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ABSTRACT

This document consists of the six issues of the "Wilderness Medicine Newsletter" published during 1997. The newsletter provides medical and rescue information for the non-physician in remote wilderness areas. Issues typically include feature articles, conference and training courses schedules, an "Ask the Expert" column, and personal narratives. Feature articles in this volume cover managing fractures in a wilderness environment; winter trip advice; drowning and near-drowning assistance; bats and rabies; women's health issues; potable water; Medecins Sans Frontieres (Doctors without Borders), an international humanitarian medical relief agency; a proposed river-crossing rating and assessment system; an overview of tick-borne diseases; death in the backcountry; and an update on the Prehospital Emergency Training, Standards, and Accreditation Committee (PETSAC). (SAS)

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Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

JANUARY/FEBRUARY 1997 ISSN-1059-6518 VOLUME 8, NUMBER 1

# THE MUSCULOSKELETAL SYSTEM PART II "STICKS & STONES MAY BREAK MY BONES"

## or The Principles of Managing Fractures in a Wilderness Environment

*by Frank Hubbell, DO*

In the July/August edition of the Wilderness Medicine Newsletter, we began a series of articles on managing injuries associated with the musculoskeletal system. In that issue the anatomy and physiology of the musculoskeletal system was reviewed, and the collection of injuries that this system can suffer were broken into four categories:

1. The wear and tear syndromes or "**sprains and strains.**"
2. The direct trauma to bones or "**fractures.**"
3. The disruption of joints or "**dislocations.**"
4. The "**itis"es** or overuse syndromes and inflammatory conditions.

Sprains and strains were also featured in Part I. Part II is dedicated to reviewing direct trauma to bones.

The skeleton can be divided into two parts: the **axial skeleton** or skull, vertebral column, ribs, sternum, and pelvis and the **appendicular skeleton** or the extremities. In this article we are going to concentrate on the extremities, leaving the axial skeleton for another article.

**Bones** are vital living structures that consist of hard connective tissue. This tissue is made up of cells embedded in a mineralized ground substance and collagen fiber matrix that is impregnated with calcium phosphate. As a result bones are very strong, resilient, and durable. However, one of the most kable feats of the skeletal system is its constant renewal or replacement and "remodeling" of bone as the bones respond to stresses being placed on them throughout a lifetime.

This "feat" is accomplished by cells found in the fiber matrix called **osteoclasts** and **osteoblasts**. These cells are responsible for the renewing and remodeling of bones. Osteoblasts are bone-forming, constantly laying down new calcium phosphate to repair fractures, replace old bone with new, and strengthen existing bone in response to stress being placed on it. Osteoclasts, on the other hand, are constantly reabsorbing the existing bone, but as fast as they reabsorb the bone, osteoblasts are following laying down new bone.

This constant reabsorbing and rebuilding of our skeleton allows it to change in response to stresses and to repair itself as it recovers from significant injury and fractures. An example of bone changing in response to stresses is running. If an individual takes up running as a form of daily exercise, the bones in the lower legs are going to respond to this new and additional stress (pounding) by laying down new, additional bone so that the legs become stronger and more able to tolerate and withstand the increased stress being placed on them by the increase in activity level.

When a fracture occurs, the initial healing response to the injury is to lay down a dense, hard calcium callus in order to stabilize the fracture site; this response occurs within weeks

of the injury. The osteoclasts then come along and reabsorb this callus or lump of calcium and are immediately followed by the osteoblast cells that lay down new, well-organized bone. Eventually, over a period of months, the bone is rebuilt, "good as new." In point of fact, this bone is new.

As a part of the musculoskeletal system, bones not only provide protection to delicate underlying organs but also provide a rigid structure for the muscles to pull against which allows us to perform tasks or just move around. The fact that bones are made of calcium as opposed to some other mineral is important because it allows bones to act as calcium reserves to help maintain appropriate blood levels of calcium. Calcium is a very important electrolyte that is utilized in the contraction of skeletal, smooth, and cardiac muscles and in nerve conduction and other essential biochemical pathways.

The central area of a bone is the **bone marrow** which produces red blood cells, the various types of white blood cells, and platelets. Obviously then, with blood cell production going on at their core, bones are very vascular. When broken, bones are going to bleed at the site of the fracture.

Bones are surrounded by a protective envelope of connective tissue called the **periosteum**. This layer is also very vascular and contains nerves and pain receptors. The pain associated with a fracture is caused by the injury and tears to the periosteum, the swelling of surrounding tissue caused by the bleeding at the fracture site, and the muscle contractions of the surrounding muscular layers. The spasms or cramps of the surrounding muscles are the brain's effort to stabilize the fracture site and minimize additional injury.

## Principles of Pain Associated with Fractures:

1. **Fractures hurt.**
   What a revelation. Pain is a protective mechanism; pain prevents further injury by inhibiting us from attempting to use the injured part of our body.

2. **Pain is our friend.**
   No, really. Pain allows us to isolate and locate the injury, to get a sense of the extent of the injury, and to monitor how well the injured area is doing over time.

3. **Do not treat the pain.**
   Treat the underlying injury. Once the injury is stabilized, the pain will decrease.

In order for a fracture to occur, the body has to suffer a significant amount of direct trauma or force. The amount of force required to cause a fracture varies with bone structures. The force required can be very large, such as the tons of force it takes to fracture a healthy femur, or it can be relatively small, such as the minimal amount of energy it takes to fracture a healthy ankle. (Ankle fractures can be caused by a simple twist of the ankle while hiking.) Part of trauma management is understanding the mechanism of injury and implied forces. An individual complaining of a broken ankle probably has an isolated injury that resulted from trivial amounts of force or energy. However, an individual with a fractured femur most likely has other significant injuries because of the large amounts of energy needed to fracture the femur. Never assume that a fracture is an isolated injury. Based on the mechanism of injury and the forces implied, perform a complete patient exam looking for other, potentially more serious, related injuries.

## Signs and Symptoms of a Fracture:

There are a variety of diagnostic clues that will help you decide if the injury has an associated fracture:

1. **Mechanism of injury: Ask "what happened?"**
   Does the mechanism of injury indicate a possible fracture? Was there enough force?

2. **The chief complaint: Ask "where does it hurt?"**
   Did the victim feel anything break, snap, crack, pop, or crunch?

3. **Expose the injury site and look at it.**
   It is impossible to make a proper assessment through multiple layers of mountaineering gear. Remove enough clothing and gear to examine the injury. Is there discoloration, erythema or ecchymosis, swelling, or angulation; or are there wounds, protruding bone ends, or objects sticking into the skin.

4. **Palpate the area** - (examine the area closely for point tenderness) - **TOUCH IT.**
   As you gently palpate the injury for point tenderness, listen and feel for crepitation and unusual movement.

5. **Is there guarding?**
   Is the injured part being cradled or protected? Is the patient anxious or do they move away from you as you try to examine the area and palpate the injury.

6. **Can they use it?**
   Can they move the injured area? Are they willing to use it or walk on it?

In wilderness medicine fractures can be placed into two categories: **uncomplicated** and **complicated fractures.** Uncomplicated fractures are simple, in-line fractures with good circulation and sensation and no associated wound. Complicated fractures have any one of the following qualities: angulated, compound or open, associated with a wound, or impaired or decreased circulation or sensation.

## Principles of Splinting & Managing Uncomplicated Fractures:

The principle of splinting is to immobilize the fracture enough to minimize movement of the fracture site which will, in turn, decrease the pain; control bleeding at the site; prevent further injury; and help maintain circulation distal to the fracture.

For splints to be effective, they need to be:

1. **Well-padded:**
   Padding allows the splint to conform to the shape of the extremity and evenly distributes the pressure to immobilize the fracture.

2. **Warm:**
   The padding used in the splint must be dry to prevent heat loss from the injury. The splint also needs to be surrounded by insulation to keep the area warm.

3. **Rigid:**
   The splint must be rigid enough to prevent movement of the fracture site and to prevent movement of the joints above and below the fracture. In the extremities it is best to immobilize the entire limb; otherwise, the muscles anchored around the fracture site can cause movement of the fractured bone ends when the unsplinted portion of the extremity is moved.

4. **Monitor:**
   Monitor the splint every 15 minutes to guarantee good circulation distal to the site of the fracture. Fractures bleed internally causing the area to continue to swell, even after the splint has been applied. Unfortunately, the best made splints can become too tight and impair circulation. Stop every 15 minutes and check circulation distal to the site of the injury to ascertain that the extremity is warm and has an adequate blood supply. To confirm the presence of adequate circulation, check pulses, capillary refill, sensation, and movement distal to the site of the fracture.

## Principles of Splinting & Managing Complicated Fractures:

Complicated fractures are:

- malaligned, angulated, or rotated.
- compound or open with bones protruding through the skin.
- associated with a wound over the fracture.
- associated with impaired circulation distal to the site of the fracture.
- associated with a dislocation.
- associated with an impaled object.
- associated with nerve impairment distal to the site of the fracture.

The most important aspect of long-term fracture care is the **maintenance of circulation in the entire extremity**. Circulation distal to the site of the injury is crucial to prevent permanent tissue loss , frostbite, or permanent impairment of the extremity's function.

There are several aspects to be managed in complicated fractures:

1. **Initial stabilization**:
   Stabilize the fracture site with "hands on," taking appropriate "Body Substance Isolation" precautions.

2. **Wound management**:
   Control bleeding with direct pressure or pressure dressings, being careful of protruding bone ends.

3. **Wound debridement**:
   If the wound is grossly contaminated or there are protruding bone ends that are grossly contaminated, the wound needs to be gently irrigated with a weak Betadine solution once bleeding has been controlled.

4. **Deformity correction**:
   Once the bleeding is under control and the wound has been debrided and irrigated, use gentle "in-line traction" to slowly straighten out or de-rotate the deformity until circulation is re-established distal to the site of the injury or the extremity is in proper anatomical position.

5. **Impaled objects**:
   Impaled objects should be removed if possible. However, gentle traction-in-line may have to be applied before the object can be easily extracted. If the object is not going to be easily removed, leave it and immobilize it in the position found.

Once the fracture is realigned with good distal circulation, splinting principles and procedures are the same as those for uncomplicated fractures.

## Techniques of Splinting Uncomplicated Extremity Fractures:

**Upper Extremity:**
**Shoulder/Clavicle/Humerus/Elbow**

These four fracture sites are mentioned together because the splinting technique for each is essentially the same. If the injury is "in-line" i.e. anatomically correct, and there is good circulation, sensation, and motion distal to the site of the injury, the fracture can be easily splinted with a **sling and swathe.**

With the patient's assistance, place the arm in a comfortable position across the chest with the elbow bent at 90 degrees. Support the forearm with the sling, padding well around the neck and tying off to one side, and immobilize the forearm to the chest wall with a 6-inch Ace wrap or other wide material that incorporates the forearm in it. Do not wrap around the humerus because this will cause the bone to bend at the site of the fracture. If this is the only injury, the patient should be able to walk once splinted. Monitor the fingers every 15 minutes to make sure that circulation is maintained. If circulation becomes impaired, recheck and redo the splint.

**Special considerations:**

A fractured clavicle is one of the most common fractures seen both in the backcountry or in town. Simply falling forward and catching yourself on an out-stretched arm can exert enough force against the shoulder to fracture the clavicle. These fractures are easily diagnosed with mid-clavicular tenderness and usually a palpable deformity. Do not attempt to realign the deformity. The potential complication with clavicle injuries is the close proximity of the lungs. When a clavicle fractures, it can potentially puncture a lung causing a pneumothorax. Monitor respiratory status closely every 15 minutes. Check for subcutaneous emphysema and check for shortness of breath. A punctured lung is a rare but important complication of a clavicular fracture that can ultimately result in a tension pneumothorax.

**Forearm & Wrist:**

Forearm and wrist fractures are also managed with a sling and swathe. However, before immobilizing the arm with a sling, a well-padded rigid (coaptation) splint like a SAM splint needs to be applied to the forearm. Make sure you secure the splint at the joints above and below the injury. When splinting the forearm and wrist, it is important to remember that the wrist should be dorsi-flexed 30 degrees and the fingers flexed as if holding a can of soda. This is the position of comfort for the wrist, and this position will help to maintain circulation to the rest of the hand.

**Lower Extremity:**

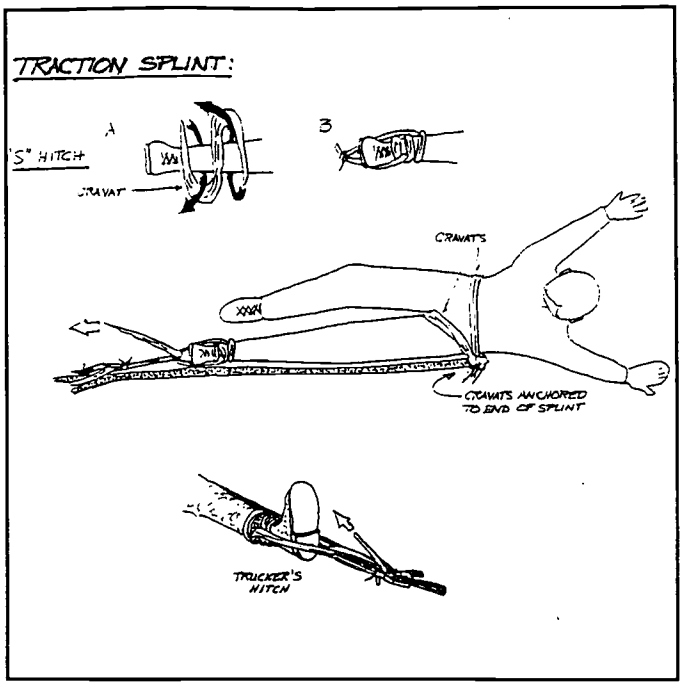
**Hip** (or proximal end of the femur):
Hip fractures are most commonly seen in the geriatric population secondary to a weakening bone structure due to osteoporosis. However, they can occur at any age from direct trauma to the hip. Hip fractures can be diagnosed by the localized point tenderness in the hip region, with external rotation of the affected leg, and the inability to use the leg. The pain of a fractured hip is typically not very severe and is not associated with muscle spasms in the same area.

Suspected hip fractures can be easily treated by placing padding between the legs and binding the legs together with Ace wraps or cravats to comfortably support the fracture.

**Femur:**

The largest and strongest bone in the human body, it takes tons of force to fracture a femur. It is not unusual for there to be other severe injuries associated with a fractured femur. A femur fracture is almost unmistakable because of the severe pain and muscle spasms that occur with the fracture. Once recognized, this is an injury that should be managed as soon as possible.

Initial management is to manually stabilize the fracture and pull gentle traction-in-line. The gentle traction, 5 - 10 pounds of tension, will slowly, over a period of 1 - 2 minutes, fatigue




the muscles surrounding the femur and they will relax. As the spasms abate, the pain will dramatically decrease. Once traction has been pulled, it is essential to maintain traction while a splint is applied.

A traction splint can be improvised from any rigid object that is 18 - 24 inches longer that the leg, 6 cravats, and two 6-inch Ace bandages. The traction splint is attached to the lateral side of the leg with two ties. The first tie goes around the waist like a belt to hold the splint to the side of the body and the second tie, around the affected leg only and into the groin. This tie will prevent the splint from riding up as traction is applied. These two ties should anchor the superior end of the splint.

The inferior end of the splint is the work end where traction is applied and maintained. To accomplish this, first apply an ankle hitch to the ankle on the affected leg. There are a variety of ways to improvise an ankle hitch, but, regardless of which is used, the hitch should be well-padded around the ankle to minimize the risk of impairing circulation to the foot. One of the simplest to tie is an "S" hitch as shown in the diagram. Next, a second loop is fashioned at the end of the splint; there should be at least 12 inches between the loop on the end of the splint and the loop created at the base of the foot by the "S" ankle hitch. Traction is then created by using a "trucker's" hitch to approximate the two loops. Mechanical traction is applied until it equals the manual traction being pulled by the assistant.

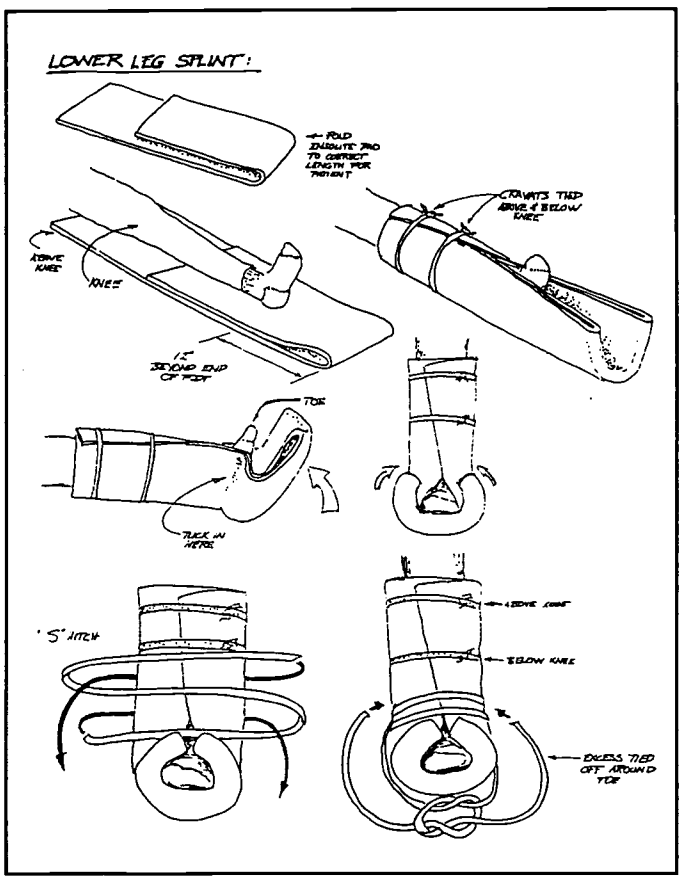
Once the leg is in mechanical traction, the two 6-inch Ace wraps should be applied. Starting at the ankle with the first Ace, wrap from the ankle to just above the knee. The second one should extend from the knee to the groin, covering and encasing the fracture site. These two Ace wraps unify and support the splint and apply direct pressure to the fracture site which helps to control internal bleeding.

As with any splint, it is essential to monitor circulation, sensation, and motion distal to the site of the injury. If circulation becomes impaired, it may become necessary to remove the Ace wraps temporarily or to re-establish manual traction. Do this by removing the trucker's hitch and ankle hitch (while maintaining manual traction) and massaging the foot until circulation returns. When circulation has returned, reapply the ankle hitch and mechanical traction.

If you are alone with an injured friend, keep them still while completing the patient exam, and then attach the splint, using the splint to apply mechanical traction. Do not apply traction unless you are able to maintain it until the splint-generated mechanical traction is applied.

**Knee:**
Knee injuries are very common. Determining the difference between a simple sprain or strain, a ligament injury, or a fracture without an X-ray is virtually impossible. Typically all of these injuries are splinted until the patient can get to definitive care.

Knees should be immobilized in the position of comfort. This is usually accomplished by bending the knee to 10 - 20 degrees of flexion. This position is maintained by first placing padding behind the knee and then a rigid support along the back of the leg from below the foot to above the hip/buttocks.




**Lower Leg & Ankle:**
These two distinctly different injuries are discussed together because the splinting technique is the same. As soon as the injury is isolated, traction-in-line should be pulled at the ankle to straighten out any deformities or angulations and to bring the foot into proper anatomical position at 90 degrees.

Once the lower leg and ankle are in proper position, they need to be affixed in this position with a well-padded, rigid splint that immobilizes the knee and lower leg (tibia/fibula) and maintains the ankle joint at 90 degrees.

As with any splinting situation there are many adequate ways to get the job done. One of the most effective techniques is to use an ensolite foam pad or a "Crazy Creek" chair. As shown in the diagrams these soft materials can be shaped and tied in place giving excellent support and providing a high insulation quality which will protect the extremity from the cold.

## Contents of a Wilderness Fracture Kit:

In addition to the materials in a wilderness first aid kit that would be used to manage blisters, cuts, abrasions, and other common backcountry injuries, the following are recommended for managing fractures:

6 cravats; 2 six-inch Ace wraps; 1 SAM splint

The ensolite pad or Crazy Creek Chair would be carried as part of the general mountaineering equipment, and the long pole for a traction splint can be improvised from a ski pole, canoe paddle, tent pole, or a stick in the woods.

It takes very little additional equipment to properly manage a fracture in the backcountry. The investment is not in first aid gear, but in time. It takes time and practice to become experienced and efficient at splinting. To gain the skills and confidence to use them, practice fracture assessment and management techniques with friends. Then, if the day comes, when these skills are needed, the risks are minimized and the benefits are maximized for your friend and patient.

## WINTER TRIP ADVICE

*by Bryan Yeaton, WEMT*

Tie a sweater around your waist, grab an apple, and jaunt off down the trail. Although you are a prime candidate for a Search and Rescue mission, most of the time you are going to get lucky and make it out of the woods on your own. Even if you twist an ankle or get lost for a night, apart from mild hunger and dehydration, you will most likely live to hike another day, presumable somewhat better prepared.

At this time of the year, however, when the rain turns to freezing drizzle and glazes every step, and the wind relentlessly carves away at your precious shell of heat, such lazy liberties turn— not comfortable— but deadly.

In the old days they called it "exposure" as if simply being in the natural environment was itself dangerous. People who are familiar with the outdoors recognize the insidious killer as "hypothermia." Jed Williamson, Editor of *Accidents in North American Mountaineering*, often says that there is no bad weather, just weather, and your preparation makes the difference. As more people take journeys away from motor access and the other shackles of the modern world, more people will have jobs leading them there. Whether you plan to lead an extended wilderness trip for your hiking club chapter, or a day trip with friends, a little knowledge and attention to detail can help ensure that the winter season will be as enjoyable and safe as any other, for you and your group. The folks who earn their living from such trips have some advice for those leading groups into winter for the first time.

Joe Lentini, Director of Eastern Mountain Sports Climbing Schools, stresses the difference between climbing on your own and guiding a trip. "As a guide," he says, "I have to take responsibility for the client; they can go with (approximately) lighter packs; I take the extra down parka, the backup mittens, the Gore-Tex bivy sack, the rope, and the heat packs. If I were on my own, I'd get rid of half of it."

Marc Chauvin is the Head Guide of the International Mountain Climbing School, as well as being responsible for training staff who will lead clients on anything from introductory ice climbs to expeditions on the worlds highest peaks, Chauvin agrees with Lentini, but uses a different philosophy to achieve it. "If you are leading in the winter, plan on dealing with the client and not the cold." Chauvin calls himself a "lightweight fanatic." He says, "My biggest pet peeve is (the client's) pack weight; if you can't put it all on your body at once, then you don't need it. The extra gloves and hat are okay, but do you really need and extra parka?"

