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ABSTRACT

Five case studies explore issues in wilderness medicine, with emphasis on evacuation decision making. The cases describe medical problems encountered during wilderness trips involving college or high school students. In each case, the situation and facts of the case are outlined, including the patient's medical history and vital signs, and at several points in the case's progression, the outdoor leader is asked to make an assessment and outline a plan and anticipated problems. Each case is followed by a debriefing that discusses the important points in the presenting problem and the signs that would call for immediate evacuation of the patient. The cases involve hyperventilation, asthma attacks, mild head injury, abdominal pain with vomiting, and possible spinal injury. (SV)

CASE STUDIES IN WILDERNESS MEDICINE

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ABSTRACT
This workshop will explore current issues in wilderness medicine through the use of case studies. Emphasis will be placed on evacuation decision making. This will be an excellent refresher for anyone with wilderness medicine training and invaluable for program administrators responsible for developing evacuation protocols.

Case Study 1
You are an instructor on a 10-day spring outdoor leadership course in North Carolina. It is day five of your course and your first scheduled day of climbing. You are approximately eight miles from the nearest roadhead. Katie Doe, a 19-year-old female is half-way up a 5.7 top-rope. She appears to be struggling with the crux move. She calls down to her belayer and reports feeling dizzy, though she declines wanting to be lowered. After a few more clumsy attempts at the crux move she requests to be lowered down. By the time she reaches the ground she is complaining of numbness around her mouth and tingling in her finger tips. She has no relevant medical history, takes no medications and is allergic to poison ivy. At 11:30 AM her vital signs are:

LOC: Alert but anxious
HR: 96, strong and regular
RR: 28 and deep
SCTM: Flushed/warm/moist
BP: 124/P
CRT: <2 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems.

At 11:35 AM she appears to be having difficulty catching her breath, reports increasing tingling sensation in her extremities and is starting to have spasms in her hands and feet that cause them to curl inward. Shortly thereafter, she passes out and ceases to breathe. She wakes up after about 15 seconds, gasping violently and complains of chest pain. At 11:38 AM her vital signs are:

LOC: Alert and extremely anxious
HR: 100, strong and regular
RR: 32 and gasping
SCTM: Flushed/warm/moist
BP: 120/P
CRT: <2 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems.

Debrief Points Case Study 1
This case study illustrates a classic progression of hyperventilation syndrome. Typical early signs and symptoms include dizziness and numbness and tingling around the mouth and in the extremities. If the hyperventilation is allowed to continue the patient may experience carpal pedal spasms, chest pain, and periods of apnea associated with a drop in level of consciousness. Treatment includes calming the patient down, educating them about what is happening and aggressively getting them to focus on their breathing

pattern. Having the patient hold their breath may be helpful. Oxygen therapy is contraindicated. Evacuation is unnecessary, but emotional support is key.

CASE STUDY 2

You are an instructor for a college outing club. It's spring and your group is on a 10-day hike in the Escalante Canyon of Utah. You are on the third day of the trip and have just descended into the canyon to camp amidst the blooming cottonwoods. You are about five miles from the closest trailhead, which is 20 dirt road miles to the closest town. Suddenly a student runs up to relate that his tent mate, Betsy Doe, a 21-year-old female, is having a hard time breathing.

At 5:00 PM you find Betsy in obvious respiratory distress. She is sitting up on a log, arms bracing on her knees. She is extremely anxious and between breaths she tells you this came on over the last 30 minutes while setting up camp. She coughs severely occasionally and her breath sounds show bilateral wheezing. She seems to have a harder time getting air out than in. She has a history of asthma, well-controlled by Proventil inhaler, and hay fever. Vital signs are:

LOC: Alert but anxious
HR: 108 and regular
RR: 30 and labored
SCTM: Pale/cool/moist
BP: 140/P
CRT: 3 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems.

At 5:15 PM, after using her inhaler as directed, Betsy's breathing has become easier. Wheezes are still present bilaterally. She is still anxious and sitting upright. Betsy states she had a bagel and trail mix at 3:00 PM and has consumed three liters of water over the last eight hours. A second physical exam is unremarkable. Vital signs are:

LOC: Alert and anxious
HR: 92 and regular
RR: 24 and labored
SCTM: pale/cool/moist
BP: 132/P
CRT: 3 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems.

