Wilderness First Aid Course Handouts

Wilderness Medicine Institute of NOLS

Wilderness First Aid Course Schedule

DAY 1
Morning

- Introductions
- Patient Assessment System
  - Initial Assessment
  - Patient Exam, Vital Signs, Focused History
  - Documentation

Afternoon

- Spine Injury Management
- Head Injuries
- Shock
- Wilderness Wound Management

DAY 2
Morning

- Focused Spine Assessment
- Athletic Injuries
- Fractures
- Dislocations
- Heat

Afternoon

- Cold Injuries
- Lightning
- Altitude Illness
- The Unresponsive Patient
- Acute Abdomen
- Anaphylaxis
- Wilderness First Aid Kits

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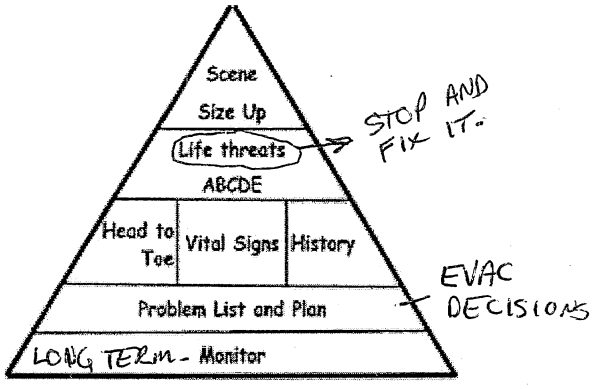
WFA Schedule 2 Day 10/8/08

Patient Assessment System (PAS)



Size-up the scene

1. Survey the scene for hazards:
   - Immediate danger to rescuers
   - Immediate danger to bystanders
   - Immediate danger to patients
2. Determine what might have caused the accident or injury (MOI).
3. Protect yourself from bodily substances (BSI).
4. Determine the number of patients.
5. Form a general impression of the patient.

Initial Assessment: Survey the patient for immediate threats to life

1. Identify yourself and your level of training. Obtain consent to treat.
2. Establish responsiveness. Assess for verbal or pain response and if the mechanism warrants, stabilize the spine.
3. Airway management: Look in the patient's mouth. Clear any obstructions.
4. Breathing adequacy: Look, listen, and feel. Expose chest injuries.
5. Circulation: Assess for pulse. Control life-threatening bleeding.
6. Disability: If there is any chance that the patient has a spine injury, maintain manual stabilization of the spine.
7. Environment/Expose: Assess and treat environmental life-threats. Expose any serious wounds.

Complete physical exam, vital signs and history.

Patient Exam

- Complete a head to toe assessment: Look, ask, feel, and listen.

Vital Signs: Note time taken

- Level of Responsiveness (LOR)
- Heart Rate, Rhythm and Quality (HR)
- Respiratory Rate, Rhythm and Quality (RR)
- Skin Color, Temperature and Moisture (SCTM)

Patient History:

- Chief Complaint
- Cause of the injury or illness (MOI)
- Symptoms
- Allergies
- Medications
- Pertinent medical history
- Last intake/output
- Events preceding the incident or illness

Complete patient care and SOAP note. Make evacuation decision.

Monitor your patient.

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Written SOAP Note

Patient Name _____ Date_____

Subjective/Summary/Story (age; sex; chief complaint; cause of injury or illness (MOI)

_____

_____

Objective/Observations/Findings (Describe position found. Describe injuries.)

Patient Exam _____

_____

Vital Signs

TIME	_____	_____	_____
LOR	_____	_____	_____
HR	_____	_____	_____
RR	_____	_____	_____
SCTM	_____	_____	_____

History

Symptoms_____

Allergies_____

Medications_____

Pertinent medical history_____

Last intake/output_____

Events preceding the incident/illness _____

Assessment _____

_____

_____

Plan_____

_____

_____

Anticipated Problems _____

_____

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Verbal SOAP Report (Headlines)

Subjective/Summary/Story *What, Who, Where*

"This is name(s) _____ with a patient report/evac request.

We are currently located at _____."

"I have a ___ year old (M/F) whose chief complaint is_____."

"The cause of the injury/illness is _____."

"The patient is currently (LOR) _____ _____."

Objective/Observations/Findings *Head to Toe, Vitals, Patient History*

"Pt has _____."
(List relevant injuries/key signs of illness)

"The patient's vital signs are stable/unstable." (If unstable, give details)

"Pertinent SAMPLE history includes _____."
(Only relevant findings.)

Assessment: Problem List

"We suspect the following problems _____."

Plan

Treatment

"Our treatment has included _____."

(If appropriate, include focused spine assessment)

Evacuation

"Our evacuation/bivouac plan is to _____."

"We request the following supplies/support _____."