Chauvin's belief is that cold becomes a problem for two reasons: either injury, or they can't move. "A heavy pack slows you down and makes you sweat," he says, "and that is where you get uncomfortable and cease to have fun." The comfort items, says Chauvin, are the things to leave behind. "People have tried to bring makeup or deodorant on a winter traverse; you just don't need them."

According to the guides, having proper gear is usually not a problem for their clients. However, these clients are well aware, says Marc Chauvin, of the conditions they are going into. If you are just getting winter trip leading, there are still some basics which should command your attention.

The trip-leader's job actually begins well before the day you lace up boots and strap on snowshoes or crampons. Whether you are a professional guide or just out with some friends, you need to know some background information. One of the first things to discern is if they are physically able to succeed on the trip, even— for longer trips— a shakedown hike. Joe Lentini: "I look at what they have done in the past." For the more arduous trips, he feels the leader should have seen the participant's skills and endurance first-hand." A (Presidential) range traverse is not the place to start your winter experience. We would like to see you on another trip first."

Mountains and Rivers is a company which runs trips in Alaska, from above the Arctic Circle in the Brooks Range to Mount McKinley. Chris Morris runs Mountains and Rivers, and he agrees with Lentini, "most folks who want to climb McKinley have done their research. We like to see them come with experience down south, such as Rainier. But the cold (in Alaska) can still catch you off guard."

Another important area of medical screening, which can be a detailed form filled out before the trip, or garnered from a brief phone conversation. Screening will be covered in-depth in a later article, but briefly, you should look for any unusual condition, or one with which you are not prepared to deal. An underlying condition does not necessarily preclude someone from your trip, although it may require adjustment of your perspective, or the group's goals, which is another good reason to know of a situation well beforehand. For example, a diabetic is usually able to control and monitor his or her insulin/sugar balance, but a strenuous trip may disrupt that. The leader needs to ask about how they will monitor in the field, and how to deal with any emergency which might arise, as well as determining if it may affect the trip agenda. Have they done a trip like this before, and how did that affect them? How will the cold affect them or their medication? Is there any special information you as the leader need to know, or any procedure you have to perform. Your diabetic participant is the best source of information— he or she has been dealing with the disease for longer than you have.

Another part of medical screening is general physical conditioning. Is someone potentially overextending him or herself? How do you tell?

On paper, one thing to look at is height to weight ratio, although there are certainly people who are cardiovascularly capable, even when appearing somewhat overweight. Joe Lentini asks about specific cardiovascular training programs: what is the exercise? how often? How have they performed on similar trips?

Gear is also critical, especially with people who's abilities you may not be familiar. Do they understand the layering system? What specifically do they have for gear? Talk to potential participants and find out what they have and how they use it. Most organizations have a required gear list which is sent to participants well before the trip. "Be very careful about specific gear," says Joe Lentini; "When you have faxed them the gear list and they still show up wearing a cotton turtleneck, that shows a fundamental lack of understanding."

Okay, so now you're out in the field; how do you ensure that everything goes smoothly? What are the signs of impending doom for your trip? That depends on how you approach it according to Marc Chauvin. "Most of the things I do are subtle," he says. The biggest key, in Chauvin's view, is keeping people fed and hydrated. "In harsh conditions, most

people forego eating and drinking; on my trips, dinner is a three-to-four-hour process. Keep fuel burning in their bodies, and you will prevent a lot of problems."

All the guides agree that you cannot rely on participants to know what is happening to their bodies in the cold environment. According to Dunham Gooding, President of the American Alpine Institute in Bellingham, Washington, believes in constant monitoring. "Young guides trust the client to do the right thing, but it takes constant communication on a one-to-one basis. You can't just check in on them in the morning, and again after lunch. You have to talk to them regularly, every day."

One of the first things the guides look for is someone slowing just a bit. Gooding says, "A common sign is people dragging along, not performing up to their potential; that means something is wrong. You have to find out why— food? drink? cold?— because it usually will only worsen."

Joe Lentini likes to walk along beside his clients and talk to them; if they are having trouble carrying on with the conversation, he says, it is time to slow down. Marc Chauvin likes to be subtle— and creative— in solving the pace problem. He says, "One time I had two clients, one who was much slower than the other. Since all the cairns (rock piles above treeline to mark the trail - Ed) were covered with snow, I had the faster one help me clear off the cairns while the other kept along at his pace. I don't know if they even noticed the strategy."

One decision the guide cannot be afraid to make, is the one to turn back. "The safety of the client," says Chris Morris, "is paramount. Things like frostbite are unacceptable."

Realistic goals, according to Dunham Gooding, are a major factor for the winter guide; "You can't expect to achieve what you would in the summer."

Lentini adds, "I never say to clients, we'll make it to the top." Putting the goal of ascent over safety will get you killed. If you don't make it, that's the reality.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Mar. 17 - Apr. 11 Conway, NH (603-447-6711)
Apr. 21 - May 16 Conway, NH (603-447-6711)
May 19 - June 13 Conway, NH (603-447-6711)
July 28 - Aug. 22 Conway, NH (603-447-6711)
Sept. 8 - Oct. 3 Conway, NH (603-447-6711)
Nov. 16 - Dec. 12 Conway, NH (603-447-6711)

**Wilderness First Responder**
Mar.7-16 River's Way, Bluff City, TN (423-538-0405)
Mar.15-23 Bradford Woods, IN (317-342-2915)
Mar. 17 - Apr. 11 Conway, NH (603-447-6711)
Mar.21-29 Harvard Univ, MA (617-495-7935)
Apr. 3-11 Outward Bound, ME (800-341-1744)
Apr. 4-13 Outdoor Excursions, MD (800-775-2925)
Apr. 7-18 AMC, NH (603-466-2727)
Apr. 8-16 Outward Bound, FL (904-487-4365)
Apr. TBA Seneca Rocks, WV (800-206-6910)
May 5-16 MKC, Ottawa, CAN (613-594-5268)
May 5-15 Blue Ridge, NC (704-297-4098)
May 12-23 Earlham Col, IN (317-983-1327)
May 13-23 SOLO, Wheeling, WV (800-206-6910)
May 19-30 Hulbert, VT (802-333-3405)
May 26 - June 4 Springfield Col, MA (413-748-3129)

**Wilderness First Aid/WFR Recertification**
Mar. 8-9 Earth Treks, MD (410-872-0060)
Mar.15-16 Middlebury, VT (802-388-3711X4910)
Mar. 15-16 Alexandria, VA (703-836-8905)
Mar. 15-16 Blue Ridge, NC (704-297-4098)
Mar. 21-23 Sargent Camp, NH (603-525-3311)
Mar. 22-23 Green Mtn Audobon, VT (802-434-3068)
Apr. 5-6 Alexandria, VA (703-836-8905)
Apr. 5-6 Cleveland Metro, OH (216-341-3152)
Apr. 5-6 Binghamton, NY (607-777-2233)
Apr. 5-6 Mtn. Lynx, MA (508-840-6464)
Apr. 5-6 Sunrise Lake, IL (630-830-0146)
Apr. 11-13 Horizons, MA (617-828-7550)
Apr. 12-13 Towson, MD (410-830-2310)

**Wilderness/Rural EMT Module**
Apr. 16-20 Conway, NH (603-447-6711)
June 18-22 UNE, ME (207-282-6397)
Aug. 8-12 Conway, NH (603-447-6711)

**Wilderness First Responder Review**
Apr. 5-6 Outward Bound, FL (904-487-4365)
Apr. 12-13 Outward Bound, ME (800-341-1744)
June 21-22 Outward Bound, ME (800-341-1744)

**Basic Snowcraft**
Mar. 15-17 Conway, NH (603-447-6711)

**The Essential Box**
Apr. 12-14 Conway, NH (603-447-6711)

**NORTH AMERICAN RESCUE INSTITUTE**
PO Box 3150, Conway, New Hampshire 03818
Telephone: (603) 447-6711 Mon-Fri 9am-5pm

Mar. 22-23 Incident Commander at the MVA, NH
Apr. 12-13 Wilderness Search & Rescue, NH
May 17-18 High Angle Rescue, Conway, NH
June 13-15 Adv. High Angle Rescue, Conway, NH

**WILDERNESS MEDICINE INSTITUTE**
PO Box 9, Pitkin, Colorado 81241
Telephone: (970) 641-3572, Mon-Thurs 9am-1pm

**Wilderness EMT**
May 19 - June 13 Pitkin, CO (970-641-3572)
July 28 - Aug. 22 Pitkin, CO (970-641-3572)

**Wilderness First Responder**
Mar. 7-16 Stillwater, OK (405-744-5581)
Mar. 21-30 Santa Cruz, CA (408-459-2806)
Mar. 21-30 Orcas Island, WA (970-641-6532)
Mar. 22-30 Portland, OR (970-641-6532)
Apr. 4-13 Salt Lake City, UT (801-581-8516)
Apr. 4-13 Pitkin, CO (970-641-3572)
Apr. 11-20 First Ascent, OR (541-548-5137)
Apr. 29 - May 8 Boulder, CO (303-444-9779)

**Wilderness First Aid/WFR Recertification**
Apr. 5-6 Yosemite, CA (970-641-3572)
Apr. 12-13 Oregon State, OR (541-737-6833)
Apr. 19-20 Outdoor Adventures, WA (360-705-1585)
Apr.26-27 Orcas Island, WA (206-382-5009)
May 3-4 Santa Cruz, CA (408-459-2806)
May 10-11 Bellingham, WA (970-641-3572)

**WEMT Module**
Apr. 25-27/May 2-4 Lakewood, CO (303-914-6564)
May 11-16 Park City, UT (801-581-4512)

WMN

# Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

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# DROWNING & NEAR DROWNING

*by Anne E. Dickison, MD*

**Epidemiology**

Drowning is the third most common cause of death from unintentional injury in the United States,[1] and (exceeded only by motor vehicle accidents) is the second most common cause of injury-related deaths in children and young adults.[2] Approximately 8000 people drown per year in the U.S.A. Though statistics are not available, it is estimated that worldwide 150,000 drown annually. The world drowning rate is approximated at 6 per 100,000 population. In the U.S., for every drowning, five near-drowning victims are hospitalized for services ranging from overnight observation to life-support. Of the approximately 3000 children treated annually in hospital emergency rooms for submersion accidents, 80% are admitted.[4] It is estimated that 15% of the population has experienced a life-threatening episode in the water.

The highest drowning rates are among children under four years of age, with a peak occurrence in toddlers. A second peak incidence occurs in young adults 15-24 years of age. Drowning rates for black children (4.5/100,000) is almost twice those for white children (2.6/100,000).[2,3,4,7] Males drown four times more often than females.[2,3,4,6] In one 10-year study in Washington state, boys after one year of age had two to eight times greater risk of having a significant submersion incident than did girls. Additionally, the submersion risk associated with being a boy increased with age for both incidence and mortality. The case fatality rate was greater for boys in every age group.[5] It is interesting to note that although pre-school children of both sexes have the greatest incidence of significant submersion incidents, that male adolescents have by far the highest case fatality rates.[7]

Drownings, not surprisingly, are most common in warm weather, with 50% occurring from June through August.[2,3,5,7] The southern regions of the country have the highest rates and the northeast the lowest.[2,3] In three states (Arizona, California, and Florida) drownings and complications of near-drownings are actually the leading cause of fatal injuries for pre-olers.[4]

The U.S. Army Corps of Engineers, Department of the Army, is the largest federal provider of water-based recreation facilities in the United States. Each year 25 million people visit one of the Corps' 460 lakes and reservoirs. In a collaborative study with the Center for Disease Control (CDC), The Corps compiled data on all 1107 water-related deaths that occurred at their facilities from 1986-1990. 30% of these were adolescents or young adults. More than half of the drownings occurred on Saturday or Sunday. Most drownings occurred during swimming or wading activities (44%) followed by boating activities (23%), and fishing from shore (17%). Of the swimming/wading drownings, 302 (62%) occurred outside designated swimming areas.[6]

Toddlers drown primarily in residential pools and account for 75% of all pool-related fatalities. Victims older than five drown mainly in rivers, lakes, and canals. The US Consumer Product Safety Commission (USCPSC) has recommended that swimming pools be fenced on all four sides. The house should not be one of the sides if it directly accesses the pool. USCPSC recommends that the fence be at least five feet high with vertical spacing of no more than four inches. The gate should have a self-closing and self-latching lock. There is substantial evidence that fencing can be a very effective measure in the prevention of submersion incidences.

**Frequency of Drowning in Different Media**

| | | | |
|---|---|---|---|
| **Salt Water** | **1-2%** | **Bathtubs** | **20%** |
| **Fresh Water** | **98%** | **Buckets of Liquid** | **15%** |
| **Swimming Pools:** | | **Fish Tanks or Ponds** | **4%** |
| **Private** | **50%** | **Toilets** | **1%** |
| **Public** | **3%** | **Washing Machines** | **1%** |
| **Lakes, Rivers** | **20%** | | |

**Drowning Facts of Interest**

- **35% of drowned victims can swim.[10]**
- **90% deaths occur <10 yards from safety.[8]**

- **Pre-swim hyperventilation: Bad Idea.[8]**
- **Seizure disorders raise risk 4-5 times.[2]**
- **Bathtub drowning rate 9.5/100,000<1 year old.[2]**
- **Child abuse is involved in > 6% < 5 year old.**
- **5-gallon buckets: 24% drownings < 1 year old.[4]**

It should be remembered that any container of liquid into which a child can fit is a potential site for drowning. Five-gallon industrial buckets hold particular appeal to the curious toddler with his cephalad center of gravity and short reaching span. Unless the bucket tips over, the young child may not be able to extricate himself. Drownings in hot tubs, spas, and whirlpools have increased as much as tenfold in the last decade.[10] Solar pool covers represent another hazard to children because they give the false appearance of a solid surface which will support toys but not the child's body weight.

Alarmingly, more than 50% of teenage and adult drownings are thought to be alcohol related[2,5,7,8] Additionally, the role played by adult alcohol consumption in pediatric submersion incidences can never be assessed, but is probably significantly contributory.

**Pathophysiology**

In the classic sequence of events, the drowning victim will go through several stages. The duration of each stage will vary with the victim and environmental circumstances:

| | | |
|---|---|---|
| 1. | Struggle and panic | Automatic swimming motions<br>Coughing, sputtering, calling out<br>+/- laryngospasm |
| 2. | Apnea or breath holding<br>+/-laryngospasm | Swallow large amounts of water<br>Vomiting probable<br>+/- pulmonary aspiration of water<br>+/- aspiration of gastric contents<br>"Dry" drownings (20%)<br>"Wet" drownings (80%) |
| 3. | Unconsciousness | Airway reflexes are lost<br>+/- agonal respirations<br>+/- anoxic seizures<br>Ventricular fibrillation or asystole |

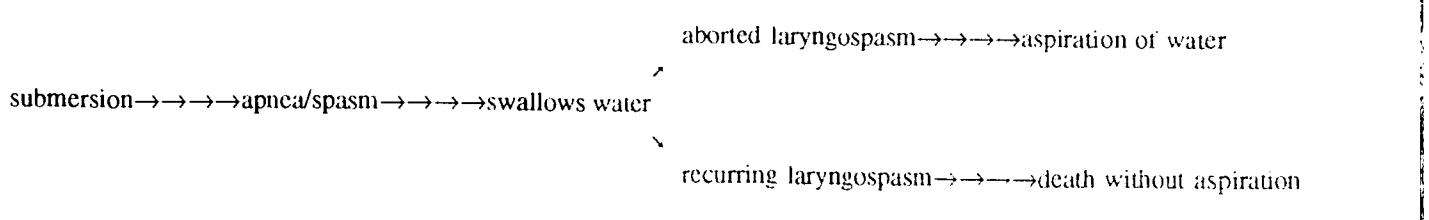
Pathologic findings in victims who have been resuscitated and later die will vary, and will depend to a great extent on the duration of survival, the initial duration of anoxia, the pulmonary affects of any aspirated fluid, and the effects of therapy including pulmonary oxygen toxicity and barotrauma from mechanical ventilation. Damage to the alveolar lining cells, the capillary endothelial cells, and the alveolar Type II cells is almost universal, and appears similar to the changes occurring in Adult Respiratory Distress Syndrome (ARDS) from any other etiology.

What type of fluid the victim may have aspirated has relatively minor impact on the subsequent clinical ventilator management, but should be included in the history. Water which contains chemicals (hydro-carbon-contaminated, caustic cleaning fluids, highly halogenated fluids, soapsuds, alcohols, etc.) will further potentiate pulmonary dysfunction through a chemical pneumonitis and destruction of surfactant; these near-drownings have the highest acute and chronic pulmonary morbidity and mortality.

In terms of management, it makes little difference if a victim aspirates salt water or fresh water. Historically, concerns have been twofold: hypervolemia (rapid volume expansion from aspirating a hypertonic solution), and electrolyte disturbances (notably water intoxication, hyponatremia, and hemolysis from aspirating a hypotonic solution). However, animal data has demonstrated that aspiration of more than 11 cc/kg of sea water must occur before volume expansion occurs, and aspiration of more than 22 cc/kg must occur before electrolytes are affected.[11] It has been determined that accidental drowning victims seldom aspirate more than 3-4 cc/kg[12] and therefore are not at high risk for either volume overexpansion or electrolyte disturbances.

Indeed, near-drowning victims are almost always hypovolemic. They will have increased capillary permeability induced by hypoxia with resultant redistribution of fluid from intravascular to extravascular spaces. They may have undergone a cold diuresis or an alcohol diuresis prior to the circulatory arrest. Albumin may be lost into the pulmonary bed or other tissues, with resultant loss of colloid oncotic pressure in the circulation. To maintain optimal cardiac function and both cerebral and renal perfusion pressures, pressure-guided fluid resuscitation is an important aspect of the intensive care management for the significantly injured patient.

## SEQUENCE OF DROWNING



Salt and fresh water affect the lung in different ways, but the end results (ventilation-perfusion mismatching, diffusion impairment, pulmonary hypertension, stiff lungs, surfactant insufficiency, impaired immunity, mucociliary dysfunction, etc.) Are the same. The goals for mechanical ventilation and circulatory support remain the same as well.

**Management at the Scene**

It is discouraging to recognize that once the hypoxic-ischemic injury has taken place, there is little that can be done to favorably influence the ultimate neurologic outcome. Quickly reestablishing the circulation and an oxygen supply to the tissues is of the highest priority. When possible, mouth-to-mouth rescue breathing should be initiated immediately and not delayed until the victim is taken to dry land or secured to a backboard.

Until the patient can be further evaluated, cervical spine precautions are recommended for all victims of submersion incidents. Axial traction is preferable to a cervical immobilizer during the initial resuscitation. Poorly fitting collars can compromise the airway and/or jugular venous return.

Great care must be taken not to increase the probability of aspiration. More than half of submersion victims vomit during resuscitation. Until the lungs can be protected by the presence of an artificial airway, the first responder must be ready to intervene with protective maneuvers such as positioning, suctioning, and the application of cricoid pressure. Positive pressure ventilation may further distend the already full stomach, especially in children. As soon as the airway is secured, the stomach should be emptied with a nasogastric tube or a suction catheter.

Though it was formerly recommended, the use of the Heimlich maneuver to empty the stomach is now discouraged. Valuable time to the initiation of effective CPR is lost. Gastric emptying past an unprotected airway increases the incidence of pulmonary aspiration of gastric contents. It is difficult to maintain the cervical spine precautions throughout the application of the Heimlich maneuver. Overly distended stomachs and passively engorged livers have been ruptured, and ischemic pediatric duodenums are vulnerable to complications from forceful thrusts. Most importantly, the rescuer may be discouraged from or distracted from doing the one thing that may make a difference in outcome, and that is reestablishing a circulating oxygen supply to the brain.

**Medical Treatment**

The near-drowning victim has suffered a global hypoxic and ischemic insult. The entire organism is affected, not just the brain and lungs. Intensive care management must address these often major multisystem organ injuries to heart, liver, kidneys, intestinal mucosa, and coagulation.

Basically, by the time the patient has reached the intensive care unit, the die has been cast. The ethical dilemma faced by intensivists and the families of the victim is when to stop life-support interventions on a patient with minimal but not absent brain function. Decision time is usually precipitated about three days post-resuscitation when issues of sepsis, GI bleeding, dialysis, surgical intervention for the intestinal perforation, and intractable seizures present a critical end-organ failure turning point. Unfortunately, the only neurologic assessment tools that intensivists have (Cts, MRIs, PET scans, xenon flow studies, EEGss, BAERs, VERs, SSEPs, ICP monitors, jugular venous bulbs, CSP analysis, etc.) have little or no predictive value at 3 days post-injury. In general, if the unsedated patient has not demonstrated some improvement in the Glascow Coma Scale in three days, the prognosis for complete recovery is extremely guarded. To order a test to guide life-support decisions is to give the family false hope.

Controversies rage on regarding the value of post-injury therapeutic interventions. Disappointingly, time and both prospective and retrospective studies have demonstrated that many interventions based on sound and hopeful principles have not improved neurologic or pulmonary outcomes. It is generally agreed that barbiturate comas, induced hypothermia (to 90-92 degrees F.), intentional hypovolemia, intracranial pressure monitoring, steroids, and prophylactic antibiotics do not benefit the patient, and may actually worsen the survival statistics.

### Controversial Management Issues in Intensive Care Units

- Advisability of rewarming moderately hypothermic patients
- Paralysis for mechanical ventilation
- Role for anti-hypertensives
- Role and endpoint for mechanical hyperventilation
- Role for osmotic diuretics
- Significance and treatment of hyperglycemia
- Ideal hematocrit (tissue delivery and viscosity benefits of normovolemic hemodilution, versus maximized oxygen carrying capacity and non-crystalloid circulating volume)
- Cardiovascular manipulation to keep cerebral perfusion pressure (MAP-ICP) > 50 torr
- Indications for Extracorporeal Membrane Oxygenator (ECMO)
- Usefulness of hyperbaric chambers
- Cerebral protective effects or advantages of various anesthetics

| | |
|---|---|
| Suctioning protocols | Etomidate |
| Propofol | Lidocaine |
| Fentanyl | Barbiturates |
| Clonidine | Benzodiazepines |

**Outcome Prediction**

Effective resuscitation at the scene remains the only medical intervention that clearly improves outcome in the victim of near-drowning.

Over the last thirty years numerous studies have been designed to identify which of the observations at the scene or at presentation to the Emergency Department may have predictive value for survival and neurologic recovery. Now that technology has evolved fairly effective supports for other

failing end-organs, but at present has little to offer for augmentation of brain recover, efforts to identify reliable predictors has received renewed attention.

### Factors Most Frequently Included in Outcome Analyses

* Time of immersion by history
* Age of victim
* Presence of pulse on the scene
* Indication for CPR
  - On the scene
  - At presentation to the ER
* pH of arterial blood gas on presentation to the ER
* Presence of fixed and dilated pupils
* Duration of CPR
* Presenting core temperature in the ER
* Presence of spontaneous respiratory effort in the ER
* Presenting blood glucose in the ER
* Presenting serum phosphorus and potassium

The three assessment scales most commonly used to attempt to predict outcome are 1) the Glasgow Coma Scale, 2) the Conn ABC Classification System, and 3) the Orlowski Score.

