



## Introduction

This packet contains guidelines for all of the WEMSI Wilderness EMT small-group discussion and practical skills stations. It is paged so that it can be divided for each individual station. Each packet then consists of one or two sheets (two or four pages), except for the scenario packet, which is much longer. Each of the Practical Station sections provides the following.

The duration of the station (45-60 minutes), the Number of instructors and Number of students, and Equipment required, and any Special notes.

The overall goals of the station are outlined in a small box.

- ▶ A bulleted outline explains in detail what the instructor should plan to accomplish for the session.
- ☐ For some stations, a succinct Checklist is provided. While conducting the station, it is a bit easier to use than the more detailed bulleted outline.

*Your comments on this document are appreciated. Please contact Keith Conover, M.D., WEMSI Medical Director, <kconover+@pitt.edu> by email, or by regular mail at 36 Robinhood Road, Pittsburgh, PA 15220-3014. Thank you.*

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to allow separation of the pages  
for the different stations if needed.

## Neurological Assessment -- I

**Extent:** 45-60 minutes

**Instructor:** one

**Students:** 2-4

**Equipment:** Reflex hammer, key, dry-erase board or chalkboard or similar

**Special note:** discussion time must not extend into time for student practice.

### Activity Outline:

**Overall Goal:** students gain overall familiarity with the concepts of the neurological exam; learn relevant anatomy and physiology; and perform a standardized WEMT neurological exam at least once. The Neurological Assessment II station is for further practice, as are the Scenario stations.

- Instructor shall **demonstrate a standard WEMT-level complete neurological exam** on a student or model. The instructor shall then discuss the anatomic and physiological basis **and** explain the following variations (*not part of a standard complete neurological exam, but may help confirm findings on a standard exam*):
    - **Mental status exam:**
      - Standard for WEMTs is AVPU (Alert, Verbal, responsive only to Pain, or Unresponsive to pain) system.
      - Review orientation to time, person and place.
      - Mention the Glasgow Coma Scale (but don't require students to memorize).
      - demonstrate and discuss serial 7s.
      - demonstrate and discuss recall of three objects at five minutes.
      - discuss informal assessment of insight and judgment via continued conversation with patient.
    - **Cranial nerve examination:**
      - Briefly name and describe all 12 cranial nerves and their function but stress there is **no** need for students to memorize or test them all; students are responsible **only** for reporting normal or abnormal on a standard
- exam of the most important cranial nerves.
- *Optional enrichment: explain the difference between extraocular muscles (move the eyes) and intraocular muscles (constrict the pupil and adjust the lens). Optional enrichment: relate to blowout fracture of orbit with entrapment of inferior rectus (lower extraocular) muscle and preventing upward gaze.*
  - Outline the WEMT cranial nerve exam:
 

➤ Eyes (vision)	II - optic
➤ Eyes (pupils)	III - oculomotor
➤ Eyes (EOMI)	III + IV, VI - trochlear, abducens
➤ Feel	V - trigeminal
➤ Smile	VII - facial
➤ Ears (hearing)	VIII - auditory
➤ Shrug	XI - spinal accessory
➤ Tongue	XII - hypoglossal
  - **Vision:** counting fingers with one and then the other eye [CN II, optic]
  - **Pupils and extraocular motions** [CNs III, IV, VI, oculomotor, trochlear, abducens]:
    - check pupillary size and reactivity to light with light shined into eye
      - *N.B. while is correct to shine light from lateral side to avoid constriction of the pupil from focusing on the light, this is inconsequential point for WEMT exams; don't discuss unless brought up by students*
    - Watch eye movements as patient's eyes follow the examiner's finger in an "+" pattern ("*H*" patterns and checking for accommodation are not wrong but not part of the standard WEMSI exam)
    - This is charted as **PERL**=Pupils Equal and Reactive to Light (not PERLA which includes accommodation) + **EOMI** = ExtraOcular Movements Intact.

- Sensation on the bilateral forehead, cheek and chin [CN V, trigeminal: bilateral face sensation]
  - There are three main parts of the trigeminal nerve -- one each to forehead, upper cheek, and jaw on each side; is why we check three places on each side of face.
- Motor Strength of face [CN VII, facial: bilateral face strength]
  - Damage to this nerve's origin in the brain responsible for "facial droop" and drooling of many patients with major strokes.
  - Standard way is to have patients **smile** and **elevate eyebrows**.
  - Alternative: have patient squeeze eyes shut and you try to open (more likely to hurt patient but may help if not sure).
  - *(Optional enrichment) With damage to the origin of the facial nerve in the brain, there is usually some crossover from the nerve origin on the opposite side of the brain to the eye, but not the mouth. Which is why those with a "facial droop" from a stroke can usually close their eyes, but those with direct damage to the nerve ("Bell's Palsy") cannot.*
- Hearing: Standard way is to hold hands next to both of patient's ears, rub fingers of one hand together, and ask patient to tell which ear hears it; then test other ear (demonstrate) [CN VIII, auditory: hearing]
- Shoulder strength:
  - The eleventh cranial nerve controls muscles that elevate the shoulders and twist the head to the side. Standard way to test is to press down on the shoulders as the patient holds them up.
  - An alternate, useful if there is no cervical spine injury but there is a shoulder injury: have patient turn his or her head against the resistance of your hand} [CN XI, accessory: elevates shoulders, turns head side to side]
- **Tongue Protrusion:** The twelfth cranial nerve supplies the tongue.
 

Damage will cause the tongue to deviate to one side or the other. [CN XII, hypoglossal: protrudes tongue]

  - Several nerves are seldom tested, even in the Emergency Department: CN I, olfactory: smell; CN IX, glossopharyngeal: sensation back of throat; CN X, vagus: parasympathetic to internal organs. These nerves are hard to test reliably, and of limited significance in an emergency.
- **Sensory exam**
  - Discuss how light touch and pinprick (pain) travel by separate pathways. Physicians sometimes test them separately. Sometimes WEMTs may want to, e.g., if it's not clear by light touch whether there is truly numbness or not. Other sensations such as temperature and vibration are tested by physicians, but not needed for WEMT exams
  - *(Optional Enrichment) Discuss the use of two-point discrimination in evaluating for cut nerves in the hand*
  - Discuss the difference between **dermatomes** (areas supplied by a particular spinal nerve root, e.g., the L5 (lumbar #5 nerve root) and **peripheral nerve distributions** such as tingling in the ulnar forearm and little finger after hitting the "funny bone" (ulnar nerve) at the elbow. Instructor can use fingers or hand to "draw" a few dermatomes and peripheral nerve distributions on own body.
- **Motor exam:** mention the standard grading used by physicians (1-5) but explain that WEMTs just need to note general weakness vs. strength.
- **DTRs and Babinski test:** explain that eliciting DTRs takes practice and is much easier with a reflex hammer than with an improvised alternative. WEMTs are really just (1) testing for gross hyperreflexia (describe the 1-4 rating system for DTRs but explain that WEMTs don't need to learn) and (2) WEMTs are looking for changes between one side and the other, or changes over time; report Babinski test not as "positive" or "negative" or "normal" or

- “abnormal”: simply say “the toes go down(/up) with the Babinski test”; explain that upgoing toes are normal up to about 1 year of age; after this toes normally go down; upgoing toes confirm hyperactive reflexes; indicate loss of control from above (spinal injury, head injury, stroke).
- **Cerebellar:** discuss the role of the cerebellum in coordinating actions started by higher centers in the cerebral cortex; explain that cerebellar bleeds (usually from hypertension) may present with little more than dizziness, and a poor finger-to-nose test on one side, but that such bleeds may press on the nearby brainstem, causing sudden coma and respiratory arrest and are considered a neurosurgical emergency; demonstrate alternate tests for cerebellar function, e.g., rapid alternating motions like tapping thumb and index finger together (useful for someone strapped in a litter who can't reach the nose) and the heel-to-shin test (tracing straight line down one shin with other heel; useful if bilateral upper extremity injuries).
  - **Students shall practice, on one another or a model, standard WEMSI neurological exam:**
    - Instructor may have students refer to a WEMSI Patient Record Form and pocket Reference Card, which have reminders about the neuro exam.
    - Instructor should reinforce that the previous was a detailed exposition; now will practice "standard" exam
  - **Do a mental status exam:** assess via the AVPU system, plus orientation to time, person and place, with an informal assessment of mental functioning,
  - **Do a standard WEMT cranial nerve exam:**
    - Check vision: student has patient count fingers with one and then the other eye.
    - Check pupils and extraocular motions: students uses penlight to check pupillary size and reactivity to light and verbalize as PERL and EOMI.
    - Check Sensation: student touches the bilateral forehead, cheek and chin to assess for light touch.
    - Check Motor Strength: student has patient raise eyebrows.
- Check Hearing: student rubs fingers next to patient's ear, then other ear, and asks which side sound is on.
  - Check Shoulder strength: student presses down on patient's elevated shoulders.
  - Check Tongue Protrusion: Student asks patient to protrude tongue and check for midline protrusion.
  - The mnemonic “Eyes, Eyes, Face, Face, Ears, Shoulders, Tongue” may help students.
  - **Do a sensory exam:** light touch in bilateral medial and lateral foot, calf, thigh, hand, forearm, and arm.
  - **Do a motor exam:** flexion and extension against resistance (or resistance to the student's attempted flexion and extension) at shoulder, elbow, wrist, and hip, knee, and ankle.
  - **Check deep tendon reflexes** (biceps, knee and ankle) and perform the **Babinski test**, and
  - Do a **cerebellar exam** (finger to nose test).
  - *(optional) Students shall discuss the neurological examination cases in the textbook, including field diagnosis, neurological and bony structures involved, and field management.*

**Checklist:**

- Discuss standard WEMT-level neurological exam, anatomic and physiological basis and extensions:
  - Mental status exam**
    - AVPU
    - Orientation x3
    - Glasgow Coma Scale
    - serial 7s
    - three objects
    - insight and judgment
  - Cranial nerve examination**
    - list of all cranial nerves*
    - "How many fingers?"** [CN II, optic: vision]
    - check pupil reactivity to light; "Look up, look down, look right, look left."** EOMI (ExtraOcular Motions Intact) [CN III: pupils; CNs III, IV, VI, oculomotor, trochlear, abducens: move eyes in all directions]
    - "Close your eyes and say "now" when you feel a touch."** {forehead, cheek, chin} [CN V, trigeminal: bilateral face sensation]
    - "Smile; raise your eyebrows."** [CN VII, facial: bilateral face strength]
    - "Which side do you hear the sound on?"** {rub fingers next to ear, then other} [CN VIII, auditory: hearing]
    - "Hold your shoulders up."** {press down on shoulders} {alternate: have patient turn head against resistance} [CN XI, accessory: elevates shoulders, turns head side to side]
    - "Stick out your tongue"** {tongue in midline?} [CN XII, hypoglossal: protrudes tongue]
    - Review mnemonic **"Eyes, Eyes, Face, Face, Ears, Shoulder, Tongue"**
    - Not tested: CN I, olfactory: smell; CN IX, glossopharyngeal: sensation back of throat; CN X, vagus: parasympathetic to internal organs*
  - Sensory exam**
    - light touch and pinprick
    - two-point discrimination

- dermatomes
- peripheral nerve distributions
- Motor exam**
- DTRs and Babinski test**
  - gross hyperreflexia
  - 1-4 rating
  - changes between one side and the other, or changes over time
  - Babinski test: "the toes go down(/up) with the Babinski test"
  - upgoing toes normal up to 1 year
- Cerebellar**
  - coordinating actions
  - cerebellar bleeds = neurosurgical emergency
  - finger-to-nose test
  - rapid alternating motions
  - heel-to-shin
- Students Practice/Demonstrate:**
  - mental status exam**
    - AVPU
    - orientation to time, person and place
  - cranial nerves**
    - "How many fingers?"**
    - "Look up, look down, look right, look left."** EOMI
    - "Close your eyes and say "now" when you feel a touch."** {forehead, cheek, chin}
    - "Smile; raise your eyebrows."**
    - "Which side do you hear the sound on?"** {rub fingers next to ear, then other}
    - "Hold your shoulders up."** {press down on shoulders}
    - "Stick out your tongue"** {tongue in midline?}
  - sensory exam:**
  - motor exam:**
  - deep tendon reflexes (biceps, knee and ankle) and Babinski test**
  - cerebellar exam.**
- Student completes WEMT neurological exam on normal subject**  
*(optional) discuss neurological examination cases in textbook*

## Neurological Assessment -- II

**Extent:** 45-60 minutes

**Instructor:** one

**Students:** 2-4

**Equipment:** Reflex hammer, stethoscope

### Activity Outline:

**Overall Goal:** In the previous Neuro I station, students were exposed to the concepts of the neurological exam and performed it once. In this station, students practice and refine their standard neurological exam, and learn basic interpretation of common neurological syndromes.

- With direct instructor supervision, students should **practice testing deep tendon reflexes with improvised equipment** such as the bell of a stethoscope and bunched fingertips.
- Instructor shall **demonstrate a standard WEMT-level neurological exam** on a student or model ***with no additions or commentary.***\* (See checklist.)
- Students should be presented with **simulated cases** requiring a neurological exam; for each case, students should discuss appropriate portions of the neurological exam to perform, and discuss results provided by the instructor. ***Note: this discussion must be timed to allow adequate time for student practice.***
  - **Back Injury**
    - While carrying a litter full of gear up the mountain, a 20-year-old male team member develops sudden pain and tenderness at the lumbosacral junction after lifting the litter. The patient denies radiation of pain down his legs, or numbness or weakness of his legs.
    - ***Which neurological examinations should the WEMT students perform?*** WEMT students should confine their neurological exam to

\*For learning purposes WEMSI has found a single, one-pass demonstration to be necessary for students to solidify their understanding of the "standard" neurological exam.

- sensation, motor, and reflexes below the injury; no indication for cranial nerves or cerebellar exam.
- Exam shows the following:
  - a positive straight leg raise on the right, causing shooting pain down the leg to the lateral foot
  - decreased sensation on the top of the right foot (dorsal midfoot),
  - and weakness on dorsiflexion (pulling upwards) of the foot on the right side.
- Patient has a "slipped disk" with compression of the L5 nerve root.
  - Mention briefly the need for evacuation, rather than walking out that would cause continued compression of the intervertebral disk, with possible worsening of the nerve root compression -- but that the urgency is relatively low if no signs of cord compression (no trouble passing urine, no numbness in genital/perineal area, no neurological signs except for a single nerve root).
- Note that this is one example of where a only a subset of the neurological exam is appropriate.
- Another example is the "clearing the cervical spine" algorithm contains a subset of the neurological exam.
- Give another example -- for a shoulder dislocation, one only needs to examine "downstream" (distal) of the injury.
- **Possible Fall**
  - A 39-year-old man is found at the bottom of a thirty foot cliff without obvious injury by park rangers; he complains of head and neck pain, presumably resulting from a fall, but the patient doesn't remember what happened.
  - Physical examination by the WEMT is normal – no evidence of head or neck or other trauma.
  - ***Which neurological examinations should the WEMT students perform?*** WEMT students should

perform a complete neurological exam on this patient, as the diagnosis is unclear.

- The exam is normal except for very poor cerebellar function on the left.
- The patient has a cerebellar bleed, either from a fall (if one occurred) or more likely from hypertension with the fall secondary to this CVA.
  - Discuss the implications of cerebellar bleeds possibly expanding, causing compression of the brainstem breathing center and possible sudden death.
  - Discuss need for urgent evacuation to facility with neurosurgical capabilities and careful medical attention along the way.
- **Whiplash Injury**
  - The patient is a 22-year-old female mountain rescue team member. She was being given a ride up a trail on the back of a trail-bike club motorcycle when the cycle crashed. She flew through the air and landed on her buttocks. She provides a reliable history that she didn't hit her head, and had no loss of consciousness. She complains of tightness in her upper back and some bilateral hand tingling. Members of the trail-bike club are holding cervical spine immobilization when the WEMT student arrives.
  - ***Which neurological examinations should the WEMT students perform?*** a sensory and motor exam of the upper and lower extremities for suspected cervical spine injury, or as part of the "clearing the cervical spine" algorithm (which should fail immediately due to neurological symptoms). Remind students that neuro and c-spine exams are on the WEMT reference card and the WEMSI patient record forms.
  - A full "standard neurological exam" is appropriate, too, as the patient has some neurological symptoms; some

sort of indirect injury to either the spinal cord or the brain.