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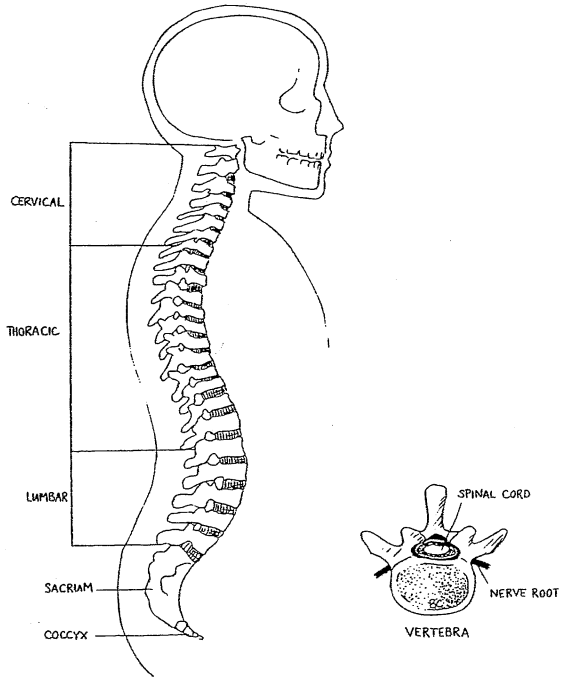
Spinal Injuries

The spinal cord is a bundle of nerves running continuously from the brain to the lumbar vertebrae. The spinal column is a stack of 33 vertebrae that supports and protects the spinal cord.

Signs and Symptoms

- Pain, tenderness or obvious injury along the vertebral column
- Altered extremity sensations e.g., numbness, tingling, unusual hot or cold sensations
- Weakness or paralysis
- Respiratory difficulty
- Loss of bowel or bladder control
- Signs and symptoms of shock



Treatment Principles

1. Stabilize the spine and control the head manually.
2. Check circulation, sensation and motion (CSM) in the extremities.
3. Establish neutral alignment of the spine.
4. Apply a cervical collar.
5. BEAM or log-roll the patient onto a pad and protect her or him from the environment.
6. Maintain head stabilization throughout.
7. Recheck CSM in the extremities.
8. Evacuate. Ideally, utilize a commercial spinal immobilization device rather than an improvised litter.

Evacuation Guidelines Summary: Spine Injury

- Evacuate any patient being treated for possible spinal injury.
- Rapidly evacuate any patient with signs or symptoms of spinal cord injury.

Focused Spine Assessment

For patients *with* a potential for spine injury and *without* signs or symptoms of spine injury. This assessment is done after the PAS is complete.

1. Reliable patient: A+O x 3 or 4, sober, not distracted
2. Normal CSM in all four extremities:
   - Circulation (warm, pink digits or good pulse at wrists)
   - Sensation (no numbness, tingling or unusual hot or cold sensations
   - Motion (unless otherwise explainable by another injury or illness)
3. The patient must deny spinal pain and tenderness.

If the patient meets all the above criteria, a decision to discontinue spinal immobilization can be made.

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Head Injury

The brain can be injured by bruising, bleeding or swelling. The earliest reflection of this is often a change in the patient's level of responsiveness (LOR).

Signs and Symptoms of Mild Head Injury

- Brief change in LOR
- Amnesia
- Temporarily blurred vision or "seeing stars"
- Nausea and/or isolated vomiting
- Headache, dizziness and/or lethargy

Treatment Principles for Mild Head Injury

- Monitor the patient for developing signs of serious head injury. Let the patient rest, but wake him or her every couple of hours to assess LOR.

Signs and Symptoms of Serious Head Injury

- LOR: Disoriented (<A&Ox3), irritable, combative
- HR: Decreases and bounds
- RR: Hyperventilation, erratic respiration
- SCTM: Warm and flushed
- The patient may also experience a worsening headache, vision disturbances, repeated vomiting, lethargy, sleepiness, poor balance and seizures.
- Signs and symptoms of a skull fracture
  - o A depression on the skull and/or visible crack beneath a laceration or avulsion
  - o Body fluid leaking from the ears or nose
  - o Bruising around the eyes or behind the ears

Treatment Principles for Serious Head Injury

- Consider positioning the patient on his or her side.
- Do not apply direct pressure to control bleeding; use diffuse pressure with a bulky dressing.
- Immobilize the spine and elevate the head 6 inches (15 cm).
- Evacuate immediately.

Evacuation Guidelines Summary: Head Injury

Observe the patient for 24 hours if:

- The patient was assessed as A + O x 3 or 4.
- Only signs and symptoms of a mild head injury are present.

Evacuate the patient if:

- The patient had a loss of responsiveness, even if he or she recovers to A + O x 3 or 4.
- Headache, nausea and vomiting, irritability or other signs and symptoms of a mild head injury are not improving after 24 hours.

Rapidly evacuate the patient if:

- The patient is not A + O x 3 or 4.
- There are distinct changes in the patient's mental status (disoriented, irritable, combative)
- There are signs and symptoms of a serious head injury.

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Shock

Shock is an inadequate supply of oxygen rich blood to the brain and other body organs and cells.

Stages of Shock

- Mild/Compensatory: The body responds with vasoconstriction, increased heart rate and increased respiratory rate to maintain an adequate supply of oxygen rich blood to the brain.
- Serious/Decompensatory: The body's efforts to compensate begin to fail and the brain no longer receives the oxygen rich blood it needs.