Other factors which are predictively most favorable on presentation to the Emergency Department include spontaneous respirations,[17] blood glucose<238+/-170 mg%[18], no evidence of aspiration (small A-a gradient)[19], presence of a detectable heartbeat *and* a core temperature of <33 degrees C.,[20] and reactive pupils.[17] The initial presence of non-reactive pupils does not have a predictive value, by the way. In Kemp's study of 330 pediatric British children admitted to the hospital following a submersion incident, one third of those presenting with unconsciousness and fixed and dilated pupils still had good outcomes. All of those with good outcomes recovered pupillary responses within six hours of CPR, however.[17]

Convulsions limited to the first 24 hours and responsive to treatment have been associated with a full recovery. In the same study, half of the children who became neurologically impaired had convulsions which were difficult to control and which persisted beyond the first 24 hours.[17]

Hypothermia by itself is not a favorable prognostic sign.[19] The protective mechanism of hypothermia apparently works only if the decrease in basal metabolism precedes the circulatory arrest.[13,19] The observed degree of hypothermia may also suggest the duration of the ischemic insult. The hypothermic patient who has been submersed in relatively warm water has a very poor prognosis for successful resuscitation.

It is important to recognize how devastating a drowning or near-drowning can be to the family of the victim. One study revealed that 24% of parents separated after a drowning accident involving their child.[4] Post-traumatic stresses in these families have been observed to continue for years. Substance abuse and sleep disturbances are common. Siblings are also profoundly affected and may experience incapacitating survivor's guilt.

**Glascow Coma Scale**[14]

| | |
|---|---|
| Eye opening | 4 possible points |
| Verbal response | 5 possible points |
| Motor response | 6 possible points |

Worst GCS is 3
Best GCS is 15

| | |
|---|---|
| GCS>5 | Good for intact recovery |
| GCS 4-5 | 25-39% intact neuro survival |
| GCS 3 | 0-39% intact neuro survival |

**Conn ABC Classification**[15]

| | |
|---|---|
| A | Awake or fully conscious |
| B | Blunted but arousable |
| C | Comatose |

| | |
|---|---|
| C1 | Flexion |
| C2 | Extension |
| C3 | Flaccid |

| | |
|---|---|
| A | 100% intact survival |
| B | 90-100% intact survival |
| C | 32-55% intact survival |

**Orlowski Score**[16]

1) Age < 3 years
2) Estimated max submersion > 5 min
3) No CPR within 10 mins of rescue
4) Coma on admission to ER
5) Arterial pH <7.11

1 point for each category

| | |
|---|---|
| Score ≤ 3 | 90% intact recovery |
| Score > 3 | 5% intact recovery |

**Statistical Disclaimers**

Submersion history unreliable

Variable time to first pH

Rating scales are subjective

Temperature does not enter in

How effective is initial CPR?

What does intact mean?

**Prevention**

It is clear that we are limited in our medical ability to "treat" the global hypoxic-ischemic insult sustained by the victim of a significant submersion accident. High technology hospital management has not significantly altered the fatality rate except to defer somatic death to a later time. Preservation of patients in persistently vegetative states is a tragedy of our times.

Prevention of submersion accidents takes several forms: legislation of effective barriers and a pool inspection program;

education of the population about barriers, CPR, etc.; improved access to emergency responders (implementation of a nationwide 911 system, BLS certification requirements for all lifeguards, commercial river and fishing guides, spa managers, people seeking recreational usage permits, etc.), and improved supervision of and education about identified populations at risk. It is estimated that barrier legislation and inspection alone could decrease submersion accidents by as much as 80%, as has been demonstrated in Australia and in Washington state[5], and by the 1981 USCPSC study. Washington state has also passed a law against driving while intoxicated for boaters; it remains to be seen if the incidence of alcohol-related submersion accidents will be decreased as a result.

Infant swimming classes have not been found to be an effective way of "drownproofing" a child or preventing serious submersion incidences. It can be argued, in fact, that by giving a false sense of security to both the child and his parent, that accidental submersions might actually increase. The American Academy of Pediatrics does not endorse the practice of encouraging swimming programs for the child less than three years of age.

### General Consensus about Prognostic Factors in Near-drowning

**Favorable Factors**

Age < 3 years
Submersion (warm water) < 3 min
Ice in water
Core temperature < 33°C.
Conscious on arrival to ED
Presence of pulse in ED
Presence of respiratory effort in ED

**Unfavorable Factors**

Submersion (warm water) > 9 mins
CPR duration > 25 minutes
CPR needed on admission to ED
pH < 7.0
Fixed + dilated pupils > 6 hours after CPR
Seizures persisting > 24 hours after CPR
Hyperglycemia > 450 mg% on ED adm.
Cardiotonic drugs needed to get a BP

**Summary**

Drowning and near-drowning are preventable accidents that have significant morbidity and mortality for a previously healthy and functional population. The hypoxic-ischemic insult leads to multisystem organ dysfunction, but the pulmonary and neurologic injuries have the greatest impact on future disabilities in survivors. Effective and aggressive cardiopulmonary resuscitation at the scene is the most important therapy presently available. Children needing CPR in the Emergency Department have poor outcomes unless the submersion incident occurred in ice-water and the patient was hypothermic on arrival to the ED. The great majority of patients who arrive at the Emergency Department with a pulse and responsiveness to pain will emerge from the incident neurologically intact. Prevention measures are of paramount importance because treatment modalities are limited once the injury has occurred.

*ANNE DICKINSON, MD*

*In the wilderness medical community Anne Dickison is a well-known and frequent presenter of virtually every major conference. Currently on the Board of Directors for the Wilderness Medical Society and the Chair of the NASAR Medical Committee, Dr. Dickison is board-certified in Pediatrics, Intensive Care, and Anesthesiology as well as bord-eligible in emergency medicine. Prior to becoming a physician, she was first an EMT and later a nurse. Having been a whitewater guide, Dickison continues to be active in a variety of outdoor pursuits, leading rafting trips yearly. In 1995, Dickison volunteered for a medical project in Brazil and continues her membership in Kiwanis.*

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## ASK THE EXPERTS...

***By Buck Tilton***

**1. What is the best way to "clear the spine"?**

First, a disclaimer. There is always a slim chance you'll miss a spine injury and cause harm to the patient. If you always want to be certain, every patient should be immobilized on a backboard. What wilderness medical training offers is a way to clear the spine that is extremely accurate, approved by the Wilderness Medical Society (WMS) and adopted by the State of Maine for urban EMTs. It gives all those patients who don't have a spine injury freedom from hours or even days on a backboard and all those rescuers freedom from carrying a patient miles and miles to have him cleared five minutes after he arrives at the hospital.

Second, the patient should receive a full patient assessment with his or her head manually immobilized prior to considering the patient as one who can have his or her spine cleared. Do not allow your wish to clear the spine interrupt the patient's need for a full assessment.

Consider the patient's MOI. If the MOI is severe, say, a 100 foot leader fall to the ground, you may choose to immobilize that patient even if he or she passes the test for clearing the spine. Severe head injuries, also, get immobilized. It's the moderate to mild MOIs that we are concerned with.

Next, the patient must be reliable: Alert, oriented, without drugs or alcohol on board. Does alert mean alert and oriented to person, place, time, and event (A+Ox4)? That would be best, but if the patient is only A+Ox3 (immediate loss of vivid memory as to the event) he could still be considered for clearing if he meets the rest of the criteria.

A reliable patient is also *free of distracting injuries* that could block perception of spinal pain, injuries such as fractured femurs and dislocated shoulders.

Your first question may be "What hurts?" If he or she says neck or back, he or she gets treated. If the patient complains of numbness or weakness, the patient gets treated.

Then check for altered sensations in the extremities: Numbness on palpation, weakness when checked for strength, pins and needles, inability to move, even temperature irregularities such as cold feet without another reason for cold feet. Once again, the patient passes or the patient gets treated.

Now check for tenderness on palpation. The patient must have no spinal tenderness, spasms, or guarding, or else he or she gets a ride on the "plywood pony."

As Bill Clem, MD, Mountain Rescue Association Medical Committee Chairman says: "The vast majority of patients who have cervical spine injuries complain of pain; those who don't will usually have some tenderness or guarding."

So far the patient has passed the test. Now, while supporting the head, ask the patient to gently flex the neck. If no pain, then ask for rotation. If any pain on movement shows up, he gets treatment.

Then the patient may be allowed to move about freely but cautiously (if no other injuries, of course, would hamper moving about). If the patient experiences the onset of numbness or weakness later, or the onset of sharp pain later (not tightness of muscle spasms), he gets the treatment later.

**"What about waiting two hours before clearing of the spine?**

The teaching of "wait two hours" was based on clinical data which stated, and still states, that cord impingement will show up within two hours of the injury. However...

The *WMS Guidelines* give no time constraints.

Dr. Frank Hubbell, Executive Director of SOLO, says there is no need to wait two hours.

Dr. Peter Goth, founder of Wilderness Medical Associates (WMA), says to only wait "a few minutes" to allow any adrenaline surge that might mask early pain to pass.

Dr. Keith Conover, founder of Wilderness Emergency Medical Services Institute (WEMSI), says there is no need to wait beyond a maximum of five minutes. "If the spine is cracked," Dr. Conover says, "it will hurt right away. Swelling should make it hurt worse later, but it should hurt plenty enough right away..." Dr. Conover continues by saying "...muscular stiffness and then pain starts to develop (from the muscles being tweaked and not from spinal damage, ed.) soon after the injury, even as soon as an hour. So I'd jump in there right away and clear the cervical spine before the spasm sets in."

Remember: The patient must be reliable, and the patient must have no distracting injuries. The patient must deny pain, tenderness, and altered sensations in the extremities. (Dr. Conover adds, "there must be a need to clear the spine.")

**2. Are bats a primary reservoir for rabies?**

Worldwide, bats account for approximately two percent of all cases of rabies. In the United States, bats account for a higher percentage of all cases of rabies, perhaps as high as 14

percent according to records dating up to 1989. This information comes from *Wilderness Medicine: Management of Wilderness and Environmental* Emergencies, 3rd edition, edited by Paul Auerbach, MD. The Center for Disease Control (CDC) currently lists bats as a primary reservoir along with skunks, foxes, and raccoons.

**Do vampire bats feed on humans? Do vampire bats carry rabies?**

"Vampire bats feed at night on animal blood, including humans...Vampire bats are a vector for rabies in Central and South America...small epidemics occur in isolated villages in the jungle; these can infect and kill up to five percent of the population, up to 17 percent of children, and 22 percent of families." -*Wilderness Medicine: Management of Wilderness and Environmental Emergencies.*

**3. Should very large wounds be packed open with wet dressings or dry dressings?**

The best answer is wet dressings covered with dry dressings, changed a couple of times a day if materials allow. The best solution to wet dressings is probably sterile saline. Sterile water would be next best. Water safe to drink would be third best.

Herbie Ogden, MD, medical advisor to the National Outdoor Leadership School (NOLS), says: "Keeping the wound moist helps to prevent epithelization of the wound edges...The inner layer eventually dries and, when removed, takes some wound debris with it which keeps the wound clean and open. Because you don't know how the wound will be closed (primary vs. secondary intention) while the evacuation is taking place, I would adopt SOLO's practice (of wet dressings covered by dry dressings, ed.)."

**4. Should infected wilderness wounds be soaked in hot water or hot *salty* water?**

Plain water as hot as the patient can tolerate is probably best.

Tod Schimelpfenig of NOLS offers this insight: "I believe the heat and moisture promotes circulation and draining. I question the addition of salt to this because 1) we can't control the osmotic gradients in the salt concentration and may dehydrate viable tissue on the edge of the wound, 2) there is potential tissue toxicity in high salt concentrations, and 3) I question whether the salt adds anything to an osmotic gradient across intact tissue."

**5. What's the source of the story of the two-year-old who survived 66 minutes of submersion in cold water and lived?**

Bolte Rg, Black PG, Bowers RS, Thorne JK, Corneli HM: "The use of extracorporeal rewarming in a child submerged for 66 minutes." *Journal of the American Medical Association* 1988; 260:377-379.

It was a June day near Salt Lake City. The girl was 2.5 years old. She fell in a creek. Water temperature was estimated to be near freezing. She had a core temperature of 19 degrees C on entering the hospital. CPR was initiated on scene and maintained for approximately two hours. Extracorporeal rewarming then initiated. In EC rewarming, blood is taken from a femoral artery, oxygenated and warmed, and returned to a femoral vein.

**6. What proportion of Lyme disease patients present the characteristic rash called *erythema migrans?***

An uncertainty surrounds the "bull's-eye" rash of Lyme disease. Some experts say it appears on as little as 60 percent of patients while others suggest it appears on as many as 80 percent. David Weld, Director of the American Lyme Disease Foundation, has said the actual number of patients who present with the rash may be as high as 90 percent. What we know for sure is this: If a patient has the rash, that patient should be started on antibiotic therapy as soon as possible to prevent later complications associated with the disease.

**How long does a tick have to be attached to spread Lyme disease to a human?**

Researchers reporting in *The New England Journal of Medicine*, December 17, 1992, wrote: "When ticks were attached for less than 48 hours, *B. Burgdorferi* was transmitted only rarely by infected nymphal-stage ticks and never by infected adult female ticks." On the other tick-infested hand, 83 percent of test animals were infected after a tick was attached for 72 hours, and 100 percent after a tick was allowed to feed to repletion (more than 120 hours).

**7. Has the U.S. Food and Drug Administration (FDA) approved a poison ivy skin protectant?**

At least one for sure. IvyBlock skin protectant, a product of EnviroDerm Pharmaceuticals, helps block skin contact with urushiol, the oil in poison ivy, poison oak, and poison sumac that causes the allergic reaction in patients. The lotion must be applied to skin at least 15 minutes *before* contact with the plants, and it must be reapplied every four hours. The lotion can be washed off with soap and water.

*Editor's Note: If you have other wilderness medicine questions to which you would like answers, please send them to:*

*Wilderness Medicine Newsletter*
*Ask the Experts*
*PO Box 3150, Conway, New Hampshire 03818*

*We will be happy to do the research and print our findings in a future edition of WMN.*

## A PROPOSED RIVER CROSSING RATING AND ASSESSMENT SYSTEM

*by Jed Williamson*

While this system is based on my 35 years of mountaineering experience that has included hundreds of river crossings under all conditions in many geographic locations, I fully appreciate that you may, and SHOULD say, "Big Deal!" That's why it is called "proposed," because I couldn't find any such system anywhere. And why did I engage in this exercise? Because there have been many river incidents in adventure programs, some of them resulting in fatality, and judging the conditions has been a key factor. If you have never seen the likes of river crossing and navigation in remote corners of such places as Pakistan, Indian, and Borneo by the "natives," I assure you that you would be astounded. And I would have to bet that THEY don't have a codified system either. Just experience and pure necessity. As we do this kind of thing just for experience or to reach an objective, we need to think about it a bit.

So after you've thought about what you see here, how about a response?

This rating is according to the following factors and descriptions of various possibilities.

Stream/River, Physical, and Human Factors include, but may not be limited to:

**1 ..... Width**
**2 ..... Depth (average and specific)**
**3 ..... Velocity**
**4 ..... Volume (CFS)**
**5 ..... Color (clear, translucent, or opaque)**
**6 ..... Bottom composition**
**7 ..... Obstacles (large boulders, sweepers, etc.)**
**8 ..... Configuration (location and number of bends and eddies)**
**9 ..... Time of day**
**10 .... Weather history and current weather**
**11 .... Water temperature**
**12 .... Aids for crossing (ropes, poles)**
**13 .... Technique used**
**14 .... Skill level and strength of the participants**
**15 .... Attitude of participants**

Using the following continuum, we can put the factors that determine how to categorize the crossing accordingly:

**Easy-----Moderate-----Difficult-----Very Difficult----- Extremely Difficult**

**Easy:** Late summer, when the water level is ankle to shin deep. Clear.

**Moderate:** Early summer, early morning, when the run off from snow melt is reduced by lower night temperatures. Bottom composition - various sizes of rocks and boulders, none bigger than a soccer ball, 50-75% coverage. Water depth shin deep to knee deep. Clear.

**Difficult:** Early summer, mid-day to mid-afternoon, when the run off is beginning to increase as the daytime temperatures rise. Water depth knee high or just below. Water velocity four to six knots. Clear to translucent.

**Very Difficult:** Early summer, late afternoon, when snow melt is at its peak. Water depth above knees. Bottom composition - various sizes of rocks/boulders. Water velocity five to seven knots. Clear to opaque.

**Extremely Difficult:** Spring and early summer, late afternoon, assuming a melting snow pack and/or combined with rain storms and rising temperatures. Water depth above knees. Bottom composition - various sizes of rocks/boulders, including large rocks where one's boot could get wedged. Water velocity seven knots and above. Generally opaque (grey/brown from turbulence).

*Editor's Note: Please consider these thoughts carefully and send your comments to WMN at the following address:*
*Wilderness Medicine Newsletter*
*Proposed River Crossing Rating System*
*PO Box 3150, Conway, New Hampshire 03818*
*Your input will be considered and any pertinent information or results will be published in a future edition of WMN.*





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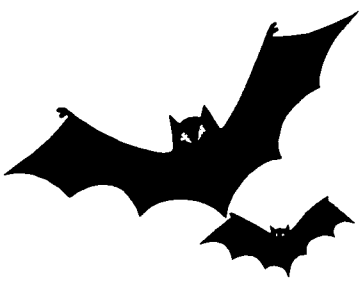
FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

MAY/JUNE 1997 ISSN-1059-6518 VOLUME 8, NUMBER 3

# BATS AND RABIES
## (But mostly bats)

*by Bryan Yeaton, NREMT-B*

*He loops in crazy figures half the night*
*Among the trees that face the corner light.*
*-Theodore Rothke* The Bat



They dart about in the dusk, flying erratically, wildly, seemingly without purpose. Their familiar, mysterious forms silhouetted against the graying sky. Everything about them— from the fearful to the fanciful— seems to have ominous overtones: they haunt the night, they fly into women's hair, they suck your blood, they all have rabies, they are an incarnation of the most hideous of ghouls.

Of course, when examined objectively, these myths fade like the light at sunset. Bats little resemble the monsters we imagine them to be. In fact, they are some of the most important cogs in the machinery of our ecosystem. Because of our human fears and desire to control Nature, many bats are now in trouble, and with them, the many plants and animals they help support and prosper. Let's look more closely at these creatures of the night, and perhaps dispel some rumors in the process.

The first misperception is that bats, because they can fly— and they are the only mammals which can— are either mice with wings or awkward birds. In fact, the German word for bat— *"fleidermaus"*— means simply "flying mouse." Actually, bats are much more closely related to humans than mice or birds. Look at the drawing of the bat's wing; if you took your human fingers and lengthened them, then stretched the remaining skin between them, you would come pretty close to the bat's wing (see top of page 3). Additionally, bats are mammals, giving birth to live young and nursing the same way human mothers do. Birds, instead, lay eggs and do not nurse, and the bone structure— and even flight itself— has evolved in a way vastly different from the bat.

It is thought that present-day bats evolved from small insect-eating mammals, possibly similar to shrews. In order to aid in catching flying bugs, it probably first developed loose flaps of skin between the fore and hind legs, enabling it to glide (as does the misnamed "flying" squirrel). Evolution continued from that to today's bat, with its "hand wing," which gives us the scientific order: *Chiroptera.*

One of the most prevalent myths is that bats will fly into and get caught up in people's hair. Part of that may derive from another myth: that bats are blind. Certainly, as night-active animals, they do not rely on sight as their primary information source. All bats can see, and some bats have excellent vision; however, most use sound— echolocation— to find prey. When bats hunt, they emit high-pitched squeaks beyond the range of the human ear: supersonic. These bounce off prey and back to the bat like a radar, and tell the bat the size and direction of the snack. So, even though they can see, bats can also navigate in total darkness! An animal that can track a mosquito at thirty feet in total blackness is not likely to miss an object as large as a human. They may, however, come near to chase an insect. I have been brushed by bat wings while hiking at night by headlamp; the bats were chasing the insects which were attracted to the light.

One concern which does have some legitimacy is that bats are, indeed, carriers of rabies. This is true; bats, like all mammals— including humans— are susceptible. Rabies is a virus which travels through the nervous system until it infects the brain, causing it to swell (encephalitis). The disease travels

at a very specific speed (estimated at 3mm/hour), and may take from ten to more than sixty days to reach the brain, depending on where the patient is bitten. Once it does, however, it is a death sentence; only three people in recorded history are reported to have survived once the disease reached the brain, and all of those received aggressive immunotherapy. Yet still, despite the immunotherapy two of those suffered severe neurological damage. No one has ever survived the disease without such therapy.

That's the bad news. The good news is that rabies seems to be 100 percent treatable before it reaches the brain. Treatment is not cheap— often around $1500— but no longer consists of twenty or so painful abdominal injections. Instead only six shots in the upper arm are given.

The rabies virus is concentrated in saliva and brain/spinal cord tissue of the infected mammal. In addition to bats, small carnivorous mammals seem to carry the highest risk for rabies infection: skunks, foxes, raccoons, as well as unvaccinated dogs and cats. Although it is possible for other mammals to carry rabies, it is not often reported in the deer family (including elk and moose) or in rodents (mice, squirrels, beavers, woodchucks, and the like), or even in bear. Opossums are generally not considered infectious. Still, hunters— a high-risk group— are advised to wear shoulder-length gloves and wash thoroughly when cleaning all mammal carcasses, because of exposure to brain and spinal cord tissue.

The most common route of exposure is a bite or lick from an infected animal. The rabies virus will not pass through intact skin, but the lick of an open wound can introduce infection. The bite inoculates the virus-laden saliva directly into the system.

After exposure to a potentially rabid animal, the wilderness care provider must remember his or her protocols for soft tissue care and envenomation. First, put on your latex gloves! If a bite is bleeding, but not enough to cause concern about the danger of shock, the blood flow will help flush some of the virus out of the wound. A small puncture wound can be encouraged to bleed, but obviously, serious bleeding will need to be controlled. Once bleeding is managed, irrigating and scrubbing the wound are imperative to lessen the amount of virus introduced into the system. Different sources show that from 15 to 40 percent of untreated exposures will develop the disease, even with similar inoculations.

One recently documented area of concern for cavers is the risk that aerosolized bat waste products (urine and feces) in the warm, humid cave environment can transmit the virus through the nasal mucosa— the thin porous lining inside the nose. However, according to an article in the September, 1996 issue of NSS News (a magazine for cavers), Author Danny A. Brass, D.V.M. points out that of the four deaths attributed to aerosolized rabies, two exposures occurred in a laboratory environment, and the other two cases, where victims possibly could have been exposed in Southwestern caves hosting large colonies of Mexican Free-tailed bats, are considered inconclusive. Warren C. Lewis, M.D. adds in the December 1996 issue of NSS News:

> Two human deaths from rabies in caves should be examined critically before being attributed to infected cave air. Rabies virus cannot survive long in daylight at ambient temperatures. It is difficult, if not impossible, to transmit the disease by fomites (solid objects) no matter how intimate the contact has been.