- Instructor shall observe students performing a **standard WEMSI neurological examination**, and coach students as they repeat the exam.
  - Goal at this point is not understanding, but ability to repeat the basic exam elements reliably on demand. (See checklist.)
  - Instructor shall counsel students that the goal is not perfection -- that practice during scenarios and outside of class are needed to make this neurological examination routine.

### Checklist:

- Students Practice/Demonstrate:**
  - mental status exam**
    - AVPU
    - orientation to time, person and place
  - cranial nerves**
    - "How many fingers?"
    - "Look up, look down, look right, look left." EOMI
    - "Close your eyes and say "now" when you feel a touch." {forehead, cheek, chin}
    - "Smile; raise your eyebrows."
    - "Which side do you hear the sound on?" {rub fingers next to ear, then other}
    - "Hold your shoulders up." {press down on shoulders}
    - "Stick out your tongue" {tongue in midline?}
  - sensory exam**
  - motor exam**
  - deep tendon reflexes (biceps, knee and ankle) and Babinski test**
  - cerebellar exam.**

## Physical Assessment

**Extent:** 45-60 minutes

**Instructor:** one

**Students:** 2-4

**Equipment:** Stethoscope, otoscope, penlight

### Activity Outline:

**Overall Goal:** This station is designed to give WEMT students a chance to review and practice their physical examination skills with the supervision of an experienced clinician (a physician or someone else with extensive physical exam experience). The impetus is not to develop a single detailed "secondary survey" but to develop individual physical exam elements that the student can apply as seems appropriate given the patient's history.

- The instructor will demonstrate proper technique for WEMT-level physical examination (as defined in the text) of each of the following, indicating which of the four modes of physical examination (inspection, palpation, percussion, auscultation) can be applied (note this excludes neurological examination and limb examination, which are covered in other stations):
  - general appearance
  - skin/rashes
  - head
  - ears (including use of otoscope)
  - eyes (including discussion of entrapment of inferior rectus muscle by blowout fractures)
  - nose (including mention of inspecting for a septal hematoma)
  - mouth
  - neck (mention the examination of the neck that is included in the "clearing the cervical spine" algorithm)
  - lungs
  - heart
  - back
  - pelvis
  - abdomen
  - (explain to WEMT students that practice in genital and rectal examination will

occur during clinical in-hospital training, and that musculoskeletal limb examination and neurological examination are covered in another station)

- Students will perform the detailed physical exams of the items in the previous objective, and properly report the results to the instructor.
- Instructors should demonstrate, and students practice, a general screening physical exam for a patient who just suffered minor trauma but who has no complaints, including cursory examination of all of the above, and patient demonstrating full range of motion of all limb joints.



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to allow separation of the pages  
for the different stations if needed.



## Orthopedic Assessment

**Extent:** 45-60 minutes

**Instructor:** one

**Students:** 2-4

**Equipment:** skeleton or bone chart, 3 rolls adhesive tape for each group of students, 3 elastic bandages for each group of students.

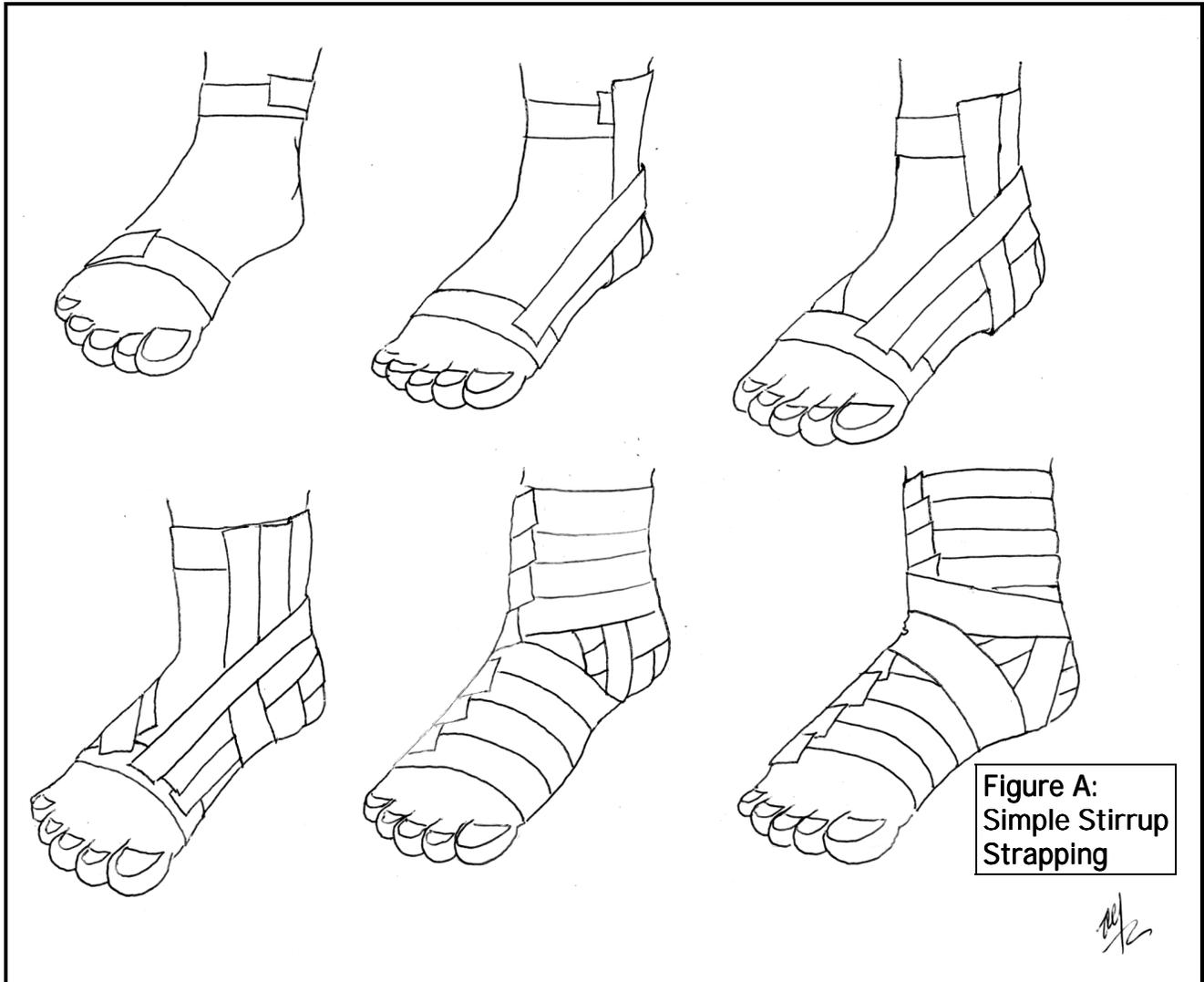
### Activity Outline:

**General Goal:** this section provides students with an opportunity to learn assessment of the spine and extremities in small group session where such things are best learned. Skills to be practiced includes an algorithm for "clearing the cervical spine" and learning how to tape an ankle sprain.

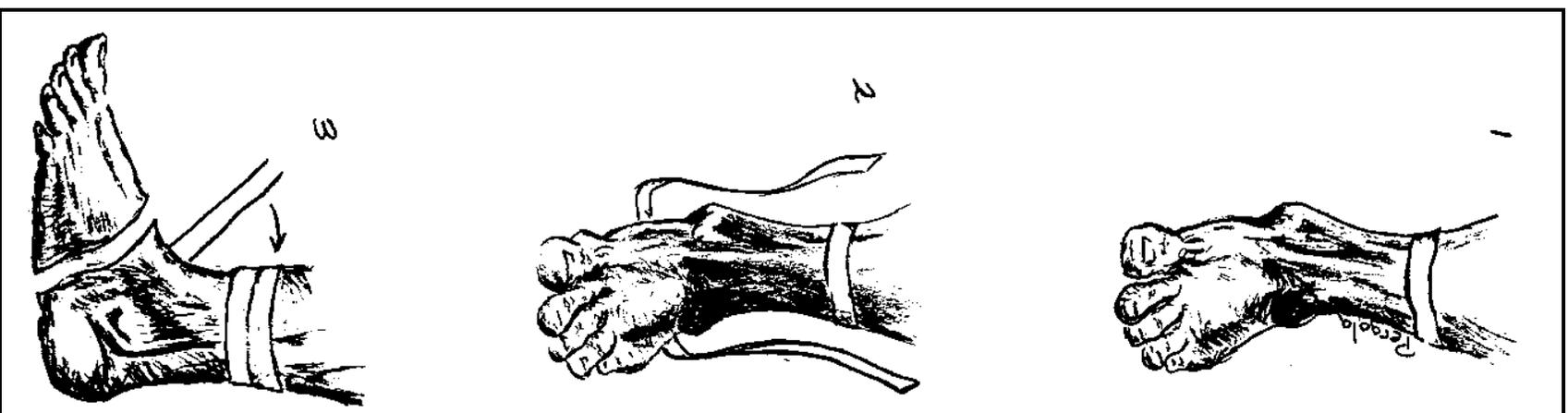
- Students will discuss the "clearing the cervical spine" algorithm and its proper use.
  - When to use the algorithm: when mechanism would lead one to suspect possible cervical spine injury but the patient has no symptoms of cervical spine injury.
  - When does one immobilize the cervical spine on the street? Whenever there is a significant mechanism of injury, as shown by head injury, level of consciousness, or significant fall, or symptoms of a spine injury (e.g., partial numbness or weakness of an arm or leg).
  - Students will discuss the overall requirements for "clearing" the cervical spine:
    - A reliable exam:
      - patient not still confused from a head injury
      - patient not demented
      - patient not intoxicated from any drug
      - patient not distracted by a significantly painful injury or illness (e.g., major long bone fracture, multiple rib fractures, severe burns, kidney stones, active labor)
- No symptoms of cervical spine injury
  - neck pain ("stiffness" doesn't count)
  - numbness or tingling in arms or legs
- No signs of cervical spine injury
  - neck tenderness
  - abnormal sensory or motor exam of arms or legs
  - pain on rotation of neck
- Students will practice going through this algorithm on each other.
- Students will enumerate and demonstrate the principles of musculoskeletal examination of the extremities after trauma.
- Students will see and then practice standard musculoskeletal examinations of injured upper and lower extremities.
- Students will see and practice the physical diagnosis of the following:
  - jaw dislocations;
  - finger and toe sprains, dislocations, and fractures, and "mallet finger" injuries;
  - hand fractures, including "boxer's fractures";
  - wrist fractures, including scaphoid fractures;
  - elbow injuries; and

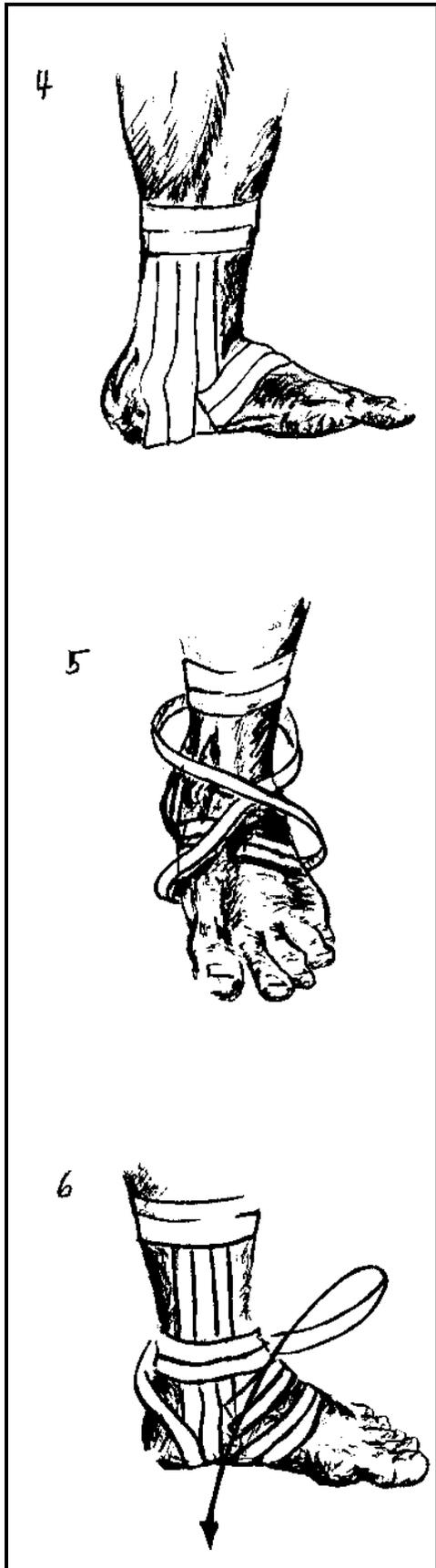
- clavicle fractures, AC joint sprains, rotator cuff tears, and shoulder dislocations.
- Students will see and practice the physical diagnosis of the following:
  - hip dislocations;
  - knee injuries, including patellar dislocations and fractures, knee dislocations, and knee sprains and cartilage injuries;
  - ankle sprains, dislocations, and fractures; and
  - foot sprains and fractures.

- Students will see and then practice standard taping for ankle sprains and toe fractures. **Demonstration will be over an elastic bandage or a sock to ease tape removal.**
  - Taping for ankles can be a simple "boot" of U-shaped "stirrup" loops (Figure A), which is easy to remember, or a more-complex but better-supporting combination of J-loops (Figure B, 3-4) and Figure-8 loops (Figure B, 5).
  - *Taping an Ankle\**
    - *Sprains damage the supportive structures in the ankle. A good taping job may provide enough stability and support for a patient to walk out on his or her own. The sequence below outlines an easy-to learn general purpose wrap.*
  - *Getting Started*



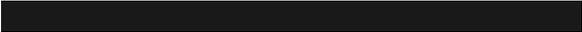
- ▶ Since 85% of all injuries involve only the lateral (outside) ligaments, our drawings and instructions explain which direction to wrap the tape to treat that type of sprain. However, the same wrap can be applied to sprains of the medial ligaments by reversing the direction you pull the tape in drawings 2, 4, and 5. The principle is simple: **When wrapping tape under the arch, wrap in the direction that allows you to pull up towards the injured side.**
- ▶ You will need one roll of 1 inch athletic tape and, probably, a safety razor. Angled bandage scissors are handy for removing the finished wrap.
- ▶ Adequate preparation increases the chance of a successful job. Make sure the lower leg is clean, dry, and clean-shaven midway up the calf . If you have it, an application of tincture of benzoin will make the tape stick better. (To practice without shaving wrap the ankle with "pre-wrap" )
- ▶ Position the foot at a 90 degree angle relative to the leg and keep it in that position until the wrap is complete.
- ▶ As you apply each strip of tape, overlap the previous application a little bit. Your goal is to encase nearly the entire ankle and foot (except for the heel and toes) in tape.





