Wilderness First Aid and BLS Protocols

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This document, as well as an abbreviated version for carrying in the field available at www.asrc.net.

Comments to:

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Background and Versions

In 2015, the ASRC modified its first aid, EMS and medical policies. From the 1970s through 2015, first aid, EMS and medical care were organized by states, with each state having an ASRC State Medical Director position. State Medical Directors were charged with establishing first aid, EMS and medical care protocols for their states, with the expectation that ASRC members would follow the protocols established for their states. Given that medical regulation is primarily a function of states, and the ASRC functioned operationally much as a unitary organization, this made sense. Pennsylvania and Virginia established such protocols, but other states did not.

On the other hand, state EMS offices regulate EMS from a per-agency standpoint, and some ASRC Groups had become EMS agencies. And, by 2015 the ASRC had evolved to more of an association providing services to its Groups. Therefore, the ASRC Board of Directors decided to change the system. Now, first aid, EMS and medical protocols were to be determined by Groups and not by the ASRC as a whole.

The sole exception is that the ASRC's Medical Advisory Committee was to provide a set of protocols at the first aid and BLS level. These are optional, but authoritative. They are to provide legal backing for Groups who wish to use them, and serve as a model for Groups whose medical directors wish to create Group-specific medical policies and protocols.

For some conditions first aid or BLS treatments are different in the field (Wilderness Context) and on the street (Street Context). An example is the treatment of wounds. For some other conditions, new information has recently changed how we deal with them. An example is the scene safety assessment, and in the primary survey for life-threatening conditions, where the American Heart Association has changed their primary survey from ABC to CAB, and the military has changed their primary survey to MARCH. In both cases, there is more need for detail, and therefore the protocols for these conditions go into more detail than for conditions where field and street care are essentially the same.

There are (or will be once the full version is done) two versions of these Protocols. This long version serves both as a tutorial and as a definitive reference. A pocket version, sized to fit the ASRC Patient Record notebook, provides a bare-bones reference, basically a set of mnemonics. When there is a question as to how to interpret the short, bare-bones version, this document is definitive.

This full version of the Protocols is freely available in PDF format that can be loaded on most smartphones for detailed reference at need.

Definitions

Appalachian Search and Rescue Conference — The ASRC is a multistate wilderness search and rescue organization that provides operational, training and administrative guidance and support for member Groups. Every member of an ASRC Group is also a member of the ASRC.

ASRC Member As used in these Protocols, an ASRC Member is a member of the ASRC affiliated with any ASRC Group, at the Callout Qualified certification or above, who is qualified to serve in the field and provide First Aid per these Protocols.

ALS As used in these Protocols, ALS (Advanced Life Support) refers to a level of EMS considered "invasive": interventions that include starting intravenous lines, administering drugs, and performing procedures such as endotracheal intubation.

BLS As used in these Protocols, BLS (Basic Life Support) is a level of EMS that does not involve providing medications or invasive procedures such as endotracheal intubation or intravenous access. This used to be equated with the care given by an EMT, indeed, the base level of EMT used to be called EMT-Basic. However, this equivalence no longer holds; most states have now added some ALS skills to EMTs' scope of practice.

Emergency Medical Services (EMS) As used in these Protocols, EMS is a level of patient care distinct from First Aid, and distinct from Medical Care. EMS is regulated by the states, and falls under the appropriate state EMS law and EMS regulations. EMS is provided following the state EMS protocols (both BLS and ALS). EMS is generally provided by individuals licensed as one of the following, though levels vary somewhat between states:

- An emergency medical responder (previously known as Emergency Care – First Responder),
- An emergency medical technician (EMT),
- An advanced emergency medical technician (AEMT),
- A paramedic (EMT-Paramedic or EMT-P),
- A prehospital registered nurse (PHRN),
- A prehospital physician extender (PHPE, which is a Physician Assistant with prehospital training), or
- A prehospital emergency medical services physician.

Field Provider As used in these Protocols, a Field Provider is any ASRC Member who has training in medicine or allied fields, or EMS or Wilderness EMS training, beyond the first aid level. This includes Wilderness EMTs and Wilderness Medics, but also those who have EMS or medical training and/or certification but who are not credentialed by their Group. This includes, but is not limited to, the list of EMS providers above (see EMS), as well as the following training, certification or licensure:

- OEC (Outdoor Emergency Care
- WFR (Wilderness First Responder)
- Emergency Care – First Responder, Emergency Medical Technician-Basic, EMT-Advanced, EMT-Intermediate, EMT-Paramedic
- RN (Registered Nurse),
- CRNP (Certified Registered Nurse Practitioner), PA-C (Physician Assistant – Certified), which used to be known as "Mid-Levels" and are generally now called "Advanced Practitioners",
- CRNA (Certified Registered Nurse Anesthetist),
- DPM (Doctor of Podiatric Medicine),
- DDS (Doctor of Dental Surgery),
- DMD (Doctor of Dental Medicine),
- MD (Medical Doctor), and
- DO (Doctor of Osteopathic Medicine).

Field Providers may provide First Aid, EMS or Medical Care depending on their Group medical credentialing, state law and the specific situation at hand. Note that some Field Providers, such as MDs or DOs licensed in the state, have an independent right to practice medicine. Such physicians or osteopathic physicians provide care under their own licenses and not under these Protocols.

First Aid As used in these Protocols, First Aid is a level of care for medical illness and injury that is generally taught in first aid classes, such as those by the American Red Cross or by providers of wilderness first aid classes, and that does not involve administering medications, or invasive procedures such as orotracheal intubation or starting intravenous lines. First Aid is not regulated by most states. In the wilderness context, First Aid may include skills not included in Street Context first aid classes, including the irrigation of wounds, or, for those trained in this optional skill, reduction of certain dislocations.

Force Protection As used in these Protocols, Force Protection is Medical Care provided to other team members on a search and rescue operation or training session, while in the wilderness context. These team member patients need not be ASRC Members. The goal of Force Protection is to provide incidental medical care to team members, to prevent mortality and morbidity, to return team members to being able to carry out search and rescue tasks, and to help prevent the need to evacuate injured or ill team members. As EMS is "bringing the hospital to the patient" and Wilderness EMS is "bringing the hospital *all the way* to the patient," Force Protection is "bringing the Urgent Care Center to the team

member." Force Protection in this sense is not authorized under these Protocols but may be authorized under Group protocols.

Medical Care

As used in these Protocols, Medical Care is a level of care for medical illness and injury that is distinct from First Aid or EMS. Medical Care is not regulated by the state EMS laws or regulations, but instead is considered the practice of medicine, and is regulated by agencies such as state Boards of Medicine and Osteopathic Medicine. Physicians (MDs or DOs) may provide Medical Care directly, or delegate certain individuals to act under their authority to provide Medical Care. Medical Care is not authorized under these Protocols but may be authorized under Group protocols.

Online Medical Direction

Online medical direction is when a licensed physician, via cellphone or radio, gives medical direction to a non-physician ASRC Member. This is an example of *delegated practice*: the licensed physician is delegating a portion of his or her licensed practice of medicine to the ASRC Member. Each state has a formal system for Medical Command Physicians (that's the term in Pennsylvania, it varies from state to state) to provide such online medical direction to EMTs, paramedics and other EMS providers. In certain states, and with certain ASRC Groups, this may also be online medical direction of Medical Care outside the EMS system; in such a case, the ASRC Member, even if certified or licensed as an EMS provider, is not providing EMS or acting as an EMS provider, but is providing Medical Care under the physician's medical license via delegated practice.

Personal Wilderness First Aid Kit

As used in these Protocols, a Personal Wilderness ***First Aid*** Kit is a personal kit, carried by ASRC Members, that is intended for personal use. Personal Wilderness First Aid Kits may contain personal over-the-counter or prescription medications, but ASRC Members are not authorized by these Protocols to administer such medications to any other individual.

Protocols

As used in these Protocols, a protocol is a general way to deal with a specific wilderness medical problem. It does not address administering medications or performing procedures that require a physician's order. However, protocols should be taken as general orders of the physicians of the ASRC Medical Advisory Committee. An example of a protocol is: "always add heat and try your best to rewarm hypothermic patients, unless victims of cold-water submersion (near-drowning)."

Standing Orders As used in these Protocols, a standing order is a specific physician's order to be carried out when not in direct contact with a physician. An example of a standing order is: "If significant soft tissue infection, open fracture, fever over 102°F with abdominal pain, suspected meningitis, suspected pyelonephritis, or suspected pneumonia; and if evacuation and transport time to a hospital is estimated at more than four hours; and if patient has no history of allergy to ceftriaxone (Rocephin®) or to other cephalosporins such as Keflex® or Ceclor®, or history of anaphylactic allergy to penicillin: then give one (1) gram of ceftriaxone. Give IV push if an IV is available, else give by deep IM injection." These Protocols do not include any Standing Orders. Group protocols may establish such Standing Orders.

Street Context As used in these Protocols, Street Context is the standard prehospital situation of urban and rural contexts, in which EMS delivery is routine, and provided by or near ambulances, or in otherwise relatively "civilized" surroundings.

Wilderness Context As used in these Protocols, Wilderness Context includes the specialized prehospital situations of wilderness, backcountry, and other delayed and prolonged transport contexts such as catastrophic disasters, in which delivery of first aid, EMS or Medical Care is complicated by one or more of the following four factors:

- remoteness as far as logistics and access;
- a significant delay in the delivery of care to the patient;
- an environment that is stressful to both patients and rescuers; or
- lack of equipment and supplies.

Wilderness EMT As used in these Protocols, a Wilderness EMT is an ASRC Member who cares for sick or injured persons in the Wilderness Context, who:

- is trained as an Emergency Medical Technician in accordance with the current U.S. Department of Transportation (DOT) Emergency Medical Technician-Basic: National Standard Curriculum or a prior or subsequent DOT EMT-Basic Training Curriculum, and ASTM F1287-90(2012) Standard Practice for the Training of the Emergency Medical Technician (Basic), and
- has completed an additional Wilderness EMT class and/or equivalent training.

Wilderness EMTs may provide First Aid. Wilderness EMTs who are currently certified as an EMT-Basic may provide EMS while operating

within a state in which are licensed, in accordance with state laws and regulations.

Wilderness First Responder

As used in these Protocols, a Wilderness First Responder is an ASRC Member who cares for sick or injured persons in the Wilderness Context, who:

- is trained as a First Responder in accordance with ASTM F1287-90 Standard Guide for Performance of First Responders Who Provide Medical Care and ASTM F1453-92 Standard Guide for the Training and Evaluation of First Responders Who Provide Medical Care, and
- has completed additional training in applying his or her training in the wilderness context in accordance with ASTM F1655 - 95(2007) Standard Guide for Training First Responders Who Practice in Wilderness, Delayed, or Prolonged Transport Settings, ***or*** has completed a National Ski Patrol or equivalent Outdoor Emergency Care course.