After cleaning a wound, it is recommended to see a physician as quickly as possible. History is important: was this a high-risk animal? Was its behavior abnormal (an unprovoked fox bite is abnormal; a bite while you are reaching into a den to pet the kits is not)? Most wild animals— understandably— are extremely wary of human contact; often perceived friendliness is a sign that the animal is extremely ill. Although the "foaming at the mouth" picture of rabies (as in movies such as *Old Yeller*) is uncommon, other unusual behaviors can include either viciousness (furious rabies) or lethargy (dumb rabies), excessive drooling (probably where the "foaming" perception arises), or staggering, drunken behavior (as in *To Kill a Mockingbird*). The latter is similar to the ataxia found in other brain-swollen patients, such as those with High Altitude Cerebral Edema (HACE).

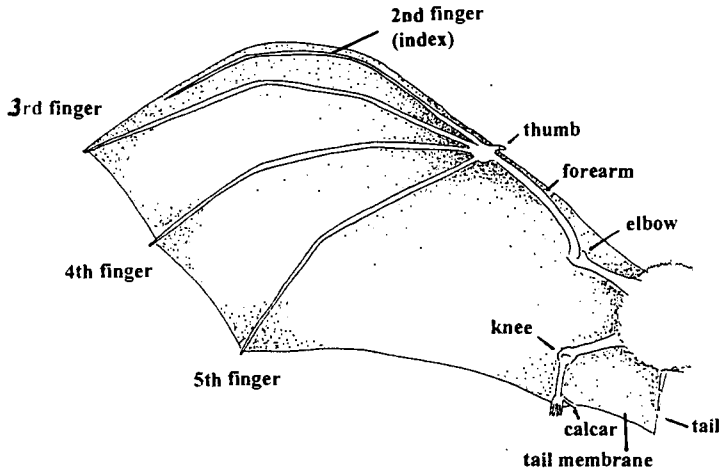
The physical will decide whether rabies therapy is indicated. If so, the patient will get a dose of Rabies Immune Globulin (RIG), 20 International Units per kilogram of body weight (IU/kg), one-half infused at the wound site, and one-half injected into the deltoid muscle (shoulder). This is a serum derived from horses, with allergies and side-effects (serum sickness) possible. The other five shots consist of disabled virus injected in the deltoid on days 0, 3, 7, 14, and 21 or 28. There are two types of vaccine: Human Diploid Cell Vaccine (HDCV), and Rabies Vaccine Adsorbed (RVA).

For those in high risk categories (animal control workers, veterinarians and technicians, etc.) there is a pre-exposure vaccine, which is administered on days 0 and 3, and no RIG is required. RIG and vaccine are administered, but in smaller doses, should a potential infection occur.

Now, back to bats. There are more species of bats than any other mammal group. Their variety is amazing, from the smallest known mammal— the bumble bee bat of Thailand (which is, indeed, its size)— up to fruit bats (or "Flying Foxes") of Indonesia, which can have nearly eagle-sized wingspans of up to six feet.

In this country, people seem to fear bats because they lurk in the night, but in some areas where bats are active in the daytime, as in flying-fox habitat, the animals are respected, and even venerated. Perhaps the best way to think about bats is in their environmental niche.

Birds have a number of important roles in our ecosystem. As well as decorating windshields, they help pollinate flowers




(along with, of course, the bees), and eat lots of insects. Bats simply take over those roles when the sun goes down. Do you like bananas? Or those tall Organ Pipe cactus of the desert Southwest? You can thank bats as the primary pollinators of those and many other species such as cashews, figs, and agave, from which we make tequila. In fact, the agave has flowers which open only at night to cater specifically to the longnose bat.

Hate mosquitoes? Bats are probably the most effective control we have for the little bloodsuckers (we will deal with the accused bat "bloodsucker" shortly). It is reckoned that one colony of Mexican Free-tailed bats in Bracken Cave, Texas, consumes about 250 tons of insects— every night! That's half-a million pounds of bugs! And the guano (feces) from bats is mined in some caves, as it is an excellent fertilizer.

Some other interesting bat facts, from a brochure by Bat Conservation International:

- A single little brown bat, in one hour, can catch and eat 600 mosquitoes.
- With a following wind, Mexican Free-tailed bat can reach speeds of 60 miles per hour.
- Can you hear a beetle walking on the sand six feet away? The African Heart-nosed bat can.
- The echolocation of the Fishing Bat is so sensitive, it can detect a minnows fin on a pond's surface, and then scoop it up like an osprey.
- A little brown bat can live up to 32 years.
- Not only does bat guano make great fertilizer, it also supports the life in the cave ecosystem. Plus, humans are using bacteria found in it to detoxify wastes, make gasohol, improve detergents, and produce antibiotics.
- The anticoagulant in vampire bat saliva may someday help dissolve clots in coronary arteries, preventing heart attacks. Present-day thrombolitics ("clot busters") are made from rat saliva.

Speaking of the vampire bat: it is hard to imagine a creature with a more sinister reputation. From ancient legends of the Rumanian tyrant Vlad Tepes— also Vlad Dracul, or Vlad the Impaler— to Bram Stoker's updated *Dracula*, and the famous portrayal of that ghoul by Bela Lugosi, the vampire has conjured apparitions of the undead— *Nosferatu*— who roam the earth by night seeking to satiate their unquenchable lust for human blood. The reality, however, is not only quite different, but rather mundane.

The vampire bat is a sparrow-sized little bat. True, it does feed exclusively on blood— any mammal blood. Humans are rarely and only incidentally a meal. Only one species— *Diphylla ecaudata*— barely enters the United States, and this prefers the blood of birds. Vampires have two razor-sharp incisors, which they use to make a small slit, often near the hoof or rump of a domestic farm animal. The same anticoagulant which may someday save human lives allows the blood to flow for a bit without clotting, and the bat, while trying not to disturb the large hoofed mammal and get stepped on, gingerly laps up the blood in a way likened to a cat lapping up a bowl of milk. Total consumption is only a teaspoon or two, although several bats can feed off the same animal in one evening, but usually the animal doesn't even notice the loss. Contrary to mythology, the vampire does not suck blood at all. Only in Hollywood.

Vampires do occasionally inflict rabies on domestic livestock from Mexico through South America, often resulting in an the destruction of an entire colony. On humans, these bats will generally go for a non-sensitive area with decent blood flow, such as between the toes. Precautions for humans are easy to take: sleep with windows closed or install screens. The worldwide mortality for humans infected by rabid vampires was not found, but it is certainly statistically insignificant compared with snakebite, bee stings, or, in the United States, the animal most likely to cause a human death, the deer. Bambi is a killer; according to *Shooting* magazine, more than twice as many Americans die from automobile/deer collisions as from the next most dangerous animal, the bee. That study from *Shooting* also showed deer to be more dangerous than all other animals combined, except humans.

What many people do not know is that vampires are one of the few creatures in the animal kingdom which will share a meal with a sick roostmate, or even adopt an orphaned bat.

With all the fear and fantasy surrounding bats, and our subsequent human reaction— wipe them out— you might suspect that some bats are in trouble. And you'd be right. All over the world bats are endangered, for many reasons. As with other species, habitat destruction is a major factor. Many bats require very specific conditions in which to nurture their young, often in caves or abandoned mines. Many of these areas have been vandalized, driving the bats away, or worse, sealed off to prevent people from falling or wandering in, sometimes with the bats inside.

Partially because it is in their interest as well, the caving community has been accomplishing much in conserving these areas. Instead of dumping a load of cement into the opening (which has been done by property owners or communities on occasion to absolve them of liability issues), cavers and bat conservationists— and some individuals are both— have been

working to seal off access to the general public, but make the entry still available to both cavers and bats. This is done by sealing the opening with a bat-friendly grate, small enough to exclude human access, but easy for the bats to come and go for nightly feedings or winter hibernation. The cavers have keyed access to the padlocked gate. Obviously, educated landowners are playing a huge role in this protection.

There are, however, other strains on these flying mammals: pesticides, the destruction of rain forest, predation, export for food, to name a few. The rate at which bats are disappearing is shocking; almost 40 percent of U.S. bat species are now endangered. In one instance, nearly 30 million Mexican Free-tailed bats were destroyed by vandals in an Arizona cave. At Carlsbad Caverns, there are only 1/32 the number of bats as before, most likely due to pesticides.

On the other side, there are groups working feverishly to reverse these trends. A major obstacle to support is not the acknowledgment of the bat's role in the ecology, but many of the myths mentioned at the beginning of the article. To most people, bats are still shrouded in mystery, they are not perceived as "cute and cuddly", as are, say, koalas or giant pandas. Surprisingly, many bats, like the little brown bat or many of the flying foxes, are indeed attractive up close. But most people do not have the opportunity to view bats up close, in full light. There are a few organizations trying to change that.

Dr. Merlin D. Tuttle wrote *America's Neighborhood Bats*. He also founded Bat Conservation International (BCI). BCI is perhaps the leading organization concerned with making the world a better place for bats and people. Dr. Tuttle's organization supports research and education all over the world. BCI had a big hand in developing *Masters of the Night*, a traveling exhibit presently making the rounds of science museums across the nation, packing in the crowds. Still, when I saw the show in Boston, there were people, mostly adults, who said, "I don't care, they're still disgusting."

Based in Austin, Texas, BCI has been working to educate people, especially young people, convincing them that bats are attractive, intelligent, and vital. A BCI poster shows Ding, an Indian Flying Fox hanging upside down (the way all bats sleep), with the caption: "Sleep all day, hang out all night. No wonder kids love bats."

Ironically, Austin is also the home of a unique evening ritual that draws thousands of tourists to the city: the emergence of the bats. The Congress Avenue Bridge was designed with crevices underneath to provide shelter for the local colony of Mexican Free-tails. Just at dusk, millions and millions of bats pour out from underneath the bridge for a night of scraping insects from the skies over Austin.

If our former nighttime nemesis— the bat— can be a tourist attraction, or attract a museum crowd, perhaps there is still hope for its future. But is there still time?

## SOURCES

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*Bats of the World*, Gary L. Graham, Ph. D. 1994, Golden Press, Racine, Wisconsin.

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***Books***

*Medicine for the Backcountry*, 2nd Edition; Buck Tilton, M.S. and Franklin Hubbell, D.O. 1994, ICS Books, Merrillville, Indiana

*Medicine for Mountaineering*, edited by James A. Wilkerson, M.D. 1992, The Mountaineers, Seattle, Washington

*Wilderness Medicine*, 3rd Edition, edited by Paul S. Auerbach 1995, Mosby-Yearbook, St. Louis, Missouri

***Publications***

"Human Rabies of Insectivorous Bat Origin", 1994-1995, Danny A. Brass, D.V.M. *National Speleological Society News*, September, 1996

Letters, *National Speleological Society News*, December 1996, January, 1997

# ASK THE EXPERTS...

***By Buck Tilton***

**1. What is the current status of Hepatitis A, B, C, D, and E?**

In the United States, there are 84,000-134,000 symptomatic infections of hep A per year. About 100 die from fulminant hep A each year. Transmitted via the fecal/oral route, hep A can come from food, water, and hands. A new highly effective vaccine consisting of two shots is now available.

In the United States, there are 70,000-160,000 symptomatic infections of hep B per year with 5000-6000 deaths per year from resulting chronic liver disease. Hep B is a bloodborne pathogen.

In the United States, there are 300-54,000 symptomatic infections of hep C per year with 8000-10,000 deaths resulting from chronic liver disease. Formerly known as hepatitis non-A, non-B, hep C is a bloodborne pathogen.

Hepatitis D cannot be contracted by someone unless that person has had hep A previously. The current status of the disease was unavailable.

Hepatitis E, transmitted via the fecal/oral route, is currently prevalent in third world countries. There is no vaccine, and gamma globulin is not effective.

See enclosed chart for more information.

2. **What is permethrin and does it really work? Where can I purchase it?**

Permethrin, originally extracted from chrysanthemum flowers, is a potent insect neurotoxin currently synthesized for human use as an insect repellent. "It's not really a repellent," says Dr. Murray Hamlet, Director of Operations for the US Army Research Institute for Environmental Medicine, "it's an insect killer." Within minutes after contact with permethrin-treated clothing, the insect dies. It bonds strongly to the fibers of clothing and, depending on the concentration and application process, can withstand numerous washings, remaining active, in some cases, for years. "An application of the spray," says Dr. Hamlet, "may last up to five washings, and an application of the concentrate may last up to 50." Permethrin is colorless and odorless, and does no harm to vinyl, plastic, or other fabrics. It can be applied to mosquito nettings on tents, to sleeping bags, even to window screens at home. It should not be applied to human skin. After many tests, the experts agree it apparently does no harm to humans, but it does work as a repellent or insecticide when applied to skin. "With normal use," says Dr. Hamlet, "it is a safe and extraordinary advance in protection against insects."

Permethrin is available under the trade names Permanone from Wisconsin Pharmacal, Duranon from Coulston Products, and Permethrin Tick Repellent from Sawyer Products. It is available from many suppliers of outdoor products, and can be ordered from Sawyer Products (800-940-4464), REI (800-426-4840), Travel Medicine (800-872-8633), Sportsman Guide (800-888-3006), and Ranger Joe's (800-247-4521).

3. **Is there such a thing as a field treatment for second and third degree burns that consists of an occlusive dressing?**

"Covering wounds reduces pain and evaporative losses, but do not use an occlusive dressing," recommends the Wilderness Medical Society Practice Guidelines for Wilderness Emergency Care. Thomas Burke, MD, a Denver-based emergency medicine physician who advises the Wilderness Medicine Institute, supports the WMS guideline for burn management. "You want the burn to drain," says Tom, "and I wound not suggest an occlusive dressing for any burn." Tom continues: "I prefer the field treatment of burns to be a layer of antibiotic ointment."

*Editor's Note: If you have other wilderness medicine questions to which you would like answers, please send them to: Wilderness Medicine Newsletter, Ask the Expert, PO Box 3150, Conway, New Hampshire 03818*

*We will be happy to do the research and print our findings in a future edition of WMN.*

**DISEASE BURDEN FROM VIRAL HEPATITIS A, B, AND C IN THE UNITED STATES**

| | Hepatitis A | Hepatitis B | Hepatitis C |
|---|---|---|---|
| Number of Cases Reported in 1994 | 226,796 cases[1] | 12,517 cases[1] | 4,470 cases (Non-A, Non-B)[1] |
| Estimated Number of Infections - 1994† | 152,000[2] | 140,000[2] | 35,000[2] |
| Estimated Annual Infections, 1984 - 1994† | Minimum: 125,000 (1984) Maximum: 20,000[2] | Minimum: 140,000 (1994) Maximum: 320,000(1984)[2] | Minimum: 35,000 (1994) Maximum: 180,000 (1984)[2] |
| Estimated Number of Infections among Health Care Workers in 1994 | Not Applicable | 1,000[2] | No estimate |
| Estimated Number of Fulminant Deaths Due to Acute Infection per year | 100[2] | 150[2] | Unknown, but "rare"[3] |
| Number of Persons with Chronic Infection | No chronic infection[4] | 1 to 1.25 million persons[5] | 3.9 million persons[5] |
| Estimated Number of Deaths Attributable to Chronic Liver Disease per Year | No chronic infection[4] | 6,000[2] | 8,000 - 10,000[2] |
| Percent Ever Infected | 33.0%[5] | 5.3%[5] | 1.8%[5] |

†Adjusted for underreporting and asymptomatic infections.

# WILDERNESS MEDICINE TREK TO NEPAL

The Wilderness Medicine Trek to Nepal is a 25-day program beginning at SOLO in Conway, New Hampshire, traveling to Kathmandu, Nepal, into the Annapurna Himal, returning to Kathmandu and finally back to Conway, New Hampshire.

At SOLO and along the way, classes in wilderness medicine will be taught. A typical day may start with a two-hour class and hands-on practice session. By mid-morning we will be trekking towards our daily destination. After lunch, another class period and more medical scenarios, and completion of the days trek. We will have dinner at a teahouse and discuss the events and topics of the day. Variations on this theme will occur daily.

Along the trail we will be staying primarily in teahouses and eating local foods prepared by the Nepalese. Weather permitting, we will cross the snout of the South Annapurna Glacier and into the valley of the West Annapurna Glacier where we will be prepared to bivouac and practice much of what we've learned. The majesty of the landscape is sure to astound you.

Upon completion of the program, you will be certified as a SOLO Wilderness First Responder, which includes American Heart Association Basic Life Support. Within one year from the date on your WFR certification, you are eligible to take a two-week module at SOLO and become certified as a SOLO Wilderness Emergency Medical Technician (WEMT), State of New Hampshire EMT, and nationally registered EMT. After becoming a SOLO and nationally registered EMT you will be eligible to take the SOLO sponsored Geomedic course and practice medicine in developing countries.

This is more than a Wilderness First Responder and more than a trek.

**Cost:** $195.00 includes WFR certification, room, board, and program-related expenses in Nepal.

**Dates:** September - October, 1997

For more information about this exciting program, a registration and required gear list, write or call Curtis Cote at SOLO, PO Box 3150, Conway, New Hampshire 03818 (603-447-6711).

**Proposed Itinerary:**

Evening arrival, welcome, slide show

| | |
|---|---|
| Day 1 | At SOLO, Conway, New Hampshire<br>What is Wilderness Medicine? Patient Assessment System |
| Day 2 | At SOLO, Conway, New Hampshire<br>Antibiotic Therapy, Parasitology, CPR |
| Day 3 | Boston to Kathmandu<br>Reading Assignments |
| Day 4 | Arrive Kathmandu<br>Hygiene & Water Purification |
| Day 5 | In Kathmandu<br>Airway Management and Chest Trauma |
| Day 6 | Kathmandu to Pohkara<br>Travel Day |
| Day 7 | Pohkara to Biretanti<br>Shock & Soft Tissue Injuries |
| Day 8-13 | Biretanti to Annapurna Base Camp<br>Head, Spinal Cord, & Musculoskeletal Injuries, Altitude Emergencies |
| Day 14 | At Annapurna Base Camp<br>Hypothermia, Frostbite, & Hyperthermia |
| Day 15 | Annapurna Base Camp to West Annapurna Glacier Cave Camp<br>Bivouac |
| Day 16 | West Annapurna Glacier Cave Camp to Machupachare Base Camp<br>Scenarios |
| Day 17 | At Machupachare Base Camp<br>Drowning & Lightning |
| Days 18-21 | Machupachare Base Camp to Biretanti to Pohkara<br>Altered Level of Consciousness, Difficulty Breathing, Chest Pain, Poisons |
| Day 22 | Pohkara to Kathmandu<br>Travel Day |
| Day 23 | In Kathmandu<br>Temples, Shrines, Culture |
| Day 24 | In Kathmandu<br>Temples, Shrines, Culture |
| Day 25 | Kathmandu to Boston |



# CONFERENCE UPDATE

**The National Association of EMS Physicians**
July 9 -11, 1997
The Hyatt Regency Lake Tahoe
Incline Village, Nevada
Call 10913-592-5858 for information
**Annual EMS Research Assembly and Scientific Meeting*

**Maine Appalachian Trail Conference**
August 1-8, 1997
Sunday River Ski Resort
Bethel, Maine
Write ATC '97 Conference, PO Box 1256,
Auburn, Maine 04211-1256 for information
**Sponsored by the Maine Appalachian Trail Club with the help of the Maine Chapter of the Appalachian Mountain Club*

**Wilderness Medical Society**
August 2-8, 1997
Sun Valley Resort
Sun Valley, Idaho
Call 1-800-967-7494 for registration
**Annual Scientific Meeting*

**National Coordinating Council on Emergency Management**
September 14-16, 1997
The Buttes Mountaintop Resort
Tempe, Arizona
Call 1-703-538-1795 with any questions
**45th Annual Conference & Exhibit*

**National Association of Emergency Medical Technicians**
October 1-4, 1997
John Ascuaga's Nugget
Reno, Nevada
Call 1-800-34NAEMT for information
**Outlook '97 Conference & Exposition*

**Wilderness Risk Management Conference**
October 12-14, 1997
Snowbird Resort, Salt Lake City, Utah
Call 1-307-332-1256 for details
**Hosted by NOLS, Outward Bound, and WEA*

**International Conference on Outdoor Recreation and Equipment**
Fall 1997
Mexico
**Details forthcoming...*

**6th Annual Canadian Search and Rescue Workshop**
October 16-18, 1997
The Holiday Inn in Sault Ste Marie
Sault Ste Marie, Ontario
Call 1-705-949-0611 for more information
**SARSCENE '97 - Partners in SAR*

**The Association for Experiential Education International Conference**
November 23-26, 1997
The Grove Park Inn
Asheville, North Carolina
Call 1-303-440-8844 for registration
**"Deeply Rooted, Branching Out"*

**America Outdoors Confluence 1997**
December 5-7, 1997
Cook Convention Center
Memphis, Tennessee
Call 1-423-558-3595 for information
**Confluence by the River*

**The University of Alabama at Birmingham**
January 9-17, 1998
Amazon Travel Medicine Course
ACEER and Lima, Peru
Call 1-800-633-4734 for details
**Educational Trip*

# WILDERNESS FIRST AID & MEDICAL TRAINING OPTIONS

**SOLO**
PO Box 3150, Conway, New Hampshire 03818
Telephone: (603) 447-6711, Mon-Fri 9am-5pm

**Advanced Leadership & Emergency Care (ALEC)**...A combination of WFR, NREMT, WEMT and wilderness leadership skills, survival, rescue and more, this is ideal for the professional outdoor leader.
Oct 6 - Nov 14 Conway, NH (603-447-6711)

**Wilderness EMT**
July 28 - Aug 22 Conway, NH (603-447-6711)
Sept 8 - Oct 3 Conway, NH (603-447-6711)
Nov 16 - Dec 12 Conway, NH (603-447-6711)

**Wilderness First Responder**
July 21 - Aug 1 U of New Eng., ME (207-282-6379)
July 26 - Aug 3 Evanston, IL (847-866-6190)
Aug 4 - 14 Virginia Commonwealth, (804-828-2549)
Aug 28 - Sept 5 Outward Bound, ME (800-341-1744)

**Wilderness First Aid/WFR Recertification**
July 3 - 4 Merrowvista, NH (603-539-6607)
July 11 - 13 Dartmouth, NH (603-646-2428)
July 12 - 13 Alexandria, VA (703-836-8905)
July 12 - 14 AMC, NH (603-466-2727)
July 19 - 20 Dartmouth, NH (603-646-2428)
July 26 - 27 Green Mtn Club, VT (802-244-7037)
Aug 4 - 6 AMC, NH (603-466-2727)
Aug 16 - 17 Lehihg Valley, PA (215-559-9595)
Aug 16 - 17 Ottawa, Can (613-594-5268)
Aug 23 - 24 AMC, NH (603-466-2727)
Aug 23 - 24 Ottawa, Can (613-594-5268)
Aug 25 - 26 Conway, NH (603-447-6711)

**Wilderness/Rural EMT Module**
Aug 8 - 12 Conway, NH (603-447-6711)
No 2 - 6 AMC, NH (603-466-2727)
Dec 14 - 18 Conway, NH (603-447-6711)

**Wilderness First Responder Review**
Aug 26 - 27 Outward Bound, ME (800-341-1744)
Sept 9 - 10 Outward Bound, MD (800-341-1744)
Oct 11 - 12 Outward Bound, ME (800-341-1744)

**Wilderness Trauma Life Support**
July 14 - 19 New Brunswick, Can (603-447-6711)

**EMT/WEMT RTP**
Oct 4 - 7 Conway, NH (603-447-6711)
Dec 5 - 8 Conway, NH (603-447-6711)

**NORTH AMERICAN RESCUE INSTITUTE**
PO Box 3150, Conway, New Hampshire 03818
Telephone: (603) 447-6711 Mon-Fri 9am-5pm

July 12 - 13 Flat Water Rescue, Conway, NH
Aug 2 - 3 First 5 Min. for School Bus Drivers, Conway, NH
Sept 6 - 7 High Angle Rescue, Conway, NH
Oct 3 - 5 Adv. High Angle Rescue, Conway, NH
Oct 18 - 19 Off-Highway Vehicle Rescue

**WILDERNESS MEDICINE INSTITUTE**
PO Box 9, Pitkin, Colorado 81241
Telephone: (970) 641-3572, Mon-Thurs 9am-1pm

**Wilderness EMT**
July 28 - Aug 22 Pitkin, CO (970-641-3572)
Nov 24 - Dec 19 Kelly, WY (307-733-4765)

**Wilderness First Responder**
Fall - Albuquerque, NM (970-641-3572)
Fall - Pueblo, CO (zarr@uscolo.edu)
Oct 25 - Nov 3 Vail, CO (970-926-5299)
Dec 1 - 11 Kelly, WY (307-733-4765)

**Wilderness First Aid/WFR Recertification**
Aug 23 - 24 Tacoma, WA (206-554-2171 x 8017)
Oct 4 - 5 Ashland, OR (503-488-1202)
Oct. 11 - 12 Corvallis, OR (541-737-6833)
Nov 15 - 16 Vail, CO (970-926-5299)

**WEMT Module**
Nov 7 - 12 Pitkin, CO (970-641-3572)

**EMT/WEMT RTP**
Nov 14 - 17 Pitkin, CO (970-641-3572)


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WMN

# Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

JULY/AUGUST 1997 ISSN-1059-6518 VOLUME 8, NUMBER 4

# WOMEN'S HEALTH ISSUES

*by Jeanne Twehous, WEMT*

The concept of women in the wilderness is as old as the hills. Though their triumphs and feats of endurance are often not as widely acclaimed as those of the "rougher" sex, women have explored this planet from the rooftop of the world to the depths of the oceans. They have accompanied men on major expeditions and organized and led their own. They have battled with defeats and celebrated successes, and, along with their male counterparts, have been bruised and battered by unmerciful environments indifferent to gender or physiology.