Signs and Symptoms

- Early Changes: Compensatory
  - LOR: Anxious, restless, mild confusion
  - HR: Rapid
  - RR: Rapid
  - SCTM: Pale, cool and clammy
  - Symptoms: The patient may feel nauseated (and may vomit) and may complain of dizziness and/or thirst.
- Late Changes: Decompensatory
  - LOR: Continues to decrease. (<A&Ox3)
  - HR: Radial pulse weakens and eventually disappears.
  - RR: Continues to increase and becomes shallower.
  - SCTM: Pale, cool and clammy

Treatment Principles

- Treat before serious signs develop.
- Treat the cause. Keep the patient calm.
- Keep the patient warm.
- Keep the patient flat with her or his legs elevated no more than 12 inches (30.5 cm). Head or lower extremity injury may preclude this.
- Consider administering oral fluids in an extended care situation and *only* if the patient can tolerate the fluids and the patient's mental status is adequate to allow swallowing.
- Monitor the patient closely.

Evacuation Guidelines Summary: Shock

- Evacuate any patient whose vital signs do not stabilize or improve over time.
- Rapidly evacuate any patient with altered mental status or worsening vital signs.

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Wilderness Wound Management

Small wounds are common injuries in the wilderness. Preventing infection and promoting healing are important skills.

Short Term Care: Control Bleeding

1. Direct pressure and elevation
2. Pressure dressing
3. Tourniquet

Extended Care: Prevent Infection and Promote Healing

1. Clean the wound.
   - Wash your hands and put on your gloves.
   - Clean around the wound with soap and water and rinse with clean, drinkable water.
   - Remove any foreign matter with disinfected tweezers or by gently brushing it out of the wound.
   - Pressure irrigate the wound with at least a 1/2 liter of disinfected water.
2. Cover the wound with a clean dressing and bandage. Monitor CSM.
3. Keep the dressings clean and dry. In general, change the dressings at least once every 24 hours.

Specific Wound Considerations

- Bruises can cause swelling, discoloration and pain. RICE therapy is appropriate.
- Abrasions can be painful and can easily become infected. After cleaning, cover with a sterile dressing that has been coated with a thin layer of antibiotic ointment.
- Lacerations – Bring the wound edges together with wound closure strips. Consider evacuation for stitches if the cut gapes open or is on the face. Pack the wound open (wet to dry) to keep it moist during evacuation.
- Avulsions - Irrigate under the flap.
- Amputations - Wrap the part in a moist, sterile dressing and seal in a plastic bag. Immerse the bag in cool water and transport rapidly to the hospital with the patient.
- Punctures - Irrigate the surface of the skin only. Do not close the wound. Monitor for infection.
- Impaled Objects –Immobilize in place unless it is an airway obstruction or interferes with transport.

Infection

Signs and Symptoms of Mild Infection

- Redness extending beyond the wound
- Warmth; mild swelling; tenderness
- Pus formation

Signs and Symptoms of Serious Infection

- Heat, swelling, discoloration and pain often associated with increased pus formation
- Red streaking may form from the wound towards the nearest lymph nodes
- Swollen lymph nodes
- Malaise, fever and shock

Treatment Principles for Infection

- Hot soaks for 20-30 minutes several times daily
- Clean the wound following the hot soak.
- Consider packing the wound open (wet to dry) to allow drainage.

Evacuation Guidelines Summary: Wounds

- Evacuate any patient with a wound that cannot be closed in the field.
- Evacuate any patient with an infection who does not show improvement within 12-24 hours.
- Rapidly evacuate any patient with signs or symptoms of a serious/systemic infection.
- Rapidly evacuate any patient with a wound that is heavily contaminated, opens a joint space, involves underlying tendons or ligaments, was caused by an animal bite, is on the face, has an impaled/imbedded object, caused by a crushing mechanism, or shows evidence of serious infection.

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Burns

Other than sunburn, the most common burn in the backcountry is from spilled hot water.

Types of Burns

Superficial: These burns injure only the epidermis. The area heals in 4 or 5 days with the epidermis peeling.

Partial-Thickness: Deeper burns injure both the epidermis and the dermis. The burn takes from 5 to 25 days to heal or longer if it becomes infected.

Full-Thickness: These burns penetrate deeply and injure the epidermis, dermis, and subcutaneous tissue. Full-thickness burns destroy the dermis and, if large, require skin grafts to heal.

Treatment Principles

- Safety
  - Ensure that the scene is safe.
  - Remove the patient from immediate danger.
  - Put out the fire and heat. Cool compresses or irrigation with water may reduce pain and injury. Avoid hypothermia. Remove clothing and constricting objects (e.g., jewelry, watches, belts).
- Airway: Be suspicious of face/neck burns, soot in the mouth/nose, singed hair, and a dry cough.
- Breathing: Monitor and assist respiration if necessary.
- Circulation: Assess, monitor, and treat for shock.
- Assess the depth of the burns: superficial, partial-thickness, full-thickness.
- Estimate the extent of the burns: palm and fingers are 1% of the patient's total body surface area.
- Assess the location of the burns. Face, neck, hands, feet, armpits and groin, and circumferential burns are particularly dangerous.
- Dress burns with sterile dressings, burn sheets/creams, or 2nd Skin®. In extended care situations, clean several times daily, and cover with an antibiotic ointment and a clean dressing. Do not drain intact blisters.
- Pain medications as needed (Anti-inflammatory drugs such as aspirin or ibuprofen are often recommended).
- Monitor. Keep the patient hydrated.