At 5:30 PM Betsy appears sleepy and is making little effort to breathe. The wheezes have diminished. The patient is speaking in one-two word clusters only. Vital signs are:

LOC: Awake but disoriented
HR: 140 and regular
RR: 30 irregular and shallow
SCTM: Pale/ cool/ moist
BP: radial pulse present
CRT: 4 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems.

At 6:00 PM Betsy is alert but tired. She is breathing easily but there are are still some slight bilateral wheezes. She states she thinks she could move slowly to the new cottonwood-free camp. Vital Signs are:

LOC: Alert
HR: 92 and regular
RR: 20 and easy
SCTM: pale/ warm/dry

BP: 130/P
CRT: <2 seconds
Pupils: equal and reactive
Please list your current assessment, plan, and anticipated problems.

Debrief Points Case Study 2
Asthma is a common backcountry problem that can be triggered by a variety of environmental stimuli such as: cold, exercise, and pollens. Most mild asthma attacks can be managed with the patient's own inhaler, pursed lip breathing, aggressive hydration, and attempting to remove the patient from the stimulus. If an asthma attack worsens to the point that the patient is no longer making an effort to breathe and is exchanging very little air, administration of epinephrine is indicated. The epinephrine needs to be followed by the patient's own medications and hydration. In spite of the pollen stimuli, the administration of Benadryl is contraindicated in patients having an asthma attack due to its dehydrating effect. Any patient who receives an epinephrine injection needs to be evacuated and monitored for relapse.

Case Study 3
You and your assistant instructor are leading a group of 12 college-aged students in Utah's Canyonlands. You are on the 5th day of a nine-day trip and are 15 miles from the closest trailhead. The students are hiking in small groups today and you are waiting for them at the previously designated camp 5 miles from last night's camp. It is 3:00 PM.

As the students arrive in camp, one group states that James Doe, a 20-year-old male, fell while hiking, striking the left side of his head on a rock with his frame pack hitting the back of his head. The incident occurred at 8:30 AM shortly after the hiking day began. The group states James lost consciousness briefly (a few seconds).

James states he felt dizzy and weak throughout the day, but was able to carry his own weight. He also states he has a headache and feels slightly nauseated. Patient exam reveals small bump (1 inch across) on his left temple. Patient denies pain and tenderness in the spine or any altered sensations distally. James also denies vision disturbances or vomiting.

James denies taking any medications except Seldane for his allergies. He ate a bagel, peanut butter, and a handful of trail mix for lunch, and drank 2 liters of fluid throughout the day. At 3:15 PM, vital signs are:
LOC: Awake and oriented
HR: 76 regular and strong
RR: 16 and easy
SCTM: Pale, warm, and moist
BP: 100/60
CRT: <2 seconds
Pupils: equal and reactive
Please list your current assessment, plan, and anticipated problems.

James' vital signs remained stable throughout the night. He slept, but restlessly. At 7:00 AM vital signs are: LOC: Awake and oriented
HR: 64 regular and easy
RR: 12 and easy
SCTM: Pink, warm, dry
BP: 110/68
PUPILS: equal and reactive
In the morning, James is ambulatory and alert but complaining of dizziness, nausea and a slight headache. Please list your current assessment, plan, and anticipated problems.

Debrief Points Case Study 3
Head injuries often present significant challenges to outdoor trip leaders when deciding whether a student needs to be evacuated or not. A patient with a mild concussion may complain of dizziness, nausea, slight vision disturbances, headache, and weakness. None of these symptoms in and of itself is necessarily cause for concern. A patient who is unconscious briefly with signs and symptoms of a mild concussion may be allowed to remain in the backcountry, but needs to be monitored for a worsening head injury. Patients should be allowed to sleep, but should be woken up at 2 hour intervals to check for: increasing disorientation or a drop in level of consciousness, cyclical vomiting, seizures, worsening headache, ataxia, or the development of visual or speech disturbances. If any of these serious signs develop the patient should be evacuated from the field rapidly.