There is no denying that differences exist between the sexes. Men and women were not created equal, superiorities and inferiorities being a matter of perspective and/or circumstance. Women have vastly more complex reproductive anatomies and highly sensitive endocrine systems which make them vulnerable to a number of problems which do not befall men. This article will address some of those differences as well as common maladies that women routinely deal with in the backcountry. Some of these problems develop over time and are more of a concern on long expeditions; others are more frequently experienced by women who spend much of their time outdoors doing strenuous physical activities. Most of the common problems that are discussed can happen on short two or three day trips.

## ENDOCRINE AND GENITOURINARY PROBLEMS

### MENSTRUAL CYCLE DISTURBANCES:

Menstrual cycle disturbances, from physical and psychological stresses experienced by women on wilderness trips, are very common occurrences. While this may be an annoyance on trips of short duration, it can become a health issue on longer expeditions. Amenorrhea especially (the absence of menstrual periods) should be a concern as it signals a state of estrogen deprivation which, over the long term (10 or more years), will lead to a decrease in bone density (osteoporosis), putting women at increased risk for fractures. (Amenorrhea is often seen in highly-trained athletes.) Hormonal therapy such as estrogen and/or progesterone supplements or oral contraceptives will help to regulate menstrual cycles and reduce the risk of osteoporosis.

Dysfunctional uterine bleeding, or unexpected menstrual bleeding with no anatomic cause (such as uterine fibroids or cysts), may also result from hormonal imbalances. Estrogen supplements can help here, as well. Uterine bleeding from ruptured fibroids, ovarian cysts or abscesses, on the other hand, will not respond to hormonal therapy and is a true life-threatening emergency. (Ovarian cysts in and of themselves are not life threatening.)

Another potential health concern unique to menstruating women is anemia. Menstruation is not considered a cause of anemia; instead, it is seen in young women, usually secondary to diet. Monthly bleeding results in lower hemoglobin counts (hemoglobin is the oxygen-carrying part of the blood). Iron supplements can help, as iron is lost through menstrual bleeding and is a necessary component for the production of hemoglobin. Signs and symptoms of anemia are excessive tiredness and fatigability, breathlessness on exertion, pallor, and poor resistance to infection. Considering the demands of expeditions, anemia can constitute a serious health risk for women on extended trips, especially at altitude. (There is some evidence to suggest that women are more susceptible to Acute Mountain Sickness than men [headache, anorexia, nausea, malaise], although the manifestation of pulmonary edema at altitude is less common in women.) During pregnancy especially, women should minimize time spent at altitude as there is a fourfold higher incidence of toxemia noted at high altitude. Pregnancy, otherwise, is not a contraindication for women in the backcountry, in the absence of complications. There is no evidence that exercise during pregnancy is detrimental to the fetus, and pregnant women in the wilderness may perform as well or better than those in a non-pregnant state provided endurance training is maintained throughout the pregnancy. Pre-natal care should be continued as much as possible on extended trips, and it is especially important to monitor blood pressure regularly during the second and third trimesters to watch for pre-eclampsia

(pregnancy-induced high blood pressure) which may progress to more serious complications.

**URINARY TRACT INFECTION:**

Inflammations of urinary tracts (urethra, bladder, ureters), UTIs are more common in women than in men due to poor toilet habits (wiping back to front which introduces fecal bacteria into the urethra) and the relatively short length of the urethra (allowing bacteria a quick access to the bladder).

Signs and symptoms of a UTI can include an increase in the frequency and/or urgency of urination with reduced output; a burning sensation during urination; pain above the pubic bone; cloudy or blood-tinged urine. The primary danger with a UTI is that it can progress to a kidney infection, a potentially life-threatening condition. (Signs and symptoms of kidney infection can include tenderness in the small of the back, pain in the groin area, severe headache, and fever).

Treatment of a UTI includes drinking lots of water to flush out bacteria (helps to prevent UTIs as well); cleaning the perineal area regularly; taking vitamin C supplements and/or consuming foods which can make the urine more acidic (to prevent bacteria from growing) such as whole grains, fruits and nuts. White flours, rice or pastas, and refined sugar may predispose people to infection, and spicy foods such as curry, cayenne, chili and black pepper; caffeine; and alcohol can irritate the bladder.

On extended expeditions, it's a good idea to carry antibiotics for a UTI. Consult a physician prior to departure for an appropriate UTI antibiotic therapy. If the infection persists for greater than 48 hours despite the use of antibiotics, evacuate. Also, evacuate anyone with signs and symptoms of a kidney infection.

**VAGINITIS:**

A common backcountry AND frontcountry malady, vaginitis is an inflammation of the vagina. Infections usually result from decreased resistance of the body to certain microorganisms. These microorganisms are normally present in the vagina but are usually held in check by various defenses, such as *Lactobacillus,* a friendly bacteria that keeps the vagina slightly acidic, inhibiting the growth of potentially harmful organisms. There are three common types of vaginal infections:

1. Bacterial vaginosis, the most common vaginal infection, is caused by an overgrowth of organisms normally found in the vagina or bowel. It may or may not be spread through sexual contact. The main symptom is a thin, gray or milky discharge that has a foul or fishy odor (most pronounced after intercourse). Some itching may occur in the vaginal area

2. Candidiasis (yeast infection) is caused by a fungus that usually exists harmlessly in the mouth, digestive tract, and vagina. Certain factors may upset the balance of organisms and lead to yeast infection (pregnancy, diabetes, obesity, bcp, steroids, antibiotics). According to the US Department of Health and Human Services, 75% of all women will have at least one episode of Candidiasis in their lives and many will have recurrent bouts. The main symptoms are a thick, cottage-cheesy discharge with itching and burning of the vagina. Painful urination and intercourse are also common.

3. Richomoniasis, caused by a parasitic protozoa, occurs in both men and women. It is usually spread through sexual contact but can, in some instances, be transmitted through washcloths, wet towels, or bathing suits. Typical signs and symptoms are a profuse gray or yellow-green discharge with a foul or fishy odor. There is usually some itching and inflammation of the vaginal area, and there may be burning during urination.

A variety of factors can alter the vaginal environment and make it the perfect setting for malicious microorganisms to set up shop. These include taking birth control pills or antibiotics; changes in vaginal tissues caused by menopause; a diet high in sugar, caffeinated beverages, and /or alcohol; stress—both physical and emotional; damage from prolonged or frequent intercourse or tampon use; diabetes. Also, some women are just more predisposed to vaginitis than other women.

In the backcountry, improper hygiene is often the source of vaginitis: not cleaning the perineal area regularly, not changing underwear regularly, wiping from back to front after a bowel movement, or wearing a wet bathing suit or shorts for prolonged periods of time.

Treatment in the field is aimed at restoring the pH of the vagina. The patient can douche with plain, disinfected water or a povidone iodine solution (2 tablespoons per liter) ideally in the morning and evening at onset of infection. On extended trips, or for women with a history of vaginal infections, you may want to bring an over-the-counter anti-fungal cream (generic name—miconazole; brand names—Monistat, Gyne-Lotrimin, etc) for the yeast infections and a prescription oral antibiotic (metronidazole) for the non-yeast varieties. Also, garlic as a suppository in the vagina (crushed and wrapped in gauze) has been suggested but there is no evidence to support or refute this application. Plain yogurt in the vagina has also been recommended for yeast infections by some gynecologists. (Keeping yogurt from spoiling on some trips would be a real challenge.)

If the treatment given doesn't provide relief in 48 hours, the patient needs to be evacuated as the infection may develop into something more serious such as Pelvic Inflammatory Disease (PID).

The best prevention for all vaginitis is to stay well-hydrated; decrease sugar, caffeine, and alcohol intake; wear cotton underwear and loose-fitting clothing to allow air to circulate which discourages bacterial growth; wash the perineal area daily; change tampons regularly; and decrease stress.

PELVIC INFLAMMATORY DISEASE:

An inflammation of the reproductive organs (fallopian tubes, ovaries and/or uterus), PID is one of the most common infections in women (in the US there are approximately 1 million cases a year with about one quarter of those requiring hospitalization). It is also one of the most common sources of abdominal pain among women of reproductive age and occurs almost exclusively in sexually active women. Most prevalent in women under 30, it peaks in women between the ages of 20-24. Although it is primarily caused by sexually transmitted microorganisms such as gonorrhea and chlamydia bacteria, PID can be caused by staphylococcus or streptococcus bacteria as well.

Signs and symptoms appear during or immediately after the menstrual period and begin as an achy, crampy, diffuse pain in the middle of the lower abdomen, developing gradually into a constant ache. The patient may also complain of pain in the upper right quadrant of the abdomen (due to bacterial irritation of tissues surrounding the liver), as well as lower back or leg pain. These complaints are usually accompanied by flu-like symptoms such as fever and chills, nausea and/or vomiting, diarrhea, and fatigue. The patient may have a watery, foul-smelling vaginal discharge. She may complain of irregular bleeding, an increase in menstrual cramps, or bleeding during or after intercourse. Some women develop acne-like rashes on the back, chest, neck, or face.

Field treatment for women experiencing PID is evacuation (and antibiotics) as PID left untreated can lead to peritonitis (inflammation of the abdominal lining) and possibly scarring of the fallopian tubes which can result in sterility and even death. It also increases the potential for ectopic pregnancy in the future. Risk factors include frequent sex with multiple partners, use of an IUD (intrauterine device), and a previous history of PID.

TOXIC SHOCK SYNDROME:

TSS is an infection caused by the bacterium *Staphylococcus aureus*, a bacteria often present—and harmless—on the skin but dangerous when it enters the bloodstream. Tampons have been suggested as one of the possible causes of Toxic Shock Syndrome (TSS). Super absorbent tampons that dry the vagina or cause blackflow of blood into the peritoneal cavity may predispose women to TSS. The highest incidence is reported in 10-30-year-old menstruating white females.

TSS commonly presents with sudden onset of general flu-like symptoms—high fever, chills, muscle aches, abdominal pain, vomiting, diarrhea, fatigue, dizziness and/or fainting, sore throat, and a sunburn-like rash. In some people the onset may be gradual, and the characteristic rash does not appear for 1 or 2 days. The rash appears on the palms of hands or all over body and typically peels, like a sunburn, one to two weeks later. Mucus membranes are beet red.

Field treatment for TSS is to remove the tampon, if present, and treat for shock. Evacuation is critical as this is a life-threatening condition. Antibiotic therapy should be started immediately.

Proper hygiene in the backcountry can go a long way towards prevention of TSS—change tampons frequently (every few hours) and use pads at night and on low-flow days. The staph bacteria is often found on hands, so wash thoroughly prior to inserting tampons. If a patient has had TSS previously, there is a 30% chance of recurrence. Fortunately, modern improvements in tampons have helped to correct the problem, and incidences of TSS are becoming extremely rare.

ECTOPIC PREGNANCY:

Ectopic literally means "occurring in an abnormal position," and an ectopic pregnancy is any pregnancy that occurs outside of the uterus—most commonly in the fallopian tubes (95% of ectopic pregnancies are "tubal" pregnancies). Due to congenital anomalies or scarring caused by infections or abscesses, the fertilized egg begins to grow in the tube. Ectopic pregnancies are on the rise and account for 1.4% of all pregnancies. They are also the most common cause of maternal death in the first trimester.

Some time between the fifth and sixth week after the last menstrual period, the patient will experience abdominal pain and bleeding. The pressure exerted on the wall of the tube (or elsewhere) by the embryo causes crampy and intermittent, unilateral lower abdominal pain. As the embryo becomes too large for the tube, it may rupture or the embryo may be aborted out the fimbriated (open) end of the tube. Both scenarios produce abrupt agonizing pain that is localized and constant. The pain may also radiate to the shoulder due to diaphragmatic irritation from intraperitoneal bleeding. Shoulder pain indicates a large volume of blood in the peritoneal cavity and shock may develop rapidly, although slow bleeding is more common with ectopic pregnancies. Sixty-five percent of patients will have vaginal bleeding as well as the intraperitoneal bleeding. (The vaginal bleeding comes in part from the shedding of the uterine lining as the embryo is disrupted from the site of implantation and ceases the production of hormones. Vaginal bleeding may be slight or considerable and is no indication of how much blood has been lost internally.)

Ectopic pregnancies are life-threatening emergencies, and any women of child-bearing age complaining of acute abdomen should be evacuated. Treatment for shock is essential.

Risk factors include previous ectopic pregnancy, use of an IUD, history of PID, abdominal/pelvic surgery.

## ENVIRONMENTAL CONCERNS

When it comes to weathering the elements, women fare just as well as—and in some circumstances better than—their male counterparts. According to Joseph Mortola and Gunhilde Buchsbaum in *WILDERNESS MEDICINE, Management of Wilderness and Environmental Emergencies*, women adapt more easily to hot, wet environments than do men of equal

size and fitness because of their generally lower sweat rate. Less sweating reduces a woman's risk of dehydration. Conversely, in a hot, dry environment, men's higher sweat rate is more advantageous where perspiration decreases the risk of hyperthermia. But once acclimated to dry heat (a two-week training period in hot, dry weather will provide sufficient acclimation), females can substantially increase their sudorific (sweat) response.

Women in cold environments adapt better, on average, than men—possibly due to their thicker subcutaneous fat layer. Their lower muscle mass (relative to males) decreases insulation somewhat but may be disadvantageous only in extreme low temperatures. Also, it has been found that exercise performed during cold exposure is more effective in maintaining body heat in women than in men.

One area where women are more susceptible to cold injuries than men is with Raynaud's Disease. Raynaud's is a hypersensitive vasoconstriction response of the peripheral vessels to cold or decreases in temperature. Vessels in hands and/or feet clamp down more tightly, more quickly, and, take longer to open up in someone with Raynaud's than in someone experiencing a normal vasoconstriction response. Though men can have Raynaud's, it is most common in women, especially between the ages of 15-45. In and of itself, Raynaud's is not a major health concern, but the condition may predispose one to frostbite in freezing environments. (Note, however, that extreme cold is not necessary to bring on the Raynaud's response; a significant drop in temperature [e.g., 70-50 degrees F], even in temperate environments, may precipitate Raynaud's.) Signs and symptoms of Raynaud's are similar to incipient frostbite—affected parts (fingers and/or toes) are white and waxy in appearance (usually with a clear line of demarcation), and there is a feeling of numbness or loss of sensation. Keeping extremities and the torso warm and dry will help to prevent episodes of Raynaud's, but treatment consists of one of two methods: (1) Pharmacological therapy (sympatholytic agents and calcium channel blockers) has been shown to give positive results in about 50% of affected patients; (2) A Pavlovian-type therapy is aimed at reconditioning the body to respond differently to cold environments or to significant drops in temperature. The training consists of immersing one's hands in warm water, first in a warm indoor setting for 2-5 minutes and then in a cold environment for 10 minutes, followed by a final immersion indoors for 2-5 minutes. This procedure needs to be repeated 3-6 times a day every other day for a total of about 50 trials. Though somewhat time intensive, this technique has been proven to be effective and results can last for a number of years.

Another environmental health threat, whether in a hot or cold environment, is direct exposure to the sun. Radiation from the sun can pose long-term health problems in the form of skin cancers. This holds true for both men and women, but studies show that from the ages of 20-39, women develop melanoma (the rarest but deadliest of skin cancers) up to twice as often as men. It is the most common cancer for women in their late 20s and second only to breast cancer in 30-34 year-old women. Why is skin cancer more common in young women? According to Allan Halpern, MD (Chairman of the Skin Cancer Screening Program Task Force of the American Academy of Dermatology) young women—unlike men—*work* on getting tans. That means more exposure to harmful UVA and UVB radiation (whether from the sun or from tanning booths)—a direct link to skin cancer. Also, more women are doing high-altitude mountaineering these days where UV radiation is increased due to the thinner atmosphere and there is more reflection of harmful rays from the snow.

Obviously, prevention is the best defense against skin cancer and that means decreasing exposure—especially when the sun is the strongest (between 10 a.m. and 4 p.m.). If you must be in the sun, use a sunscreen with a Sun Protection Factor (SPF) of at least 15, applying it at least 30 minutes before going out, and use sun block (zinc oxide) on lips, nose, and other sensitive areas. Also, cover up with tight-weave clothing of thicker fabrics and darker colors that afford the most protection (the average cotton t-shirt offers an SPF of only 6-9 and only 3 when wet). Wear hats with brims and sunglasses with UV protection. And remember: early detection is important in treating all types of skin cancer, so watch for changes in the size and shapes of moles and birthmarks, which can be early indicators.

Another environmental concern that has been raised regarding women in the backcountry is the association of animal attacks with menstrual blood—specifically bears and sharks. More than a few women have been cautioned against going into bear country during their period. However, there is no evidence to prove or disprove the association. Certainly, bears that are provoked, startled, or hungry are more inclined to attack, but the odor of blood *may* attract a variety of animals, including bears. Therefore, appropriate hygiene and disposal practices in the backcountry are recommended. Tampons/napkins should be placed in sealed zip-lock bags (an aspirin or two thrown in can help dissipate the odor) and stored away from camp or burned in a very hot fire. (Better to be safe than to be somebody's statistic).

Consider "Jaws," on the other hand . . . . The great white shark—the most dangerous of sharks and one commonly associated with human attacks—is indeed quite adept at honing in on blood. It can detect blood in water at one part per million—which makes *any* open wound a risk factor in shark-infested waters. Indeed, swimming at all in shark-infested waters—with or without open wounds or menstrual flow—is probably not the best way to spend your vacation.

## GYNECOLOGICAL PREPARATION

To help ensure a safe and healthy trip, any woman considering a strenuous, extended expedition, should consider the following before departure:

1. A pregnancy test should be taken. If a woman is pregnant with no contraindications, there is no reason she

should not go on the trip provided the fetus is clearly demonstrated (by ultrasound) to be intrauterine and at least 8 weeks gestational age (earlier than that carries a 25% chance of miscarriage).

2. Hormonal contraception is recommended (oral, injectable, or indwelling— pill-less, however, can cause uterine bleeding) both for the prevention of pregnancy on the trip (any pregnancy remote from medical care carries risk for both the fetus and the mother) and for the prevention of irregular, dangerous, and difficult to diagnose uterine bleeding.

3. A gynecological exam should be done to detect preventable difficulties such as uterine fibroids (that could result in profuse and hormonally unresponsive bleeding) and cysts that may be inclined to rupture during strenuous exercise.

Since there are gender-specific concerns for women in the backcountry on extended trips, it is a wise idea to carry first aid supplies specific to treating those problems. Below is a recommend list from Mortola and Buchsbaum in *WILDERNESS MEDICINE, Management of Wilderness and Environmental Emergencies:*

## FEMALE FIRST AID KIT

- Acetaminophen--for cramps associated with dysmenorrhea
- Trimethoprim-sulfamethoxazole--for UTIs (contraindicated for those with sulfa allergies)
- Metronidazole (Flagyl)--for vaginitis (non-yeast)
- Miconazole antifungal cream (Monistat, Gyne-Lotrimin)--for vaginitis (yeast)
- Estrogen--for irregular vaginal bleeding, non-pregnancy related
- Pregnancy test kit

## RESOURCES:

**EMERGENCY CARE IN THE STREETS**, 5th edition; Caroline, Nancy, MD; Little, Brown & Co.; 1995

**EMT: PREHOSPITAL CARE**; Henry, Mark, MD & Stapleton, Edward, EMT-P; W. B. Saunders Co.; 1992.

**HUMAN ANATOMY & PHYSIOLOGY**, 3rd edition; Marieb, Elaine, RN, PhD; Benjamin/Cummings Publishing Co., Inc.; 1995

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**WILDERNESS MEDICINE: MANAGEMENT OF WILDERNESS AND ENVIRONMENTAL EMERGENCIES**, 3rd edition; edited by Auerbach, Paul, MD, MS, FACEP; Mosby (Times Mirror); 1995

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***Editor's Note:** Jeanne Twehous is a freelance writer who has published articles in* Backpacker, Family Camping, Walking *and* AMC Outdoors. *Jeanne divides her time by teaching wilderness and emergency medicine classes with SOLO in Conway, New Hampshire and leading trips for the Appalachian Mountain Club. She is an active member on the Bartlett/Jackson Ambulance Squad and in the Mount Washington Valley search and rescue community.*

## YOUNG LOUDS AND FIRE

***by Buck Tilton***

You imagine, when you talk with Holly, when she speaks in her matter-of-fact tone, in her confident and easy manner, that she would be calm "under fire," someone you'd want on your side when things got hot. And you would, I have decided, be correct.