Evacuation Guidelines Summary: Burns

- Evacuate all full thickness burns. Consider evacuating partial thickness burns, especially to the hands, feet, face, armpits or groin for pain management and wound care.
- Rapidly evacuate any patient with partial and/or full thickness burns covering more than 10% of his or her total body surface area, any patient with partial or full thickness circumferential burns and any patient with signs and symptoms of airway burns.

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Musculoskeletal Injuries

Fractures are broken bones. Strains are injuries to muscles. Sprains are injuries to ligaments. Tendonitis is inflammation of the tendons. Specific diagnosis of a musculoskeletal injury is unnecessary. We assess the injury and decide if it is usable or needs to be immobilized and evacuated.

Signs and Symptoms

- Diffuse or specific pain
- Swelling and/or bruising
- Deformity
- Tenderness or point tenderness
- Sounds: Snaps, pops, grating or crackling of bones.
- Altered circulation, sensation, and motion (CSM)
- Wounds with or without protruding bone
- Changes in range of motion

Treatment Principles for Usable Musculoskeletal Injury

1. Assess the injury: Look, ask and feel. Check CSM. Assess for stability and usability.
2. RICE Therapy
   - Rest: Get the pressure off the injury site
   - Ice: Cool the area for 20 minutes
   - Compression: Apply an elastic wrap. Wrap from the ends of the extremity towards the heart.
   - Elevation: Above the patient's heart
3. Consider pain medication.
4. Allow the injury site to passively warm.
5. Assess for usability.
6. Support the injury with tape or other supports (e.g., elastic wrap, knee brace.)
7. Continue RICE therapy as needed.
8. Evacuate if unusable.

Treatment Principles for Obvious Fractures and Unusable Musculoskeletal Injury

1. Assess the injury: Look, ask, feel. Check CSM.
2. If necessary use gentle traction-in-line to establish normal anatomical position.
   - Slow or discontinue if pain increases significantly or you meet resistance.
3. If the fracture is open:
   - irrigate and clean wounds prior to traction-in-line
   - use traction-in-line and allow bone ends to slip beneath the skin
   - if bone ends remain exposed, protect them from freezing or drying
   - pack wounds open
   - dress the wound
   - rapidly evacuate the patient
4. Splint in a position of function. A splint should be:
   - padded, but not bulky or heavy
   - rigid
   - adjustable
   - allow for CSM assessment
   - immobilize the joint above and below long bone injuries
   - immobilize the bones above and below a joint injury
5. RICE, consider pain medication
6. Monitor CSM before and after traction-in-line and splinting.
7. Evacuate.

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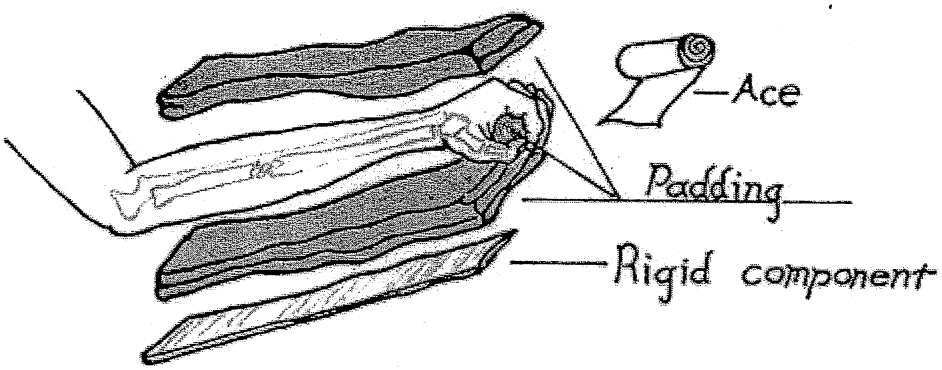