Wilderness First Responders may provide First Aid. Wilderness First Responders who are currently certified as a state Emergency Medical Responder may provide EMS in accordance with state EMS laws and regulations, when operating within a state in which they are licensed.

Wilderness Medic

As used in these Protocols, a Wilderness Medic is an ASRC member, of a Group with an advanced Medical Care program (AMRG is such a Group), who cares for sick or injured persons in the Wilderness Context, and who:

- is an actively practicing Pennsylvania-licensed Advanced EMT, EMT-Paramedic, Physician Assistant, Registered Nurse, CRNA, CRNP, podiatrist, oral surgeon, physician, or osteopathic physician;
- has completed an additional Wilderness EMT class and/or equivalent training that meets the Group requirements; and
- who has been accredited by the Group to administer medications and provide Medical Care.

Wilderness Medics may also provide First Aid.

Authority and Source

The ASRC Medical Advisory Committee, appointed by the ASRC Board of Directors, has been charged with establishing protocols for care at the first aid and Basic Life Support levels.

While these protocols have been reviewed by many interested parties, these are promulgated by the ASRC Medical Advisory Committee. These protocols are physician's orders from the ASRC Medical Advisory Committee physicians, and in particular, the Chair of the ASRC Medical Advisory Committee in his or her capacity as ASRC Medical Director, to those ASRC Members who are operating under them.

Scope and Applicability

Do these protocols apply to me?

If you are an ASRC member at Callout Qualified level or above, and your Group has decided to operate under these Protocols, these Protocols apply to you, and you should follow them.

If your Group has established its own protocols that supersede these Protocols, then you should follow your Group's protocols.

If your Group has not adopted any of its own protocols, and has not officially adopted these Protocols, you are not obligated to follow these Protocols. However, we *recommend* that you follow these Protocols. If there are later questions about the care you provided, having followed these Protocols provides you with some degree of legal protection against claims that you did not provide proper care.

When can I deviate from the Protocols?

If you are an ASRC Member who is supposed to operate under these protocols, you can deviate from these protocols for one or more of these four reasons:

1. you are at the patient's side, you are a member of a Group that provides online physician medical direction, and you're talking with one of the Group medical-direction physicians on the cellphone or radio, and the physician directs you to deviate from the protocols; or,
2. a physician is at the patient's side with you and has accepted full responsibility for the patient's care, but asks for you to assist in that care; or
3. you are a licensed EMS provider, and the person at the scene with the highest medical training, or a Group medical-direction physician via online medical control thinks that following the state BLS or ALS EMS protocols would be better (for example, for a very short evac); or
4. in the judgment of the highest-trained medical person at the scene, these Protocols have not adequately addressed the specific situation at hand, you don't have a medical direction physician to consult, or cannot reach a medical direction physician, and deviating from the Protocols is in the patient's best interests.

If a patient is being cared for by both an ASRC Member and local EMS personnel, these protocols take precedence over local EMS protocols, unless those local EMS protocols have specific provisions for care of wilderness/backcountry patients beyond the standard state or regional Protocols.

General Protocols

These protocols are written in text form. We do not expect rescue personnel to carry this entire document in the field, but to read, understand and remember the general principles. An abbreviated pocket reference is available, containing specifics that may be difficult to remember.

Safety and Survival

Safety of rescuers is paramount; no specifics will be covered here, as safety is a major part of mountain, cave and wilderness rescue training. Team leaders should depend on the team medic to provide advice about the medical condition of team members and patients.

Previous Training and Judgment

ASRC Members providing medical care should follow their first aid or emergency medical training except in those specific situations covered in these protocols. In situations not covered by these protocols or by previous training, ASRC Members must use their best judgment, giving safety of team members and well-being of team members and patients priority over legal or regulatory concerns.

Medical Command/Control

As a best practice, ASRC Members caring for a patient or team member with any significant injury or illness should discuss the case with a Group medical direction physician, if one exists and can be contacted.

Choice of Medic; Rotation of Medics; Reports

Care of any patient should be coordinated by a single person: the ***medic***. The term medic is a generic one and does not say anything about the person's level of medical training: the medic could be a physician, nurse, paramedic, EMT-Basic, First Responder, or simply a first aider. Whenever possible, all communication with the patient should be by the medic.

In general, the person with the best medical qualifications should be chosen as the medic. However, there may be occasions where the person with the best medical training needs to perform other vital functions such as directing rescue rigging; in such a case, a reasonable alternate should serve as medic.

It is appropriate for a medic to hand over care to a more experienced medic when one becomes available. It is also appropriate for a medic to be replaced by another person so as to be able to rest. It even may be appropriate for a medic to be replaced by a less-capable medic, to avoid exhaustion or hypothermia of the original medic.[*]

When a medic turns over care of a patient during a rescue, the best practice is that the medic should make and turn over a written report to the new medic, unless taking the time for a written report would place the medic or patient at risk, with:

1. results of the initial examination of the patient, including all injury or illness detected,

[*] The doctrine of abandonment would seem to require a medic only to allow a replacement medic of similar or higher qualifications, but a court would certainly recognize personal danger of hypothermia and exhaustion as reasons for leaving a patient's side.

2. any care rendered so far, vital signs, and
3. medical plans for the remainder of the rescue.

This may not be possible if the original medic is exhausted, hypothermic, injured, or simply needs to rest and is unable to keep up with the patient. In such cases, the original medic should make a written verbal report to the oncoming medic, and complete a written medical report for his or her portion of the patient's care as soon as possible.

Primary and Secondary Surveys; Vital Signs

Primary Survey

In EMS and trauma parlance, *primary survey* refers to the process of searching for and immediately treating life-threatening conditions. (Secondary survey refers to a more detailed exam, completing the survey before treating less-serious problems.)

In the early days of EMS and trauma surgery (1960s-70s), the primary survey was always ABD: Airway, Breathing, and then Circulation. This had the advantage of simplicity.

There are a variety of recommended approaches to the primary survey, which depend on some of the conditions around you, and the number of injured or ill people, and the number of trained people ready to help. This means it's harder to learn than ABC, but then it also means you're more likely to do the right things in the right order for the patient.

Therefore, these Protocols do not provide a rigid approach to the primary survey. It will be up to your judgment to select the most appropriate approach from the following, or perhaps use some combination of them.

In all cases, though, before even dealing with patient issues, you should do a quick assessment for scene safety, and deal with urgent safety issues first. In the first example below, this may only last a fraction of a second; in some other scenarios, you may never even get to perform a primary survey because you would get killed it you tried to perform it.

1. You're in a civilized place like outside on a nice day, or inside a climate-controlled building, and nobody is shooting at you. Someone collapses. In this case, the "CAB" approach taught by the American Heart Association makes sense: Circulation, Airway, Breathing:
    a. **check for responsiveness** with a tap and a shout; if unresponsive:
    b. shout for nearby help, activate the EMS system if you can, and get an AED (Automated External Defibrillator) if you can; next:
    c. check breathing and pulse at the same time; if no breathing or pulse:
    d. **use the AED** as soon as it's available, and while waiting for an AED or if the AED doesn't resuscitate:
    e. "**C": Circulation –** compress the chest at 100-120/minute, compressing 2-2.4"
    f. "**A": Airway –** open the airway

   g. "**B": Breathing** – ventilate once every six seconds without pausing cardiac compressions (if you've got two people)

2. You're in a civilized place like outside on a nice day, or inside a climate-controlled building, and there are multiple injured people around you bleeding. Somebody is shooting at you and everyone around you. According to the FBI Crisis Incident Response Group, you should
   a. **run away**; if you can't run away, you should try to
   b. **hide**; if you can't hide, you should
   c. **fight: attack the shooter** and try to disable or kill him or her, and
   d. once you (or someone else) has disabled or killed the active shooter, **then** you can worry about primary surveys.
3. You're in a civilized place like outside on a nice day, or inside a climate-controlled building, and there has just been a shooting. The shooter is gone, and you only see two people injured, who are bleeding badly; the Hartford Consensus says you should
   a. **control bleeding** as quickly as possible, using a military-style tourniquet (this means you should probably consider keeping a couple of tourniquets with you all the time; there are some moves to put hemorrhage control kits in public places along with AEDs, but progress has been slow), and
   b. you and your patients should **get out of the danger zone** before doing you do any more assessment or treatment.
4. You're in a civilized place like outside on a nice day, or inside a climate-controlled building, and there has just been a shooting. The shooter has run away, and the scene is now safe. The military has an algorithm MARCH for dealing with this situation:
   a. "**M": Massive hemorrhage** – control life-threatening bleeding. If appropriate, apply a tourniquet immediately.
   b. "**A": Airway** – open and maintain the airway
   c. "**R": Respirations** – assess adequacy of breathing and support as needed. Seal open chest wounds (and military doctrine is for ALS providers to decompress tension pneumothorax).
   d. "**C": Circulation** – assess pulse presence and quality, skin perfusion (and military doctrine for ALS providers: start IV or IO access and give fluids)
   e. "**H": Head Trauma and Hypothermia** – prevent/treat hypotension (low blood pressure) and hypoxia (low oxygen in the blood) to prevent worsening of traumatic brain injury and prevent/treat hypothermia.
5. You're in a civilized place like outside on a nice day, or inside a climate-controlled building, and there has been an explosion. You are the only uninjured person helping right now but you expect others to show up soon. There are lots of injured people around you; SALT, arguably the best field triage algorithm, says you should

   a. stand in a safe-seeming place, and shout "**if you can walk, come over here!**" and then
   b. **tell one of the walking wounded** to take care of all those people who walked over to you, and then
   c. direct your attention to the remaining casualties; shout "**if you can hear me, wave your hand!**" and then
   d. direct your attention to those who didn't wave their hands, and
      i. **control bleeding** by direct pressure and/or tourniquet;
      ii. **open the airway**; if no breathing give up as dead and move to the next victim;
      iii. see the SALT flowchart for how to continue triage.

6. You're not in a civilized place, you're outside in the woods a mile or two from the nearest road. It's not a nice day. It's 45 degrees with wind and rain. Your team is crossing a stream when one of your members slips and falls, breaking her ankle (the fracture is obvious, but it's not open). You saw it happen, and it's obvious there is no other injury. She is in the stream and is soaking wet. Based on accepted wilderness first aid and survival principles, you should
   a. get her out of the water immediately, while handling the ankle gently,
   b. set up a temporary emergency shelter for her, with insulation under her (improvised from items from you packs, bark from dead trees, or whatever seems best at the time), and insulate over and around her with a tent, a European-style bothy bag, or at least a couple of leaf bags, and
   c. only then finish your primary survey (which was really done as you watched her twist her ankle and fall into the stream)and secondary survey.

