for patient
  - Treat for shock
  - Immediate evacuation or summoning of EMS
  - Be prepared for cardiac arrest



# Wilderness Medical Emergencies

- You should be familiar with the medical conditions of your group
- Be sure they are bringing an ample supply of medications
- For long, rigorous or extremely remote trips, members with medical conditions should be cleared by their physician prior to departure
- Always have an action plan in the event that a medical emergency becomes life-threatening



# Wilderness First Aid Kits



# First Aid Kits

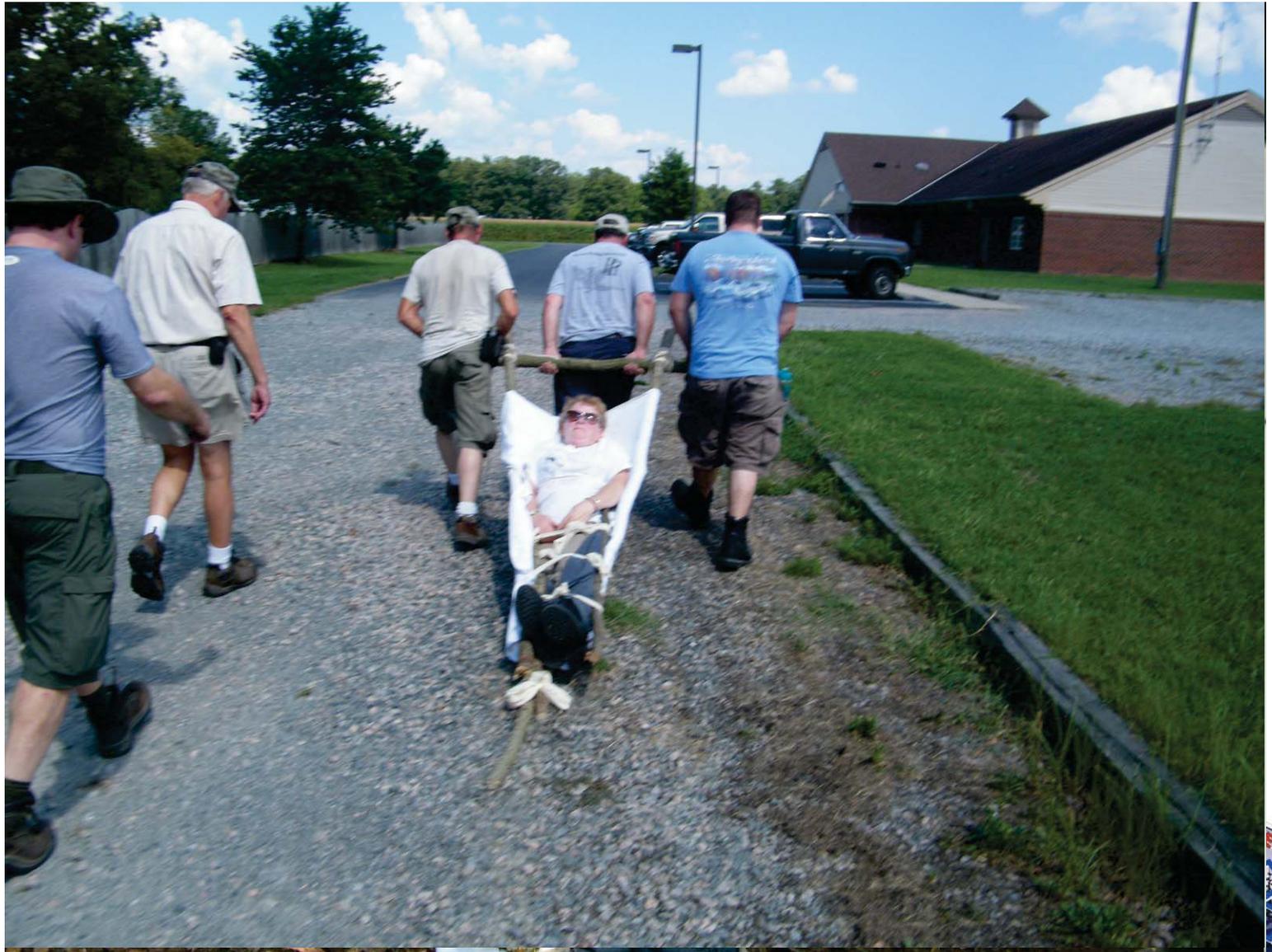
- Must contain materials to treat life-threatening conditions as well as minor to moderate problems
- The best kit is the one you assemble yourself
  - Based upon the conditions and risks you will face
  - Includes personal items of the group
- Additional resources
  - WFA student handbook
  - BSA First Aid Kit Guideline (from instructor)



WILDERNESS EMERGENCY CARE



# Moving Patients



# Evacuation

- Shelter in place
- Walk
- Horse
- 4 Wheeler
- Ski
- Truck
- Helicopter
- ?



- Get Ready for the Wilderness Type EMS Call.....
- Research
- Prepare
- Equip and Respond....



Thank you for attending  
the course.