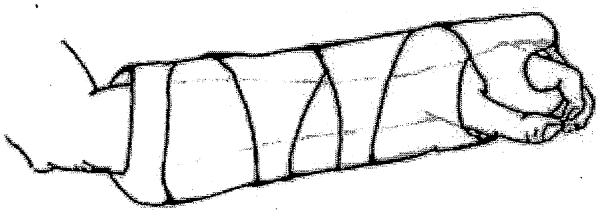

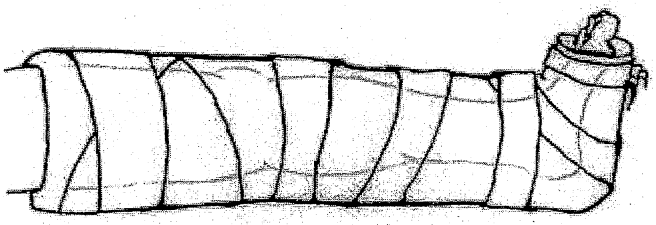

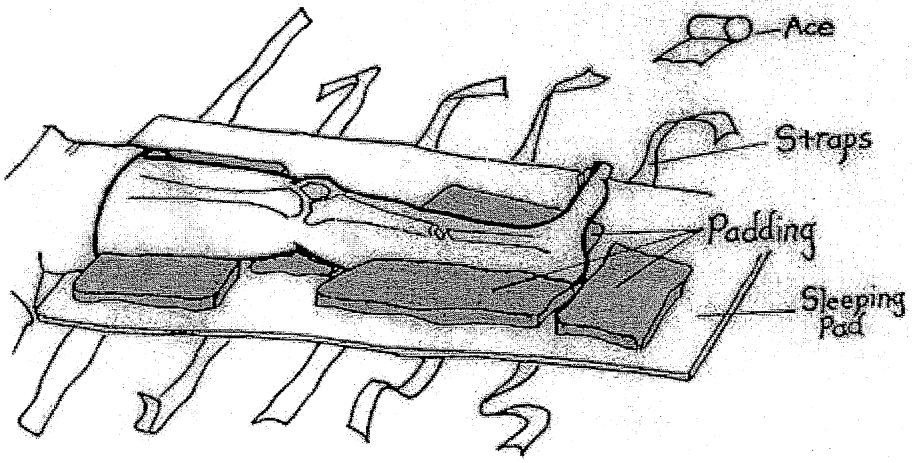

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Dislocations

A dislocation is the displacement of a bone from its normal alignment at a joint.

Signs and Symptoms

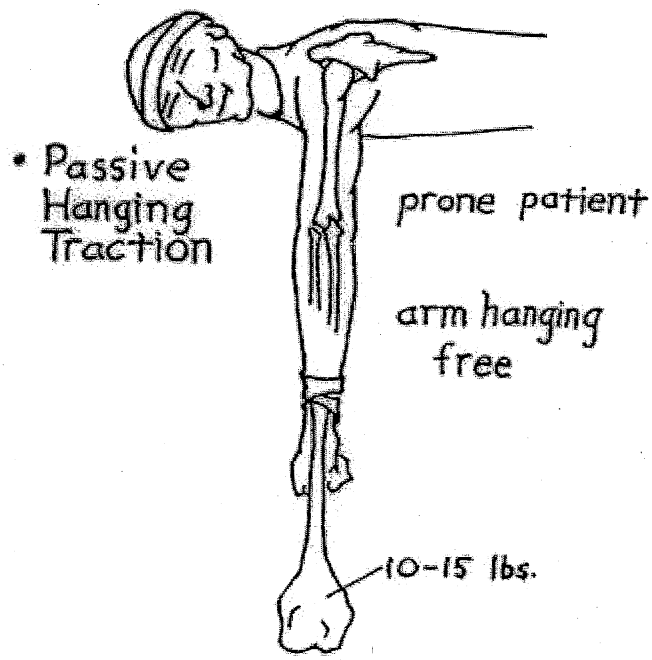
- Diffuse or specific pain
- Swelling and/or bruising
- Deformity
- Tenderness
- Sounds: Snaps, pops, grating or crackling of bones
- Loss of circulation, sensation, and motion (CSM)
- Changes in range of motion

Treatment Principles for Dislocations

1. Assess the injury: Look, ask, feel. Check CSM. Consider how the injury occurred and whether the patient has a history of chronic problems.
2. Consider attempting to reduce the shoulder, patella or finger/toe dislocation if the evacuation is in the wilderness context. Treat all other dislocations as unusable musculoskeletal injuries.
3. Use slow, steady, and gentle traction-in-line.
4. Start your reduction attempt as soon as possible.
5. Slow or discontinue if pain increases significantly or if you meet resistance.
6. After reduction, RICE, consider pain medication and immobilization as needed.
7. Monitor CSM before and after reduction and/or immobilization.
8. Evacuate if necessary.

Evacuation Guidelines Summary: Musculoskeletal Injury

- Evacuate all unusable musculoskeletal injuries and any first time dislocation.
- Rapidly evacuate all open fractures, unreduced dislocations and any musculoskeletal injury with altered CSM.



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Hypothermia

A lowering of the body's core temperature to a level where brain and/or muscle function is impaired.

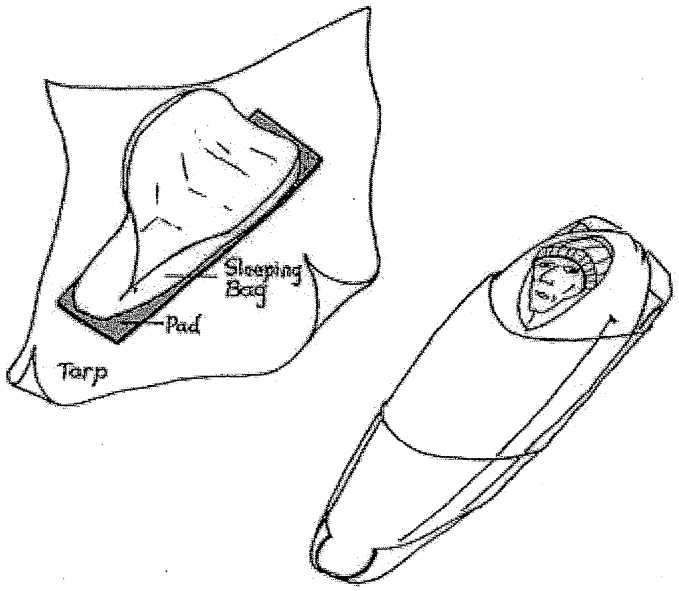
Signs and Symptoms

- Mild: Impaired ability to perform complex tasks, fine motor shivering, apathy, confused and sluggish thinking, slurred speech, stumbling, "the umbles"
- Moderate: Uncontrollable violent shivering, worsening of "the umbles"
- Severe: Shivering stops, muscular rigidity, stupor progressing to unresponsiveness, decreasing pulse and respiratory rates which may become non-detectable