The theme that runs through these different scenarios can be summarized as:

1. "A dead rescuer never did anyone any good": assess **scene safety** first, and deal with immediate threats to your and your patients' life before dealing with a patient's medical issues.
2. Deal first with whatever is most like to help the patient survive.
   a. In a penetrating trauma situation, deal with life-threatening bleeding first.
   b. In a likely cardiac arrest situation, get some blood pumping with external cardiac compression first, and then defibrillate with an AED (Automated External Defibrillator) as soon as possible.
   c. In a wilderness situation, unless there is arterial bleeding or likely cardiac arrest, consider cold exposure as part of your scene safety assessment and take measures immediately.

Bleeding Control

If you've been doing first aid for a long time, you may have been taught the PEST mnemonic for controlling bleeding: direct Pressure, Elevation, pressure on the Supplying artery (pressure points), and Tourniquet as a last resort ("sacrificing a limb to save a life").

Now it's time to forget all that and consign it to the dustbin of history. Military research from the wars in Iraq and Afghanistan teaches us new lessons about bleeding and how to control it.

First, forget about elevation and pressure points; they are no longer recommended. Experience teaches they just don't work. There are two other major changes.

First, tourniquets work well and should be used liberally, and newer military tourniquet designs work well.

Second, newer hemostatic dressings (dressings that help bleeding blood vessels clot) can be effective.

If, as part of the primary survey, you see bad bleeding from an arm or leg, put a tourniquet on the arm or leg right away. Tighten the tourniquet until the bleeding stops. Leave this in place until you finish your primary and secondary survey.

The best tourniquet is a standard commercial military tourniquet. There are currently three models acceptable to the US military: the *C-A-T, Combat Action Tourniquet*; the *SOF-TT, Special Operations Forces Tactical Tourniquet*; and the *EMT, Emergency Medical Tourniquet*. One of these makes a good addition to a personal wilderness first aid kit.

Whenever you apply a tourniquet, it must be ***wide***, to prevent damage to soft tissues, and ***tight***, to prevent any leakage. A blood pressure cuff makes an ideal tourniquet, provided you can ensure that it doesn't deflate. A Kelly clamp on the BP cuff tubes will work, provided you watch the cuff to make sure it doesn't leak.

A piece of 1" tubular webbing can often be found in SAR team members' packs, and can be used as an improvised tourniquet. It is probably superior to a leather belt as it is easier to use a windlass to tighten 1" tubular webbing than a leather belt. There are no published studies of how to do this most effectively.

You can simply tie the webbing around the extremity with a square knot or surgeon's knot. These are binder knots that will allow you to get it fairly tight even before applying a windlass. There *is* a study that shows that pencils don't work well as they tend to break; we suspect pens, too, will be too flimsy to work well.[*] A hardwood stick about 4" long and ¾" in diameter would be ideal.

Place the stick on top of the square or surgeon's knot, then tie a third and then a fourth twist in the knot to secure the windlass stick. If there is time and something is readily available, placing a bit of plastic or cardboard under the knot and against the skin may help prevent you from pinching and tearing the skin when you tighten the windlass. Tighten until the bleeding stops, and secure the windlass from unwinding with another piece of webbing.

Note the time that you applied the tourniquet. It is traditional to write the letters TK and the time on the patient's forehead, with a bloody finger if nothing else is available as in a mass disaster setting. Less-impressive methods such as noting it in an ASRC Patient Record or other waterproof notebook is an acceptable alternative. More about the reasons for this below.

[*] The same study showed that a pair of chopsticks worked better. However, they didn't study the ultralight titanium chopsticks that are marketed for backpackers. If you carry these and end up using them for a tourniquet, *please* let us know whether it works.

Ongoing Bleeding Control

A tourniquet will usually stop the blood loss, and allow you to proceed with the remainder of the primary and secondary survey. Though slightly out of sequence in that it is part of treatment after the secondary survey, we will continue to discuss how you can control bleeding when a tourniquet is not placed as part of the primary survey.

The key way for you to control bleeding os to use firm ***localized pressure*** over the bleeding vessels. Your gloved finger, covered with a single gauze pad to make it less slippery, is ideal. You should apply pressure for a full ten minutes, then release pressure and see if it bleeds again. Use your watch to time yourself. If it starts bleeding again, apply pressure, this time for fifteen minutes. If you release pressure or slip off the blood vessel and it starts again, start holding again for another full count by the clock. (When the bleeding starts again, the clot that had been building is pushed off by the bleeding.)

You might find it difficult to do this, because you can't precisely identify the bleeding vessel to get your finger on it. If this happens, you canuse a temporary tourniquet as a tool to identify the bleeding sites.

Surgeons and emergency physicians routinely use tourniquets for up to thirty minutes to allow "bloodless field" surgical repairs: having details not obscured by bleeding makes the surgical repair much easier. Similarly, you can use a tourniquet to locate the bleeding vessels; you then apply direct pressure, and release the tourniquet. If this fails, you may need to leave the tourniquet tightened for a longer period to get the bleeding to stop.

Once the bleeding is controlled, you can apply a pressure dressing with a wad of small gauze pads under it to replace your finger's pressure to prevent it from bleeding again. Using a hemostatic gauze pad (discussed below) may help.

If you put a tourniquet on someone's limb and tighten it, the limb won't become severely painful for about half an hour, and you won't start having irreversible damage to the limb for another about two hours. However, for this tourniquet-then-direct-pressure technique, you shouldn't need a tourniquet for more than a few minutes.

If you have applied a tourniquet during the primary survey, you may want to try loosening after the secondary survey and when you have the time to try the direct pressure technique. Loosening the tourniquet just a bit will show you where the bleeding vessels are.

If you have to leave a tourniquet on to control bleeding, you should remember the importance of ***two hours***. After two hours of tourniquet time, irreversible damage occurs to the limb.

After six hours of tourniquet time, there is enough lactic acid and potassium in the limb that releasing the tourniquet poses a rare but significant chance of cardiac arrest. Current military recommendations are that, if you have to leave a tourniquet on for more than six hours, you should not attempt to remove it in the field; it should only be removed in a facility that can deal effectively with a possible cardiac arrest. A direct quote from military training materials: *Limb tourniquets and junctional tourniquets should be converted to hemostatic or pressure dressings as soon as possible if three criteria are met: the casualty is not in shock, it is possible to monitor the wound closely for bleeding, and the tourniquet is not controlling bleeding from an amputated extremity. Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means. Do not remove a tourniquet that has been in place more than 6 hours unless close monitoring and lab capability are available.*

The military training materials also state (in red): ***When a tourniquet has been applied, DO NOT loosen it intermittently to allow circulation to return to the limb; causes unacceptable additional blood loss; this HAS happened in the past, and was responsible for at least one near fatality.***

Continued slow bleeding is not a major problem for most EMTs. The patient will be in the Emergency Department before the continued blood loss will be a problem. With long evacuation and transport times, though, even slow external bleeding can cause shock. Usually, if you can slow the bleeding down, the body's own clotting mechanisms will stop the bleeding. However, these clotting mechanisms may not work properly under certain conditions, e.g., hypothermia, extensive crush injury, or snakebite.

An old standard rule on the street is not to remove blood soaked dressings, but to place new dressings on top. This is not appropriate for the wilderness. In the wilderness context, you should remove blood-soaked dressings, identify the bleeding vessels, and apply pressure to them as described above.

If needed, apply a tourniquet as described above to allow you to better inspect the wound to figure out more precisely where to apply direct pressure. Once you have done so, you can try removing the tourniquet. If your direct pressure controls the bleeding, leave the tourniquet loose but in place, in case you need to tighten it again.

Various materials can be placed into or onto wounds to help staunch bleeding. ASRC Members may carry and use such materials, provided that the material is currently approved for use by a branch of the US military. Our current knowledge recommends the newer QuickClot brand gauze[*], either in the form of 4”x4” gauze pads, or rolls of similar gauze known as Combat Gauze. A couple of these gauze pads is a reasonable addition to your wilderness first aid kit.

Extent of Secondary Survey

For minor injury or illness of a search and rescue team member, you may need only to examine the affected part. For instance, a complete primary and secondary survey is not needed for someone with a splinter in the little finger. For a rescue situation, however, you should perform as complete a survey as is reasonable.

Your secondary survey should be consistent with your training, and appropriate to the context: the weather, terrain, and mechanism of injury or the illness.

Possible Pelvic Fracture; Log Roll vs Many-Hands; Backboards vs Vacuum Mattress

Possible Pelvic Fracture

Part of a standard secondary survey after multiple trauma, such as a major fall, is to check the pelvis (hip girdle) for possible pelvic fracture.

[*] The prior “cat litter” material developed too much heat. If the QuickClot looks like cat litter, or a large teabag filled with cat litter, it is the older formulation and you should not carry or use it.

People can bleed to death internally from a pelvic fracture. Disturbing the pelvic fracture can make bleeding worse. One type of severe pelvic fracture, known as an open-book fracture, can benefit from splinting with a device called a pelvic sling.

A traditional method for moving a multiple-trauma patient is called a *log roll*. This is where someone kneeling at the head stabilizes the cervical spine, and then others help roll the patient on his or her side, either to check the back for injuries, or to move the patient onto a backboard to protect the spine.

The best evidence at present is that both log rolls and backboards hurt patients and do not help them, and you should not use either.

A standard part of the secondary survey for a trauma patient is to palpate the pelvis to assess for a possible fracture. To do so, place your hands on either side of the hips, and press inwards. Tenderness suggests a pelvic fracture. Movement of the pelvis inwards suggests an open-book pelvic fracture, the kind that can cause severe internal bleeding.

If the pelvis moves inwards, even a little bit, assume an open-book pelvic fracture and ***continue holding the pelvis together*** with your hands. Continue to do so until you can apply or improvise a pelvic binder. A pelvic binder is a device to keep the pelvis folded inwards, in normal anatomic alignment. This can decrease internal bleeding enough to save a life.

Commercial pelvic binders – there are several brands – work well. If you wish to keep one with your wilderness first aid kit, we recommend that SAM Pelvic Sling II. It is relatively light but somewhat bulky. Apply as per the manufacturer's recommendations.