On the Fourth of July, 1987, Holly was co-leading a group of ten 14- and 15-year-old females, and they had set a camp in the woods in the vicinity of Sebago Lake in Maine. Although the morning had been bright and beautiful, storm clouds shadowed the site as dinner water neared boiling on the Peak One stove. Holly wore cotton shorts and a T-shirt.

When the water bubbled furiously, the other instructor moved the pot, a large one, to a rock and turned hurriedly away, knocking the pot to the ground. Most of the scalding liquid landed in Holly's lap. Some of it splashed onto the lower legs of the second leader who immediately began to scream in pain and fright. Panic swept the group, and Holly's attention was diverted to settling the young women down and managing her co-leader's burns. "It was three minutes tops," says Holly, "until I noticed I was soaked in steaming water from my waist to my knees." Those three minutes proved critical.

She rapidly stripped off all her cotton clothes . . . "death cloth" she now calls it. Intense heat had been trapped against her skin, the burning process penetrating deeper and deeper. The only cold water in camp was in water bottles, water which she first began to pour on her abdomen and thighs, then used to wet bandannas that were placed on her burns. Holding the bandannas as best she could, Holly, followed by the entire group, hiked to the lake and a private campground where she walked into the shower room and stood for an hour under the cold water. Great boggy blisters filled on her lower body around pale areas that continually weeped clear fluid.

Someone dialed 911 from the camp office, but the storm had broken in summer fury, flooding the roads and blowing trees to the ground. The ambulance arrived in gushing rain two-and-a-half hours after the call. In that time Holly felt "more pain than I can remember," but the group demanded her care, and she gave it. When the ambulance pulled away with both the burned women, Holly had shifted management of the group to the camp's director.

Approximately seven hours after the incident Holly arrived at the nearest hospital. The hospital staff gave their immediate attention to the second instructor, the one "obviously" in pain and distress. Holly's quiet lack of complaint relegated her to a room for observation and later treatment. After three days, she says, "the lower front of my body looked like leather and steady doses of morphine failed to keep the pain away." She had burns to the second and third degree over approximately 15 percent of her body. It was almost three weeks before she left the hospital. The co-leader went home long before Holly.

Scalding hot liquids and erupting flammable fuels produce the majority of serious wilderness burns. Burns from campfires, hot cooking gear and stoves typically cause minor injuries requiring little care. The Wilderness Medical Society Practice Guidelines for Wilderness Emergency Care (ICS BOOKS, Inc., Merrillville, IN, $12.95) says initial burn care, despite the seriousness, should be directed toward stopping the burning process, "within 30 seconds, if possible." Cool the burn with water. Remove clothing and jewelry from the burn area. Do not try to remove anything stuck to the burn. Check the patient for injuries that might have occurred in addition to the burn.

How long does the cooling process take? No definitive answer exists. As long as cool water makes the patient feel better, and hypothermia is not a threat, you can keep the water flowing for up to two hours. "Trust me," says Holly, "every little bit helps."

After cooling, burns should be assessed in three ways:

1. Depth. First Degree burns are superficial damage to the epidermis, look red and feel painful. Second Degree burns are partial thickness burns of the dermis (the true skin), forming blisters in addition to redness and pain. Third Degree injuries penetrate the full thickness of the dermis, produce no blisters, and look pale (scald burns) or charred (burns from other high-heat sources). Third degree burns may not cause pain themselves, but they will be surrounded by areas of intense pain. Burns are often a combo of one or more depths, and it may take time, an hour or more in some instances, before you can judge the depth of the burn. The greater the degree of damage, naturally, the greater the need for professional medical attention. "All burn wounds are sterile for the first 24 to 48 hours," says the Practice Guidelines. But infection almost invariably results eventually without professional care to deep burns.

2. Extent. To determine the amount of the patient's body surface area that has been burned use the Rule of Nines. Each arm represents nine percent of the total body surface area (TBSA). Each leg represents 18 percent (nine for the front, nine for the back of the leg), the front of the torso represents 18 percent, the back of the torso 18 percent, the head nine percent and the groin one percent. First degree burns are easily managed no matter their extent. Second and third degree burns covering more than 15 percent TBSA are often life-threatening and require immediate evacuation. Serious degree burns to the face may cause airway damage, and should be considered for immediate evacuation. Third degree burns to the hands, feet or genitals require professional attention as soon as possible.

3. Pain. The patient's level of pain will help you evaluate the seriousness of the burn. Pain should resolve within 24 hours for first degrees burns. Deeper burns will cause increasingly severe pain. If the pain can be controlled in the wilderness, the burn can often be managed in the wilderness.

After cooling and assessment, your wilderness care should be directed toward keeping the wound clean and reducing the pain. Dirty burn wounds should be washed with great gentleness, tepid water and mild soap. After washing, pat the wound dry. To protect burns and ease the pain, leave the blisters of second degree burns intact. If the blisters pop while a physician is still far away, or if you're dealing with third degree burns, you can do one or more of several things: (1) Cover the burn with a thin layer of antibiotic ointment. (2) Cover the burn with Water-Jel™ (pain-relieving gel or gel-soaked dressings), Spenco 2nd Skin™ or Nortrade's Burnfree™ dressings. (3) Cover the burn with dry gauze or clean dry clothing. Covering burns reduces pain and evaporative fluid losses.

Do not use an occlusive dressing, one that prevents all air or water from passing through. Do not place ice on large burns.

When the trip to the doctor will not be a long one, do not re-dress or re-examine the burn. If evacuation will take more than a day, change the dressings at least once a day: remove old dressings, remove old ointment (you may have to gently wash off old ointment with tepid water) and re-apply fresh ointment and dressings.

Serious burns will swell and, when possible, such as burns to arms and legs, the extremities should be elevated to minimize swelling. Burned patients should gently and regularly exercise burned body areas as much as they can tolerate.

"Ibuprofen," says the Practice Guidelines, "is probably the best over-the-counter analgesic for burn pain (including sunburn)."

Burned patients should be encouraged to drink as much water as they can during the entire evacuation process.

After leaving the hospital Holly began a six-month-long regimen of smearing on aloe and vitamin E oil three to four times every day and exercising often in order to heal better with less scarring. She is still, she says, "very sensitive to hot and cold water and direct sunlight."

I wanted to know what Holly thought was, as a professional care provider, the most important lesson she'd learned from her accident.

"The loudest patients," she said without hesitation, "are usually hurt the least."

## ASK THE EXPERTS...

**Should an attempt be made to reduce hip dislocations in the field?**

**Wilderness Medicine: Management of Wilderness and Environmental Emergencies, Third Edition** states, "If it will be more than six hours before the victim can be evacuated to a definitive care center, closed reduction (of the hip) should be attempted." Edward L. Farrar, MD, an orthopaedic surgeon, offers a less specific time line: "Generally a classic posterior dislocation a long way from medical care should probably be reduced." Joseph Serra, MD, an orthopaedic surgeon and contributor to the Wilderness Medical Society Practice Guidelines provides more aggressive advice: "Forget the possibility of an associated fracture and go for a reduction (of the hip)." The Practice Guidelines flatly state: "It is important to diagnose and reduce a dislocation quickly after it occurs." (Note: Serra's technique is described in **Medicine for the Backcountry, Second Edition.)** As **Wilderness Medicine** continues: "If this maneuver fails to reduce the hip, evacuation must be expedited because there is a direct relationship between the time to reduction and the incidence of osteonecrosis of the femoral head."

**Editor's Note:**
There was a slight "typo" in our last edition that many of our readers brought to my attention. The cost of the Wilderness Medicine Trek to Nepal is actually $1950.00. We accidently listed the course cost at $195.00— who wouldn't go at that price! Sorry.



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*Wilderness Medicine Newsletter*

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WMN

# Wilderness Medicine Newsletter

FOR THE RECOGNITION, TREATMENT, AND PREVENTION OF WILDERNESS EMERGENCIES

SEPTEMBER/OCTOBER 1997 ISSN-1059-6518 VOLUME 8, NUMBER 5

# WATER, WATER, EVERYWHERE AND NOT A POTABLE DROP TO DRINK

*By Frank Hubbell, DO*

Over the past several decades there has been a dramatic increase in individuals and groups taking advantage of the great outdoors— hiking, climbing, camping, paddling, and mountaineering, just to name a few outdoor activities. More recently, there has been an explosive growth in international adventure travel. Conservative estimates state that there are over 300 million international travelers per year, some on business and many on holiday. It is also estimated that the international tourism portion of those travelers generates an excess of $100 billion annually. A rapidly growing part of international tourism is adventure travel and ecotourism, marked by trips that are more and more frequently taking tourists to the wonderfully lush and diverse tropical and remote regions of the world— a world that is rich with life and biodiversity with a wide variety of beautiful birds and colorful plants, as well as venomous snakes and disease-spreading insects.

It is extremely rare that a person becomes a meal for a lion, tiger, or bear. But it is very common for people to become the unintentional home for microscopic parasites that "worm" their way into our intestinal tracts through our consumption of contaminated food or water. These uninvited guests can potentially cause serious disease or illness which can last years or may even cause death. Crystal clear water in any part of the world that appears deceptively refreshing and inviting can be full of microscopic parasites waiting to make you part of the food chain. (Keep in mind one of the single most important rules in life: To survive and thrive, you have to remain at the top of the food chain.)

If you are an outdoor enthusiast, adventure traveler, or a trip leader, there are a few essential principles that you need to understand in order to properly take care of yourself or your people. Not only do you and/or your charges need to have a good time and perhaps learn a great deal, you also need to go home as you've arrived without carrying any alien species in their gut. Having been at the top of the food chain, everyone needs to return home still on top of the food chain, not part of it.

There are a wide variety of parasitic organisms around the world that can be spread by eating contaminated food, being bitten by blood-sucking insects, or even from walking barefoot on the ground. But, by far, one of the easiest and most common ways to become sick is from drinking contaminated water.

A parasite is an organism that lives in or on another living organism at that other organism's expense. Parasites that proliferate in the small and large intestine are referred to as "enteric pathogens" ("enteric" for in the bowel and "pathogens" for disease-causing). A simple example is *Giardia lamblia*, a very common parasitic protozoa found in fresh water throughout the tropical, subtropical, and temperate parts of the world. If you drink Giardia-inhabited water, you will open the door to this parasite. Taking up residence in your small intestine, the "bug" will begin to multiply while consuming nutrients from your bowel. Eventually this will result in diarrhea and abdominal pain.

Common parasites, besides *Giardia lamblia* (giardiasis), that can be obtained from drinking water are *Entamoeba histolytica* (amoebic dysentery), Hepatitis A virus (hepatitis), and Cryptosporidium, to name just a few. What all of these have in common is their ability to ruin someone's trip by causing gastrointestinal upset, abdominal cramps, and diarrhea. Individuals (and possibly their travel companions) are not going to enjoy their travel experience if they cannot venture more than 10 feet from the bathroom. While it is not your

responsibility to be able to describe and identify the parasitic organism in a stool sample, it is your responsibility as a traveler or adventurer to know how to prevent this from occurring.

"An ounce of prevention is worth a pound of cure"... and two rolls of toilet paper. Prevention of water-related illness and disease is achieved by understanding what is safe to drink and not to drink and knowing how to produce safe potable water.

We first need to dispense with several myths and *state the facts about drinking water*:

Myth #1 *Crystal clear water is generally safe to drink.*

Fact: Cool, clear water may appear pure and potable, but it can still contain a variety of microscopic protozoa and other parasites that will cause disease.

Myth #2 *Freezing will kill these organisms.*

Fact: Giardia, for example, can survive frozen in ice waiting to be dropped in your margarita, for up to 90 days. These microscopic organisms, which are actually protozoa, exist in two states: one, the motile form (a trophozoite) that proliferates in the bowel and causes the symptoms of the disease; the other, a cyst form, that the organism assumes when it finds itself in a hostile environment, such as cold or dry or acid like the environs of your stomach. The cyst form, the form in which the disease is usually spread from one person to another, protects the organism from freezing— thus, its ability to survive in an ice cube, in your margarita, and in your stomach. Passing unscathed through your stomach, giardia will change back into the motile form, the trophozoite, and proliferate, causing the disease giardiasis.

Myth #3 *Drinking alcohol, ethanol, will kill most of these organisms.*

Fact: Just as with freezing, the cyst form of the organism protects the organism from the toxic effects of the alcohol. So, adding tequila to everything you drink will not sterilize the fluid or protect you from the organism.

Myth #4 *Bottled water and drinks are always safe to consume.*

Fact: Bottled and canned carbonated beverages are pasteurized to preserve them and increase their shelf lives. As such, these beverages are, therefore, potable. Bottled water, with the factory seal still in place, is also safe. But, be sure to check the factory seal; if it is broken, the bottle may have been refilled with suspect water. (Milk and other dairy products vary in potability because of the differences in pasteurization processes.)

Myth #5 *Water served in a "good" restaurant or in a five-star hotel is always safe.*

Fact: The sanitation standards vary around the world, and may not be up to our American standards. Even beverages or ice served in the most expensive eateries may not be safe.

Water is not something that you can go without for very long, especially in the hot tropical environment where the average individual will lose up to 1 liter of fluid per hour sweating in a effort to stay cool. Individuals, trip leaders, and international guides not only need to understand what is safe and what is not safe to consume, but, more importantly they must know how to make pure drinking water and potentially how to make a lot of it.

There are three effective ways to purify water: boiling, filtering, or chemical disinfection. Each method can be used in remote and wilderness settings, and each method is completely effective, if done properly. Which method is used depends upon the setting and resources available.

**BOILING:** At sea level water reaches a rolling boil at 212 degrees. There is not a single disease-producing organism on the planet earth that can survive that temperature. So, by simply bringing water to a rolling boil, the water is now safe to consume. The problems with boiling water are that it requires a source of heat; it is hard to do in large quantities; boiling is time-consuming; and, probably the biggest issue, it is now in the form of hot water, which is great for tea and coffee in cooler climes, but may not be very refreshing in the heat of the tropics. If the now sterile water is allowed to stand and cool, it must be kept covered to protect it from possible contamination. This method will work extremely well on any source of fresh water, but boiling requires the right equipment like a container in which to boil the water and a significant source of heat. Having a large enough container or adequate fuel makes this method very difficult with groups that require a lot of potable water.

One of the tricks, though, with preventive medicine is getting people to take certain measures. Steps or procedures have to be relatively quick and easy to do. Both filtering and chemical disinfection are quicker and easier than boiling, and, if done properly, just as effective.

**FILTERING:** Filters contain small holes known as pores that are so small that the dimension of the hole is measured in microns. (A micron is 1/1000th of a millimeter or one millionth of a meter.) Water is able to flow through even the smallest pore, but the invisible enteric pathogens, the viruses, bacteria, and protozoa, that cause disease have dimension. If the pore is small enough, a pathogen will not be able to get through.

A pump filter, the most common type of system used in portable water purification systems (another type is gravity-feed), works by drawing in the bad water, forcing it through a filter to remove the pathogens, and producing potable water. There are many different commercial filtration systems, most of which work as advertised. Their differences and drawbacks are ease of operation, taste of filtered water, and expense. Several are efficient, easy to use, and their safety is well-documented.

The Swiss-made Katadyne filter, for example, has been around for years. It consists of a 0.2 micron ceramic filter impregnated with silver to decrease bacterial growth. This system is very effective and time-tested, does not add any taste to the water, and the filter is easily cleaned. But, the Katadyne system itself is relatively expensive; replacement filters are pricey; and it can be laborious to use with large groups.

The Pur company makes a variety of effective filters. For groups, their Explorer is one of the finest on the market. It uses the technology of a 1 micron filter impregnated with an iodine resin to kill any small viruses or other pathogens that made it through the pores. The system produces biologically safe water with a minimal effort, but it can add a slight iodine taste to the water.

Several other very effective filtration systems include the SweetWater, MSR Waterworks, Basic Designs Ceramic Filters, and General Ecology First Need. Which system is selected depends upon the specific needs and the group size. The important point is not which filter is chosen, but rather, that a system of water purification is consistently used.

**CHEMICAL DISINFECTION:** Chemical disinfection works by adding a compound to the water that will kill all the pathogens in the water but which is relatively harmless to us if used properly. Chemicals typically used are iodine and chlorine. To be used properly the concentration of these "cidal" or killing compounds must be great enough to kill the disease- producing organism but low enough to be harmless to us.

Iodine and chlorine are both very effective, easy to use, and available in pre-measured, pre-packaged, user-friendly systems. Their primary disadvantage is taste: both will add a taste to the water, but this tainted taste is easily masked with another flavor (lemonade crystals, for example). The trick with these compounds is that they have to be used properly. First, they must be used in correct concentrations and, second and most importantly, they have to have a sufficient "contact time" for the toxins to work and destroy all the pathogens.

Easy-to-use, commercially available products are Potable Agua iodine tablets and Polar Pure iodine crystals, both designed to be added directly to 1 liter of water. These may be difficult to use for large volumes of water, such as for a group, but individuals should carry them to produce their own potable water supply when necessary. For groups it may be most effective to use concentrated iodine or chlorine bleach solutions. Both are safe, but it is critical to know exactly how much to add to be effective without being toxic to humans.

As stated earlier, which system or technique is used is not important, as they are all very effective. What does matter is that the traveler, trip leader, or guide assumes the responsibility of assuring that ample, safe, potable water is available. An individual becoming ill or returning home with enteric pathogens will not have fond memories of the trip and may have ruined the experience for others in the group. An individual coming back from a guided trip with a waterborne illness is additionally evidence of a leadership problem and presents a liability exposure. As an individual you have a duty to protect yourself; as a trip leader or guide, you have a duty to protect your clients. So, despite the availability or lack of availability of this "elixir of life," the ultimate challenge for travelers or trippers with water is ensuring that the water supply is adequate and safe.

*Editor's Note: Franklin R. Hubbell, DO is the Executive Director of SOLO, a school that offers a variety of intensive programs to train individuals in the applications of wilderness emergency medicine, leadership, and emergency care in remote settings including specific courses for international trip leaders and guides. He is also the Vice President of GEOMED, a non-government organization dedicated to helping develop grassroots sustainable health care in underdeveloped countries.*

## TICK-BORNE DISEASES: AN OVERVIEW

*by Keith Conover, M.D., FACEP,*
*WEMSI Medical Director*

*Adapted in part, with permission, from materials of the Wilderness EMS Institute*

Several years ago, I was involved in a summer search in Virginia - hot and sweaty. I can still distinctly remember a large group of us stopping for dinner at the Lord Hardwicke's on US 29 just north of the University of Virginia for dinner. While we were eating dinner, I gradually started feeling a pain in the back left part of my scalp. I scratched at it and seemed to accidentally pick off a little scab - didn't think much about it; but about halfway through dinner, I started feeling warmth and swelling in the back left part of my neck - and when I felt my neck, I could tell there was some swelling in the lymph nodes there. Hmm, I said to myself, must be getting some cellulitis (skin infection) from that scratch on my head. I went out to my car and got some bacitracin ointment for the place on my scalp, and some antibiotics (I had some samples of something called Duricef similar to the common antibiotic Keflex) and started taking them. Over the next week or two the lump on my scalp was slow to heal, and the lymph nodes in my neck continued to be swollen and warm - they didn't actually go away until I gave up on the Duricef (and started taking another antibiotic called doxycycline). It was only when I sat down to work on an earlier version of this article that I suddenly stopped, hit myself in the head with the palm of my

hand, and said out loud (to myself), "You idiot, this wasn't cellulitis, this was _____! And if you'd figured this out in beginning, you'd have started doxycycline instead of Duricef (and wouldn't have had a pain in the neck for two weeks!" I will say that it made tick-borne disease much more interesting to me. What did I have? Read the information below and see if you can figure it out.

Many diseases may be spread by ticks. For instance, North Asian tick typhus, Mediterranean spotted fever (Mediterranean area, South Africa, and India), and Queensland tick typhus (Australia) are all similar to Rocky Mountain Spotted fever, and transmitted by tick bites. In the U.S., relapsing fever is found on the North Rim of the Grand Canyon and some caves in the Southwest. However, our discussion here will be limited to those tick-related problems that are widespread in North America, and thus likely to be encountered by those doing wilderness hiking, especially in the Appalachians: RMSF, Lyme Disease, tularemia, and tick paralysis. The only way to get Rocky Mountain Spotted Fever, Lyme Disease, or Tick Paralysis is from a tick bite; by avoiding tick bites, you can avoid these diseases.

## Rocky Mountain Spotted Fever (RMSF)

***RMSF Background:*** Rocky Mountain Spotted Fever is an infectious disease transmitted by the bite of certain ticks. It is caused by Rickettsia rickettsii, and is transmitted to humans only by the bite of certain ticks. Contrary to its name, Rocky Mountain Spotted Fever is much more common in Virginia and North Carolina than in the Rocky Mountains, although it is found throughout most of the U.S. Ninety-five percent of cases occur in the warm months between April and September (when people and ticks are in the woods together). RMSF is most common in children and wilderness travelers. In 1990, 651 cases were reported in the U.S.

***RMSF Course:*** The normal course for RMSF is about two weeks of severe illness. It is, as the name would lead you to suspect, characterized by a spotty macular rash - (Macular refers to a rash in which you can see small spots, but cannot feel them as compared to papular, which is a rash with palpable bumps.) - a non-palpable, red rash* and high fever. However, the classical syndrome is not all that common: sudden onset, high spiking fever, severe headache, myalgias (muscle aches), weakness, and a rash beginning on the extremities, including palms and soles, then spreading to the trunk. Often, the picture is confused by gradual onset, nonproductive cough, nausea, vomiting, diarrhea, and abdominal pain; a significant minority of patients never notice a rash. Anyone with sudden fever and rash should get medical evaluation without delay, as RMSF and related diseases may be fatal.

***Recognition of RMSF:*** RMSF is not likely to occur while a hiker is still in the wilderness: the incubation period is two days to a week. However, those involved in outdoor recreation, especially in the mid-Appalachian region, are more likely to contract the disease than others. If someone who was in the mid-Appalachian woods a week ago develops symptoms of RMSF, especially someone who had a tick attached, get him or her to a physician immediately, and mention the possibility of RMSF.