- *Neatness counts. Avoid wrinkles and creases. Allow the tape to follow natural contours of the body.*
- *Pull firm pressure on the tape as you wrap. The tape will stretch out a bit as the patient walks. So, it should feel a bit tight immediately after you have finished.*
- *As you would do with any splint, periodically check for good circulation, sensation and motion distal to the wrap.*
- **Step one**
  - *Wrap tape once around leg several inches above the malleoli, but below the calf muscle. Allow it to overlap itself about an inch and tear it from the roll. This first strip is called the "anchor" (drawing 1).*
- **Step two**
  - *Tear a piece of tape long enough to reach from the anchor on one side, down the leg under the arch, and up to the anchor on the other side of the leg. Place the center of this strip under the arch, align one running end over each malleolus, pull both ends firmly toward the knee and stick these ends to the sides of the leg being sure to overlap the anchor. Immediately apply another anchor slightly below the first, so that it secures the tape you just applied. This is called a 'stirrup' (drawing 2). Repeat step two.*
- **Step three**
  - *Apply a "J-loop" on the medial aspect of the leg at the same point as the beginning of the stirrup. Wrap down the leg under the arch, and up over the instep until you can overlap the downstroke of the J about an inch, then tear the tape. Secure the top of the "J" with an anchor. Repeat step three. (Drawing 3 illustrates the beginning of this step, seen from the lateral aspect; drawing 4 illustrates two completed J-loops seen from the medial aspect. For clarity stirrups have been omitted from drawing 3.)*
- **Step four**
  - *This time start under the arch. Wrap the tape up and over the lateral ligaments, across the instep, and behind the ankle. Continuing with the same strip, bring*

*the tape back across the instep and down over the medial aspect. Finish where you began under the arch. This is a "figure-of-eight" (drawing 5j). Repeat step four.*

- *Step five:*
    - *To create a "heel-lock," begin at the arch. Wrap up and over the medial aspect and around the heel. Pull tape directly forward, over the instep and back to where you started (drawing 6). Repeat step five.*
  - *Step six*
    - *You should be left with some tape on the roll and with some exposed patches of skin. In any artistic way you like cover those patches so that only the heel itself and the toes remain open. Any other patches that you leave open will be highly susceptible to uncomfortable rubbing and to friction blisters. Check circulation, sensation, and movement. Then have the patient check for usability.*
    - *If he or she seems able, it is time to head back to the trailhead. Some adjustment and periodic re-taping may be necessary.*
- 



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to allow separation of the pages  
for the different stations if needed.



## Shoulder Dislocation

Shoulder Dislocations  
 Extent: 45-60 minutes  
 Instructor: one  
 Students: 2-4  
 Equipment: skeleton shoulder model or anatomical diagrams

### Activity Outline:

General Goal: This station has two main goals. First is to drill students in the procedure for reducing a shoulder dislocation. Second is to discuss in some detail the theory and pathophysiology of anterior shoulder dislocations.

- Students and instructor will discuss, and during subsequent simulated reduction will verbalize, criteria for diagnosing anterior shoulder dislocation:
  - proper mechanism of injury (indirect injury);
  - patient can't bring arm across chest to touch opposite shoulder (instructor will note that this applies only to anterior dislocations but this accounts for the vast majority of shoulder dislocations); and
  - student can see and feel a "notch and hole" on exam of the shoulder.
- Students and instructor will discuss, and during subsequent simulated reduction will verbalize, criteria for attempting shoulder reduction in the field, and the reasons for them:
  - must be long transport time, and must have on-line command or standing orders (discuss the sequelae of leaving shoulder out, including damage to bones, blood vessels, nerves; and role of reduction for pain control); **or**,
  - if can't evacuate patient unreduced (e.g., small passage); **or**
  - if absent neuro or vascular status (note that this is a criterion for reduction on the street, too); **or**
  - so patient can self-rescue, if required for safety.
- Students will discuss advantages and disadvantages of hanging traction vs. direct reduction.
  - Passive nature of hanging traction -- less likely to cause harm
  - Need for adequate location for hanging traction
  - Need to use carefully-padded sling for hanging weight to avoid neurovascular compromise from the sling
  - Various techniques for direct reduction:
    - Some of which may cause danger of humerus fracture especially in older patients (e.g., Hippocratic "dirty sock method" with foot in axilla).
    - Also some other manipulation techniques including scapular manipulation and simply bringing into the extended and externally-rotated position.
    - Some interesting variations such as "Eskimo technique" (traction upwards on patient lying on uninjured side) that can be accomplished by one person on the Greenland ice floes.
    - WEMSI has chosen "Milch technique" which is traction slightly upward with shoulder extended and externally rotated ("throwing a baseball" overhand) as being easy and having high rate of success.
- Students will discuss and practice an appropriate detailed neurovascular check for a suspected shoulder dislocation:
  - neurovascular and ROM check of distal extremity:
    - radial pulse and capillary refill
    - check sensation in three distributions in hand (e.g., thenar eminence, little finger, and back of web space of thumb), and in forearm, and in "patch" area over shoulder; document
    - check active range of motion (have patient try to perform)
    - check motor strength in three distributions in hand (finger-spreading, thumb/little-finger opposition, holding fingers extended against resistance)
- Students will see instructors perform a simulated shoulder reduction, and then

practice shoulder reduction, on a (simulated) team member who slipped and hit outstretched hand against tree; patient has had dislocations before and has self-diagnosed:

- Position patient properly (on back, with arm extended and externally rotated; "throwing a baseball") and position assistant (on opposite side, with sling around patient's chest for countertraction.)
- Apply proper amount of force (verbalize this is half of force to be used in actuality); apply slowly and gently yet firmly increase force, and stop if patient indicates markedly increasing pain; generally at 30°-45° angle higher than lateral unless patient comfort directs otherwise; use "figure 8 sling" on elbow
- Verbalize: that this is to be continued for 15 minutes; verbalize that additional elevation may be tried.
- Once it is reduced, place arm across chest and immobilize.
- Repeat entire neurovascular check.

## Checklist

- Ask: verbalize **criteria for diagnosing** shoulder dislocation:
    - proper **mechanism** of injury (indirect injury)\*
    - can't bring arm across chest** to opposite shoulder\*
    - WEMT can see and feel a "notch and hole" on **exam** of the shoulder\*
  - Ask: verbalize **criteria for attempting reduction** in the field
    - must be **long** transport time, and must have on-line command or standing orders; or,
    - if can't evacuate patient unreduced (e.g., small passage)
    - if absent neuro or vascular status
    - so patient can self-rescue, if required for **safety**
  - Ask: verbalize advantages and disadvantages of **hanging traction vs. direct reduction.**
  - Tell student: no location nearby for hanging traction so must use direct method; perform shoulder reduction on (simulated) team member who slipped and hit outstretched hand against tree; patient has had dislocations before and has self-diagnosed; perform technique and verbalize as needed:
    - Verbalize use of **medication and/or suggestion**/guided imagery/hypnosis as appropriate\*
    - Neurovascular and ROM** check (sequence not required)
      - radial **pulse and capillary refill**\*
      - sensation in three distributions in hand (thenar eminence, little finger, and back of web space of thumb), forearm, and "patch" area over shoulder; document\*
      - active range of motion (student asks patient to try)
      - motor strength in three distributions in hand (finger-spreading, thumb/little-finger opposition, holding fingers extended against resistance)\*
    - Position** patient properly (on back, with arm extended and externally rotated; "throwing a baseball") and position assistant on opposite side, with sling around patient's chest for countertraction.\*
    - Apply proper amount of force\* (verbalize this is half of force to be used in actuality); apply slowly and gently yet firmly increase force, and stop if patient indicates markedly increasing pain; generally at 30°-45° angle higher than lateral unless patient comfort directs otherwise; use "figure 8 sling" on elbow; verbalize danger of impairing circulation with sling
    - Ask student to verbalize roughly **how long** this is to be continued: 15 minutes
    - Ask student to verbalize additional **options** if doesn't seem to be working: acceptable answers: more elevation of arm, manipulation of humeral head, medication, other methods
    - Once reduced, place arm across chest and **immobilize**.\*
- Repeat entire neurovascular **check**.\*

## Advanced Skills

**Extent:** 45-60 minutes

**Instructor:** one

**Students:** 2-4

**Equipment:**

- an intubation mannequin, laryngoscope, endotracheal tubes, syringes, disposable CO<sub>2</sub> monitor, and materials for securing endotracheal tubes;
- an IV practice arm, IV bags, macrodrip and microdrip tubing, peripheral over-the-needle catheters, a central through-the-needle catheter, a central over-the-wire ("Seldinger") catheter kit, a blood warming tubing extension set, a three-way stopcock, a BP cuff, a sharps disposal box, a single-length nylon webbing loop sling and carabiner, and materials for securing peripheral/central IVs.
- an NG tube and catheter-tip syringe.
- male and female catheterization mannequins, a standard Foley urinary catheter kit, multiple sizes of urinary catheters, and a Texas condom "catheter."
- disposable scalpel blades/scalpels, curved Kelly clamp, and large over-the-catheter needles as used for needle thoracostomy.

### Activity Outline:

**General Goal:** this station serves two purposes. For EMT-Basics, it is a "show and tell" designed to familiarize the student with advanced procedures that paramedics, nurses and physicians may perform. For the most common of these procedures, the goal is for students to understand how to assist an advanced practitioner in performing these procedures. For EMT-Paramedics or other advanced providers, the goal is to discuss and show modifications of these procedures for the wilderness setting.

- See ways to help verify endotracheal tube placement, including:
  - lung and abdominal auscultation;
  - checking tube length at teeth or gums;
  - end-tidal CO<sub>2</sub> monitors; and
  - syringe aspiration.

- See and practice proper technique to pull back an endotracheal tube that may have become lodged in a mainstem bronchus, including:
  - deflating the balloon;
  - repositioning the tube;
  - re-inflating the tube; and
  - securing the endotracheal tube again.
- Discuss the roles and usefulness of intravenous therapy, including:
  - hydration;
  - electrolyte supplementation;
  - drug administration;
  - blood administration; and
  - obtaining blood samples.
- Discuss dangers of IV therapy for patient and EMT, including:
  - catheter shear;
  - air embolism;
  - infection;
  - local irritation (phlebitis);
  - clotting (thrombophlebitis); and
  - needlesticks and other blood exposure.
- See and identify equipment used for IV therapy and its function, including:
  - peripheral over-the-needle catheters;
  - central through-the-needle catheters;
  - central over-the-wire ("Seldinger") catheter kits;
  - macrodrip and microdrip tubing;
  - blood warming tubing extension sets;
  - three-way stopcocks; and
  - solution bags.
- See and identify common sites for peripheral IVs, including:
  - dorsal hand veins;
  - veins of the forearm;
  - veins of the antecubital fossa;
  - saphenous vein of medial ankle; and
  - external jugular vein.
- See and identify common sites for central IVs, including:
  - internal jugular vein;
  - subclavian vein; and
  - femoral vein.

- See proper technique for starting a peripheral IV, including:
  - site choice and preparation;
  - venipuncture and threading the catheter;
  - securing intravenous catheters for the wilderness context;
  - aseptic technique, site rotation, and site care.
- See the Seldinger Wire Technique for central lines, and describe how to assist in such a procedure.
- See and practice how to assess the patency of an intravenous catheter, including:
  - inspection for swelling;
  - checking for backflow of blood; and
  - observing continued flow of intravenous solution.
- See and practice proper technique for discontinuing an intravenous infusion when the catheter has become dislodged or is infiltrating, including:
  - proper care to prevent contamination with blood;
  - proper disposal of contaminated materials in the backcountry and
  - shutting off the intravenous infusion and pulling the catheter.
- Discuss how to adapt intravenous infusions for the wilderness environment, including:
  - how to attach heat packs and insulation to provide a warm infusion;
  - how to secure intravenous lines against inadvertent dislodging;
  - how to use a blood pressure cuff as an infusion pump;
  - how to place an intravenous bag under the patient and use the patient's own weight for pressure infusion, including clearing the line of air;
  - how to carry an intravenous bag on a single-length runner in the armpit, and run the intravenous line down one's parka sleeve to protect from cold.
- For nasogastric intubation:
  - discuss indications, contraindications, limitations, and the role of orogastric intubation as an alternative, as applied to the wilderness context;
  - see equipment used for gastric intubation in the wilderness context, and modifications needed for wilderness use;
- describe patient positioning and the general technique of gastric intubation;
- discuss securing gastric tubes and cre;
- discuss considerations of clogging when administering food via gastric tube; and
- the method to check for residual volumes and their significance.
- For urinary catheterization:
  - discuss indications and contraindications;
  - see the standard equipment used;
  - see how to choose an appropriate size catheter;
  - discuss the need for aseptic technique;
  - see standard site preparation;
  - see the technique for catheter insertion;
  - see securing the catheter;
  - discuss site maintenance and urine output monitoring for litter patients;
  - discuss the role of urinary catheterization in patients with suspected pelvis fracture or genital trauma; and
  - see the use of a "Texas" (condom) catheter as an alternative to standard urinary catheterization, and its advantages and disadvantages.
- See the technique and equipment for:
  - escharotomy;
  - fasciotomy;
  - surgical cricothyroid membrane airways; and
  - needle thoracentesis and chest tubes, including the use of flutter ("Heimlich") valves in the wilderness context.

## Splinting and Minor Surgical Procedures

**Extent:** 45-60 minutes

**Instructor:** one

**Students:** 2-4

**Equipment:**

- Casting material for half of the students to apply an arm splint, and half to apply a leg splint (thus, half will apply, and the other half will have one applied to them).<sup>\*</sup>
  - Fiberglass (or, if necessary to substitute, plaster) casting material.
  - Cast padding rolls.
  - Elastic bandages (e.g., Ace, Tensor).
  - Basins and water for dipping casting material.
  - Disposable nonsterile examination or casting gloves.
  - A roll of plaster, a roll of fiberglass casting material, and a precut fiberglass splint to show students the differences.
  - A piece of tube stockinet to show.
- Material to practice ring removal:
  - Two 18" cotton strings.
  - Two simple band rings (wedding bands ideal).
- Materials to practice trephining a subungual hematoma:
  - Two disposable cigarette lighters.
  - Two metal wire paper clips.
  - Two Kelly clamps, hemostats or needle holders.
  - Two pieces of plastic suitable as model "fingernails" (some disposable suture removal kits come in plastic packages that are ideal).
- Material for practicing wound irrigation:
  - Water and basins.
  - A 60 cc disposable plastic syringe.
  - A "Splashield™" device, or an 18-ga. Angiocath® intravenous cannula.
  - A small freezer-style plastic Ziploc® or similar bag for each student, plus a few

<sup>\*</sup> In the interests of time and money, sometimes this amount may be decreased slightly, especially when some of the groups of rotating students have only three students instead of four -- in which case, two students may jointly put a splint on the third, and then the one with the splint may take part in putting a splint on one of the other students.

extras for students who mangle their first bag.

- Towels to clean up the mess after students (inevitably) squirt each other.
- Q-tips® (cotton-tip applicators) for everting the upper eyelid: one for each student.

### Activity Outline:

**Overall Goals:** This station, compared to some of the others, provides little discussion and much practice. The goal is for students to gain experience with common WEMT surgical skills.

- Applying "fiberglass" splints
  - Instructor demonstrates technique for applying thumb spica splint, as for a suspected wrist fracture, observing and discussing:
    - Dressing open fractures, lacerations or abrasions with a sterile dressing.
    - Applying tube stockinet against the skin is used in splints that will be on for a long time but is not required for wilderness splints.
    - Cast padding is applied firmly, with stretching, to prevent any wrinkles that might cause pressure sores.
    - Cast padding rips easily, and can be ripped as needed to keep the padding from wrinkling.
    - Cast padding will generally "give" with swelling and thus it can be put on firmly with little concern for the "tourniquet" effect that may occur from bandages.
    - "Fiberglass" casting splints are preferred to plaster, as they are stronger, more water-resistant, and lighter to pack.
    - "Fiberglass" casting material (as opposed to precut splints) can be used, but one needs to allow for its stretchy nature -- after unrolling, allow the material to contract again before measuring for the right length for the limb.