It is not hard to improvise a pelvic sling. A detachable hipbelt from a frame pack, or even an emptied softpack placed upside down under the patient's butt so that the hipbelt comes forward around the hips will work well. Regardless of design, the best place to place a pelvic binder is around the greater trochanters of the hips. If you "put your hands on your hips" they will be on the anterior superior iliac crests. The greater trochanters are a hands-length (from base of the hands to the tips of the fingers) below this.

Log Roll vs Many-Hands

If a patient has a pelvic fracture, a log roll can move a fractured pelvis and have worse bleeding. Instead of a log roll, if you need to move a multi-trauma patient, such as into a litter use the *many-hands technique*. Get as many people on either side of the patient as possible. Everyone places hands under the patient, and then lift in unison.

It's hard to get a grip with hands under the patient; grabbing a fold of clothing may help. It's also possible to have an additional person straddle the patient, and lift up on the patient's belt the front of the pants while hands underneath are lifting. Another useful technique for the person near the patient's feet is to place two fingers of a lifting hand in one long pants cuff, and two fingers in another.

In some circumstances, such as in a crevice in a cave, there may not be room for many people around the patient. Sometimes, you can pass webbing or rope slings under the patient, and someone standing several feet overhead can lift these slings in unison with those beside the patient.

A standard practice is to lift a patient like this, and then slide in a litter from one end.

Backboards vs Vacuum Mattress

Backboards are a traditional method to attempt to immobilize the spine after multiple trauma. However, there is no evidence that backboards help, and plenty of evidence that the cause damage. In particular, those on backboards develop debilitating pain after 45 minutes, and after a couple of hours, they develop skin necrosis over the sacrum (above the butt) that can require hospital admission and skin grafts, and tend to get infected and result in death from sepsis. Therefore, never put a patient on a backboard, or allow those in your team to do so.

The ideal way to immobilize a patient with a potential spinal injury, for a search and rescue situation, is in a full-body vacuum mattress. ASRC Groups tend to have these. If a vacuum mattress is not available, place the patient in a cervical collar, then into a litter with excellent padding underneath the patient and particularly under the sacrum, customized to support voids such as under the lumbar area and the back of the knees.

Vital Signs

The interval for taking vital signs, and the vital signs to take, are medical decisions. These should be made by the team medic, in consultation with a Group medical command/direction physician if desired by the medic.

If you are the medic, factors that should enter into your decision include any danger to the patient from taking vital signs (e.g., exposure to cold), delay in evacuation from taking vital signs, and the stability of the patient.

Frequent vital signs are not needed for stable patients; a set of vital signs every few hours might suffice. For a critically ill patient, vital signs every few minutes might be appropriate.

Pulse rate and quality, respiration rate and quality, and temperature are a reasonable set of vital signs. If a blood pressure cuff and someone who knows how to use it are available, a blood pressure is a reasonable addition.

You should take and report a temperature on every patient. Even if no thermometer is available, feel the patient's skin in an armpit and make an estimate of whether the patient's core temperature is normal, cold, or hot. Even the notation “skin in armpit is cold” “skin in armpit warm” might be helpful later on.

Reporting to Medical Command/Base

The medic should make reports to a Group medical command/direction physician, if communication is established, or at least to the operation Base. The content and timing must be adapted to the situation, but the following outline is fairly standard. This applies to written notes (often used in the initial phases of cave rescue) and radio/field phone communications:

ID: Team Identifier and Medic name and level of training

Chief Complaint

History:

- History of Present Illness
- Past Medical History
- Medications
- Allergies

Physical Exam (primary and secondary survey)

Field Diagnoses (or problem list) and Extended Status Code (see below)

Scene:

- Weather
- Terrain
- Resources
- Prior Treatment

Evacuation Time Estimate

Evacuation Priority:

- **Hasty (Very Urgent)** or
- **Urgent** or
- **Routine** or
- **Delayed** (bivouac)

Treatment Now

Plans for Possible Problems During Evacuation

Extended Status Codes

Status Codes are in fairly wide use in wilderness search and rescue, and almost universally understood in the Mid-Appalachian region:

Status I: alive and well, able to evacuate self.

Status II: ill or injured, requiring evacuation and/or medical treatment.

Status III: dead.

Status II may be subdivided for medical reporting. This is a new extension of the standard status codes, and has yet to become widely used. But since these brief codes summarize medical information in a way useful to Incident Staff, it still is worthwhile to give them a try. These codes were chosen to reflect the important differences in patients' clinical status.

Extended Status Codes are as follows. Note the A, B, C, D, F “grades” correspond with the standard U.S. secondary school grading system for ease of remembering them.

Extended Status Codes:

IIA: ill or injured but able to walk/climb out with assistance

IIB: minor to moderate injury or illness; requires evacuation but at a measured pace because patient appears stable for a long evacuation.

IIC: serious injury or illness; stable but requires urgent evacuation.

IID: serious injury or illness; unstable and requires hasty evacuation (e.g., start improvised evacuation even if litter not yet available)

IIF: serious injury or illness, death seems likely before evacuation completed

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Note that actual evacuation plans hinge not only the patient's condition, but also other factors such as the time of day, weather, terrain, and available resources.

Documentation

When available and permitted by Group policies, please use standard ASRC Patient Record Forms.

There are four critical areas of medical documentation, listed with the most important first:

Decision-making

Why did you start an improvised evacuation? Why did you move the patient without even trying to clear the cervical spine? Why did you request a higher level of medical personnel before moving the patient?

Field Diagnoses

List specific **field diagnoses**. (All will understand that these are tentative diagnoses made under field conditions.)

Exam

Give **details of your examination of the patient:** What was your overall assessment of the nature and severity of the injuries?

Vital Signs and Repeat Examinations

Of these two, repeat examinations and repeat overall assessments are more important.

Initial Care of Those Lost or Stranded

Patients who may have been without food or water for a period of days should be given fluids and food unless there are reasons not to (see below). ***However***, there are dangers in giving fluids or food to a starving or dehydrated patient:

1. Some patients who have been without food for a long time, or have been sweating excessively from the heat, may have a very low level of salt in their blood; giving water may drive the level down even more, causing confusion, seizures, or coma. Instead of water, give electrolyte drinks such as Gatorade™. Even if the patient has a normal or high salt level in the blood, electrolyte drinks are still good. ***Don't give water*** unless there will be a long delay until an electrolyte drink is available. An alternative is to add a small amount of salt (one fast-food salt packet, or about a half-teaspoon of salt) to a liter of water or flavored drink.
2. Those who have been without food or water for a long time may become nauseated or vomit if give a large amount to drink or eat. Start with small sips of electrolyte drink, then small bites of food.
3. If the patient has been without food for a very long time (several weeks), food might cause shock and death. This may be prevented by giving the vitamin thiamine, which is contained in almost all multivitamins. If the patient has been starving for several weeks, don't give food unless you also give a thiamine or multivitamin pill.
4. Patients may be disoriented and even perhaps slightly agitated when found. This is usually situational (related to being lost or stranded, not to underlying physical or mental disease.) Even if sedative medication such as over-the-counter Benadryl (diphenhydramine) is available in someone's kit, it is best to simply wait about an hour for the patient to recover spontaneously or due to interaction with rescuers.

Oral Fluids and Food

Give Food and Drink

In general, all patients who are more than a couple of hours from the hospital should be given food and fluids. The following are reasons not to give food or fluids:

1. Patient is so ***lethargic or confused*** that the patient may choke if trying to eat or drink. If unsure, you may give the patient sips of water or electrolyte drink and see if the patient chokes. Choking on a small amount of water or electrolyte drink should cause no significant medical problems for a patient.
2. Patient has an ileus: stomach and intestines not working properly; patient nauseated, not farting, no bowel sounds at all. This often comes after trauma (including burns). Assume that anyone with an "acute abdomen" has an ileus (see page 45).
   If unsure, give the patient sips of water or electrolyte drink and see if the patient vomits.
   However, some patients with a simple "stomach flu" may be able to keep down some oral fluids despite vomiting; keep trying to give such patients oral fluids even if they vomit a lot.
3. Patient will certainly have surgery and general anaesthesia in the next 2 hours.

Do ***not*** give patients caffeine. Chocolate is acceptable, as are decaffeinated coffee or tea.

Even if very hungry, give patients only small bits of food to begin with. Easily digestible foods such as trail mix or gorp are ideal to start with.

Rehydration

Patients, in addition to needing food and fluids for routine nutritional needs, may also need fluid replacement for various reasons: dehydration from excessive sweating, dehydration from vomiting or diarrhea, or shock from burns or blood loss or crush injury. Unless there is a good reason to avoid oral fluids (described above), start oral rehydration for any of these situations.

Oral rehydration fluids must contain salt. Do not attempt oral rehydration without some salt in the fluid.

Two main kinds of oral rehydration fluid are available: Oral Rehydration Salts (ORS), and "athletic" drinks such as Gatorade™. Both contain salt, sugar, and potassium, but ORS is much more salty.

For diarrhea and vomiting, or for shock from blood loss or burns or crush injury, the ideal fluid is the World Health Organization (WHO) Oral Rehydration Salts. Packets of this salt mixture, each to make a liter, are available online, and a packet is a good addition to any wilderness first aid kit.

For dehydration from sweating, less salt is needed; athletic drinks (e.g., Gatorade™) are better. You may dilute them half-and-half with water, or alternate a liter of athletic drinks with a liter of plain water.

If you only have ORS, you can use it for dehydration from sweating; if only "athletic" drinks available, they may be used for dehydration from vomiting and diarrhea or shock.

If you have neither ORS nor "athletic" drinks, but do have some salt, add between half a teaspoon and a teaspoon of salt per liter of fluid. A few fast-food salt packets make a good addition to any wilderness first aid kit. A full teaspoon of salt will result in an average "athletic" drink's salt concentration. Salt can be added to any type of fluid.

Hypothermia Prevention

Hypothermia prevention for rescuers is a standard part of search and rescue training and for the purposes of these protocols is not considered a medical procedure.

Hypothermia prevention for patients, however, is a critical medical procedure. Even aboveground in the summer, patients with illness or injury who are immobilized or not moving are subject to hypothermia.

During or after the primary survey, rescuers of all levels shall move the patient and place available insulation under the patient, then over the patient. If the there are reasons to suspect a spine injury, the rescuer shall employ a many-hands carry or similar technique to move the patient while protecting the spine. In certain situations (cold water immersion, severe winter storms), rescuers may legitimately consider hypothermia a life-threatening hazard and do whatever is needed to protect the patient from hypothermia even before completing a primary survey.