***Treatment of RMSF:*** If a hiker may have RMSF, and it will be a long time until he or she will reach medical care, the antibiotics tetracycline or doxycycline are the usual treatment. DON'T give sulfonamide antibiotics such as sulfamethoxazole/trimethoprim (e.g., Bactrim), as they might make the disease worse. [1]

## Lyme Disease

***Lyme Disease Background:*** Lyme Disease is yet another infectious disease transmitted by the bite of certain ticks. Named after the Connecticut town where the disease was first discovered, it is the most common tick-borne infection. In 1989, 8333 cases were reported. It is caused by bacteria called spirochetes (because they look like little spirals under the microscope), Borrelia burgdorferi. The immature deer ticks (Ixodes species) that transmit Lyme Disease are very common in some areas; it is said that well-tended lawns in Westchester County, NY, average one infected tick per square meter. These ticks are small, about the size of a pencil point. Like RMSF, Lyme Disease is transmitted by the bite of a particular kind of tick. Unlike RMSF, it has a longer and more drawn-out course, and can cause chronic disease.

***Lyme Disease Geographic Area:*** Lyme disease centers in the the mid-Appalachians and is found primarily in the Northeast and northern Midwest of North America and as far south as North Carolina. It is also found along the Pacific coast as far north as British Columbia. Lyme Disease is also found in Asia, Scandinavia, and Europe.

***Characteristics of Lyme Disease:*** Lyme Disease occurs in varying forms, but can be usefully divided into *early* and *late* phases. The early phase includes two stages: first, local infection at the bite (the "Erythema Migrans" rash), and second, symptoms that spread throughout the body. The late phase involves persistent disease, primarily in skin, heart, joints, or central nervous system. Only a fraction of those who develop the first phase go on to develop the second phase. Some people may develop persistent disease without ever noticing the symptoms of the first phase. Some people may develop an infection without noticing any symptoms.!! [2]

The *early* phase includes localized infection. Erythema Migrans is a slowly-spreading circular red rash that is a sign of Lyme Disease. This red circular rash starts at the tick-bite and spreads over days to weeks. The ring-like rash is usually about three inches across at the two week point.**

During the *early* phase, some people will develop symptoms of widespread infection. A rash similar to Erythema Migrans may appear in many places on the skin. Intermittent symptoms similar to encephalitis (brain infection) or meningitis are

common: headache and a stiff neck. The patient may also develop malaise, fatigue, and muscle and joint pains. In most people, these symptoms go away in about three to four weeks.

The *late* phase is characterized by persistent infection. In the U.S., about a fifth of those with infection will have persistent disease. Of these, over half will have a form of arthritis (inflammation of the joints) similar to rheumatoid, which is characterized by hot, red, swollen joints, especially the knees. (This was how the disease was discovered -- mothers near the town of Lyme, Connecticut pestered public health officials to find out why so many of their kids were getting what looked to all the world like rheumatoid arthritis.) Others will have encephalitis and meningitis, similar to the early phase, and may have paralysis of various cranial or peripheral nerves. Some problems (in less than a tenth of those with persistent disease) are thought to be autoimmune abnormalities of conduction of electrical impulses through the heart (called heart blocks - an abnormality of the cardiac conduction system) and inflammation of the heart muscle.

***Diagnosing and Treating Lyme Disease:*** If a member of a search and rescue team (or anyone, for that matter), especially someone who has been bitten by a tick, develops a rash similar to Erythema Migrans, or develops arthritis or heart block at a young age, that person should see a physician for possible Lyme disease. [3] Blood tests for Lyme disease, while available, are not highly reliable; therefore, a careful history and physical exam are very important in the diagnosis of Lyme disease. [4] Lyme disease is readily treatable with antibiotics, especially when detected early.

## Tularemia

Tularemia is caused by the gram-negative bacterium Francisella tularensis. Tularemia is traditionally thought of as a disease of rabbits, but is actually carried by many wild mammals. It can be transmitted by ticks, and it can cause serious disease in humans. If infection occurs through the skin, ulceroglandular tularemia develops in about two days. The bite (or other site of inoculation) forms an abscess and then ulcerates. The patient develops a high fever and enlarged lymph nodes (Small subcutaneous bumps that are found in many places, especially in the neck, armpit, and groin which lie along lymphatic vessels. Lymph nodes are "factories" for certain kinds of white blood cells and enlarge in response to infections.). Severe headache and enlargement of the liver and spleen are common. Variant forms of tularemia involve the eyes or lungs, sometimes with few other symptoms. In 1990, 152 cases were reported in the U.S.

There is no particular field treatment for tularemia. Tetracycline or doxycycline, if available, may be effective, though neither is as effective as the intramuscular streptomycin that is used in a hospital. [5]

## Tick Paralysis

Tick Paralysis is a rare form of ascending paralysis (paralysis that starts at the feet and works its way upward). It can be fatal as the paralysis can reach as high as the muscles of respiration, causing respiratory arrest requiring someone to intervene with artificial respiration. This disease is caused by a chemical secreted in the saliva of one particular kind of female tick. If you find and remove the tick, the paralysis disappears within a day or so. [6]

So, as I think you can now tell, I must have had a tick bite on the head, and contracted ulceroglandular tularemia. I'm just glad it wasn't Rocky Mountain Spotted Fever! The same year I got tularemia, a fellow member of the Allegheny Mountain Rescue Group here in Pittsburgh got RMSF during a training session along the Laurel Highlands Trail in southwestern Pennsylvania. He had a high fever, shaking chills, and felt miserable for several days, until the antibiotic finally started clearing out the infection.

Prevention is key - but that's a topic for another article. So, for now, let me just say "be careful out there!"

## Glossary

*Arthritis*: Inflammation of the joints.

*Autoimmune*: When you develop an allergic (immune) reaction against part of your own body. This may be caused by an infection with a germ that looks like a part of your own body. Your lymphocytes then attack the part of your own body as well as the germ.

*Encephalitis*: A brain infection.

*Erythema Migrans*: A slowly-spreading circular red rash that is a sign of Lyme Disease.

*Heart Block*: An abnormality of the cardiac conduction system.

*Lyme Disease*: An infectious disease, transmitted by the bite of certain ticks. Named after the Connecticut town where the disease was first discovered.

*Lymph nodes*: Small subcutaneous bumps that are found in many places, especially in the neck, armpit, and groin. They lie along lymphatic vessels. Lymph nodes are "factories" for certain kinds of white blood cells, and enlarge in response to infections.

*Macular*: Refers to a rash in which you can see, but not palpate (feel), small spots. As compared to papular, which is a rash with palpable bumps.

*Myalgias*: Muscle aches.

*Rheumatoid Arthritis*: A common type of autoimmune arthritis characterized by swollen, hot joints, particularly affecting the knees.

*RMSF*: Rocky Mountain Spotted Fever.

*Rocky Mountain Spotted Fever*: An infectious disease transmitted by the bite of certain ticks.

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*Early, the rash is blanching (the red goes away when you press on it); later, the rash may become papular (palpable lumps) and may not blanch when pressed.
**Because the rash usually resolves in 3-4 weeks, many now refer to the rash as "Erythema Migrans" rather than "Erythema Chronica Migrans," as was more common a few years ago.

## DEATH IN THE BACKCOUNTRY

*By William Kane, WEMT*

Recently, while watching a wildly moulaged mock backcountry rescue at SOLO, my son Nick asked, "Dad, does anybody ever 'die' at SOLO?" "No, son," I replied, "We always find a way to help them pull through." Unfortunately, as realistic as we might try to make our training, this is one place where we create an artificial world. As the events of the past summer here in the White Mountains have reminded us, sometimes we can do everything right, but rescuers and people will still die; sometimes help just can't get there in time, and even if help arrived sooner not enough could have been done to save them. In these sad and difficult circumstances, rescuers will have to deal with the consequences of a death in the backcountry, consequences that may go far beyond the time it takes to get a body to the trailhead.

It is important to understand the three basic situations in which we, as rescuers, may have to deal with a death. The first situation is to be called to the scene to help remove the body of someone who is obviously, or believed to be dead. I intentionally add the word "believed" because the nature of cold injuries is such that someone who by circumstance, or quick appearance, is believed to be dead, but who instead is hypothermic, is actually a patient capable of recovery. Most of the time, however, when we are called to the scene of a backcountry death is just that — a cold, frozen body, perhaps with gross injury, perhaps with multiple injuries, or perhaps unscathed. [Please note that there are certain legal requirements in the event of an unexpected death of this sort that must be acknowledged, and notification of your state's appropriate authorities (Fish and Game in New Hampshire, the Warden Serve in Maine, National Park Rangers, or State Park officials, etc.), is not only an absolute necessity, but these folks can be a great help in handling situations that we as rescuers can't, shouldn't, and don't want to handle.]

These cases generally present us with two challenges, the first is getting and keeping the number of folks we need to quickly and safely carry the body out; the second, and most difficult, is the handling of the body at the scene. The problem here is that no matter how much time and energy people will sacrifice to help a gravely injured person, for a variety of reasons there is less enthusiasm for carrying out a body. A suggestion in this situation would be to focus rescuers on the family and friends of the deceased, who will be helped immeasurably by the opportunity to begin bringing closure with the death once the body of their loved one has been returned.

The second problem is the handling of the body at the scene—often a grisly, disturbing job. The recommendation here is to limit physical and visual exposure of the body to a few individuals, one of whom should probably be one of the authorities mentioned earlier. These few will perform the necessary, if seemingly perfunctory, assessment and before placing the body in a body-bag. Only then should the balance of the rescuers be exposed to the scene in order to complete the removal. Regardless of whether someone had exposure to the body or not, even in this scenario some of the rescuers may need the benefit of Critical Incident Stress Debriefing (CISD), as we'll discuss later.

The second situation in which rescuers may be exposed to death in the backcountry is in the demise of someone for whom they're already providing care. Rescuers have responded to the need for help; they rendered appropriate care; but during the rescue or the evacuation, the person died. As the result of our standard of care, CPR will very often have been performed as the last attempt to save the person. The very difficult task of having to stop CPR after a half hour or more has left the team feeling at best deflated and empty, at worst devastated. Many new folks on a backcountry team, even those with lots of street experience, have never been in a situation where they just stop resuscitating — especially outside a hospital emergency room where the very appearances of docs and nurses and machines gives them comfort that everything possible was done. In the mountains, there usually are not docs, nurses, machines or drugs. When someone in our care dies, doubt, guilt, discouragement, and despair can trouble us deeply. Although it has been said before, now is the time to remind ourselves that we can do everything right as rescuers, but people can still hurt themselves so badly, or get so sick that they can't be helped, even by definitive care, at the best hospitals.

The third circumstance, and the one most likely to disturb us, is when we and our patient realize that they are not going to survive. They are conscious and alert, but their injuries or

illness are so serious, or the evacuation is delayed by the environment or terrain that you are with them when the realization that death is inevitable hits both of you. An even worse scenario is having to leave this person, perhaps to get more help, perhaps to save yourself, knowing that they may, or most likely will die in your absence. Staying helps no one in this situation, but as you can imagine, this indeed, will be the most difficult backcountry situation you're likely to encounter. If you are to remain with someone during an evacuation, you must be prepared to understand the emotions they will likely display, as the situation will place tremendous emotional stress on you as well. The Kubler-Ross model gives an idea of what to expect...typically the emotional profile will progress like this: Denial — "not me!"; Anger — "why me?"; Bargaining — "can't I/we...?"; Depression — "leave me alone"; Acceptance — "I'm dying." During this cycle, the patient may place blame or show great anger in the situation, at you and at others. It's important to understand that you simply listen, support, and understand; you don't argue, debate, or explain... what they need is someone to listen, and make them as comfortable as possible. Afterward, it's very important for anyone who was part of this scenario to once again consider availing themselves of a CISD. The impact of the above situation is unpredictable. One rescuer may get over it quickly; or another may be so affected that it could quietly be devastating to them — the event permeating every aspect of their lives. Once a life has been lost to this tragic rescue situation, we must find a way to ensure that all those involved have the opportunity to "unload" any baggage they carry away from the situation, or it may continue to diminish and damage the lives of the rescuers.

The mention of Post Traumatic Stress Disorder (PTSD) outside of the generally accepted battlefield situations, challenges us to understand that the nature of PTSD is such that it is just as likely to occur to public safety personnel who must deal with emotionally challenging, stressful situations every day. Military personnel, police, firefighters, and EMS folks are often routinely screened for signs of PTSD, especially if they're been involved in a situation which potentially exposed them to extraordinary emotional stress. Although no one is hooting at backcountry rescuers and despite the fact that they're often in beautiful country, this group can suffer the same troubling effects of PTSD. In fact, a few years ago after a particularly difficult rescue, a close friend and fellow member of the Mountain Rescue Service (MRS) with years of special military training remarked that working on the MRS, especially in winter, reminded him very much of the same stress he felt when in combat. I was dubious at first, because even through I'd had lots of mountain rescue experience, I had never been in the military. However, as I looked more closely at the parallels, I realized he was right, that perhaps our backcountry teams occasionally needed the ability to "debrief" a difficult rescue, with something a little more guided and professional than a couple of beers to dull the feeling.

The risk of denying the need for help in dealing with this kind of emotional stress carries with it a whole host of symptoms including the following: guilt; loss of interest in work, play, or sex; loss of appetite; loss of temper; difficulty sleeping; withdrawal; depression; increased use of drugs/alcohol; and so on. Looking at this list, one's first impression could easily be, "I know lots of folks on our team with some of those traits," or "I have lots of those traits," and you wouldn't be wrong. Any of us in our day-to-day lives may display many of those actions, symptoms, or emotions. However, it is when we begin to exhibit many of them, more frequently that they become a problem to the point where they begin to control our lives. Of course, to correctly diagnose anyone as having a clinically, recognizable psychological problem, they must see a psychiatrist. Before there are clinically significant signs of PTSD, it would be better to begin the emotional healing process. That is where the Critical Incident Stress Debriefing (CISD) can be invaluable. CISD is a voluntary, informal, but professionally run process through which personnel who have been exposed to extraordinary emotional stress are given the opportunity to discuss openly... what happened, why what was done was done, what else could have been done, who did what, and basically to go through all the "what-ifs" that those who were involved might have. It is important to realize that often emotions run high, people feel guilt, sometimes accuse, and often second-guess themselves and others, all of which is better said there during a CISD than outside, and all of which may mean that there is a need to hold some subsequent meetings.

Although I cannot adequately discuss the intricacies of the CISD process within the scope of this article, I feel it is important to acknowledge the kind of emotional stress and "baggage" that dealing with a death in the backcountry can have on rescuers and to try and ensure that there is a debriefing mechanism in place, so that these tragic situations don't continue to claim victims in the future. As human beings, rescuers deserve the fullest, most emotionally stable lives possible — as members of the rescuer community, they are needed to be there for all those people in the future who will need their support, whose cries for help they'll answer, and whose lives will be made better by the rescuers' efforts.



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# MEDECINS SANS FRONTIERES: HISTORY, MORALITY, AND CHOICE IN AN APOLITICAL CRUSADE FOR HUMAN RIGHTS

**By Rebecca S. Newton, WEMT**

*Editor's Note: Many of our readers call and write to WMN seeking information on where they can put their wilderness medicine skills to work. This article takes an in-depth look at one of the "non-traditional" worksites where wilderness medical skills can not only be utilized, but can be the difference in healthcare.*

> "One cannot simultaneously assert science and dogma, one cannot travel half the road *under the former banner, in the hope of taking up the latter, too, at the middle of the march. Science, once embraced, will conquer the whole." (Flexner 161).*

This comment, circa 1910, echoes the once-widespread sentiment that science must know no morality, only truth. It also upholds the opinion that science in itself is strong enough to confront any problems or questions that it raises. Historically, the position that good science should exclude emotion and principle has been acceptable, responsible—revered, even, in some circles. In light of the spirit and scope of the scientific advances of the twentieth century, however, most members of academic and applied scientific communities alike, as well as the general public, have come to abandon the concern over conflating truth (represented by "pure" science) with belief (represented by dogma or politics). In its place now stands the assertion that science, too, must have a conscience.

Among the leaders of this modern generation of scientists are those who have aimed to apply the tools of medicine to the quest to advance basic human rights. Many of them have come together in organizations that recognize the commingling of morality and discovery, that believe in breaking down the myth that science and politics, if they are to safely coexist, must encompass discrete realms.

## GROUND BREAKING AND EARLY HISTORY

Medecins Sans Frontieres (MSF) has helped to set the standard among such organizations since its founding. Also known in English-speaking countries as Doctors Without Borders (DWB), MSF is an international humanitarian medical relief agency that was born in France during the winter of 1971. The original MSF was established by two groups of doctors driven by their frustrations with international aid programs. Each group had come to believe that provision of medical care was being overshadowed by too much regard for national borders- that help was being hindered by politics, rendering the powerful tools of medicine less effective to deal with the crises they were trying to confront.

One of these two groups came from projects with the French Red Cross. Among its members were 50 doctors who had been in Africa to witness portions of The Republic of Biafra's attempted secession from Nigeria and the ensuing civil war spanning the years from 1967 to 1970. The war ended on 15 January 1970 with Nigerian victory, yet International Committee of the Red Cross (ICRC) regulations forbade ICRC staff from publicly denouncing the ethnic genocide that occurred along with the fighting, killing some one million people. In condemnation of the silence imposed by ICRC regulations, a group of physicians came together to speak out against the Biafran genocide and formed the Groupe d'Intervention Medical et Chirurgical d'Urgence (GIMCU) in 1970.

Coinciding with the formation of GIMCU was the attention of another group of French physicians to a problem in a different part of the world. This second contingent grew concerned about those who had lost homes and loved ones to a major tidal wave in eastern Pakistan (now Bangladesh). Urged on by reporting in television images and by editorials in the medical

journal *Tonus,* they came together in a team known as Secours Medical Francais (SMF) to offer help to people affected by this tragedy.

In the wake of these two crises— one a human-imposed devastation, the other a natural disaster- the merging of GIMCU and SMF on 20 December 1971 created the basis for the original MSF. The conditions of the founding of MSF, based upon the need created by these two divergent kinds of catastrophes, continues to shape the nature of MSF missions. MSF does not discriminate among victims of natural and man-made disasters; it offers aid in times of troubles of incredibly varied origin. The targets of MSF projects have included populations in crises precipitated by earthquakes, hurricanes, droughts, famines, and disease epidemics, as well as both intra- and international conflicts.

Just as the founding of MSF was driven by the two very different types of crises in Biafra and eastern Pakistan, the motivations of MSF's early volunteers were varied and diverse. Some traveled to offer aid driven by religious or spiritual convictions. Others sought adventure in the tastes and smells and images of exoticized locales. Most common, perhaps, were those who sought authenticity in the medicine of desperation; they longed to escape routine medicine and the predictable ailments of residents of a developed society, with the expectation that medicine in undeveloped countries would be more challenging, more stimulating, more "real" somehow.

The basic fact that MSF began in France during the early 1970s is as revealing as are the details of the founding themselves. Some observers speculated that France, preoccupied with its colonial past, felt an obligation to provide assistance to undeveloped countries to assuage its guilty national conscience over possible historical wrongdoings. This factor, coupled with so many physicians' frustrations in combating the minor and "imaginary" illnesses so predominant in their comfortable European communities, meant that the country and its medical professionals were primed for a medical and volunteer outlet such as MSF would provide.

At the same time as these frustrations in France were rising, a communications revolution had begun, causing the world to feel smaller and smaller. According to Rony Brauman, 12-year president of MSF through June 1994, "The instantaneous visibility of disasters and conflicts on television [in the 1970s] made it less and less acceptable either to do nothing or to offer only a confused effort at emergency assistance." Not only could one receive and disseminate information more quickly than ever before; those willing to provide assistance could now launch an essentially instantaneous response due to the concurrent democratization of air transport and improvements in transportation facilities.

Still, MSF was not an immediate success. During its first five years, the organization provided a pool of doctors willing to volunteer their skills in time of crisis, but had not yet developed any real structure within which to mobilize its resources. It tended to rely on mutual missions with other agencies, as it lacked the funds— operating on a total budget of only a few hundred thousand francs- to coordinate and to dispatch independent efforts.

Before it could be a medical force in fact as well as in name, MSF needed time to develop its resources and to define its niche. Until the late 1970s, the reputation of MSF resounded louder than its actual successes. In the public eye, MSF had grown beyond its image as a group of amateur adventurers and "cowboy doctors"; its volunteers knew, however, that it had merely become a superficially revered but frustratingly small-scale contingent of well-meaning medical professionals. It had yet to make the leap toward becoming a true healing force in undeveloped nations.

## IDENTITY FORMATION AND THE TRANSITION TO PRESENT-DAY MSF

The surge of refugee camps in the late 1970s was the singular precipitating factor that allowed MSF to create a self-identity and to form a primary intervention strategy. The world's refugee population of approximately 2.7 million had been a relative constant between the time of MSF's formation and the mid-1970s. Suddenly, between 1976 and 1979, this population doubled; then, between 1979 and 1982, it doubled again. An increasing incidence of conflict in the southern hemisphere, fueled by decolonization and the ensuing reemergence of ethnic rivalries and intranational antagonisms, caused this remarkable growth. By the late 1970s, MSF was ready to respond; it had at its disposal a great supply of enthusiastic and able French babyboom doctors— none of whom felt the constraints of post-study debt so common today in the United States, and many of whom had gotten a taste of international medicine during military service and wanted more.

During the course of the past quarter-century, MSF has evolved while the tone of world politics has changed. One responsibility that its founders doubtless could not have foreseen is MSF's current actions in Europe; while MSF began as an effort to provide assistance to needy undeveloped nations, its missions now reach out at even the shortest distance— into its own backyard. Led by its Holland branch, for example, MSF has undertaken an ambitious AIDS prevention program in Moscow, comprised of healthcare and prevention-driven education surrounding issues of drug use and safer sex. MSF has stepped in to provide assistance during this summer's floods in Poland and during recent conflicts in eastern Europe, including those in Bosnia-Herzegovina and other regions of the former Yugoslavia. MSF has even mobilized medical response in western Europe to recent crises in its homeland of France and in Spain.

A subtle factor that has distinguished MSF from other international aid organizations throughout its history has been its recognition of the role of the media in bringing quiet crises of remote populations to the attention of the general public, and its willingness to use the media to help spread its message. While MSF began as a small contingent of physicians traveling on occasional missions to remote and obscure locales, publicity

has transformed it into a household name. This attention has stemmed both from MSF members' own drive to bear witness and to bring their experiences into public view and from its inclusion in coverage of crises by international media. Furthermore, its current advisory board is composed not only of physicians, but also of celebrities such as writer Maya Angelou, actress Candice Bergen, CNN consultant Garrick Utley, and Dow Jones Senior Vice President Jim Ottaway, Jr., all of whose individual successes have helped to garner widespread attention and respect for MSF through their affiliation with it.