- All casting material needs to be kept dry until used; one must take care not to let packages of "fiberglass" get punctured, because the water in the air is enough to make them solidify.
- A pack of fiberglass casting splints, some padding, and an elastic bandage makes a light splinting kit that can be applied to almost any fracture.
- Form-fitting splints like this are more comfortable, stronger and immobilize better than almost any other splint; they can often allow a patient with an extremity fracture to start assisting in his or her own evacuation.
- As with all splints, one checks neurovascular status after splinting.
- After this demonstration, the students pair off and take turns applying splints to each other. Including a thumb spica splint and lower leg posterior splint.
- Ring Removal:
  - The instructor should first demonstrate the procedure, then the students practice on each other:
  - Explain the need to remove rings from injured fingers to prevent swelling from turning them into tourniquets.
  - Indicate that the optimal way to remove a ring is with a ring cutter -- but such ring cutters are seldom available in the backcountry. And a piece of cotton string adds almost nothing to the weight of a first aid or medical kit, and has many uses.
  - Use a piece of cotton string about 18" long.
  - Place the string under the ring, with about 2-3" sticking out from the proximal side of the ring, and the long end out the distal side. Use a Kelly clamp if needed to insert the string under the finger. Tell the patient to expect it to be mildly painful.
  - Wrap the distal portion of the string firmly around the finger, extending distally from the ring to the end of the string.
    - Keep the spiraling turns of the string right next to one another.
    - Caution the patient that the next part will hurt significantly.
  - Pull the **proximal** end of the string distally, spiraling around the finger.
    - The string will pull the ring over the spiraling distal turns of the string.
    - When near the end of the spiral, stop -- if the ring is still impacted, pull the string distally, wind again, and try again to move the ring more distally.
- Trephining a Subungual Hematoma.
  - Explain that a subungual hematoma can develop such high pressure that it can be exquisitely painful, and that trephining it (making a hole in the nail to let the blood out) provides instant relief.
  - Have students heat a straightened paper clip, held in a Kelly clamp, in the flame of a disposable cigarette lighter.
  - Students then should apply the red-hot end of the paper clip to a piece of plastic roughly the same thickness as a fingernail. Explain that this melts about twice as easily as a real nail.
    - It may take a second reheating and application to melt through the "nail"
    - Explain that, if done with gentle pressure only, this procedure is virtually painless (certainly compared to the relief it provides)
    - Explain that the released blood will cool the paper clip before it burns the tissue underneath; however, patients may tend to jerk away in fear, so it is worth holding the finger **firmly** during trephination to prevent involuntary withdrawal to cause actual injury.
    - Mention alternatives, such as using a heated safety pin or needle (makes smaller hole that is more likely to clot closed) or gently spinning a sharp pointed knife blade to drill a hole in the nail (slightly more painful, and also leaves only a small hole).
- Everting the upper eyelid
  - Review the indication for everting the upper eyelid:

- to inspect for suspected foreign material causing a foreign-body sensation in the eye.
- Explain that a foreign body sensation is often caused by an abrasion of the cornea, but that it is generally appropriate to check under the lids for foreign bodies anyway.
- Explain that this procedure is mildly irritating, but not painful. Recommend that students with contact lenses **not** be subjects for this, as it may cause a contact lens to pop out.
- Explain that in the upper lid is a firm cartilaginous **tarsal plate** and that to evert the eyelid, students will need to pull the eyelid out enough so that the student can gently push the proximal portion of this plate downward.
- Demonstrate on a student who is willing:
  - Grasp the eyelashes between thumb and index finger of one hand, pull gently. The upper eyelashes are longer and will pull the upper eyelid out away from the eye.
  - Place a Q-tip (cotton applicator) horizontally across the proximal portion of the lid and press downward gently.
  - Flip the distal portion of the lid up.
  - Remove the Q-tip and use it to hold the lid everted while another student inspects the inside of the lid for foreign bodies with a penlight.
- Irrigating a wound
  - Do this part of the station last. Don't let the students touch the materials until you're done with the demonstrations.
  - Review with students the indications for pressure irrigation of wounds in the backcountry to reduce risk of infection:
    - Lacerations that are contaminated by dirt, or caused with a dirty object.
    - Open fractures, even if not known to be dirty.
  - Mention the risks of wound irrigation splashing bloody water back into the students' eyes, nose or mouth, and the need for protection against bloodborne diseases.
- Explain and demonstrate the use of wound irrigation as done by most physicians:
  - Using a 35-cc syringe and an 18 ga Angiocath® (over-the-needle catheter) or similar; re-emphasize the danger of splashback with this method.
  - Using a Splashield™ device (18 ga opening with clear plastic cup to prevent splashback).
- Demonstrate the use of improvised wound irrigation using a Ziploc® or similar plastic bag full of water, with the "zipper" opening folded over, and a small pinhole in one corner.
  - Remind students that it is easier to enlarge a hole than to make it smaller.
  - Remind students that this method also has risk of contracting bloodborne diseases from splashback.
  - Suggest that students use a pair of Swiss Army Knife scissors or a knife to cut a tiny corner off a bag to get the requisite small hole.
  - Suggest that students not only zip the bag shut, but also fold over the edge with the zipper to prevent sudden explosion in one's face.
- Student Practice:
  - Ask students to first use the syringe method to squirt the back of their hands, so they can feel what the right amount of pressure is like.
  - Have students use the plastic-bag method to try to get an irrigation stream the right size and strength for irrigation.
  - Clean up the mess when the students start squirting one another.



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to allow separation of the pages  
for the different stations if needed.



## Scenarios

**Extent:** 45-60 minutes

**Instructor:** one instructor, one "victim" (but can be student if short on personnel)

**Students:** 2-4

**Equipment:** depends on scenario and environment; generally,

- this document,
- stack of Practical Test Checklist copies,
- blanket or tarp or foam pad on which "victim" may lie,
- stethoscope,
- BP cuff,
- penlight,
- notebook and pencil, and
- two radios or field phones so instructor may go away and force student to make report via radio or field phone.

### Activity Outline:

**Overall Goal:** with initial stations, goal is to get students into the routine of approaching, managing, and evaluating a wilderness patient, and reporting appropriately to a Wilderness Command Physician. With later stations, goal is to use the scenarios as case-based teaching to reinforce important principles from classroom sessions. Too, the later stations provide an opportunity for limited enrichment based on the instructor's experience and expertise. The later stations include practice in a stressful field environment, providing a true gut feeling for the stresses of a real wilderness rescue.

- General:
  - Students must have been given Patient Record Forms and a Reporting Reference pocket card, and have completed the following **prerequisites** prior to attempting any scenario stations:
    - The Patient Assessment lecture (3)
    - The Scene Management, Communications, Reporting and Documentation lecture (4)
    - A demonstration of a scenario performed by instructors.
    - A demonstration of good and bad radio reporting.

- **Again, when a Scenario says "Prerequisites: none" this does assume that the students have been through Patient Assessment and Scene Management as well as the demonstration of how to run a scenario.**
- You may tell students that the majority of these scenarios are based closely on actual search and rescue operations. In some cases we have made minor changes in the scenario for educational purposes. Reports for most of them may be found in the report files of the Appalachian Search and Rescue Conference and the Eastern Region, National Cave Rescue Commission. This may help students take the scenarios more seriously.
- Brief your patient before the students arrive. Have the patient act out as much as possible of the history and physical.
- Read the Settings section to the students. If the patient can provide the History, allow the patient to provide this to the students.
- Give physical exam data to the students **only** as they actually perform the physical exam and report what they actually find to you. The only exception is that students should not perform genital or rectal examinations as part of the scenarios. (Students may learn how to perform these examinations under physician supervision during clinical rotations in the Emergency Department.)
- Students should verbalize what they are doing. For example, "He's talking to me normally and doesn't seem out of breath, so breathing and airway are OK, and his level of consciousness is normal. I'm checking his radial pulse and it feels normal . . ." At this point you break in and tell the student that the simulated pulse is not palpable at the wrist; the student then feels the carotid, and tells you it feels normal at 72. You tell the student that the carotid is weak and thready with a rate of 120.

- Each student should perform the following:
  - Verbalize that they would survey the area for **hazards**.
  - Make a **Contact Report** by radio.
  - Perform a **Primary Assessment** (including observing for blood, and an assessment of shock status and level of consciousness).
  - Perform a directed **history and physical exam (H+P)**.
  - Make a tentative diagnosis and give this over the radio as a **Preliminary Situation Report**. Outline care the student would give if no contact with medical command at this point and very liberal standing orders.
- Instructors: feel free to vary the scenario slightly, or add some development, as you go along; but please don't go overboard. Although not mentioned as part of the equipment for each station, when a station is outside, instructors must have adequate shelter and insulation for staying still for many hours; in a cold or cool environment this means a tarp or tent, pad and sleeping bag, and **warm** clothing and boots; instructors won't generally have time to move around to stay warm.
- For all scenario stations, the instructor should use the first page of the standard Practical Test Checklist form (provided on two pages following, also available separately as a one-sheet document) to evaluate students and provide feedback.
- First Scenario Station:
  - For the students' first exposure to the scenarios, the instructor should be generous in coaching students through the scenario, stopping as needed to correct students.
  - For this first exposure to scenarios, the instructor should select simple scenarios, and not concentrate on the medical details, but the overall structure of the student's approach to the situation.
  - For this first exposure to scenarios, at the end, the instructor should offer brief commentary on the medical aspects, but concentrate mostly on the mechanics of the students' management.
- Second and Subsequent Scenarios Stations:
  - For subsequent scenario stations, instructors should let students complete the scenario before offering any critique.
  - For subsequent scenario stations, **after** students have completed their evaluation and report, instructors should only then sit down with the students and discuss both the overall management and the medical implications of this scenario.





### Station #3: Shoulder Dislocation

- ▶ Ask: verbalize **criteria for diagnosing** shoulder dislocation:
  - proper **mechanism** of injury (indirect injury)\*
  - can't bring arm across chest** to opposite shoulder\*
  - WEMT can see and feel a "notch and hole" on **exam** of the shoulder\*
- ▶ Ask: verbalize **criteria for attempting reduction** in the field
  - must be **long transport time**, and must have on-line command or standing **orders; or**,
  - if **can't evacuate** patient unreduced (e.g., small passage)
  - if **absent neuro** or vascular status
  - so patient can **self-rescue**, if required **for safety**
- Ask: verbalize advantages and disadvantages of **hanging traction vs. direct reduction**.
- ▶ Tell student: no location nearby for hanging traction so must use direct method; perform shoulder reduction on (simulated) team member who slipped and hit outstretched hand against tree; patient has had dislocations before and has self-diagnosed; perform technique and verbalize as needed:
  - Verbalize use of **medication and/or suggestion**/guided imagery/hypnosis as appropriate\*
  - Neurovascular and ROM** check (sequence not required)
    - radial **pulse and capillary refill**\*
    - sensation** in three distributions in hand (thenar eminence, little finger, and back of web space of thumb), forearm, and "patch" area over shoulder; document\*
    - active **range of motion** (student asks patient to try)
    - motor** strength in three distributions in hand (finger-spreading, thumb/little-finger opposition, holding fingers extended against resistance)\*
  - Position** patient properly (on back, with arm extended and externally rotated; "throwing a baseball") and position assistant on opposite side, with sling around patient's chest for countertraction.\*
  - Apply proper amount of **force**\* (verbalize this is half of force to be used in actuality); apply slowly and gently yet firmly increase force, and stop if patient indicates markedly increasing pain; generally at 30°-45° angle higher than lateral unless patient comfort directs otherwise; use "figure 8 sling" on elbow; verbalize danger of impairing circulation with sling
  - Ask student to verbalize roughly **how long** this is to be continued: 15 minutes
  - Ask student to verbalize **additional options** if doesn't seem to be working: acceptable answers: more elevation of arm, manipulation of humeral head, medication, other methods
  - Once reduced, place arm across chest and **immobilize**.\*
  - Repeat entire **neurovascular check**.\*
- Overall Performance:
  - Excellent    Satisfactory    Poor
  - Missed Important Items (\*) Entirely
  - Pass**    **Fail**    **Instructor Potential**
- Instructor Initials: \_\_\_\_\_

### Station #4: Minor Injuries

#### First Minor Injury Patient

Give student the following scenario: "A member of your Field Team fell during a steep semitech evacuation, rolling some 50 feet and hitting his head. He immediately got up and said he was fine, though he has a superficial abrasion on his right forehead and a few minor bruises. He is alert and continues to insist he's fine except for some minor bumps and bruises. He asks you to check him over." (general, head, and neck exam can be in any order; victim acts and answers as below)

- ▶ Student performs brief physical exam:
  - Checks **head**: palpates head and face, looks in ears, nose, and throat, checks for PERL EOMI [finds nothing except as above]
  - Checks **chest, abdomen, and all extremities**. [finds nothing significant]
- ▶ Student clears the C-spine by all the following:
  - Alert?** [yes]
  - Intoxicated?** [no]
  - Distracting Injury?** [no]
  - Neck **pain?** [no]
  - Neck **tenderness?** [none]
  - Normal **sensory/motor** of extremities [yes]
  - Full **range of motion?** [painless]
- Overall First Patient Performance:
  - Excellent    Satisfactory    Poor
  - Missed Some Items Entirely

#### Second Minor Injury Patient

Give student the following scenario: "A member of your Field Team twisted (inverted) her ankle about an hour ago, and now you're taking a rest stop and awaiting further orders from Base. She says it is now hurting worse and asks you to take a look at it." [victim acts and answers as below]

- Neurovascular** check [normal]
- Palpates from **knee to toes** [no swelling, tenderness just below and anterior to lateral malleolus only]
- Stresses** ankle ligaments [tenderness with stretch of lateral ligaments]
- Diagnoses** probable simple ankle sprain.
- Discusses and/or demonstrates ankle **taping** technique [Patient says she can continue with task as long as it doesn't seem to be broken, and plans to take some of own ibuprofen; will lace boot tightly.]
- Instructions** given to patient to have ankle checked by doctor at Base or on return to home.
- Overall Second Patient Performance:
  - Excellent    Satisfactory    Poor
  - Missed Some Items Entirely
  - Pass**    **Fail**    **Instructor Potential**
- Instructor Initials: \_\_\_\_\_

**SCENARIO #1: Tyrolean Traverse**

**Prerequisites:** none

**Equipment:** victim, Stokes, ropes, rigging for Tyrolean Traverse.

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**Setting** (no physical exam):

The patient is a 22 year old black male climber with a tibia/fibula fracture and mild hypothermia, but no other current or past medical problems. A complete examination has been done by another Wilderness EMT, but who gets something in his eye, and has to drop out of the evacuation.

As part of the evacuation down from the bottom of the cliffs of Massanutten Mountain and across Passage Creek at Blue Hole gorge, the patient must go across a Tyrolean Traverse (highline), and you must accompany the patient. The patient is talking to you and comfortable, but nauseated from the pain. Halfway across, the patient starts vomiting. You must invert the litter to prevent aspiration.

■

## SCENARIO #2: Wrist Injury

### Prerequisites:

- 5b: Wilderness Surgical Problems -- Orthopedic

**Equipment:** victim (can be instructor if short on victims).

### Setting:

The patient is a 23 year old oriental female. She was camping with her boyfriend at a Laurel Hill State Park. A few hours before, she and her boyfriend had an argument, and she ran off into the woods. She has a history of depression, but no history of suicide attempts. She has no other past medical history.

When she didn't return, the state park rangers began a hasty search for her, and one found her along one of the trails. This ranger has no medical training. He sent back a message that she was hurt with another hiker that passed by. Since your search and rescue team (or rescue squad) was practicing technical rescue on the nearby cliffs, the ranger at the ranger station drove up and asked your team to respond.

You follow the ranger along an easy trail for a mile. When you arrive with ropes, Stokes litter, and medical gear, you find a tearful oriental female cradling her right wrist.

### History:

She says she fell and landed on her outstretched right hand because she was running. She denies other injury, and specifically denies any neck pain or head trauma or loss of consciousness.

If students ask, she convincingly denies any suicidal ideation or intent; she was just running away for a while to "cool off."

### Physical Examination:

**Primary Survey**-- No obvious life-threatening problems.\*

**General**-- oriental female, alert and oriented, sitting on a rock.

**Vital Signs**-- BP 110/60, P 80, R 20

**HEENT**-- No signs of trauma.

**NECK**-- Supple, nontender, full range of motion.\*\*

**LUNGS/CHEST**-- Clear, nontender.

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and nontender.