Rescuers should generously insulate patients unless (1) the patient complains of being too hot, (2) an unconscious or uncommunicative patient's core temperature has climbed to normal levels, as judged by a thermometer, or as judged by the rescuer by feeling the patient’s skin temperature, or (3) the patient is being treated for heat illness.

In cold environments, rescuers should not hesitate to use hot packs, charcoal vests, or warm inspired O_2 or air as "active insulation" for patients who are not yet hypothermic. Make sure that hot packs are not directly against the skin, as that can cause burns.

Water Disinfection

If you are asked to make recommendations for backcountry water purification for drinking by patients or team members should recommend iodine tablets or other acceptable iodine methods, using adequate contact time given the temperature and turbidity of the water, or iodine-resin filtration systems.

Point out the limitations of most filter systems: except for iodine-resin systems, they will permit diarrhea, hepatitis, and other viruses through. And, Giardia filters will not filter out either bacteria or viruses.

For irrigating wounds, don't hesitate to use clean but not sterile water. The preference, however, is for water from a filter system that removes bacteria (simple Giardia filters are not useful for this purpose). There is no need to eliminate viruses from irrigation water, so most backcountry filters will be adequate for this.

For disaster situations, medics may use the following for drinking water:

- if dirty, flocculate (alum or white campfire ash)
- 8 drops povadone-iodine (e.g., Betadine®)/L for 30 minutes; use more or leave longer if dirty or very cold water
- 4 cc of chlorine (e.g., Clorox™ 5% bleach for 40 L (10 gallons) overnight; double if have to use in an hour

"Clearing the Cervical Spine"

In certain wilderness or disaster situations, the risks of waiting for or using spinal immobilization are significant. In such situations, medics who have completed a Wilderness EMT class, and ***only*** those who have completed a Wilderness EMT class, may use the following protocol to exclude the need for spinal immobilization.

A person who has sustained a significant injury with the potential for cervical spine injury may be managed without cervical spine immobilization in the wilderness if:

1. The person is alert and oriented, and not intoxicated; and
2. The person has no significantly painful "distracting injury": suspected fracture of a long bone, pelvis or skull, deep lacerations, severe contusions, large burns, or suspected multiple rib fractures; and
3. The person has no complaints of neck pain or neurological symptoms; and
4. You can find no tenderness on examination of the neck, nor any abnormality on motor and sensory exam of the extremities; and
5. The person can demonstrate a full range of motion of the neck without pain.

Rescuers may find patients in situations so hazardous that the patient must be immediately evacuated without even trying to clear the cervical spine. (Example: a patient hanging unsecured on a cliff.) This must be a decision of the rescuers at the scene, and the decision-making process should be documented in the rescue's medical records, even if well after the decision was made.

Some patients who do not meet these criteria may still be "cleared" but this will require consultation with a Group medical command/direction physician. If you are not a WEMT, but you wish to employ the above criteria to "clear" a cervical spine, you will need to consult with a Group medical command/direction physician to discuss whether this is appropriate or not.

Head Injury

(Blow to head ***with*** loss of consciousness or neurological abnormalities, such as confusion, memory lapses, partial paralysis, or a severe headache out of proportion to the apparent injury)

Head Injury and Hypothermia

Rescuers should treat hypothermia in the setting of head injury no different from other cases of hypothermia: add as much heat as possible.

Head Injury and Shock or Dehydration

Rescuers should not withhold fluid from a head-injured patient with shock or dehydration. Shock or dehydration are likely to cause a worse outcome in head injury. However, rescuers should not fluid overload such a patient. Just provide fluids until signs of dehydration or shock are gone.

Positioning and Evacuating Head-Injury Patients

Rescuers should position a head-injury patient flat in the litter unless they must place the patient on the side to protect the airway. Regardless, the patient's head should be in neutral position with respect to the rest of the body (not twisted). Package the patient so that there is nothing even slightly constricting the jugular veins across the neck. Just slight twisting of the neck, or slight obstruction of the neck veins, may cause increased intracranial pressure.

Evacuate the patient with the head slightly up if possible.

Hyperventilation with a bag-valve-mask used to be recommended for severely brain-injured patients. But, now we know it is worse than useless. Don't do it.

Chest Injury

Rescuers should care for chest injuries as taught by their standard prehospital emergency medical or first aid training.

Of particular importance is of sealing sucking chest wounds. Taping a square of plastic or foil over the sucking chest wound on three sides is standard. There are commercial devices that are superior, and defibrillator pads work well on an improvised basis.

Particular points to observe during evacuation include two items for those with serious chest injury, and one for isolated rib fractures:

1. ***Position with the good side down, and the injured side up.*** This assures better blood flow to the good lung and in scientific studies provides better oxygenation.
2. ***Encourage the patient to take deep breaths and cough***, even though it will be painful. Do this regularly during the evacuation, to prevent collapse of segments of the lung. Have the patient hold the injured area (or you may do this for the patient) while the patient coughs, to minimize pain. If long evacuation, use postural drainage, chest PT, as described in the section on lung infections, below (section V.W, page 25).
3. ***If a team member or patient appears to have one or two rib fractures without other injury, do not splint or tape the ribs except if needed to get the member out.*** Taping or splinting rib fracture over the longer term makes complications more likely. Those with rib fractures and pain medications in their personal wilderness first aid kits should be encouraged to take them.

Abdominal Injury

History

Any team member with even minor abdominal injury who develops sustained lightheadedness or develops new pain in the shoulder should be evacuated from the field immediately.

Examination

For any team member with even minor abdominal injury, check pulse (and if a blood pressure cuff and someone trained in its use are available, a blood pressure). Having a baseline may help determine the likelihood of solid organ injury with internal bleeding later.

Penetrating Abdominal Trauma

If evacuation and transport time to hospital will be more than an hour, ***gently replace*** protruding abdominal contents after irrigation with cleanest water available. Note carefully any visible tears of intestine, any fecal odor from abdominal cavity, or any visible intestinal contents in abdominal cavity. If available, cover wound with a dressing soaked in povadone-iodine (e.g., Betadine®) diluted with 10 parts water, then an occlusive dressing.

Back Injuries: Team Members with Back Pain After Lifting

First, check to make sure the mechanism of injury is appropriate for you to evaluate as a likely back strain. For instance, ***don't*** use this protocol for someone who fell 35' onto his back and has severe back pain; he or she needs to be treated as a multiple trauma patient. This protocol is only for back pain after twisting or heavy lifting.

Ask: "Have you had any trouble passing your urine?" (If the injury just happened, the person doesn't know. But, if the injury happened several hours ago, and the person tried to go and couldn't, or is dribbling all the time, you want to know about it right away.)

Ask: “Do you have numbness in your crotch?”

Ask: "Do you have any pain, numbness, tingling, or weakness going down your legs?"

If answer to any of these is yes, it may indicate spinal nerve root compression, or spinal cord compression. If you suspect spinal nerve root compression or spinal cord compression, or the back pain is so severe as to prevent walking, carry the team member out of field instead of having him or her walk.

Wounds

Contusions

Tell person to use standard "r i c e" treatment for first 24-48 hours: **R**est, **I**ce, **C**ompression (elastic bandage) and **E**levation. After 36-48 hours, apply heat, to bring more blood to area and speed healing.

Subungual Hematoma (blood trapped under fingernail)

WEMTs and above only: Clean the nail with soap and water, alcohol, or povadone-iodine (e.g., Betadine®) and then trephine the nail (make a hole in it). The preferred method is to heat tip of a paper clip in a flame to sterilize and make red-hot, then apply firmly to nail. An alternative is to use a #11 scalpel blade or a 18 Ga needle as a twist-drill to drill a hole in the nail.

Open Soft-Tissue Wounds

Examine the wound and classify it as either ***low risk*** or ***high risk*** for complications.

High risk wounds include: open fracture, bone or tendons exposed, human or other bites, deep punctures, grossly contaminated wound, or severe crushing. Other wounds are considered low-risk for complications such as infection.

Never put alcohol, merthiolate, mercurochrome, or peroxide into an open wound. **They kill human tissue as well as bacteria, and may make infection more likely.** You may use povadone-iodine (e.g., Betadine®) ***around*** but not in wounds; the only exception is diluted povadone-iodine for high-risk wounds as described below.

High-Risk Wounds

- Control bleeding.
- If contaminated, irrigate the wound (see below).
- Leave the wound open, and pack and cover it with gauze soaked in povadone-iodine (e.g., Betadine®) diluted with 10 parts water.
- Change the dressing roughly every six hours; ***wash your hands*** or wear gloves before changing dressings, and keep your mouth shut when dealing with open wounds.
- Evacuate the patient.

Low-Risk Wounds

- Control bleeding.

- Irrigate contaminated wounds (see below) if deep enough to require it.
- If available in the person's wilderness first aid kit, have them apply bacitracin (antibiotic) ointment and a clean dry dressing. Clean the wound with drinking water and soap twice a day. Over-the-counter bacitracin ointment makes a good addition to any wilderness first aid kit. It is superior to Neosporin® or generic-equivalent triple-antibiotic, as these ointments contain neomycin, which is famous for causing blistering allergic reactions like poison ivy.
- If the wound will require surgical repair, alert Base, but there is no need for evacuation, unless the team member is unable to continue because of pain or for some other reason.

Irrigation

- Use water as described above under ***Water Disinfection*** (see page 25).
- Wounds that are the result of a cut from a clean sharp object, or from blunt force, and have not been contaminated, require only ***low-pressure irrigation*** with a small amount of clean water, gently sloshed through the wound.
- Wounds that have been contaminated, either from a cut from a dirty object, or from having dirt or foreign material in the wound, or delayed treatment that can allow bacteria to crawl into the wound, should receive high-pressure irrigation.
- For high-pressure irrigation, use a 30 cc syringe and 18 ga plastic intravenous catheter, or a zipper plastic bag with small hole to provide a small forceful stream. For low-pressure irrigation, just slosh some water through the wound by pouring from a water bottle, or squirting with a low pressure stream from a Camelbak or similar water pouch.
- Use about 100 cc (about 3 fluid ounces) of fluid per inch of wound.
- Aim away from yourself and wear glasses or goggles and keep mouth closed to prevent splashing into your eyes or mouth.
- Trying to stick a needle or over-the-needle catheter into a small puncture wound to irrigate it is frowned upon. It doesn't irrigate that well, and causes enough swelling that it interferes with normal healing mechanisms.

Tetanus Status

If a team member has a wound that requires surgical repair or medical attention, and has not had a tetanus immunization within the past five (five) years, have the team member return to Base to obtain tetanus immunization.

Friction Blisters

Leave the blister intact unless it is in a place where it will obviously rupture (e.g., the sole of the foot).