Treatment Principles for Mild/Moderate Hypothermia

Mildly hypothermic patients can warm themselves if allowed to shiver in a dry, insulated environment with adequate caloric intake.

- Change the patient's environment:
  - Find shelter. Gently move the patient off snow, cold ground or out of water.
  - Replace wet with dry clothing. Dampness in clothing can be subtle. Check carefully.
  - Add wind and waterproof layers.
- Insulate the patient:
  - Add insulation under and around the patient using a ground pad and clothing.
  - Insulate the patient's head and neck, hands and feet.
  - Consider a hypothermia wrap.
- Add heat packs or hot water bottles. Insulate these to prevent burns.
- Encourage the patient to eat a meal.
- Give warm, sweet, non-caffeinated, non-alcoholic liquids.
- Exercise is encouraged for mildly hypothermic patients.



Treatment Principles for Severe Hypothermia

- Handle the patient gently. Avoid rough movement.
- Assist breathing for 5-15 minutes prior to movement.
- Field warming is unrealistic, prevent further heat loss with a hypothermia wrap and evacuate.
- Add well-insulated heat packs at the patient's hands, feet, armpits, groin, and neck.
- Avoid the chest compressions of CPR.

Evacuation Guidelines Summary: Hypothermia

- Rapidly and gently evacuate any patient with severe hypothermia.

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Frostbite and Non-Freezing Cold Injury

Frostbite and non-freezing cold injury (e.g. immersion foot) cause a local injury that, while not life-threatening, can be permanent and painful.

Non-freezing cold injury occurs when tissue is chronically cold, but not frozen. Persistent cool and wet conditions can damage nerves and other soft tissues. The prominent symptom may be pain.

Frostbite is a local, freezing injury. Tissue is actually frozen. Injury ranges from minor irritation to extensive tissue loss.

Signs and Symptoms

- Cold
- Waxy, pale or mottled
- Mild tingling, numbness or pain
- Soft (if not frozen or partially frozen), Hard (if completely frozen)
- Blisters may form if frostbite has been thawed.

Treatment

- If not frozen:
  - Warm the injury - skin-to-skin
- If frozen:
  - Warm water bath 99-102°F (37-39°C)
- Both:
  - Protect from re-freezing.
  - Never massage or use radiant heat.
  - Manage pain: Anti-inflammatory drugs are often recommended.

Evacuation Guidelines Summary: Frostbite and Non-Freezing Cold Injury

- Isolated, small (less than quarter sized) injuries can be kept in the field if infection and subsequent freezing can be prevented. In general, larger or blood-filled blisters should be evacuated. Any frostbite without return of sensation and circulation should be evacuated. The pain from a non-freezing cold injury usually dictates evacuation.

Prevention of Cold Injuries

- Know your environment and be prepared.
- Be attentive to yourself and your companions.
- Bring wind and rain gear. Wear materials that keep you warm when wet. Layer your clothing.
- Maintain adequate nutrition and hydration.
- Stay dry. Pace yourself to avoid sweating and overexertion.
- Carry emergency gear and food.
- Avoid tight clothing and boots.
- Do not sleep with cold, wet feet.
- Alcohol, caffeine, nicotine, and many other drugs predispose you to cold injury.
- Do not tolerate numbness in your feet.

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Heat Exhaustion and Dehydration

Hydration is vital to health. Dehydration underlies many wilderness medical problems and can be serious by itself. Heat exhaustion results from water and electrolyte loss caused by sweating, heat stress and ineffective hydration.

Signs and Symptoms

- LOR: Dizziness with fainting is possible.
- HR and RR elevated
- SCTM may be pale, cool, and clammy, or slightly flushed.
- Nausea and/or vomiting, fatigue
- Thirst with decreased urine output
- Heat cramps in large muscle groups

Treatment Principles

- Rest in a cool, shady spot until the symptoms subside.
- Replace fluid losses with water, a solution of sugar drinks with a tsp. of salt or a sports drink.
- Monitor for progressive shock symptoms or an altered mental status. If these develop, evacuate the patient

Heat Stroke

The high temperature of heat stroke is a life-threatening emergency.

Signs and Symptoms

- LOR changes: Disoriented (<A&Ox3), irritable, combative
- Hallucinations, seizures, poor balance
- Increased HR and RR
- SCTM hot, dry and red (possibly moist and pale)
- Temperature above 105°F (40.6°C)

Treatment Principles

- Aggressive cooling
- Spray the patient with water. Fan and massage his or her extremities.
- Monitor for relapse. Evacuate rapidly.