**EXTREMITIES**-- Tender in the anatomic snuffbox at the right wrist, but nowhere else. No other extremity tenderness. NVI distally. Axial compression on the thumb causes increasing pain.

Important points for students:

\*1. Ask students at this point if they need to immobilize the cervical spine; do they even need to clear the cervical spine? No. There is no reason to suspect cervical spine injury in this patient. Examining the cervical spine as part of a quick screening exam is appropriate, however. Have the students do their standard "screening" physical exam, and review their choice of exam items for this.

2. Review scaphoid fractures and their treatment: immobilization in the position of function. Does she need a splint? Yes.

3. Does she need to be carried out? Certainly not. Walk her out with assistance, and have her boyfriend take her to the nearest Emergency Department. Though in most cases an ambulance is available, an ambulance is not truly needed for this transport, and the WEMT student can tell Base that ambulance transport is not needed, freeing any EMS personnel at Base to return to duty. Local

EMS personnel will usually want to transport anyway, but should not be permitted to charge the patient for such a service if the patient, after discussion with the WEMT, agrees that ambulance transport isn't needed. Use this as an opportunity to discuss the issue of level of care for wilderness search patients: does everyone who's been lost, even for an hour, need an ambulance ride to the hospital? Does every such patient need a physician examination?



## SCENARIO #3: An Ankle Injury

### Prerequisites:

- 5b: Wilderness Surgical Problems -- Orthopedic

**Equipment:** victim (can be instructor if short on victims), 2" sling for backpack carry.

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### Setting:

The patient is a 25 year old white female with no medical history, a member of your Field Team. During a search task, she slips and falls. You didn't see her fall, but ran over to her a few seconds later.

### History:

She says she bumped her head slightly on a tree trunk, but she had no loss of consciousness and denies any neurological or visual symptoms or neck pain. Her chief complaint is of pain in the right ankle; she twisted (inverted) it, which is what caused her fall. She is not pregnant or breastfeeding, and has no other past medical history.

---

### Physical Examination:

**Primary Survey**-- No obvious life-threatening problems.\*

**General**-- Young white female, alert and oriented, sitting under a tree.

**Vital Signs**-- BP 110/60, P 80, R 20

**HEENT**-- Small abrasion on the right forehead. PERL, EOMI, ears nose and throat clear, no other signs of trauma.

**NECK**-- Supple, nontender, full range of motion, no jugular vein distension.\*\*

**LUNGS/CHEST**-- Clear, nontender.

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and nontender.

**EXTREMITIES**-- Tender under and just anterior to the lateral right malleolus, and directly over the base of the fifth metatarsal, but nowhere else. No other extremity tenderness. NVI distally. Drawer test is stable and nontender. Stress of the anterior talofibular ligament causes increasing pain, stress of other ligaments causes no pain.

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### Important points for students:

\*Ask students at this point if they need to immobilize the cervical spine, or simply to ask the patient to keep her head still until the exam is done. The latter is a good choice. There is nothing wrong with having the patient or an assistant stabilize the neck until the exam is done. If an assistant tries to hold traction on the neck, the patient becomes mildly irritated and says "Listen, dummy, I can tell I don't have a C-spine injury, I just have a bump on the head and a sprained ankle. GET YOUR HANDS OFF MY HEAD!"

Ask students if the ankle injury should be considered a distracting injury. The answer is that you can't tell until you talk to the patient and find out how much it hurts.

\*\*Make sure the students perform the "Clearing the C-Spine" protocol in the correct order, at least as far as checking for a distracting injury, assessing for alertness and for intoxication, and asking history questions before examining the neck for range of motion.

Have the students do their standard "screening" physical exam, and review their choice of exam items for this.

Can the students definitely rule out an ankle fracture with their exam? No. Can they rule out a large fracture, and conclude that it's likely a sprain? Yes. Review the role of an Ace wrap (elastic

bandage), Aircast® Airstirrup™ ankle brace and similar devices, good climbing/hiking boots, and ankle taping.

Is a fifth metatarsal fracture a reason to keep the person from walking? No, unless the pain is very severe with walking.

However, it will probably prevent a person from continuing with the task and may require some help in hobbling out.

Have the students tape the ankle in an attempt to get the patient to walk out. Teach proper taping technique (see text).

Does the person need a splint, or can you just have the patient walk out with improvised crutches or with assistance? It depends on the amount of pain. In this case, the patient says the pain is fine unless she bears weight, even if the ankle is taped. Therefore, she doesn't need a splint, she just needs a carry-out. Have the students demonstrate the proper way to rig a 2" sling backpack carry, and carry the patient a short distance.

When patient gets back to Base and an Aircast® is applied, she says she can hobble around OK. She'd like to stay at Base helping out with operations, then go to a local ED for X-rays later. Is this OK? (Yes.)



## SCENARIO #4: Bilateral Ankle Fracture, Humerus Fracture, Pneumothorax

### Prerequisites:

- 5a: Wilderness Surgical Problems – General
- 5b: Wilderness Surgical Problems -- Orthopedic

**Equipment:** 3 victims

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### Setting:

You are members of a rescue team that is going in to a known plane crash site. A small plane carrying three passengers has gone down in steep hills in the Laurel Mountains of SW Pennsylvania near the town of Ligonier. By radio report from the plane to the Flight Service radio station at a nearby airport, you know that there are three people on board, and one is seriously injured. The other two say they have minor injuries that are not a serious problem and were able to operate the still-functional radio. They state the plane is badly damaged: the wings are ripped off, but they landed on a ridgetop trail that was somewhat open when they developed engine problems.

Your team does not have an aircraft-band radio so you cannot talk directly to the scene, however, you have an ELT locator and are using it to guide your team a distance of about a mile to the crash site further down the ridgetop from a highway crossing.

It is early spring, and the weather is foggy and rainy. The temperature is in the 30's at night and 40's in the day. There is a low cloud ceiling making helicopter evacuation not possible.

(Instructor: if time and radio traffic permit, you may want to do some of this briefing over the radio before the student team approaches your position.)

Your team leader has assigned responsibilities for the team ahead of time: your most experienced medic will attend the seriously ill patient, and the other personnel will check the two others over quickly for any significant injury then help the primary medic.

(Instructor: The two patients with minor injuries can have their cervical spines cleared, a quick physical exam shows nothing, their minor scrapes can essentially be ignored and then they can walk out with the evacuation team. The third person is the subject of the remainder of the exercise.)

The patient is lying on the ground beside the plane. The two minor-injury people at the scene say they removed him with the best attention to cervical immobilization they could provide, and have covered him with some spare clothing.

### History:

The prime patient is the pilot. According to those at the scene, they think he hit his head and chest on the wheel, and was unconscious for about 5-10 minutes. He doesn't remember anything about the accident. His left arm, left chest, and both ankles hurt.

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### Physical Examination:

**Primary Survey**-- Moderate difficulty in breathing with patent airway; no visible bleeding, radial pulse slightly weak.

**General**-- middle-aged white male in moderate distress, holding onto his chest and breathing with obvious pain.

**Vital Signs**-- BP 96/62, P 104, R 26 (and shallow), rectal temperature is 98°F (36.7°C).

**HEENT**-- No obvious skull fracture, slight hematoma left forehead. Ears without blood. PERL, EOMI.

**NECK**-- No deformity, mild tenderness on palpation (complains of pain on flexion and refuses to move it further if students ask him to move it but does not become paraplegic), no JVD noted.

**LUNGS/CHEST**-- Absent breath sounds on upper left, diminished on the lower left, right side clear; patient complains of pain on palpation and students can feel some crepitation on the left mid-chest with slight subcutaneous emphysema. Trachea in midline.

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and nontender when palpated, including the area of the spleen and liver. Normal bowel sounds.

**EXTREMITIES**-- Left humerus fracture with obvious deformity and crepitus. No wrist drop or other weakness. Pulse, motor, and sensory intact distally. Capillary refill is 3 seconds. Bruising noted down the patients left side (arm, trunk, and leg) but basically nontender in the leg except for the ankle. Tenderness in both ankles with significant swelling in both ankles. Pulse, motor, and sensory intact distally with capillary refill of 2 seconds.

3. Non-tension pneumothorax, decompress if needed during evacuation, especially if no O<sub>2</sub> available.

4. splint fractures, IV for shock and meds

5. fully immobilize

6. Foley urinary catheter for comfort and to follow urine output during evacuation? ■

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### Important Points for Students:

1. Students can clear the first two patients with minor injuries and then essentially ignore them.
2. Students can't clear the main patient who has distracting injuries and neck tenderness.

## SCENARIO #5: Ankle Injury

### Prerequisites:

- 5b: Wilderness Surgical Problems -- Orthopedic

**Equipment:** victim and splinting materials

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### Setting:

You are a member of a search field team, spontaneously assembled from hikers (including yourselves and the search subject's hiking partners) and a few local EMS/Fire-Rescue personnel at the scene; no base or wilderness EMS medical command is set up yet, and the local EMS personnel cannot reach their medical command with the radios. You are looking for a day hiker who had been overdue for four hours before being reported missing at the parking lot at the south edge of the Otter Creek Wilderness Area, Monongahela National Forest, West Virginia. You find the patient sitting alongside the trail two miles from the parking area.

The terrain is steep hills. The weather is sunny, in the seventies, clear and dry, though the sun will set soon. The evacuation time is one to two hours.

### History:

The hiker says she was taking up the rear on the way out of the wilderness area after a three-day hiking trip. She slipped on tree root. She fell, twisting her ankle, and hitting her head on a log. She denies loss of consciousness. She states that she was "knocked silly for a few minutes." She is not pregnant or breastfeeding and has no other complaints, no other past medical history. She says she tried to walk on the ankle and can't because it hurts too much to walk on. She says it doesn't hurt much

as long as she keeps it elevated like it is right now.

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### Physical Examination:

**Primary Survey**-- No obvious immediately life-threatening problems.

**General**-- Young female, appears to be in her early twenties, sitting on a log, alert and oriented.

**Vital Signs**-- BP 120/80, P 80, R 18.

**HEENT**-- Slight hematoma on the right occipital area. PERL. EOMI. Ears/nose/throat unremarkable to exam.

**NECK**-- No deformity, no tenderness when palpated. Full range of motion if students ask her to do it.

**LUNGS/CHEST**-- Lungs clear, chest nontender to palpation.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**EXTREMITIES**-- On inspection, there is slight angulation of the lateral malleolus, with severe tenderness and slight crepitus there; in the medial ankle, there is less swelling but some significant tenderness. There is swelling from the toes to above the ankle. Capillary refill is present at just over two seconds. Motor and sensory are intact distally.

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### Important points for students:

Can the student clear the cervical spine?  
Is this ankle fracture a distracting injury?  
Difficult decision.

Consider weather, terrain, time of day, length of tie to obtain proper immobilization, patient's status. Since this is a short scenario, spend most of the time discussing two items:

1. ankle/foot injuries and the decision to walk out, walk out with assistance, carry out, or continue on task.
2. criteria and procedure and philosophy behind clearing the cervical spine in the wilderness.



## SCENARIO #6: Hypoglycemia

### Prerequisites:

- Practical Station: Neuro Exam I

**Equipment:** victim

### Setting:

You are involved in a now 48-hour-old search for a hiker lost in the Cades Cove area of the Smoky Mountains National Park. You have been looking for a lost 24 year old female. The fall weather is clear, with lows in the 40s at night and highs in the 60s during the day. The patient's friends state that she has a history of diabetes but no other known past medical history; they are not sure if she is on any medications or not.

The patient was just found, by a search team with no medical personnel, approximately two miles off the trail. They say that she is responsive only to painful stimuli with meaning, and you can't get much more useful information about her over the radio. Your team is only about half an hour's hike/run away, so you respond directly to their location. Your team has a standard WEMSI Personal MedKit and usual search gear but no other medical supplies. A team can reach your location from Base with a Stokes litter and whatever medical gear you need in about an hour and a half; the Stokes is already en route, and two other fast hikers are waiting at Base for word from you on what medical gear they should run in to you.

The weather has been pleasantly warm and sunny for the late fall, but over the past hour or two clouds have been moving in from the west, and now there is a stiff chill breeze from the west. It is 5:30 PM and getting dark. The forecast is for a major storm with high winds and freezing

rain. The one helicopter at the search base in Cades Cove has left due to the impending weather and Base tells you no helicopters are available, not that there is a LZ anywhere near the patient.

### History:

Patient unable to provide any additional history.

### Physical Examination:

**Primary Survey**-- No obvious life-threatening problems.\*

**General**-- Young white female, on a sleeping bag, responds to painful stimuli with purposeful movements. Patient pale and diaphoretic.

**Vital Signs**-- BP 96/68, P 110, R 20 T 96°F (35.6°C) rectal

**HEENT**-- no obvious injury, PERL.

**NECK**-- no deformity, no jugular vein distension.

**LUNGS/CHEST**-- clear bilaterally

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and nontender.

**EXTREMITIES**-- atraumatic.

**NEUROLOGICAL**--

**Mental Status:** moans and opens eyes to pain; no other response

**Cranial Nerves:** face is symmetric; cannot check vision, eye movements, or hearing; cannot test other cranial nerves

**Sensory:** appears to respond to pain in all extremities.

**Motor:** moves extremities in response to pain (withdraws).

**Deep Tendon Reflexes:** normal; toes downgoing both sides.

**Cerebellar:** unable to test

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**Important Points for Students:**

1. Is there any reason to suspect anything other than hypoglycemia? No.
2. Discuss the treatment of suspected hypoglycemia in such a patient without having injectable glucose.
3. Discuss the lack of danger from aspiration of small sips of fluids such as Gatorade™: essentially none in such a situation as this.



## SCENARIO #7: Lost Boxing Coach

### Prerequisites:

- 4: Scene Management, Communications, Reporting and Documentation
- Practical Station: Neuro Exam I

**Equipment:** victim

### Setting:

You have been participating in a 6-day long search for a lost man. He is a 72-year old white man who just retired as a high school boxing coach, and is in excellent health. He and his wife were day-hiking in Virginia's Mount Rogers Wilderness Area on a very foggy day. They became separated looking for the trail back to the parking area; rangers found his wife soon thereafter, but found no sign of him. A search team without medical training finds him on the sixth day after he was lost. You hear that he is "pretty badly banged up," is "cold," "confused," and is in a swampy area near the base of Mount Rogers, about two miles from the nearest road. Your team is only a half-mile from the scene and responds there on foot.

When you arrive, you find the team members clustered around an elderly man. They have placed him on a foam pad and wrapped parkas around him. They have given him a liter of water to drink, have started a stove, and are fixing a freeze-dried dinner for him.

They say that he was wandering around in the swamp without his shoes when they found him. You look at his feet, covered only with very dirty socks, and they are masses of small cuts and abrasions, though with no major signs of infection. He is alert, and not particularly agitated,

but what he is saying to the team members makes no sense at all.

### History:

His answers to questions make a slight bit of sense but don't really answer the question. However, when asked "did you fall?" or "did you hurt your head or neck?" he answers "no," and seems to be very sure of this. He goes on to tell students all about his dog, who he seems to think is right there with him though students can see no dog. (Instructor: tell the students at this point there is no dog visible, nor any dog tracks in the swampy ground, and there was nothing about a dog being with him in your search briefing.)

### Physical Examination:

**Primary Survey**-- No obvious immediately life-threatening problems.

**General**-- Older white male, sitting on foam pad; very dirty and disheveled.

**Vital Signs**-- BP 120/60, P 110, R 22, rectal temperature is 95°F (35°C). When he gets up to have another pad placed underneath him, he complains of being dizzy; you find his standing pulse to be 140 and BP to be 90/40.

**HEENT**-- No obvious injury. PERL. EOMI. Ears/nose/throat unremarkable to exam.

**NECK**-- No deformity, no tenderness when palpated. Full range of motion if students ask him to do it.

**LUNGS/CHEST**-- Clear, nontender.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**EXTREMITIES**-- The arms and legs appear atraumatic (without signs of trauma) except for numerous small scrapes and abrasions on both legs.