## MSF DISTINCTIONS: FIRSTS, LASTS, AND ONLIES

MSF was the first nonmilitary and nongovernmental agency in the modern world to specialize in emergency medicine. Indeed, even throughout its more recent history, the tale of MSF reads like a list of superlatives and singularities. Among its "firsts" were the 1997 location of the missing Rwandan refugees in Tingi Tingi; MSF teams were the first to find the refugees and to brief the Security Council on the situation in Zaire.

From its humble beginnings, MSF has grown to a staff of 12,000 at six independent chapters in Belgium, Holland, Switzerland, Luxembourg, Spain, and Germany, while maintaining its home base in France. Today's MSF sends more than 2,000 Volunteers of nearly 50 nationalities into the field each year, and has worked with upwards of 15,000 volunteers in the course of its twenty-six-year history. Its offices, which serve primarily to fund-raise, to recruit volunteers, and to increase public awareness of its work, are spread throughout 19 countries, including branches in the cities of New York, Los Angeles, Hong Kong, and Tokyo. Its missions reach roughly 80 countries annually.

Having originated with the seeds of frustration and a few hundred thousand francs, MSF now boasts an annual budget of over US $160 million and the claim to being the world's largest private international medical relief organization. Approximately two-thirds of its current income is in the form of private donations; institutional donors account for one-third of its funding. Much recent growth has come in part from MSF's new partnerships with major institutional financiers, such as the United Nations High Commissioner for Refugees, the European Economic Community, the United States Agency for International Development, and the United States Bureau for Refugee Programs.

MSF also boasts a stunning— and responsibility-laden— list of "onlies." During the 1991 civil war in Somalia, MSF was the only medical agency providing assistance in Mogadishu. During the 1995 deterioration of Yugoslavia, MSF was the only relief agency to witness the fall of Srebrenica. During the current sleeping sickness (trypanosomiasis) epidemic brought about by the Angolan civil war, MSF has been providing the only treatment available in the northern province of Kwanza Norte. MSF is the only international nongovernmental organization presently working in Iran to help the residents respond to the 7.1 Richer-scale earthquake of May 1997.

Furthermore, MSF members have often prided themselves on their" lasts." In mid-July 1997, when many foreign relief organizations had left Cambodia in the wake of the military coup, MSF chose to stay in order to help provide fuel and first aid at local hospitals. On 15 October 1997, MSF was the last international organization to leave war-torn Brazzaville, the capital of Congo Republic, when its teams were physically unable to cross the Congo River and thus to gain access to the country due to the Democratic Republic of Congo's border closure. The MSF teams, however, were not easily deterred from their mission; they returned to resume staffing basic care facilities as soon as the border was reopened, just six days after being turned away.

## POLITICS AND APOLITICS OF DANGER AND INJUSTICE

But the "firsts" and other achievements of MSF have been special, MSF provides humanitarian assistance guided by science in the form of medicine, but also realizes that science alone will not "conquer the whole," no matter how its tenets are embraced. The aid in the act— of bandaging, of performing surgery, of helping a community purify its sole water source— can begin to heal, but it does not offer cure for all those who suffer and it does not prevent problems from recurring. To this end, MSF members also bear witness to human rights violations that they observe.

Since MSF was founded in part as a response to the ICRC's unwillingness to speak out against the Biafran genocide, it seems inevitable that the organization would be a vocal party in informing the world of any injustices that its members witness directly. Although MSF underwent an initial period of relative quiet during its first few years of operation under the belief that "no state would accept the presence of overly garrulous doctors on its territory" and that silence should be "a symbol of MSF's apolitical stance," it is now an outspoken presence in international affairs. The DWB World Wide Web homepage asserts that "when medical assistance is not enough to save lives, Doctors Without Borders will speak out against human rights abuses and violations of humanitarian law that its teams witness in the course of providing medical relief." Still, "MSF does not systematically denounce all countries violating human rights;" it only gets involved with causes that its team members witness directly, and with human rights abuses that detract from the power of its teams to offer medical care to needy patients.

MSF members strive to prevent political influences from dictating how they conduct their operations during a mission, and MSF refuses aid from blatantly political sources such as the French government. MSF does not, however, ignore the political implications in its choices of where to undertake missions, and its members are vociferous and outspoken against human rights violations that they witness. This is an important distinction: MSF's relief efforts are guided by

universal standards of human rights without regard for the particular politics of the region in which any individual project is carried out, but MSF will deny its assistance to groups whose motives or actions contradict basic human rights.

While MSF disavows political allegiances, it rises admirably to the task of allowing its choices in how to help (and in whom to help) to speak to some universal foundation for basic human rights. MSF volunteers recognize that an act of omission is still an act, that not to make a choice is to make a very clear choice indeed. They are aware that, in the words of Brazilian educator Paulo Freire, "washing one's hands of the conflict between the powerful and the powerless means to side with the powerful, not to be neutral."

To this end, MSF acknowledges the statement inherent in whom they choose to help. During some political conflicts, their projects provide assistance to those working on only one side of a political conflict—against those who would aim to encroach upon that group's basic rights. During other incidents, however, they attempt to help heal any whose lives are affected by the physical fighting of a heated but hazy disagreement, without making judgements that would render only one side worthy of receiving humanitarian assistance.

One example of MSF's unapologetic attempts to help people suffering on both sides of a disagreement has been its involvement with recent political unrest over the disintegration of the former Yugoslavia. In situations such as this one, a faint grey line may be all the distinction that stands between right and wrong, between the oppressors and the oppressed—and this fine may be constantly shifting. In these types of conflicts, two or more factions are fighting over opposing principles or desires, neither of which is an affront to basic universal human rights or to MSF's sensibilities as a humanitarian organization. Essentially, in this case, MSF is responding to its belief that basic human rights are being violated on both sides when neither has access to needs such as proper medical care due to opposition with the other, and is aiming solely to remedy this unilateral injustice.

In still other conflicts, however, MSF clearly chooses sides. In the aftermath of the 1979 Soviet invasion of Afghanistan, MSF teams worked clandestinely with Afghan resistance fighters to care for their civilian population, demonstrating its decision to disregard national sovereignty. MSF was in Afghanistan just a few months after the initial invasion; MSF members are still there today. This mission has truly defined MSF's stance as an organization that defends the right of all victims of human rights abuses to receive treatment. The assistance offered by the MSF teams— particularly at the outset of the conflict— has given the Afghan fighters moral as well as medical support. MSF was Afghanistan's link to the West, and helped force the struggles of the Afghans into the world's view. Upon the Red Army's bombing of MSF hospitals in 1981, MSF publicly denounced the Soviet actions and appealed to journalists to visit Afghanistan. The volunteers of this mission have willingly placed themselves in grave physical danger every day by working along the war-torn borders and within the ravaged country. This mission in Afghanistan has been, without a doubt, MSF's most dangerous to date.

All potential MSF volunteers are warned that they must take responsibility for their own safety during MSF projects— even when they might not have control over it. MSF's initial identity, developed as a result of its quick and courageous response to a 1976 conflict in Lebanon, was specifically that of "an organization that deals with dangerous emergencies." Potential applicants are warned that they may find themselves working in difficult, threatening, and unpredictable contexts with few, if any, of the comforts or securities of the living conditions to which they are accustomed.

Political instability is a given in most of MSF's mission locations, as are differences in social and cultural practices and limited resources. Volunteers need to be flexible and adaptable, and must possess "more than just technical competence," according to one message to potential volunteers on the DWB website. They must be aware that they are likely to be witness to human rights violations, and that determining their own appropriate response to these violations will be their responsibility. There is much danger in formulating— and executing—such a personal response to abuses of human rights. But the chance to do just that is the reason many of the volunteers have been drawn to MSF.

## IN CONCLUSION: MSF AS CONSCIENCE AND RESPONSE

Organizations such as MSF have helped to shape the conscience of today's applied science by advocating the belief that medicine must offer a response to the political climate of the world in which it is practiced. Even though so many of the problems that MSF reaches out to help solve are precipitated by political discord— and its choices in where to concentrate its efforts are clearly influenced by political factors- MSF projects' activities are carried out all but independent of politics. MSF is able to remain "apolitical" while advancing a code of morality and humanitarianism precisely because universal human rights cannot be confined to national boundaries; like MSF itself, they do not subscribe to political agendas.

In working apart from yet within local political systems, MSF's members can undertake projects that support the advancement of basic rights for all populations without making overt political statements. Their choices and their commitment speak to what they believe, while their words find no need to justify motives. In today's one-world society, science no longer remains silent; but, as always, the actions of concerned scientists rise clear above the voice of politics and dogma.

*Who can get involved in MSF, and how?*
Primary care physicians willing to provide curative care and education are always needed to enter communities in crisis with MSF teams. A working knowledge of infectious disease, tropical medicine, public health, and basic surgical principles

is helpful. MSF also regularly recruits surgeons, anesthesiologists, obstetrician/gynecologists, ophthalmologists, nurses, and physician's assistants, and occasionally recruits experienced logisticians, administrators, and water and sanitation specialists. While field-workers are not salaried, they are given a monthly stipend, health insurance coverage, round-trip transportation to the project country, and room and board for the duration of the mission. Spouses and children cannot accompany volunteers— unless they are also participating in the mission themselves— and there is no fixed upper age limit imposed for joining a project.

*For more information or to find a copy of MSF's application forms and procedures, contact DWB/MSF directly:* email: dwb@newyork.msf.org, or by snail-mail at:

WWW: www.dwb.org -or- www.msf.org
New York Office: 11 East 26th Street 1904
phone: 212.679.6800
fax: 212.679.7016

West Coast Office:
phone: 310.277.2793
fax: 310.277.1667

*To make a contribution or to volunteer in the New York office:* phone: 888.DWB-0-DWB

**SOURCES**

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Abraham Flexner. "Chapter X: The Medical Sects," in *Medical Education in the United States and Canada: A report to the Carnegie Foundation for the advancement of teaching.* Public Domain, 1910.

International Center for Humanitarian Reporting website: www.ichr.org

Medecins Sans Frontieres website: www.msf.org

## PETSAC UPDATE

*Editor's note: For the past two and a half years, the WMN has tried to keep the wilderness pre-hospital medicine education community informed of the goings-ons of the Wilderness Medical Society's Prehopsital Emergency Training, Standards and Accreditation Committee. The following letter from WMS Deputy Executive Director, David VanDer Wege was sent out following the Annual 1997 Conference in Sun Valley with a copy of the meeting minutes. Rather than recap what was decided at the meeting, this letter is printed verbatim. Anyone wishing to receive a copy of the minutes can contact the WMS directly at PO Box 2463, Indianapolis, Indiana 46206, or by sending a self-addressed stamped envelope to the Wilderness Medicine Newsletter at PO Box 3150, Conway, New Hampshire 03818.*

November 5, 1997

Dear WMS Members and Friends:

Please find enclosed the minutes from the PETSAC meeting held at the WMS Annual Conference in Sun Valley. I also want to update you on the results of the WMS Board meetings and the open forum as they pertain to pre-hospital wilderness medical education issues. PETSAC met on Monday, August 4, and discussed the current status of the curriculum work, as well as the mission, goals and future plans of the committee. In their meeting, PETSAC developed and made a recommendation to the WMS Board about future work. That recommendation can be found in the minutes of the PETSAC meeting. (page 7)

The WMS Board discussed the recommendation at length, and adopted the following plan based on those recommendations.

1. The PETSAC (committee) should be re-configured for future work as defined by the Board.
2. WMS, with input from wilderness medical educators, will complete the curriculum project by developing a "recommended course content" for Wilderness First Responder.
3. A one day conference will be held in conjunction with the 1998 WMS Annual Meeting which will explore critical issues of wilderness medical education.

The proposal was then presented for feedback at the PETSAC Open Forum held on Tuesday. After listening to feedback at the open forum, the WMS Board reconfirmed its commitment to these three steps, at its Wednesday Board meeting.

Since that time Dr. Otten, WMS President, has moved to implement the first two steps by:

1. Acknowledging and thanking PETSAC for the initial work they have done and dissolving the committee.
2. Appointing Linda Lindsey, RN, as the chair of the Curriculum Writing Task Force. She is currently discussing and developing a strategy for configuring the committee. The specific task of this committee will be to develop a "recommended course content" for Wilderness First Responder. As a task force this committee will be dissolved when the task is complete.

Dr. Anne Dickison, as Annual Meeting Program Chair, is responsible for the colloquium that will explore critical issues of wilderness medical education. This concept has been under development by the 1998 Program Committee since it was first suggested by the Liaison Committee as a way to bring related organizations together. It will be a great opportunity to receive

information on standardization and accreditation and collectively discuss their viability and feasibility. We hope you will participate and contribute.

If any of you would like to contribute to these two projects please contact either Linda or Anne respectively. Contact information is listed below. If in the future you would like to discuss WMS's work and role in pre-hospital wilderness medicine in general, please direct your ideas and suggestions to Dr. Otten as President of the WMS Board. It is the role of the WMS Board to clarify WMS's mission in this area and approve the work of all WMS committees. We will keep you updated on the progress of the Curriculum Writing Task Force through information provided in the WMS newsletter, *Wilderness Medicine Letter*. Details and registration information for the colloquium, to be held as part of the 1998 Annual Meeting in Lake Placid, will be coming your way in February.


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352-372-6052 Fax
Adickison@aol.com


We hope to see you at future WMS activities and events and welcome your continued involvement in the Society.

Sincerely,

David VanDerWege
Deputy Executive Director
Wilderness Medical Society



## FREE HIKING SAFETY BROCHURE OFFERED BY NEW HAMPSHIRE OUTDOOR COUNCIL

***By Peter Crane***

A free hiking safety brochure is now available from the New Hampshire Outdoor Council. The brochure is published as a public service to make hikers in New Hampshire more aware of some of the hazards of hiking in the woods and mountains of the Granite State, and of how proper preparation can lessen those hazards.

According to Wil Brown, President of the Council, "We also have printed a free hiking safety card, which lists a few basic tips and includes a list of recommended clothing and equipment for hikers. The information in the brochure and safety card are intended principally for hikers, but it is also useful for hikers, anglers, and others who enjoy New Hampshire's outdoors."

The Council, notes Brown, is a private, non-profit organization, which includes in its mission the support of training and emergency equipment costs for backcountry search and rescue groups throughout the state. "Many of these groups consist wholly of volunteers," says Brown, "so we want to do what we can to encourage their participation in emergency missions. The volunteers are a very important complement to the efforts of New Hampshire Fish and Game, US Forest Service, and other state, federal, and local agencies."

According to Brown, "The best rescue is one that can be prevented," so the Council includes hiker safety education in its work, too. "That's why we have produced the free brochure and safety card. Even with a mechanism for search and rescue in the state, sometimes even the best emergency effort can do no more than pick up the pieces. It's critical that people assume responsibility for their own safety, and plan for their trips knowledgeably and intelligently."

For a free hiker safety brochure, and a free hiking safety card, send a stamped, self-addressed envelope to:

NHOC
Department W
PO Box 157
Kearsarge, NH 03847-0157.

Organizations such as schools, outing clubs, church groups, and scout troops which may include group hikes in their activities are encouraged to request multiple copies of the brochures and cards.

## WILDERNESS MEDICINE EDUCATORS WANTED

The **Wilderness Medicine Institute** is looking for qualified and dynamic Wilderness Medicine Educators interested in becoming part of a team dedicated to providing hands-on quality education for the recognition, treatment and prevention of wilderness emergencies.

**RESPONSIBILITIES:** Our primary need is for instructors to teach 10-day Wilderness First Responder courses, although Wilderness First Aid and Wilderness EMT courses are also available. Instructors commonly spend 6 months a year on the road.

**QUALIFICATIONS:** Wilderness EMT-B or higher. College degree is preferred. It is essential that candidates have: 1) experience teaching in either a classroom or outdoor setting, 2) significant emergency medical experience, and 3) several seasons experience leading extended trips in wilderness settings.

**BENEFITS:** $75-166/day, plus travel and living expenses while on the read. Off-season work for outdoor educators.

**TO APPLY:** Submit a cover letter describing yourself and why you strive to teach wilderness medicine, a resume, and 3 references to your teaching ability to Shana Tarter, Director of Special Projects, PO Box 9, Pitkin, Colorado 81241. (970) 641-3572. The application deadline is March 15, 1998.

## SOLO WILDERNESS FIRST RESPONDER WINTER 1998

Course information and registration for SOLO WFR's listed below can be obtained from the sponsoring organizations. If you have questions regarding curriculum, certification, or additional course listings, please call SOLO (603) 477-6711.

January 1998

| | | |
|---|---|---|
| Jan. 2-9 | New Canaan Nature Center, CT | 203-333-3405 |
| Jan. 2-9 | White Maintain School, NH | 603-444-2928 |
| Jan. 3-11 | Merrowvista Education Ctr, NH | 603-539-6607 |
| Jan. 3-11 | Cornell University, NY | 607-255-6273 |
| Jan. 3-11 | Outward Bound, ME | 800-341-1744 |
| Jan. 3-12 | Clarion, PA | 814-226-5322 |
| Jan. 5-16 | AMC, NH | 603-466-2727 |
| Jan. 6-15 | Unity, ME | 207-948-3131 |
| Jan. 6-16 | Hulbert Outdoor Ctr., VT | 802-333-3405 |
| Jan. 7-15 | Outward Bound, FL | 904-224-2752 |
| Jan. 7-15 | Slippery Rock U., PA | 412-738-2596 |
| Jan. 8-16 | Texas A&M, TX | 409-845-2587 |
| Jan. 10-18 | Garrett Community College | 301-387-3013 |
| Jan. 19-30 | Brevard College, NC | 704-883-8292 |

February 1998

| | | |
|---|---|---|
| Feb. 6-13 | Frost Valley, NY | 914-985-2291 x265 |
| Feb. 16-25 | Nantahala Outdoor Center, NC | 704-488-2175 |
| Feb.21-Mar.1 | Sargent Camp, NH | 603-525-3311 |
| Feb.28-Mar.8 | River's Way, TN | 423-538-0405 |

March 1998

| | | |
|---|---|---|
| Mar. 13-21 | Garrett Community College | 301-387-3013 |
| Mar. 14-22 | Bradford Woods, IN | 765-342-2915 |
| Mar. 21-29 | Harvard College, MA | 617-495-7935 |

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| May/June '97 | Bats & Rabies |
| Mar./Apr. '97 | Drowning |
| Jan./Feb. '97 | Managing Fractures |
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| Mar./April '95 | Outdoor Leadership—Past & Present |
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| Nov./Dec. '94 | Principles of Wilderness EMS |
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Mar. 23 - Apr. 17 Conway, NH (603-447-6711)
Apr. 19 - May 15 Conway, NH (603-447-6711)

**Wilderness First Responder**
Jan. 2-9 New Canaan, CT (203-966-9577)
Jan. 2-9 White Mtn. Sch. NH (603-837-2528)
Jan. 3-11 Merrowvista, NH (603-539-6607)
Jan. 3-11 Outward Bound, ME (800-341-1744)
Jan. 3-11 Cornell U., NY (607-255-6273)
Jan. 3-12 Clarion, PA (814-226-5322)
Jan. 5-16 AMC, NH (603-466-2727)
Jan. 6-15 Unity Col., ME (207-948-3131)
Jan. 6-16 Hulbert OC, VT (802-333-3405)
Jan. 7-15 Outward Bound, FL (800-341-1744)
Jan. 8-16 Texas A&M, TX (409-845-2587)
Jan. 10-18 Garret Comm. Coll (301-387-3013)
Jan. 19-30 Brevard Col., NC (704-883-8292)
Feb. 4-13 Frost Valley, NY (914-985-2291x265)
Feb. 16-25 Nantahala, NC (704-488-2175)
Feb. 21- Mar. 1 Sargent Camp, NH (603-525-3311)
Feb. 28 - Mar. 8 River's Way, TN (423-538-0405)
Mar. 13-21 Garrett Comm. Coll (301-387-3013)
Mar. 14-22 Bradford Woods, IN (765-342-2915)
Mar. 21-29 Harvard College, MA (617-495-7935)

**Wilderness First Aid/WFR Recertification**
Jan. 12-13 Outward Bound, ME (800-341-1744)
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Feb. 7-8 Northeastern U., MA (617-783-3020)
Feb. 18-19 Brevard College, NC (704-883-8014)
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Feb. 27- Mar. 1, Nantahala, NC (704-488-2175)
Mar. 7-8 AMC, MA (617-523-0655x3311)
Mar. 7-8 Middlebury, VT (802-443-5000x5264)
Mar. 13-14 Brown U, RI (401-863-3476)
Mar. 20-22 Sargent Camp, NH (603-525-3311)
Mar. 21-22 Metroparks, OH (216-341-3152)
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Apr. 19-23 Conway, NH (603-447-6711)

**Wilderness First Responder Review**
Feb. 27 - Mar. 1 Nantahala, NC (704-488-2175)

**EMT/WEMT RTP**
Jan. 28-3 Conway, NH (603-447-6711)

**ALS Issues in Remote and Rural Situations**
Feb. 9 Conway, NH (603-447-6711)

**NORTH AMERICAN RESCUE INSTITUTE**
PO Box 3150, Conway, New Hampshire 03818
Telephone: (603) 447-6711 Mon-Fri 9am-4pm

**Off Highway Winter Rescue Operations**
Feb. 14-15 Conway, NH (603-447-6711)

**Table Top MCI Operations**
Feb. 29 - Mar. 1 Conway, NH (603-447-6711)

**New Car Construction-Impact On Rescue Services**
Mar. 14 Conway, NH (603-447-6711)

**WILDERNESS MEDICINE INSTITUTE**
PO Box 9, Pitkin, Colorado 81241
Telephone: (970) 641-3572, Mon-Thurs 9am-1pm

**Wilderness EMT**
Dec. 29 - Jan. 23 Pitkin, CO (970-641-3572)
Mar. 23 - Apr. 17 Oakhurst, CA (970-641-3572)
May 25 - June 19 Pitkin, CO (970-641-3572)

**Wilderness First Responder**
Jan. 2-11 Boulder, CO (303-666-5523)
Jan. 9-18 Walla Walla, WA (509-527-5367)
Jan. 13-23 Yellowstone, WY (307-344-2295)
Mar. 7-16 Loveland, CO (970-679-4294)

**Wilderness First Aid/WFR Recertification**
Feb. 7-8 Albuquerque, NM (970-641-3572)
Feb. 14-15 San Luis Opisbo, CA (805-756-2743)
Feb. 21-22 Santa Cruz, CA (408-459-2806)
Feb. 21-22 Pitkin, CO (970-641-3572)

**WEMT Module**
Mar. 6-11 Pitkin, CO (970-641-3572)
Apr. 26 - May 1 Park City, UT (801-581-5809)

**EMT/WEMT RTP**
Mar. 13-16 Pitkin, CO (97-641-3572)

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