Case Study 4
After a day of tough desert travel and map reading, Gretchen Doe, a 20-year-old female, and her three tent-mates arrive at what they think is camp, though no one else is there. Gretchen was slightly nauseated during the late stages of the hike. The group eats a dinner of mac and cheese while waiting for the rest of the group to arrive. When no one arrives by dark they consider they are in the wrong spot but hit the sack, planning to find the correct spot in the morning. At 10:30 PM Gretchen awakes with pain in the epigastric region of her belly and vomits dinner. The pain is constant and dull, with episodes of cramping at midnight, 2:00 AM and 4:00 AM. She manages to get a little sleep in the early morning.

The next morning Gretchen is able to carry a light pack approximately 1 mile to the camp where you, your two other instructors and the rest of the group are anxiously waiting. She still has constant dull pain and dry heaves.

Upon examination you find her abdomen is soft and tender in all four quadrants but especially tender about midline in the upper two quadrants. Bowel sounds are present. Her bowel movements and urination have been normal. She has a history of ovarian cysts and surgery for the same but states this is different. Her appendix was removed a few years ago. She drank three liters of water yesterday, two cups of herbal tea, and one cup of tea this morning. Her last meal was mac and cheese. So far the course has been stressful for her both physically and mentally. At 10:00 AM her Vital Signs are:

LOC: Alert but anxious
HR: 80 and regular
RR: 18 and easy
SCTM: Pale/cool/ wet
BP: 128/P
CRT: 3 seconds
Pupils: equal and reactive
Temp: 98.6 F

Please list your current assessment, plan, and anticipated problems.

Debrief Points Case Study 4
Many medical problems are the result of multiple contributing factors. Perhaps most common in a backcountry context are dehydration, hypothermia and poor hygiene. It may not be possible to specifically diagnose an illness in the backcountry, but we can use guidelines to help determine the severity of the problem. In the case of the abdomen, evacuation is usually warranted for patients with: blood in their urine, vomitus, or stool; pain persisting more than 24 hours and specifically pain that is sharp or localized; a fever greater than 102F; nausea, vomiting or diarrhea that persists more than 24 hours; or signs and symptoms of shock.

Case Study 5
You're leading a 26-day trip for sixteen 14-15-year-old boys in the Absaroka Wilderness of Wyoming. It is July and you are on the 15th day of the trip and are approximately 12 miles from the closest roadhead and 30 miles from the closest phone. You have a radio.

At 4:00 PM while holding onto a rock to descend to a foot ledge on a steep section of the trail, Matt Doe, a 14-year-old male, slipped and slid 45 feet to a wet grassy landing below. He landed feet first slipping onto his buttocks where he remained sitting. He did not hit his head or lose consciousness.

At 4:10 PM the patient exam revealed no tenderness in his neck or back, a swollen and bruised left elbow with no range of motion, pain on movement of the left wrist, and tenderness in the left lateral knee. Distal circulation, sensation, and motion are normal in all extremities .

Matt has no allergies, is taking no medications, and has no past relevant medical history. He has had two liters of fluid while hiking and no food since breakfast. At 4:10 PM his Vital Signs are:

LOC: Awake and oriented
HR: 96 regular and strong
RR: 24 regular and shallow
SCTM: pale, cool, and moist
BP: 130/70
CRT: 2 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems.

At 6:30 PM Matt is calm, warm and fed. A second examination reveals no pain or tenderness in his neck or back; his elbow is bruised and swollen with no range of motion, and his knee is minorly swollen with good range of motion. Distal CSM remains normal in all extremities.

LOC: Awake and oriented
HR: 72 regular and easy
RR: 16 and easy
SCTM: pink, warm and dry
BP: 118/68
CRT: <2 seconds
Pupils: equal and reactive

Please list your current assessment, plan, and anticipated problems

Debrief Points Case Study 5

The ability to rule out a spinal injury is a valuable tool for outdoor leaders and can make the difference between walking or carrying someone out of the backcountry. To rule out a spinal injury patients must: be reliable and well oriented with no major distracting injuries; have no pain or tenderness anywhere in their vertebral column; and have normal circulation, sensation and motion in all four extremities. It may be prudent to wait two hours and reassess patients for the onset of symptoms if there was a significant mechanism of injury. All patients who show indications of a spinal injury need to be fully immobilized and evacuated in a rigid litter or on a backboard.

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