**NEUROLOGICAL--**

**Mental Status:** Oriented to person, year but not month, and knows he's near Mount Rogers.

**Cranial Nerves:** counts fingers with both eyes, EOMI, facial movement and sensation are normal, hearing is fair and similar in both ears, tongue protrudes in the midline, and shoulder elevation is strong bilaterally.

**Sensory:** Normal light touch in all extremities.

**Motor:** Normal strength in all extremities.

**Deep Tendon Reflexes:** Normal. Toes downgoing bilaterally.

**Cerebellar:** Fairly good finger-to-nose bilaterally.

**Case Development:** as the students examine the patient, he becomes more oriented, and by the end of the exam, he is making perfect sense and appears to be a good historian, though a bit slow in his answers.

3. If they feed him, how much should they give him? Small amounts at first? Yes.

4. Does he need rewarming? Yes. Should you add as much heat as possible? Yes. If you have a paramedic, and you have some bretylium, does he need some before you evacuate him? No. His hypothermia is mild and should do well.

5. Does he need an IV? There's nothing wrong with starting one, because he's clearly orthostatic (dehydrated). However, if he can take PO fluids OK, there's no compelling reason for an IV.

6. Why is he disoriented? Hard to tell. Maybe a combination of isolation psychosis from being lost, starvation, dehydration, and mild hypothermia. However, the fact that he recovers so quickly suggests isolation psychosis. ■

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**Important points for students:**

What are priorities in managing this patient?

1. Can students use their protocol to clear the cervical spine? No. Do they need to suspect cervical spine injury? Not particularly, but it makes sense to examine the neck as part of a general physical exam.

2. Should students give him more water to drink? No. Use Gatorade™ or something with salt in it, or at least give him something salty to eat with his water. What if his sodium level is low in the blood? Could giving him plain water make his sodium level go lower, and even cause seizures? Yes.

## SCENARIO #8: A Backpacker Falls

### Prerequisites:

- 5b: Wilderness Surgical Problems – Orthopedics
- Practical Station: Neuro Exam I

**Equipment:** victim

### Setting:

You are one of the instructors at a summer weeklong WEMT class offered by the Eastern Region, National Cave Rescue Commission at Dailey, West Virginia. About the middle of this exceedingly hot and humid week, a call comes in for a real rescue. As with most wilderness search and rescue situations, information comes in filtered through multiple channels: paramedic at the scene to the ambulance, ambulance to the base, base dispatcher by phone to a phone near the NCRC site, NCRC radio from the phone to the training site. The initial request comes through as a "need help for a technical rescue with medical problems, way up Red Creek at Dolly Sods Wilderness Area." There were enough instructors to keep the class going pending the report of the initial team. You and five others are dispatched.

The temperature is 95°F (35°C) and the humidity is 95 percent. The trail up Red Creek isn't steep until about two miles up the trail, at which point there is a narrow gorge with cliffs and waterfalls. Your team responds to the bottom of the Red Creek Trail, at the Laneville Forest Service Ranger Cabin, where local fire and EMS personnel confirm their request for your assistance. A Wilderness Command Physician has accompanied you to the cabin and with one other instructor sets up medical command and a communications center. You are told by

those at the scene that the patient's hiking party had gotten off the trail and she fell, tumbling about ten feet. The paramedic had reported she may have a femur fracture and a cervical spine injury; her legs are apparently paralyzed, and she had neck and right hip pain. Her vital signs are stable. The local rescuers have immobilized her on a backboard in Stokes litter, but haven't yet started an IV. They want you at the scene.

They are about two miles up the Red Creek trail. They have moved the patient to a trail, and no special technical expertise is needed for the rescue. No cliffs are involved. They are going to move her to the other side of the river, out of the sun. They might need a rope for the evacuation, though. You arrive at the scene after a sweaty hour up the trail, and get report from the local paramedic. The local medic can't reach his medical command facility on his handheld, but you can reach your Wilderness Command Physician easily on your handheld. You and the local paramedic agree that the patient would be best served by your handling medical care under your physicians' direction and the local paramedic helping you.

### History:

She denied hitting her head or any loss of consciousness or visual symptoms. She was primarily complaining of pain in the right hip area, but did have some mild pain in the neck. She had slight tingling in the hands bilaterally, numbness in the right leg, and didn't think she could move her toes.

### Physical Examination:

**Primary Survey**-- no obvious life-threatening problems.

**General**-- Patient is immobilized in a Stokes litter, she was alert, oriented, in

mild distress, and occasionally even smiling.

**Vital Signs--** BP 110/70 R 12 and normal, P 84. Skin temperature is normal.

**HEENT--** minor nontender contusions, a few very superficial abrasions. PERL, EOMI, nose and throat clear.

**NECK--** immobilized, mild left lower strap muscle but not midline tenderness. No ecchymosis or deformity.

**CHEST:** stable to AP and lateral compression, nontender, lungs clear bilaterally. Heart: normal sounds.

**LUNGS--** decreased sounds bilaterally due to shallow respirations, but no râles, rhonchi, wheezing.

**HEART--** soft but otherwise normal heart sounds.

**ABDOMEN--** soft and nontender throughout, with normal to slightly decreased bowel sounds.

**BACK--** couldn't examine well due to immobilization, but no distinct lumbar tenderness.

**PELVIS--** stable to inward and outward compression on the anterior superior iliac spines, with slight local tenderness of the right anterior superior iliac spine. Stable to AP compression of the pelvis. Moderate tenderness in the right sciatic notch area.

**EXTREMITIES--** a few scratches, no significant tenderness anywhere in any extremity, full range of motion at elbows and wrists, and normal rotation at bilateral hips; couldn't test other range of motion due to immobilization. In particular, no femur or right hip joint tenderness and full rotation there without pain.

#### **NEUROLOGICAL--**

**Mental Status:** Alert and oriented.

**Cranial Nerves:** normal.

**Sensory:** Markedly decreased sensation in the entire lateral right leg, but intact in the medial leg. Sensation intact in the left leg. Normal light touch in all extremities.

**Motor:** Strength 5/5 in both arms. Strength initially not detectable in either foot, but with encouragement, patient able to show 4+/5 strength of foot plantar flexion bilaterally and of left dorsiflexion; right dorsiflexion remains just detectable, perhaps due to pain in the right pelvic area with attempts.

**Deep Tendon Reflexes:** Normal.

**Cerebellar:** Good finger-to-nose bilaterally.

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Important points for students:

1. As soon as you arrive, the local paramedic tells you he's worried about a femur fracture and cervical spine fracture and wants you to have your Base call for a helicopter. It is a relatively easy two mile evacuation down the trail to the cabin, and you now have about 20 people at the scene for a litter team. It is afternoon, and there are scattered thunderstorms moving across the area, and as has been the case every afternoon of the week, they are getting numerous and the wind is picking up and is gusty. There is a potential LZ about a half mile up the river, on a gravel bar in the middle of the river. Should you call for the helicopter?
2. Can you clear the cervical spine?
3. What do you think are the patient's real injuries? Do you think a cervical spine injury is likely?

The patient is evaluated in the Emergency Department at West Virginia University, where her neurological and musculoskeletal examinations are unimpressive. She has cervical spine, chest, pelvis, and right knee X-rays, all of which are negative. She is observed overnight on the pediatric surgery service

and released the next day with the diagnosis of no significant injury.



## SCENARIO #9: A Climber Falls

### Prerequisites:

- 5b: Wilderness Surgical Problems – Orthopedic
- Practical Station: Neuro Exam I

### Equipment: victim

### Setting:

You are the sole Wilderness EMT with a wilderness search and rescue team that is hiking in about two miles to the local climbing rocks for a vertical practice session. You have a Stokes litter and full rescue gear, and a full standard WEMSI personal MedKit.

Just as you arrive, about 1000 hours, you see a member of a nearby rescue squad getting ready to rappel off a small (20 foot) cliff. It seems that he didn't tie in properly, because the next thing you see is him and his rope all at the bottom of this small cliff. He stands up and is cursing. Temperature is 60°F (15°C), it is foggy and there a light mist is starting to fall.

### History:

You rush over and he says "I'm OK, I'm OK, I just sprained my ankle." He denies any medical problems or past medical history. When pressed for details, he states his left heel is only mildly painful now, but hurts a lot whenever he tried to put any weight on it.

### Physical Examination:

**Primary Survey**-- No obvious immediately life-threatening problems.

**General**-- Young black male, obviously angry at himself but in only mild distress

otherwise. Shivering slightly, as it seems to be getting colder.

**Vital Signs**-- BP 110/70, P 96, R 22, he refuses rectal temperature, but oral temperature is 98.4°F (36.9°C).

**HEENT**-- Superficial scrape on the left cheek, but no bony deformity. PERL. EOMI. Ears/nose/throat unremarkable to exam.

**NECK**-- No deformity, no tenderness when palpated. Full range of motion if students ask him to do it.

**LUNGS/CHEST**-- Clear, nontender.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**PELVIS**-- Pressure inwards and outwards on the iliac wings, and pressure on the symphysis pubis, all cause no pain.

**EXTREMITIES**-- The arms and legs appear atraumatic (without signs of trauma) except for very significant tenderness on both sides of the left heel; the ankle and rest of the foot are nontender. Unable to bear weight on the left foot due to pain.

### NEUROLOGICAL--

**Mental Status:** Alert and oriented.

**Cranial Nerves:** counts fingers with both eyes, EOMI, facial movement and sensation are normal, hearing is normal and similar in both ears, tongue protrudes in the midline, and shoulder elevation is strong bilaterally.

**Sensory:** Normal light touch in all extremities.

**Motor:** Normal strength in all extremities.

**Deep Tendon Reflexes:** Normal. Toes downgoing bilaterally.

**Cerebellar:** Good finger-to-nose bilaterally.

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**Important points for students:**

1. Does an oral temperature of 98.4°F (36.9°C) rule out significant hypothermia?

Yes. Does he need some warm clothing anyway? Yes.

2. Does he have an ankle sprain, as he contests? No, it looks more like a heel fracture. Should he walk with this? No.

3. Can you clear the cervical spine? It depends. A heel fracture might or might not be a "distracting" injury. When questioned about the pain, this patient says "well, it hurts, but not too bad." Therefore, it is probably reasonable to clear the cervical spine in this particular case.



## SCENARIO #10: Another Climber Falls

### Prerequisites:

- 5b: Wilderness Surgical Problems – Orthopedics
- Practical Station: Neuro Exam I

**Equipment:** victim

### History:

You are the sole Wilderness EMT with a group of search and rescue team members and friends who are at White Rocks, a favorite climbing area on Laurel Hill about a mile from the nearest road. You have climbing gear, a standard WEMSI personal MedKit, and your normal daypack contents, but no rescue gear.

It is a pleasant, sunny summer day. Some other people who are all wearing black and have black equipment are practicing "repelling" as they call it. You assume that they are members of a SWAT team, but you don't talk to them at all.

About 1500 hours, you hear a commotion from the SWAT team's area of the cliff. You wander over, and see one of the members of their group at the bottom of a small (10 foot) drop, part of the normal scrambling route to get from the top to the bottom of the cliff. He is lying on the ground, moaning. One of the SWAT team members says "He was going back up to the top and he just slipped!"

### History:

He groans and tells you "I think I broke my butt. I landed right on my butt, and damn but it hurts." He emphatically denies hitting his head or any injury except for his rear end, and denies any past medical history, medications, allergies.

### Physical Examination:

**Primary Survey**-- No obvious immediately life-threatening problems.

**General**-- Young white male, moderate distress, pale.

**Vital Signs**-- BP 110/70, P 120, R 22.

**HEENT**-- Moderately deep scrape on the left cheek (patient is surprised and says he doesn't remember hitting his cheek), but no bony deformity. PERL. EOMI. Ears/nose/throat unremarkable to exam.

**NECK**-- No deformity, no tenderness when palpated. If students ask him to perform range of motion, complains of severe pain on movement of the neck to the right, and starts screaming about spasm in his neck. (Instructors: he does NOT become paraplegic!)

**LUNGS/CHEST**-- Clear, nontender.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**PELVIS**-- Pressure inwards and outwards on the iliac wings, and pressure on the symphysis pubis, all cause markedly increasing pain.

**RECTAL EXAM**-- Nontender, prostate in normal position, no blood. (Students may ask for the results of the rectal and the genital exam without simulating.)

**GENITAL EXAM**-- No evidence of trauma; no blood at urethra. (Students may ask for the results of the rectal and the genital exam without simulating.)

**EXTREMITIES**-- The arms and legs appear atraumatic (without signs of trauma). Range of motion at the hips causes pain in the pelvis.

**NEUROLOGICAL**--

**Mental Status:** Alert and oriented.

**Cranial Nerves:** counts fingers with both eyes, EOMI, facial movement and sensation are normal, hearing is normal and similar in both ears, shoulder elevation is strong bilaterally, and tongue protrudes in the midline.

**Sensory:** Normal light touch in all extremities.

**Motor:** Normal strength in all extremities.

**Deep Tendon Reflexes:** Normal. Toes downgoing bilaterally.

**Cerebellar:** Good finger-to-nose bilaterally.

Important points for students:

1. Can you clear the cervical spine? No. A pelvis fracture is a significantly painful distracting injury.



## SCENARIO #11: Shoulder Dislocation

### Prerequisites:

- 5b: Wilderness Surgical Problems – Orthopedic
- Practical Station: Shoulder Dislocations

**Equipment:** victim, caving gear.

### Setting:

You are a member of a cave rescue team. You are called in to treat and evacuate a 43 year old male who is three quarters of a mile back in Crossroads Cave in Bath County, Virginia.

The patient is on the far end of a one to one and a half foot wide canyon. The estimated carry out is two to two and one half days, and will require some complex rigging. Walk out time is estimated to be less than one day, but will still require some complex rigging. The patient is in a very small hole, at the end of a very narrow canyon, and the nearest place with sufficient room for a complete examination is about a quarter of a mile back toward the entrance.

The temperature for the cave is 56°F (13°C); it is wet and dark.

His friends gave him two extra-strength acetaminophen tablets and some food and water. Local EMTs have splinted the shoulder in the position it was found, and said neurovascular status is intact; they are hypothermic and members of your team escort them out of the cave.

### History:

The 43 year old patient fell down an eight foot drop, pivoting on his foot ascender when his chest ascender came loose,

striking his shoulder from the rear. He didn't hit his head, has no neck pain, has no medical problems and no past medical history of significance. The patient is in mild pain to moderate pain only, he says, and feels capable of assisting with his own rescue.

### Physical Examination:

**Primary Survey**-- No obvious life-threatening problems.

**General**-- You find a white male, who denies loss of consciousness or any injury except the left shoulder. He looks reasonable comfortable but is in significant pain when he moves despite the splints on the arm.

**Vital Signs**-- BP 140/92, P 96, R 24 96°F (35.5°C) oral.

**HEENT**-- No obvious injury.

**NECK**-- supple, nontender, full range of motion cause some pain in the shoulder only (but not in the neck) with flexion to the right (away from the left shoulder). No JVD noted.

**LUNGS/CHEST**-- bilateral breath sounds clear, nontender, normal heart sounds

**ABDOMEN**-- soft, nontender

**EXTREMITIES**-- The patient complains of pain of the left shoulder with any movement. Pulse, motor, and sensory intact distally. Some swelling and deformity noted in the area of the left shoulder with limited range of motion. Left scapula and collar bone intact. Can't really check range of motion due to the constricted area.

### Important points for students:

1. Can they clear the cervical spine? Not by protocol, certainly: the shoulder dislocation is a distracting injury. Discuss the requirements for this, and the various

considerations that go into clearing the cervical spine in the wilderness (costs vs. risks). Also discuss whether contact with a physician will be helpful in making a possible decision to forgo cervical immobilization due to the difficulty of the rescue and risks of exposure.

2. Immobilize and medicate as needed. IV or saline lock for meds and fluids. Reduce dislocation if possible, and treat for hypothermia.