WEMTs and above only: If in area so that it is sure to rupture, make a small hole at the edge of the blister with a sterilized pin, needle, or #11 scalpel blade. Press gently to remove the fluid.

If the top of the blister is partially ripped off, trim it away neatly; clean the area and cover it with some povadone-iodine or bacitracin ointment and a self-adhesive dressing (e.g., a Bandaid™) or other dressing.

Instruct the person to keep the blister clean, since it is susceptible to infection.

Impaled Objects

Splinters: Wilderness EMTs and above only: attempt removal with a #11 scalpel blade or pointed pocket knife blade.

Large Impaled Objects: whenever possible, you should discuss this with a Group medical command/direction physician. If you cannot contact a Group medical command/direction physician, the most experienced medic at the scene must decide whether to attempt to stabilize or to remove the object. Most impaled objects cannot be "stabilized" during a wilderness evacuation, so you should generally remove an impaled object before transport.

When removing an impaled object, you should generally remove it slowly, and gently but firmly, pulling out along the line the object entered. You should stop your attempt if you encounter any significant resistance or cause a significant increase in pain.

Fishhooks: The barbs make removing them backwards difficult. Sometimes you may be able to push the hook on through and clip off the barbed tip, allowing easy removal. When the tip is deeply embedded, it may be better to clip off most of the external part of the hook, and stabilize it in place for removal in the Emergency Department once the person reaches civilization.

Orthopedic Injury

Muscle Strains

Use standard RICE treatment for the first 24-48 hours: **R**est, **I**ce, **C**ompression (elastic bandage) and **E**levation.

After 36-48 hours, apply heat, to bring more blood to the area and speed healing.

For spasms or cramps or stiffness, use gentle stretching after applying heat.

Probable Sprains

Minor injuries that appear to be sprains, and do not interfere significantly with use of the part, should be treated with RICE treatment for the first 24-48 hours: **R**est, **I**ce, **C**ompression (elastic bandage) and **E**levation.

After 36-48 hours, apply heat, to bring more blood to the area and speed healing.

For more significant sprains (or possibly minor fractures) management depends on the medic's level of training:

First Aid/First Responder level: splint and evacuate.

Wilderness EMT level and above: evaluate and treat in accordance with Wilderness EMT training. Some team members with such injuries will need to be splinted and evacuated, others may be taped and walk out, and still others may be splinted or taped and continue with the task. May use the Ottawa Ankle Criteria to help determine whether ankle injuries require evacuation. See Appendix for Ottawa Criteria.

Closed Fractures:

There are two indications for your realigning a deformed long bone fracture (including open fractures). They are (1) to correct or at least improve a sensory or vascular deficit secondary to the fracture (if numbness, tingling, weakness, or lack of pulse beyond fracture), and (2) to align severely deformed long bone fractures to allow splinting with adequate immobilization.

Don't try to reduce (set) the fracture or force all the bone fragments back into anatomic alignment. This is a physician's responsibility.

Pull longitudinally, that is, along the normal axis of the injured extremity. Grasp the extremity distal to (beyond) the fracture firmly. Once you apply traction, you will not release it until the limb is fully splinted. Have an assistant stabilize by countertraction, holding the extremity proximal to (closer to the torso than) the fracture. Use the least amount of force needed to align the extremity. Having a person support the injured extremity under the site of the fracture will make the patient more comfortable. Your initial pull will usually cause slight discomfort as the fragments move, but it quickly subsides. Then, you can apply further gentle but firm traction to align the fracture. If the patient strongly resists traction, or if it causes markedly increasing pain that continues, stop, and splint in the deformed position.

Attempt realignment of a long bone fracture only twice, unless there is a sensory or vascular deficit. If you are unsuccessful after two attempts, or if you encounter resistance during realignment, splint the extremity as is. In these circumstances there is a greater risk of making the injury worse than the potential benefit of the realignment.

Femur Fractures

WEMTs and above: For the initial management of a femur fracture, use a traction splint if available and no contraindications.

Even with the best-padded ankle hitches, traction splints tend to cause pressure necrosis when used for a long period of time. You must monitor carefully for signs of pressure necrosis, and readjust or take off the traction splint if the ankle shows signs of skin breakdown. If the evacuation will be more than three or four hours, use ***skin traction*** instead of an ankle hitch: apply tincture of benzoin (Friar's Balsam) to the calf on both sides, then run a piece of duct tape in a "U" shape under the instep and up along both sides of the calf; fold the section under the instep over on itself so it does not stick to the skin. Attach the traction to the duct tape under the instep.

Many orthopedic surgeons doubt the usefulness of traction splinting for extended evacuations. Instead, they recommend a Jones' dressing: bulky padding surrounded by plaster, fiberglass, or flexible SamSplints™, and held together with elastic bandages. If no traction splint is available, apply a Jones' dressing.

If none of these splints are available, transport the patient lying in a well-padded litter or vacuum mattress with the legs strapped together, or with a tree limb or another reasonable substitute secured between them to keep the knees from bending.

Open Fractures

Realign open fractures for the same reasons as for long bone fractures as described above.

Open fractures deserve special consideration. You must arrange immediate evacuation for any patient with an open fracture. These fractures require irrigation, debridement, and open surgical reduction in the operating room. You must assume that any fracture (or suspected fracture) with a nearby laceration or wound is an open fracture. Care of open fractures in the wilderness environment depends upon evacuation time.

If you estimate that you can complete evacuation and transport to the hospital within two hours, limit cleansing to just brushing off dirt and other contaminants with clean gauze or a cloth and apply a dry, sterile dressing. Control hemorrhage by carefully applying a pressure dressing and immobilize the extremity by splinting.

If evacuation time will exceed two hours, you should clean visible dirt off the wound, and irrigate with high pressure as described for wounds, above, before applying a sterile dressing. Control hemorrhage with a pressure dressing if needed, and immobilize. If you find evidence of any nerve or vascular deficit (numbness or missing pulse), and the extremity is deformed, realign the fracture and reevaluate before splinting and evacuating.

Dislocations

Wilderness First Aid/First Responder level: attempt reduction only if numbness, or if no pulse beyond dislocation.

Wilderness EMT level: attempt reduction of all dislocations if numbness, or if no pulse beyond dislocation. Attempt reduction of the following dislocations: jaw, finger or toe, elbow, shoulder, patella, knee, ankle. Attempt hip dislocation reduction only if needed to evacuate patient.

Amputations

Control hemorrhage by direct pressure or a tourniquet if needed. A tourniquet on an a limb that has been amputated (not just a finger or toe amputation) should stay in place and not be removed in the field. Clean the amputated part with water or saline, wrap it in a moistened sterile gauze or towel, place it in a plastic bag, and transport it as cool as possible without freezing. Never place an amputated part in direct contact with ice or icy water. Keep the amputated part with the victim throughout the evacuation process.

Heat Illness

Syncope (Fainting, Passing Out, Falling Out)

Syncope may be a sign of serious medical problems, such as a seizure disorder, a heart valve problem or arrhythmia, or a stroke. On the other hand, fainting may be due to minor problems, such as dehydration, a sudden psychological shock, prolonged standing, or forgetting to eat breakfast.

If you are on a wilderness SAR task and find yourself confronted with a team member who has had a syncopal or near-syncopal episode (passing out or nearly passing out), evaluation depends on your level of training.

First Aid/First Responder level: evacuate the team member.

WEMTs and above only: You may allow a team member who meets the following criteria to resume duties after a few minutes' rest and some rehydration and sugar replenishment:

- the team member had some lightheadedness or nausea prior to the episode;
- the team member was unconscious for only a few seconds, or it's not clear if the team member was truly unconscious or just dazed;
- the team member has no history of heart problems, and had no chest pain or chest pressure associated with the episode;
- the team member had no specific neurological symptoms;
- no seizure activity was noted, nor anything to suggest a seizure (no tongue biting, no urinary or fecal incontinence);
- no significant injury occurred to the team member from falling; and
- on exam, you can hear no heart murmur, you find a regular pulse, and you find a normal neurological exam.

You should use the above protocol with caution; anything about the episode that makes you suspicious of a serious cause, even if the team member meets all the above criteria, should be cause to terminate the task and head back to base.

Any team member with syncope should be examined by a physician when the team returns to base, even if you have cleared the team member to continue with the task.

You should carefully check the team member for orthostatic lightheadedness (dizziness with standing) and should continue rehydration and sugar replenishment until the person is no longer orthostatic.

Heat Cramps

Treat heat cramps with gentle stretching and oral rehydration as described in the section on oral rehydration, above.

Dehydration

If you suspect dehydration in a team member (common symptoms are: lightheadedness, weakness, nausea, redness of vision or tunnel vision):

- Ask the team member to urinate. If he or she can produce only a small amount of dark urine, he or she has at least mild dehydration.
- Check for orthostatic lightheadedness to look for severe dehydration.
- Check patient's temperature to rule out heatstroke.
- Rehydrate as described in the section on oral rehydration, above.

Heat Illness (Heat Exhaustion, Heatstroke)

If a patient or team member has a temperature more than about 102°F (39°C), with neurological symptoms (e.g., confusion, decreased level of consciousness, weakness or numbness or tingling of one leg or one arm), in a proper setting for heat illness, and without history or physical exam evidence to suggest fever, treat for heat illness. If you have no thermometer, and patient feels hot and seems to have heat illness, treat for heat illness.

Rehydrate if any suspicion of dehydration. Place in a shady, cool area, dampen the patient's clothes with water (preferably tepid, not cold), and fan to cause evaporation heat loss.

Use cooling to bring temperature down to 102°F (39°C), then stop. Monitor temperature for decreases or increases. Evacuate.

Burns

Small Second or Third Degree Burns

Second or third degree burns of 5%, the size of five palms, or less: Gently clean the burn of loose blister fragments, and any foreign material, clean the burn with soap and water, and if available in the member's wilderness first aid kit, have the member apply silver sulfadiazine (Silvadene®) cream or bacitracin ointment twice a day. (If you don't have silver sulfadiazine (Silvadene®) or bacitracin, canned non-mentholated shaving cream makes an acceptable substitute.)

Leave complete blisters intact, unless they are where they are sure to rupture (e.g., the soles of the feet), or are very large and tightly filled with bloody fluid. In such cases, the member should prep the blister with povadone-iodine (e.g., Betadine®), then drain by a small incision at the edge of the blister with a sterile scalpel blade or needle. Have the member press the blister flat, in the hope that it will stick to the underlying skin and continue to serve as a burn dressing. Apply a dry dressing.

Large Burns

Treat the burnt area as described for small burns, above.