Hyponatremia

Over-hydration, excess water intake, may cause low blood sodium levels, resulting in hyponatremia.

Signs and Symptoms of Hyponatremia

- Headache, weakness and fatigue
- Lightheadedness, dizziness, nausea and vomiting
- LOR: anxiety in mild cases, altered mental status in severe cases
- History of excessive water intake is a key finding

Treatment Principles of Hyponatremia

- Cautious to no fluid intake
- Salty food
- Evacuate if the patient has an altered mental status.

Evacuation Guidelines Summary: Dehydration, Heat Exhaustion, Hyponatremia and Heat Stroke

- Evacuate any patient with an altered mental status.

Prevention for Heat Illnesses

- Hydration. Monitor urine output for color and quantity. Snack regularly to avoid hyponatremia.
- Heat illness and dehydration can be cumulative.
- Exercise early or late in the day in hot environments. Rest often.
- Give yourself 10 days to two weeks to acclimate before you exercise heavily in a hot climate.
- Wear well-ventilated, open-weave clothing. Cover your head and wear sunglasses.

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Altitude Illnesses

Altitude illnesses result from insufficient oxygen in the blood caused by the decreased atmospheric pressure at altitude.

Signs and Symptoms of Mild/Moderate Altitude Illness

Acute mountain sickness is a headache commonly accompanied by one or more of the following signs and symptoms, in conjunction with recent altitude gain:

- Nausea and, possibly, vomiting
- Loss of appetite
- Mild feelings of low energy, fatigue or weakness at rest
- Insomnia

Treatment Principles for Mild/Moderate Altitude Illness

- Don't go up until the symptoms go down.
  - o Stop your ascent until the signs and symptoms have resolved.
  - o Descend if the signs and symptoms don't improve.
  - o Descend immediately at the first sign of severe altitude illness.
- Maintain adequate hydration and nutrition.
- Light exercise
- Taking pain medication for the headache is okay. Avoid sedatives.
- If the symptoms do not improve over 24-48 hrs, descend to last altitude without symptoms.
- Monitor for signs and symptoms of **severe** altitude illness:
  - o Loss of balance
  - o Shortness of breath at rest, extreme fatigue
  - o Wet lung sounds and productive cough
  - o LOR changes

Prevention for Altitude Illnesses

- If you travel quickly to 10,000 feet (3048m) or above, take 2-3 rest days with light exercise.
- Staged ascent: Ascend 1000-1500 feet (305m-610m) per day above 10,000 feet (3048m) with frequent rest days.
- Climb high and sleep low.
- Avoid alcohol and sedatives.
- Acetazolamide (Diamox) may aid acclimatization.

Evacuation Guidelines Summary: Altitude Illness

- Severe altitude illness can develop quickly and is life threatening. Immediately descend (2000 to 4000 feet) (600 to 1200m) if your patient has signs and symptoms of severe altitude illness.

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Lightning

Lightning is the second most common storm-related cause of death, exceeded only by flash floods. In typical years, deaths from lightning exceed the number of deaths from tornados, hurricanes, and earthquakes.

Mechanisms of Injury

- Direct Hit: Most often occurs to persons in an open area (e.g., a meadow).
- Splash Lightning: Because electrical current is seeking the path of least resistance, when lightning hits an object it may jump onto another nearby object.
- Ground Current: Most common injury mechanism. Lightning hits a nearby object and radiates outward. If a person is in the path of the current, the electricity may pass over or through him or her.
- Blast Injury: Blast type injuries may occur from the rapidly expanding air near a lightning strike.

Signs and Symptoms

- Cardiac or respiratory arrest
- Loss of responsiveness, paralysis, seizures, loss of balance
- Eye injuries: Temporary blindness
- Ear Injuries: Temporary deafness
- Trauma associated with being thrown

Treatment Principles

- Scene safety. Lightning will strike twice in the same spot.
- Basic Life Support. Be prepared to provide prolonged rescue breathing.
- Thorough patient exam and treatment of injuries.
- Monitor closely for cardiovascular, respiratory and neurological collapse.
- Evacuate any patient struck by lightning.

Prevention

- In urban areas seek safety in buildings (not small sheds) and vehicles. "When thunder roars, go indoors."
- Outdoors there are places with greater or lesser risk, but there is no safe place in a lightning storm.
- Know the local weather patterns.
    - Plan wisely to avoid being exposed in dangerous places.
    - Pick campsites with prevention in mind; a uniform stand of trees or low rolling hills is optimal.
- Know when to seek a better location.
    - Monitor approaching storms. Lightning can strike miles ahead or behind a storm.
    - Thunder, a clear sign of danger, can be heard for 10 miles in calm air, much less in turbulent stormy air.
    - Flash-bang ranging systems are based on sound traveling 1 miles every 5 seconds (1km/3 sec).
- Avoid dangerous locations.
    - Places higher than surrounding terrain: peaks, ridges, hills.
    - Isolated tall objects such as lone trees.
    - Open terrain such as meadows.
    - Large bodies of water, especially the shoreline.
    - Shallow overhangs and caves.
    - Places obviously struck before.
    - Long conductors: pipes, wires, wire fences, wet ropes.
- Seek uniform cover: trees about the same height and rolling hills, insulate yourself from ground current, stay low (lightning position), disperse a group to limit casualties.
- When it is impractical to move to a safer location, insulate yourself from ground current, stay low (lightning position), disperse a group to limit casualties.