## SCENARIO #12: Heat exhaustion, heat stroke

### Prerequisites:

- 6: Thermal Regulation
- 7: Heat-Related Disorders
- Practical Station: Neuro Exam I

**Equipment:** victim

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### Setting:

You are a member of a search field team which has been out since 8 AM; the time is now 3 PM. You are looking for a 2 year old who presumably wandered away in the foothills of the Blue Ridge Mountains near Shenandoah National Park in central Virginia.

The terrain is steep hills with thick woods. The summer weather is hot and humid with the temperature in the mid 80's. The time to base is 4-5 hours. One of your team members, a twenty year old woman, passed out for approximately 1-2 minutes when the team was separated for a wide-spaced sweep. The two persons nearest her have no medical training.

By the time you and the other medical personnel get there she is awake.

### History:

The patient agrees with the other team members; she had been feeling nauseated since before lunch; didn't eat much then, she says. She started feeling lightheaded and more nauseated about an hour ago. Just after going up the edge of a steep ravine, she passed out. She remembers gradually falling and is sure she didn't get hurt on the way down. She's now laying on some soft moss and leaves.

She is a WEMT and without prompting gives you the history that she isn't

pregnant, has no medical history, is on no medications, has no allergies, and has had no chest pain, abdominal pain, or shortness of breath. She says the team members with her observed no seizure activity nor was she incontinent nor did she bite her tongue. She now has a slight diffuse headache, and is still nauseated, but isn't lightheaded lying down with her feet propped up.

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### Physical Examination:

**Primary Survey**-- No obvious immediately life-threatening problems.

**General**-- alert and oriented, mild to moderate distress, pale, diaphoretic. The skin is cool and clammy.

**Vital Signs**-- BP 100/58, P 104 weak, R 20 shallow, temp 101.4°F (38.6°C) oral.

**HEENT**-- No injury. PERL. EOMI. Ears/nose/throat unremarkable to exam.

**NECK**-- No deformity, no tenderness when palpated.

**LUNGS/CHEST**-- Clear, nontender. Respirations quick and shallow.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**EXTREMITIES**-- The arms and legs appear atraumatic (without signs of trauma). Pulse motor and sensory intact in all extremities.

### NEUROLOGICAL--

**Mental Status:** Alert and oriented.

**Cranial Nerves:** counts fingers with both eyes, EOMI, facial strength and sensation are normal, hearing is normal and similar in both ears, tongue protrudes in the midline, and shoulder elevation is strong bilaterally.

**Sensory:** Normal light touch in all extremities.

**Motor:** Normal strength in all extremities.

**Deep Tendon Reflexes:** Normal. Toes downgoing bilaterally.

**Cerebellar:** Good finger-to-nose bilaterally.

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**Important points for students:**

1. Should check the patient for orthostatic changes, at least after giving fluids. If check for this before hydration, patient, faints with some very slight twitching suggestive of a seizure but as soon as she lays flat, wakes up again. (Explain some slight twitching in such a situation shouldn't be classed as a seizure.)

2. Should you give oral? If you give oral fluids and she vomits once, should you stop oral fluids and call for another team to respond with IV fluids, or should you try oral fluids again?

3. How much does the patient need to be cooled?

4. Can she walk out? Does it depend on the terrain between the patient and the nearest road? What would be the criteria for letting her walk out? (Temperature, state of hydration as judged by urine output and orthostatic BP and CNS changes.)



**SCENARIO #13: Hypothermia****Prerequisites**

- 9: Cold-Related Disorders

**Equipment:** victim, WEMSI Team Medical Kit document.

**Setting:**

You are the WEMT of a team setting out to search for a hunter overdue after an unexpected fall snowstorm. He was hunting in north-central Pennsylvania, in the area of the Susquehannock Trail. He had indicated he was going to follow the Susquehannock Trail from the Cherry Springs Fire Tower down into Hogback Hollow and then return to his car at the fire tower. Those who know the area say the trail is very rugged and steeply down the first mile from the fire tower, but after that is relatively level and in good condition down about four miles to where it turns into a jeep trail about a mile above the road at the village of Short Run.

The hunter has been missing for 24 hours. Last night there was 6" of new snow. Temperature is now in the 20s, there is low cloud cover with some occasional snow showers. Your large first-in team will search down the hollow and send off small field teams up each of the three small hollows you will pass en route to the jeep trail. A local four-wheel drive ambulance will meet you and the remains of your team at the jeep trail. You will have radio contact with all of your subsidiary teams, and a local Wilderness Command Physician will be at the vehicles at fire tower and able to talk to you in about an hour.

Your team is planning to carry six heat packs, a stove, a tent, and a sleeping bag. You have a standard WEMSI personal medical kit, a HeatPac™ charcoal

rewarming vest, plus your selections from a WEMSI team medical kit. What items are important for you select from the team medical kit?

You hike, or really mostly slide, the first mile down to the level part of the trail, which is much easier going. Before you reach the first of the hollows, your team finds the patient lying next to the trail, huddled up against a log with leaves and branches pulled over him.

Because of and despite the snow, you estimate it will truly take about ten hours to get a Stokes here and get him down to the jeep trail, and then about an hour via ambulance to a medical center.

**History:**

According to your briefing, the patient has no known past medical history.

**Physical Examination:**

**Primary Survey**-- other than the cold, no obvious life-threatening problems.

**General**-- middle-aged male, only slightly if at all responsive to pain.

**Vital Signs**-- BP 94/50 R 8 and shallow, P 48 and palpable only at the carotid. Rectal temperature is 86°F (30°C).

**HEENT**-- no visible injury. Pupils dilated; you can see no response to light.

**LUNGS**-- decreased sounds bilaterally due to shallow respirations, but no rales, rhonchi, wheezing.

**HEART**-- soft but otherwise normal heart sounds.

**ABDOMEN**-- soft and nontender when palpated.

**EXTREMITIES**-- normal except the right leg which has a large amount of swelling just above the ankle. There are no palpable pulses in any extremity. All joints are stiff with cold but seem to have

a near-normal passive range of motion.  
Skin is all soft, no signs of deep frostbite.

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Important points for students:

1. Should you insulate?
2. How much heat should you add?
3. Should you try to start an IV? Assume you have someone on the team capable of it.
4. Should you ask the team coming in to bring the doctor (assuming he or she can safely travel to the patient and back out) and the central line kit from the team kit?
5. Should you give bretylium prior to starting the evac?



## SCENARIO #14: Head Injury and Hemothorax

### Prerequisites:

- 5a: Wilderness Surgical Problems -- General
- 5b: Wilderness Surgical Problems -- Orthopedics
- 14: Pharmacology (at least an introduction)
- Practical Station: Neuro Exam I

**Equipment:** victim, fiberglass splinting materials.

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### Setting:

You are medic of a wilderness search team. You know from your briefings that a 31 year old backpacker with a history of epilepsy, well-controlled on phenytoin (e.g., Dilantin®) 300 mg daily, with no seizures the last year, became lost while hiking on the Laurel Highlands Trail in SW Pennsylvania. The season is spring, with temperatures from the 30's (0-5°C) at night to the 60's (15-20°C) during the day. Except for a rare shower or two, no rain has been reported. After two days of intensive searching, the subject was found, by another search team, at the base of a 20' (7-meter) cliff, right next to a small stream. The team does not have an EMT; the team's report to base was that the patient was "delirious" but awake, and has an obvious injury to the right ankle. They have provided her with a sleeping bag and a cup of warm tea. You arrive about half an hour later with your search team. You have a small personal medical kit, and a blood pressure cuff and stethoscope, but no other medical supplies. You estimate a 14 hour evac and it will take a team 6 hours to get here with a litter and backboard.

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### Physical Examination:

**Primary Survey**-- No obvious life-threatening problems.

**General**-- Slightly lethargic patient in no acute distress, but intermittently slightly anxious and agitated.

**Vital Signs**-- BP 108/68, P 64 and reg., RR 16 and unlabored, Rectal temp. 92°F (33.3°C).

**HEENT**-- no obvious injury, except one small bruise in the right occipital area. Nose, throat, and ears clear. Bones intact to palpation with slight tenderness over bruise.

**NECK**-- supple, no deformity or tenderness.

**LUNGS/CHEST**-- clear except for slightly and diffusely decreased breath sounds on the right. Tender over the right anterior-lateral ribs, but with no crepitation. Slight decreased percussion note on the right.

**HEART**-- normal sounds.

**ABDOMEN**-- normal inspection; soft, nontender, bowel sounds present, no masses.

**EXTREMITIES**-- pulses and sensation intact in all extremities. decreased strength and movement in right wrist and right ankle secondary to pain. Obvious swelling and ecchymosis of right ankle with both medial and lateral tenderness but stable ankle, and at right wrist. Swelling, but no gross deformity with either injury, but tenderness enough to suggest fracture. Distal NVI in both extremities.

### NEUROLOGIC EXAM--

**Mental Status:** Alert, but tends to laps into somnolence. Oriented to place (off Laurel Highlands Trail) but not to year or month, although he knows it's the fall. Memory appears poor. . . keeps asking for

EMT's name, seemingly forgetting that it's been asked for previously.

**Cranial Nerves:** PERL EOMI; face shows questionable droop of left side of mouth. No other abnormalities.

**Sensory:** intact to light touch everywhere.

**Motor:** normal except for deficit from trauma; proximal strength on right is good.

**DTRs:** hyperreflexia and upgoing toe on left.

**Cerebellar:** finger to nose only fair.

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### Important points for students

1. The right hemothorax is present but not causing the patient problems and is not a priority now.
2. Hypothermia is mild, but patient needs insulation and heat as soon as possible.
3. Main problem is head injury. Cannot clear C-spine because patient is not completely alert. Evacuate patient ASAP, but with spinal immobilization. Watch neurological status carefully. If patient deteriorates before litter arrives, start improvised evac. Ask for IV and PO phenytoin (e.g., Dilantin®) to be sent in with the litter and backboard. If field teams are carrying PO phenytoin (e.g., Dilantin®) to give to the patient if found, should they give it? If so, how much? (Yes, if patient appears able to swallow; answer is to ask medical command about the dosage; most Wilderness Command Physicians would give 1000 mg spaced out over several hours.)
4. Have students use fiberglass or plaster or a SamSplint™ to splint the ankle and wrist.
5. Use this as an opportunity to review neurological exam, and to reinforce the importance of repeated exams.



**SCENARIO #15:  
Hypothermia/Knee Fracture or  
Dislocation**

**Prerequisites:**

- 5a: Wilderness Surgical Problems -- General
- 5b: Wilderness Surgical Problems -- Orthopedic
- 9: Cold-Related Disorders

**Equipment:** victim, tent/foam pads.

**Setting:**

You are the medic of a wilderness search team. You know from your briefing that the patient is a sixteen-year old white male who has been missing for 12 hours after wandering away from the picnic area on top of Laurel Hill. He was in good health according to his friends. The season is spring, with temperatures from the 30's at night to the 60's during the day. Except for a rare shower or two, no rain has been reported. Your team makes the find, where the patient is lying at the base of a short slope with some skid marks. Estimate is for the litter and litter team to arrive in about 2 to 3 hours, with a charcoal warming vest, but you cannot make contact with medic command for unknown reasons. Estimate of an 8 hour evacuation."

**History:**

Patient unable to give history and no other information available. He points to his left leg but otherwise seems unable to communicate except for head shakes or short answers to simple yes or no questions. Becomes combative if WEMT students continue questioning.

**Physical Examination:**

**Primary Survey--** No obvious life-threatening problems.

**General--** Young white male, alert but disoriented, lying on left side.

**Vital Signs--** BP 102/40, pulse 134, weak and thready; respirations 34 and shallow; rectal temperature 89°F (31°C).

**HEENT--** No obvious injury. Skin turgor poor. Tongue swollen. Mouth dry.

**NECK--** supple, nontender, full range of motion without pain if WEMT students ask patient to attempt.\*

**LUNGS/CHEST--** clear, nontender, normal heart sounds

**ABDOMEN--** soft, nontender

**EXTREMITIES--** Normal except for left leg. Left leg is twisted under the patient and deformed at the knee. There are no pulses distally and the leg is cold and blue (more so than the other extremities).

**NEUROLOGICAL--** normal, as far as can be determined, except for inability to answer questions; patient cooperates if asked to follow simple commands for the neurological exam.

**Important points for students:**

1. Priorities: Severe hypothermia. Discuss advisability of using charcoal warming vest, especially since can't contact medic command. STRAIGHTEN LEG ASAP; attempt reduction of knee dislocation if present. Discuss importance of trying to reduce ANY dislocation with a cold distal limb, regardless of where. Dehydration. Start IV ASAP if possible.
2. Does patient meet criteria for clearing the C-spine, or should he be immobilized? Patient is not totally alert due to

hypothermia. So, C-spine can't be cleared by the official criteria. However, in this scenario, he has no pain or neurological symptoms with range of motion of the neck. Also, he becomes quite alert and oriented after a little insulation and rewarming, and then the C-spine can be cleared.

3. IF he's hypothermic, why is his pulse so fast? Why does he look so dehydrated if he's only been lost 12 hours? Is the patient shocky? (If you wish, you can have the patient develop ecchymosis along the right flank while waiting for the litter, showing retroperitoneal bleeding.)

4. Can the patient take PO fluids if IV fluid is not available, or if they can't start an IV? Yes, especially since the patient is realistically at least 12 hours from surgery.

5. Review the management of knee fractures or dislocations, and what to do if you can't tell which it is. (In this case, there is neurovascular compromise, to the answer is to reduce, even though you don't know which it is; the answer would be the same on the street.)



**SCENARIO #16: Anaphylaxis****Prerequisites:**

- 11: Bites and Stings
- 12: Wilderness Medical Problems

**Equipment:** victim

**Setting:**

You are a member of a field team on a lost person search in eastern West Virginia, near Blackwater Falls State Park and Dolly Sods wilderness area. This is a particularly remote area with virtually no road access.

It is early summer, temperatures in the 60s at night and in the 80s during the day. Your team consists of four people, and you have a single standard WEMSI Personal MedKit, including both search and advanced modules.

It is late afternoon, and your team has been on a search task since before dawn. It is two miles to the nearest jeep trail bordering Canaan Valley State Park. One team member, a 26 year old woman, is stung by five bees as the team passes a nest. Everyone else gets one sting, and boy does it hurt.

**History:**

The patient complains of severe pain at stings on her arms and back. She denies any lip swelling, hoarseness, or shortness of breath. She demands the Sting-Eeze™ from the MedKit, *now*.

She denies any history of bee sting allergy, past medical history, medications, or pregnancy. Again she demands the Sting-Eeze™ *now*, at least partially in a joking manner, and is physically threatening you because you're using the Sting-Eeze™ on your own sting.

**Physical Examination:**

**General**-- small well-appearing but slightly antagonistic white female in moderate distress.

**Primary Survey**-- normal.

**Vital Signs**-- BP 110/70 R 24 P 120

**LUNGS**-- clear, no râles, rhonchi, wheezing.

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and nontender when palpated.

**SKIN**-- in addition to the obvious stings, she is starting to develop some hives on her face and arms.

**Important points for students:**

1. Development: the patient suddenly stops being antagonistic, her respiratory rate increases markedly, and she says in a very serious tone and a slightly hoarse voice "I think I'm having an anaphylactic reaction" and sits down abruptly, looking pale under her rapidly-expanding hives. She then develops some stridorous sounds and starts clutching her chest and throat. Unless students administer epinephrine within about 45 seconds (i.e., if they delay longer than this to examine her further or obtain vital signs), her blood pressure and pulse and respiration all drop, she becomes cyanotic, and seizes and dies. If they give the epi, her vital signs normalize, and her hives get better.
2. What other medications does she need?
3. Does she need to be evacuated? Can she walk out?

## SCENARIO #17: Asthma Exacerbation

### Prerequisites:

- 12: Wilderness Medical Problems

**Equipment:** victim.

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### Setting:

You are the medic of a minimally equipped search team. The subject is a 22 year old white male with a learning disability and asthma who is on Theodur®, which he often forgets to take. He is "slow" but "stable," according to his family. He lives nearby, at the base of Laurel Mountain. He had an argument with his girlfriend, and walked away mad some 8 hours ago.