Evaluate carefully for shock, and be prepared to give large amounts of fluid by mouth if tolerated. Use urine output to gauge adequacy of fluid replacement.

Evaluate for airway burns and toxic inhalation.

Lightning Strikes

A particularly important point about lightning strikes is that the patient may have ***respiratory paralysis, unconsciousness, and vasospasm with undetectable pulses; despite which, prolonged artificial respiration may allow the patient to recover with no neurological deficit***. Vasospasm is a "cramp" of blood vessel muscles that may make a pulse impossible to feel. Coma may last for days or weeks, but some patients will still make a full recovery. Each lightning strike victim needs immediate ABC's, with careful attention to protecting the C-spine. Almost all trauma patients and many cardiac patients with cardiac arrest will die even if you apply CPR. Lightning strike victims, on the other hand, offer you an excellent chance to save a life through basic life support.

If you find a patient in or near a thunderstorm, with coma, dendritic (tree-branching) burns, or ruptured eardrums as shown by blood from the ear, you should start vigorous resuscitation, for the patient may be a lightning victim.

Anyone you find confused near a lightning strike might be a victim of the strike. You should check for pulses (remember the possibility of vasospasm) and if you have a BP cuff and the ability to do so, check the BP. Perform a regular trauma exam. Although such patients are generally stable, and recover without incident, evacuation is in order, with cardiac monitoring if available.

Check the patient's urine for signs of myoglobinuria (see below) and treat it if found.

If you must triage a group of people who have been hit by lightning, the rule should be "**resuscitate the dead,**" because those showing some signs of life are likely on the way to recovery.

Hypothermia

Mild Hypothermia

Hypothermia is divided into moderate/deep and mild by the temperature 90°F (32°C). Those with mild hypothermia and no medical problems can be rewarmed by any method and will do well. Team members with mild hypothermia may return to duty after rewarming and adequate food and drink.

Assessing Hypothermia; Hypothermia in Team Members

Oral (mouth) and axillary (armpit) temperatures may be much lower than the "core" temperature, especially in mouth breathers or those who are chilled. Patients with a very cold oral or axillary temperature, even if they aren't truly hypothermic by rectal or tympanic membrane temperature, are likely severely chilled. We call this incipient hypothermia. Such patients need shelter, food, water, and rewarming.

Unless a person has been smoking or drinking warm drinks, though, a normal oral temperature rules out hypothermia, and an oral temperature above 90° F (32° C) rules out moderate/deep hypothermia. Similarly, you can use a warm axillary temperature to rule out hypothermia.

Some texts and many articles in outdoor magazines make a point of providing a chart of the signs and symptoms that develop at a particular core temperature, during the onset of hypothermia. But, the individual variation in response to cold is so wide as to make such charts meaningless. You generally will see ataxia (a staggering gait) early in hypothermia, because cold may directly affect the nerves to the legs, even though the core is still at a near-normal temperature; later, you will note the characteristic blank stare and then slurred speech as the brain and other core organs are affected by the cold. You may see shivering, or shivering may stop, at various temperatures, depending on the particular person. Those with exhaustion (subacute hypothermia) may not shiver at all.

Feeling cold is not a good indicator of hypothermia. You should suspect mild hypothermia in a cold search and rescue team member when you see evidence of mental or physical dysfunction. Examples of mental dysfunction include impaired short-term memory, difficulty concentrating, slurred speech, withdrawal from activities, and apathy. Examples of physical dysfunction include difficulty walking, numb fingers, and impairment of fine coordination, as in tying boots. You may also see protective efforts, such as uncontrollable shivering, or holding arms tightly against the sides. Impairment of thinking is a significant factor with even mild hypothermia, and what is worse, the hypothermic person may not be able to detect it. Thus, even mild hypothermia may contribute to many accidents and deaths from other causes.

All the classic signs of hypothermia listed above may be present in a person with a normal core temperature. However, this person, if not intoxicated or ill with some other disease, has probably been subject to severe cold stress, has cooled his or her periphery as much as possible, and has just about exhausted all compensatory mechanisms. Fatigue, exhaustion (glycogen depletion) and excessive cooling of the bulk of the extremities, as occur in such people, are a prelude to hypothermia. Treat them as if they have mild subacute hypothermia, for if you don't, they will soon become hypothermic!

If you have concerns about mild hypothermia or incipient hypothermia, check someone’s armpit. If it feels cold, the person probably needs rewarming.

The most important treatment for mild or incipient hypothermia is to ***bivouac immediately*** and rewarm the team member, including giving high-calorie and quick-energy food to support shivering, before going on.

Treating Hypothermia

When caring for a hypothermic patient in the field, **add as much heat as you can, using any and every method available**. Try to rewarm the core first. Acceptable methods include warm IVs, warm fluids by mouth if the patient can take them, hot packs at lateral neck, armpits, and groins, warm humidified air or O_2 and rewarming devices such as a charcoal vest. However, don't delay evacuation to rewarm the patient. Also provide lots of food calories if you can.

Hypothermic patients, especially those with subacute (=exhaustion, mountain, or cave) hypothermia, are very fluid depleted, and need fluids.

Handling Hypothermic Patients

- Handle hypothermic patients gently to prevent ventricular fibrillation (cardiac arrest).

- Do not let hypothermic patients exert themselves during rescue, especially when pulling them out of cold water. Some suspect that exertion in such situations may lead to death.
- Carry hypothermic patients flat or in the slightly head-down position; hypothermic patients are usually dehydrated, and the head-up position has been reported to result in seizures or death.
- Those who have been hypothermic for a long time (days) may have trouble handling large fluid loads, because of "stiffness" of the heart. In such cases, you must monitor carefully for signs of fluid overload when giving fluids (lung congestion, ankle or lower back swelling).

Hypothermia and Possible Cardiac Arrest

- If you come upon a cold and apparently dead person, you may start artificial respiration but should not start external cardiac compression if there are any signs of life. Check for three (3) minutes for pulse, heartbeat, and respiration. Check for a rhythm with an EKG monitor if you have one. If there is an organized rhythm, even as slow as 20, you may start artificial respiration but don't start external cardiac compression.
- Use normal rates for artificial respiration and external cardiac compression. Give O_2 if available.
- Severely hypothermic patients in cardiac arrest may survive long periods without cardio-pulmonary resuscitation, if necessary for rescue. If CPR must be interrupted for periods up to 20-30 minutes during rescue, do so, and resume CPR afterwards. (E.g., during evacuation through a small crawlway in a cave.)
- If you have a hypothermic patient who has no detectable signs of life, consider transport to a facility that can perform bypass rewarming; call ahead early to alert the facility.

Drowning (Near-Drowning)

Cold water submersion (near-drowning) is ***not*** the same as acute (immersion) hypothermia; the treatment for the two is very different.

For immersion hypothermia, without submersion, the treatment is to add as much heat as possible.

For cold water submersion (near-drowning), do ***not*** rewarm. We think that the cold may protect against brain injury. Insulate the victim and allow passive rewarming, but do not add heat in the field.

Frostbite and Immersion Foot

Superficial Frostbite (Frostnip)

Frostnip commonly affects fingers, toes, ear lobes, and noses, and you can recognize it by a sudden blanching of the nose, ear, or fingertip. Although the part is pale or yellowish, it is still soft to the touch, not hard or woody as in deep frostbite. Numbness is not a useful symptom for diagnosing frostnip. A frostnipped area may be numb, but cold skin is numb well before it becomes frostnipped.

Treatment of frostnip is simple: rewarming by a warm hand over the nose or ear, or by placing a frostnipped finger in the mouth, in an armpit, or in a warm pocket. On rewarming, the affected part tends to turn red, painful, and possibly slightly swollen, but no permanent damage results. Providing a warm armpit for a friend's frostnipped toes is supposedly a mark of true friendship. Oxygen is of no proven benefit, but you may administer it if readily available.

Deep Frostbite

In deep frostbite, the subcutaneous tissues are frozen solid, and the affected part feels hard, like a piece of wood or frozen meat.

The first thing to remember is to check for life-threatening hypothermia before treating frostbite. Generally, you can safely treat both frostbite and hypothermia at the same time. (However, if faced with an unstable patient with both frostbite and hypothermia, you might want to delay rewarming of the frostbitten extremities until the patient was stable.)

The best "street" treatment is to transport rapidly to a hospital where definitive rewarming can occur. However, when the rescue team cannot begin transport for a long time, or there is a long transport time to the hospital (more than an hour), you should rewarm en route. If the patient is hypothermic, rewarm the core and protect the patient from further cold exposure before worrying about frostbite. However, ***there is no justification for keeping the frostbitten part cold during transportation.*** Rapid rewarming is better than slow rewarming, so some recommend applying cold packs to a frostbitten limb, or leaving it out of the patient packaging during evacuation. This is ridiculous. The chance of causing more extensive frostbite far outweighs any potential advantage of "preventing slow rewarming" during transport. Indeed, studies show that slow rewarming (e.g., room temperature air or a warm sleeping bag) is better than very slow rewarming (e.g., ice water bath, or leaving the frostbitten limbs cold).

The proper definitive treatment, in the hospital or in the field, is rapid rewarming in 105-110°F (41-43°C) water.

Patients must ***not*** smoke, because of the vasoconstrictor effect of tobacco. Caffeine may also have a vasoconstrictor effect, so don't give the patient caffeine (coffee, tea, or cola drinks).

Folk and medical traditions worldwide used to recommend slow rewarming. There were several reasons for this. First, the writings of Hippocrates can be interpreted as warning against rapid rewarming. Such classical sources were highly regarded in Europe in the Middle Ages, from which we obtain much of our folklore and medical superstitions. Second, rapid rewarming often meant rewarming in front of a fire, which can cause uneven heating and cause burns. This is probably the reason Napoleon's surgeon general, Baron Larrey, recommended against rapid rewarming. Third, slow rewarming is much less painful than rapid rewarming, and with rapid rewarming, the parts become more red and swollen. Nonetheless, the final tissue loss is less with rapid rewarming. So, regardless of what you hear about slow rewarming by rubbing with snow or immersion in ice water, ***use rapid rewarming.***

Frostbitten limbs are numb, so don't cook them in too-hot water, or burn them by rewarming in front of a fire. If you don't have a thermometer, your elbow makes an adequate improvised replacement. Hold your elbow in the water for a few minutes. It should feel very warm but not painful. (Fingers and hands are not as accurate for checking absolute temperature. Think of how hot even cool water feels on your hands after you've been out in the cold for a while.)

Frostbite in Litter Patients

If you wish to treat both frostbite and hypothermia in a litter patient, it is reasonable to use hot packs to rewarm the hands and feet.