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Altered Mental Status

In a wilderness setting, common causes of an altered mental status include seizures, diabetes, trauma and changes in body temperature. A helpful memory aid is to consider things that might cause the brain:

To STOP

Toxins
S**u**gar/Seizure
Temperature
Oxygen
Pressure

Treatment Principles for Altered Mental Status

- Stabilize the spine.
- Manage the airway. Consider positioning the patient on his or her side.
- Search for clues to the patient's altered mental status.
- Consider administering sugar.
- Monitor the patient's LOR for changes.

Evacuation Guidelines Summary: Altered Mental Status Patient

- Evacuate any patient with an altered mental status.

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Anaphylaxis

A life-threatening allergic reaction characterized by a systemic release of histamines and other substances that cause extreme difficulty in breathing and shock.

Signs and Symptoms of Mild/Moderate Allergic Reaction

- Signs and symptoms of a mild to moderate allergic reaction include flushed and itchy skin, hives and/or welts on the skin.

Signs and Symptoms of Anaphylaxis

- Large areas of swelling, typically involving face, lips, tongue and, possibly, hands and feet
- Respiratory distress. The patient is unable to speak in more than one or two word clusters.
- Signs and symptoms of shock

Treatment Principles for Anaphylaxis

- Remove the allergen or remove the patient from the environment to prevent further contact.
- When the patient can speak and swallow, give oral antihistamines at the recommended doses and continue during evacuation.
- For large areas of swelling, respiratory compromise, or shock, inject epinephrine (adult dose = 0.3ml/1:1000 subcutaneous or intramuscular).
- If the reaction reoccurs or the epinephrine is ineffective, continue to administer epinephrine.

Evacuation Guidelines Summary: Allergic reactions

- Evacuate patients with anaphylaxis reactions. Recurring reactions can occur within 12 to 24 hours.

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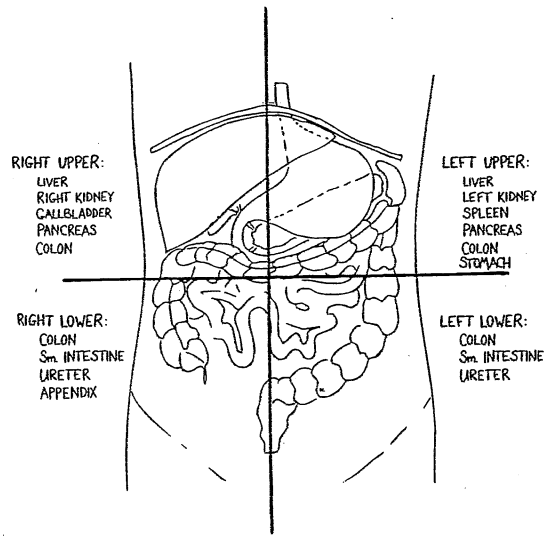
Abdominal Illness and Injury

Acute abdominal pain is a symptom of many different medical problems, some of which are urgent and some not. Our role is to assess the patient and decide whether an evacuation is warranted.

Abdominal Assessment Tools

- What caused the pain? Was it caused by an accident?
- History of the illness
  - Onset - Sudden versus gradual onset?
  - Provoke/palliate - What makes the pain better or worse?
  - Quality - What words describe the pain?
  - Region/Radiate/Refer - Where is the pain? Does it move anywhere? Does anything else hurt?
  - Severity - How severe is the pain?
  - Time/trend - How long has the pain been there? Is it getting better or worse?



- Are there any associated signs or symptoms?
  - Blood? Fever?
  - Other people with similar symptoms?
  - Nausea? Vomiting? Diarrhea? Constipation?
  - Recent changes in diet or water intake?
  - Stage in menstrual cycle?
  - History of similar pain?

- Physical Exam.
  - Pain on touch?
  - Rigidity? Guarding? Distention?
  - Bruising?
  - Open wounds?
  - Scars?

Treatment Principles

- Place the patient in a position of comfort. This will often be on her or his side with her or his knees flexed.
- Monitor non-evacuated patient. Maintain hydration.
- If the time to an evacuation is short, give nothing by mouth. If the evacuation is delayed, the patient can tolerate fluids and has normal mental status it is acceptable to give the patient clear fluids in order to avoid dehydration.
- Consider an evacuation decision.

Evacuation Guidelines Summary: Abdominal Pain

Because it is challenging to correctly assess the severity of abdominal injuries or illnesses in the backcountry, we recommend evacuation for anyone with abdominal pain that is:

- persistent for >12 hrs, especially if it is constant
- localized
- accompanied by guarding, tenderness, distension, or rigidity
- made worse by movement, jarring or foot strike

Associated signs and symptoms that require evacuation may include:

- blood in the urine, vomit or feces
- persistent lack of appetite, vomiting, or diarrhea >24 hrs
- fever > 102°F (39°C)
- signs and symptoms of shock
- signs and symptoms of pregnancy

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