The season is spring, with temperatures from the 30's at night to the 60's during the day. Except for a rare shower or two, no rain has been reported. A rough estimate is that it will take 6 hours to get the litter and medical kit here. You have a standard WEMSI personal MedKit, and another team member has a stove with some coffee, hot cocoa, and food.

Your team finds the subject. Your team's radio cannot reach base camp, so two team members are hiking out a higher place to radio in the find and request a litter and medical kit.

### History:

The patient is generally uncommunicative; when asked open-ended questions, just looks confused. Answers simple questions appropriately. When asked, does complain of shortness of breath. When asked, says he didn't fall.

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### Physical Examination:

**Primary Survey**-- No obvious life-threatening problems.

**General**-- Young white male, alert and oriented, but in marked respiratory distress, sitting under a tree.

**Vital Signs**-- BP 152/80, P 118, R 28, T 97°F (36°C)

**HEENT**-- No obvious injury. Skin turgor good. Mouth dry. Lips slightly cyanotic.

**NECK**-- Supple, nontender, some jugular vein distension.

**LUNGS/CHEST**-- Expiration takes 5 times inspiration, with diffuse wheezing in all fields. No areas of consolidation to auscultation and percussion. Some nostril flaring and retraction in intercostal areas.

**HEART**-- heart sounds inaudible secondary to lung sounds.

**ABDOMEN**-- soft and nontender.

**EXTREMITIES**-- No evidence of trauma. Fingernail beds dusky.

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### Important points for students:

1. Mild hypothermia if any.
2. Acute asthma attack. Students should check medical kit for albuterol inhaler, prednisone or other steroids, and for pseudoephedrine (e.g., Sudafed®), and should consider brewing some very strong coffee for the patient while waiting. Good time to review the treatment of asthma/COPD, including the new emphasis on steroids.
3. Check patient pockets and packs for any medications.

**SCENARIO #18: Cerebral Vascular Accident (CVA, stroke)****Prerequisites:**

- 12: Wilderness Medical Problems
- Practical Station: Neuro Exam I

**Equipment:** victim, copy of WEMSI Team Medical Kit document

**Setting:**

A large youth group with several adult leaders was conducting a multiple-day open-canoe trip down the Greenbrier River in mid-eastern West Virginia. In the morning of the third of four planned days (upon rising) fellow party members had been unable to wake him. The group is camped in an area that is particularly difficult to reach by foot or by vehicle. You arrive via canoe, in the evening of the same day, as night is falling. From what you've heard and a quick look at the situation even as you're heading to the patient's tent, you acquire the following size-up information.

There is no safe helicopter landing zone, and the clouds are lowering and rain is starting. The river downstream is only class II, but is shallow enough so that boats can't navigate up it. You hear someone on the radio someone is still working on getting a hovercraft to be available to come up the river from Cass, but you heard it has to be flown from Washington, DC, and then driven to Cass, and you don't put much stock in it being available before you can get the patient out yourself.

You figure an evacuation to the town of Cass via canoe sounds the best. By looking at people's gear and the shivering of many of the young teenagers along on the trip, many of them are not prepared

for the coming cold/wet weather that you've heard about. You feel responsible for the entire group and worry about the possibility of other injury or death due to hypothermia or hypothermia-induced injury.

You had radio contact with a Wilderness Command Physician at a Base up until the last mile of your canoe trip down the gorge to the patient's location, but now you can't get out with your handheld.

You estimate that evacuation will take about four hours, from the time you start packing the group up, to when you arrive at the road bridge at Cass. Unless the patient seems to be very sick, you consider the possibility of bivouacking overnight and going downriver with first light.

**History:**

One of the other adult leaders, who seems a competent sort, tells you the patient has a history of hypertension and has been on a medication called Tenormin® (atenolol), which is a beta-blocker, and has been taking his medication during the trip. He shows you the bottle. He says the patient has no other medical history, and shows you a standard health form for the group's leaders that really says little else.

**Physical Examination:**

**Primary Survey**-- No obvious immediately life-threatening problems.

**General**-- White male in his mid-forties, lying in a sleeping bag. He is unresponsive except for moaning and moving his left arm and leg purposefully on response to pain.

**Vital Signs**-- BP 180/100, P 70, R slightly Cheyne-Stokes at 20, T 98.4°F (36.9°C).

**HEENT**-- No deformities. Pupils equal, constricted and slowly reactive.

**NECK**-- No deformity, no tenderness when palpated.

**LUNGS/CHEST**-- Clear, nontender.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**EXTREMITIES**-- The arms and legs appear atraumatic (without signs of trauma).

### **NEUROLOGICAL**--

**Mental Status:** Patient withdraws from pain.

**Cranial Nerves:** can't really assess, but his face doesn't appear to have any drooping on either side.

**Sensory:** Withdraws to pain.

**Motor:** Weaker on the right side when withdrawing from pain.

**Deep Tendon Reflexes:** Hyperactive (three beats of clonus) in the right knee and right biceps (elbow) and brachioradialis (forearm), normal on the other side. You can't get an ankle jerk on either side but you suspect this is simply your technique and not related to the patient's problem. Toes are downgoing on the left, and definitely upgoing on the right.

**Cerebellar:** Patient won't follow commands so can't assess.

3. Would giving aspirin (e.g., an improvised rectal suppository) or the blood thinner heparin help or hurt? Review the difference between hemorrhagic stroke (bleeding into the brain) and thrombotic stroke (blood clot in a cerebral artery). What if you don't know? (Send two people up to the edge of the inner gorge to try to make radio contact.)

4. Do you want to try a night canoe trip? Or bivouac overnight?

5. Use oxygen if you have it. Transport in the recovery (coma) position.



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### **Important points for students:**

1. Can you clear the cervical spine? Do you need to? Is there any mechanism for injury?

2. Consider the patients' neurological deficit and vital signs. Do you want to treat with any medications in your standard WEMSI Team Medical Kit? Will treating the hypertension help or hurt the patient?

**SCENARIO #19: Burns**

Prerequisites:

- 8: Burns and Lightning
- 9: Cold-Related Disorders
- 13: Wilderness Trauma

**Equipment:** victim

**Setting:**

You are a member of a Mountain Rescue Association team called in to the southern Presidential Range of New Hampshire to evacuate a 20 year old male hiker whose stove exploded, setting his parka, sleeping bag and tent on fire. It is fall, temperatures are 30s at night, mid-60s during the day in the area the patient is in. It is overcast with light rain, estimated 8-12 hour evacuation. You are taken to the summit of Mt. Washington by car (it is *much* colder up there, about 20 degrees colder, and there is a 70-MPH breeze), then hike down some eight miles to the patient with members of the Appalachian Mountain Club hut crew search and rescue team.

**History:**

The history comes from the three friends who were backpacking with him; two had come out for help and one had stayed with him. On the way in the two who are returning to the site with the evacuation team tell you that he was the only one in the tent at the time. He was complaining of severe pain from burns on his face, arms and hands, and chest, and a raw feeling in his throat, but on questioning they don't think he was hoarse or short of breath. They said that he had no medical history, and was on no medications. They didn't know about when his last tetanus shot was. They left him in the other (unburnt) tent.

**Physical Examination:**

**General**-- very ill-appearing young white male, coughing and moaning in pain; obvious first and second degree burns of face.

**Primary Survey**-- Airway is grossly open but the patient has a stridorous cough and cannot speak when you ask him questions: he goes into paroxysms of coughing. Lips appear mildly cyanotic. Radial pulses are weak and thready at 110.

**Vital Signs**-- BP unavailable due to severe second degree burns on the right arm and third-degree burns all around the left arm. R 34 and shallow, temp 94°F (34°C) oral.

**HEENT**-- first degree burns all over face with a few scattered blisters, facial hair burned away, no burns inside mouth, swollen and cracked lips, hearing intact. Eyes: eyelids so swollen that can't examine eyes but patient says they don't hurt or feel there is any foreign material in them.

**LUNGS**-- clear, no râles, rhonchi, wheezing

**CHEST**-- first degree burns all across chest, second degree burns in area the size of two hands.

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and nontender when palpated.

**EXTREMITIES**--

**Legs:** normal inspection

**Right Arm:** second degree burns distal to elbow, first degree proximal to elbow. Pulse and capillary refill intact, sensation intact.

**Left Arm:** circumferential third degree burn in mid-forearm with surrounding second and first degree burns. No pulse palpable.

**NEUROLOGICAL**-- (if tested) mental status normal; cranial nerves normal except can't check vision or EOM due to swelling; motor and sensory intact except for decreased sensation distal to the circumferential burn.

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**Important points for students:**

1. Hypothermia?
2. Fluid status?
3. Foley to monitor output? Color of urine (myoglobinuria?)
4. Needs escharotomy?
5. (development: if adequate fluids given, then pulses get stronger and urine output increases.)
6. (optional development: respirations increase to 60 then decrease to 4 with decrease in level of consciousness.)



## SCENARIO #20: Old Rag Operation

### Prerequisites

- 5a: Wilderness Surgical Problems -- General
- 5b: Wilderness Surgical Problems -- Orthopedic
- 9: Cold-Related Disorders
- 13: Wilderness Trauma
- Practical Station: Neuro Exam I

**Equipment:** victim

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### Setting:

The patient is a 16 year old white male. He has a history of many injuries from wilderness related trauma. He was on a hike with several of his friends, on Old Rag Mountain in Shenandoah National Park. At the summit, he elected to "bushwhack" to the bottom and meet his friends there. They waited at the bottom, but he didn't show up by dark.

The usual circuit hike follows the Ridge Trail across a rugged ridge strewn with boulders, cliffs, and ledges. After crossing the summit, the trail runs down to the saddle between Old Rag and the main Blue Ridge Mountains, then back to the start of the Ridge Trail. At the summit, there are broken 500-foot cliffs, and a very steep, broken cliff-and-forest slope down to the Old Rag/Blue Ridge saddle.

The Park Rangers searched for him that night and the next day. Search and rescue teams arrived the following day, and as dusk was falling, he was found. As the cold front was coming through, and as freezing rain started to fall, a searcher on the end of a 200-foot roped spotted him on a narrow ledge halfway down one of

the 500-foot summit cliffs, unconscious. Estimate is for about a 12-hour evacuation to a fire road, due to the ruggedness of the terrain and the bad weather. (Though one local EMS person untrained at mountain rescue estimated 2-3 hours, experienced SAR personnel there laughed at this.)

You, the most experienced medic at the summit, rappel down with some other WEMTs to provide medical care. You arrive at the patient and tie in to a safety line for security before assessing the patient.

### History:

Patient unable to speak. Patient's only response is moaning to pain.

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### Physical Examination:

**Primary Survey**-- No obvious immediately life-threatening problems. Radial pulse is present but very weak and thready.

**General**-- Young white male, lying in twisted position on narrow ledge. Obvious lacerations and abrasions on left side of head, and open right tibia-fibula fracture with pus draining out of it. You can smell and see that the patient has been incontinent of urine and stool.

**Vital Signs**-- BP 90/50, P 55, R 8, rectal temperature is 80°F (27°C).

**HEENT**-- No obvious open skull fracture, but considerable bruising, abrasions, and small lacerations of the left side of the head with much clotted blood; causes lots of moaning when palpated. Ears without blood, but there is a large contusion (Battle sign) behind the left ear. PERL.

**NECK**-- No deformity, no moaning when palpated.

**LUNGS/CHEST**-- Decreased breath sounds on right; some crepitation of the ribs on the right with some slight subcutaneous emphysema. Trachea in midline.

**HEART**-- normal heart sounds.

**ABDOMEN**-- soft and no moaning when palpated.

**EXTREMITIES**-- The arms and left leg appear atraumatic (without signs of trauma) except for a few small scrapes. Palpation reveals no deformity or obvious tenderness. Passive range of motion is full at all joints.\* The right leg, however, has considerable swelling and some angulation in the mid-thigh, and there is a very angulated open fracture of the right tibia-fibula with bone ends sticking out, with dirt on them and pus coming out of the wound. Capillary refill is fair distally (3 seconds), and slightly longer than you find on the uninjured leg (2 seconds).

#### **NEUROLOGICAL**--

**Mental Status:** Only response is moaning to pain, with semi-purposeful movements.

**Cranial Nerves:** cannot check vision, eye movements, or hearing. Moans to a pinch on the right face but not on the left. Involuntary movements of the face show equal motor strength on both sides. Cannot test other cranial nerves.

**Sensory:** appears to respond to pain in all extremities except for the right leg, even above the injury site.

**Motor:** moves left extremities in response to pain, but not right extremities.

**Deep Tendon Reflexes:** unable to find on the left, hyperactive (2+) on the right. Toe upgoing on the right, no response on the left.

**Cerebellar:** unable to test.

What are priorities in managing this patient?

1. the pneumothorax is not a tension pneumothorax, and is not a treatment priority, but might develop into a tension during the evacuation. Is it legitimate to place a chest decompression catheter? Yes, but with a flutter valve.

2. Hypothermia could be life-threatening; another few degrees of drifting down could result in ventricular fibrillation. Ask students how they would handle and evacuation patient down the cliff and then the very steep slope at the bottom.

3. Can students clear the cervical spine? No.

4. Should students straighten the fractured leg? Yes, to attempt to improve distal circulation and allow adequate splinting. Should they clean the bone ends off first? Yes, because the evacuation time will be long. Should they give antibiotics? Yes; if only pills are available, they should give them rectally (grind them up and mix them with some surgical lubricant or some food).

5. Does the patient need IV fluids? Yes. (If necessary, review the need for adequate brain perfusion pressure in head injury.)

6. Should students "add heat" even in light of the obvious head injury? Yes. Point out the role of hypothermia in making further bleeding inside the head more likely, and that rewarming will correct this bleeding tendency from hypothermia.

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#### **Important points for students:**

Discuss the role of careful palpation and passive range of motion in checking for musculoskeletal injuries in semiconscious or unconscious patients.

**SCENARIO #21: Cardiac****Prerequisites:**

- 12: Wilderness Medical Problems
- 16: Pharmacology

**Equipment:** victim**Setting:**

You are involved in a search for two children lost in Rocky Gap State Park in western Maryland. Your team is called to check a fifty year old volunteer "searcher down, with chest pain." He is a member of a team that just split off from your team three minutes ago. Both teams are approximately two hours' hike up a steep, roadless valley. It is fall, clear, cool, no precipitation in the forecast. Temperature is in the mid 50s. Your team has a standard WEMSI Personal MedKit, including the search module, and a radio, but no other medical or rescue equipment.

**History:**

Patient complains of difficulty breathing and severe chest pain, 7 on a 1-10 scale,

Patient states he has a history of angina in the remote past, but no history of myocardial infarction. Had nitroglycerine tablets with him but now can't find them in his pack; has been frantically searching for them despite efforts of his team members to get him to sit down and rest. He takes an aspirin a day, but forgot to take one this morning. He has no other medications, and no other medical problems.

**Physical Examination:**

**Primary Survey**-- no obvious life-threatening problems.

**General**--

The man is pale, diaphoretic, and in moderate distress.

**Vital Signs**-- BP 132/88, P 90 strong, R 20 shallow, temp 99°F (37.2°C) oral.

**NECK**-- supple, no jugular venous distension.

**LUNGS/CHEST**-- Clear, nontender. Respirations normal.

**HEART**-- Normal heart sounds.

**ABDOMEN**-- Soft and nontender when palpated.

**EXTREMITIES**-- No cyanosis, no edema

**Important points for students:**

1. Are there any medications in the standard WEMSI personal medical kit, or similar kits, that students can use to treat this?
2. What if his pain goes away after administering the medication?
3. What if his pain doesn't go away after administering the medication?
4. Should this patient (a) continue with the task, (b) walk out with assistance, or (c) be carried out? Would what the patient was doing when the chest pain struck make a difference in your choice (i.e., sitting and resting vs. charging up this steep valley)?
5. What other equipment or supplies might you want to ask for?