Wrap the frostbitten hands and feet in some sort of cloth or bandages or other insulation. Heat packs and heating pads are well-known for the burns they cause during rewarming, sometimes even to extremities that were not truly frostbitten. Make sure the hot packs aren't in direct contact with the skin.

Then, wrap the entire mass of hand (or foot), insulation and hot pack with more insulation.

Some might argue against thus treating frostbite in a patient who is also hypothermic. True, rewarming of the periphery should be avoided in hypothermia, but the hands and feet (not the arms and legs) have direct venous connections to the core, so rewarming of the hands and feet is quite acceptable, even if the patient is hypothermic.

Snakebite

Coral Snake Bites

- Coral snakes only occur as far north as the Great Dismal Swamp on the eastern Virginia-North Carolina border, and bites are very rare.
- If the patient is very young, very old, or very ill, use the Australian treatment:

The Australian Treatment

In Australia, highly-toxic bites are more common than in the U.S. The venom of Australian snakes is deadly but causes little local tissue damage.

For such snakebites, an arterial tourniquet might be lifesaving. However, because of the pain and damage caused by an arterial tourniquet, Australians searched for better first aid treatments. These “Australian” techniques use less-painful methods to immobilize venom at the site of the snakebite.

The “CSL” technique, named after Commonwealth Serum Laboratories, where the principal researchers work, is simple: use an elastic bandage or roller gauze, wrapping firmly but not tightly (pressure of 55 mmHg) proximally most of the way up the arm or leg, then immobilize the limb in a splint. This decreases the blood flow in the area around the bite, theoretically limiting both the spread and absorption of the venom. This might then permit the victim to survive until you can get antivenin.

Another group of Australians argue that using a firm pressure dressing over the bite (pressure of 70 mmHg) works better than an elastic bandage, and have done experiments in humans that support this. One animal experiment seemed to show that the CSL treatment worked for North American rattlesnake bites, but Dr. Findlay Russell of the University of Arizona says he has seen a number of patients whose rattlesnake bites were made much worse by this treatment.

Therefore, the best evidence is that for North American pit vipers, this method causes severe local tissue damage and you should ***not*** use it unless willing to sacrifice the limb to save a life.

If you are on a disaster response to a country with very poisonous snakes, you might use the Australian treatment for envenomated bites.

Pit Viper (Rattlesnake, Copperhead, Water Moccasin/Cottonmouth) Bites

Initial treatment:

- First, **move away from the snake!** Do ***not*** try to kill the snake! Another snakebite is a bad thing.
- **Consider taking a cellphone picture** of the snake for later identification.
- Have the patient sit down and **relax**; give no alcohol. Alcohol causes vasodilation (increased blood flow to the skin) and may speed venom absorption. Remind the patient (and yourself) that ***the fatality rate even for untreated pit viper bites is extremely low***.
- **Remove any constrictions** (rings, watches, bracelets, tight clothing) from the extremity.
- **Treat any snakebite as a contaminated wound.** (See the discussion of wounds, above.) As mentioned in the section on wound irrigation, trying to stick a needle or over-the-needle catheter into a small puncture wound to irrigate it is frowned upon. It doesn't irrigate that well, and causes enough swelling that it interferes with normal healing mechanisms. However, if there is tearing of the bite so it is open, then high-pressure irrigation would be appropriate.
- **Evacuate** to a roadhead, and thence to the nearest Emergency Department. **Contact the Emergency Department or local Poison Control** immediately to ensure that antivenin is available; it is expensive, and is stockpiled in only a few pharmacies in a region.
- **Pain control:** if the patient has acetaminophen (e.g., Tylenol) in his or her wilderness first aid kit, encourage him or her to take this for pain control if needed; recommend against aspirin, ibuprofen (e.g., Motrin, Advil, Nuprin) or naproxen (e.g., Aleve) as they tend to increase bleeding, which can worsen swelling and cause worse tissue damage. If the acetaminophen is insufficient, and the patient's wilderness first aid kit has has an opioid pain reliever, such as hydrocodone or oxycodone, encourage him or her to take it.
- **Observe for myoglobinuria** (see page 49) and treat if necessary.

There is no evidence that splinting, keeping above or below the level of the heart, or avoiding nonstrenuous work like hiking along a trail to the roadhead, makes pit viper snakebite worse. If there are enough people to easily carry someone out, it makes a reasonable exercise if for no other reason than practice with evacuations. However, you will need to wait for an evacuation team, it is better to start walking the patient out.

Only a few snakebites are from poisonous snakes, and only a certain number of bites by poisonous snakes leave venom in the skin or muscle (are ***envenomated bites***); only those bites that are from poisonous snakes and that are envenomated need treatment for snakebite poisoning. The classic signs of an envenomated bite include a coppery taste in the mouth, and immediate local swelling. However, evidence of envenomation can be delayed for many hours, at least up to six hours, so everyone who has been bitten by a pit viper should be evacuated and transported to a hospital to assess for the need for antivenin.

The major risk from snakebite is loss of a limb, and erroneous treatments such as packing in ice have resulted in more loss of limbs than from snakebite itself; this is particularly tragic when limbs have been lost to frostbite because of a non-envenomated bite.

Pit viper venom is injected through half-inch long fangs; if there are no fang marks, it is most unlikely that any venom was injected. Even if there are fang marks, venom may not be injected. If there is no severe local reaction of pain, swelling, and tenderness, nor a metallic taste in the mouth, then the bite was probably not envenomated, and need not be treated as a poisonous snakebite.

Do not:[*]

- pack the limb in ice or dry ice, as it will cause frostbite and maybe loss of the limb
- cut the bite are open with a scalpel or knife, as this makes infection and poor healing more likely
- use oral suction, as it makes the wound more likely to get infected
- use other suction devices, as they don't work to remove significant amounts of venom, and cause swelling that can delay healing
- put venous or arterial tourniquets on the limb, as they don't help prevent the patient from getting sick, and cause local damage that may take months to heal and sometimes requires amputation
- shock the bite area with a cattle prod, it doesn't work and may cause the patient to harm you grievously

Beestings

Apply cold water or ice to sting to reduce pain. If the person has in his or her wilderness first aid kit one of the over-the-counter medications for stings such as StingEeze, encourage him or her to apply it.

See also anaphylactic reactions under Allergic Reactions (see page 48).

Rabies

If person is bitten by mammal that might potentially be rabid (not rodents, squirrels, or rabbits, as they don't transmit rabies), or contaminated by its saliva:

[*] Yes, all of these have been tried, with predictably bad results.

- Attempt to capture or kill the mammal if you can do it ***without risk of additional bites***. Do not damage the brain, as it is needed for testing for rabies. Arrange for the head to be taken to a public health service laboratory.
- You can reduce the amount of virus in a bite wound, and thus the possibility of infection, by scrubbing the wound briskly with a scrub brush. Use alcohol and soap if they are available. Although you are taught never to put strong antiseptics or alcohol into wounds, rabid mammal bites are an exception. Alcohol has been shown to kill the virus, and soaps will help remove the virus. Scrub the bite or wound vigorously with a scrub brush or gauze pad. Use both alcohol and soap if available.
- After scrubbing the wound, immediately evacuate the patient for possible postexposure vaccination. If the patient has already been vaccinated for rabies, the need for evacuation depends on the wound itself (discussed under wounds, above).

Headache

For a team member complaining of a significant headache:

Wilderness EMTs and above: evaluate with a careful history, a detailed exam of the head and neck, and a brief neurological exam. If patient has neurological symptoms (confusion, visual disturbances, weakness, numbness, or tingling in an arm or a leg), a stiff neck, a fever, or it is the sudden onset of the worst headache the person has ever had, evacuate urgently. For other headaches, assess the possibility of serious causes; evacuate at a routine pace if you think indicated, or let team member continue with task. Consult with Group medical command/direction physician if possible.

Wilderness First Aid/Wilderness First Responder: If patient has neurological symptoms (confusion, visual disturbances, weakness, numbness, or tingling in an arm or a leg), a stiff neck, a fever, or it is the worst headache the person has ever had, evacuate urgently. Otherwise, evacuate at a routine pace.

Foreign Body Sensation in Eye

- Examine the eye, starting with checking visual acuity
- If trained to do so, evert the eyelid, and gently remove any foreign bodies seen on the eyelid or conjunctiva (white part of the eye) with a cotton applicator (Q-Tip™) or improvised equivalent.
- Use irrigation with clean water to attempt to remove foreign bodies from the cornea (clear part of eye).
- If foreign body sensation persists, and person has pain medications available in his or her wilderness first aid kit, encourage person to take his or her pain medication if needed. Do not patch the eye. Evacuate at a pace determined by the patient's discomfort level.

Nosebleeds

Use direct pressure to pinch the nostrils together firmly, as close to the face as possible. Use uninterrupted pressure for 10 minutes then recheck. Hold for another 10 minutes if still bleeding. Have the patient sit forward during pressure. Check the back of the throat with a light for a thin trickle of red blood indicating continued bleeding.

If bleeding persists, ***pack*** the nose with gauze. Roll up a small gauze pad (***not*** a tissue or paper towel that will partially dissolve) and place it in the bleeding side of the nose to aid in direct pressure. It will also serve as a pressure dressing once pressure is released. If you have double-compressed nasal tampons, you may use these instead of gauze. To avoid infections, leave packing in place for no more than 1-2 days.

If unable to control bleeding (remember to check back of throat for thin trickle of red blood indicating continued bleeding), treat as for uncontrolled bleeding elsewhere: treat for potential shock and evacuate urgently.

Dental Injury

If the tooth is completely out of the socket (a complete avulsion), you may rinse dirt off it. But, don't scrub it, even with a gauze pad, as this will destroy the delicate layer of cells that will allow it to reattach. Further treatment depends on the time until you can reach a dentist or oral surgeon.

If you are within an hour or two of an available dentist or oral surgeon (call first), and a tooth is completely out, keep it moist so that the dentist or oral surgeon can reimplant it. Keeping the tooth in a commercial tooth saver solution is best; milk is a fairly good substitute. Do not keep in the patient's mouth as saliva is not good for the root of a tooth.

If you are distant from a dentist or oral surgeon, replace the tooth in its socket as soon as possible. Apply some dental splinting material to keep the tooth in place if you have some. A large wad of chewing gum often works fairly well as a dental splint.

No matter the distance to the dentist or oral surgeon, you must assure that the patient doesn't aspirate the tooth. If you have replaced the tooth but it is loose and an aspiration danger, and the patient is semi-conscious or unconscious, remove it.

Chest Pain

WEMTs and above: If an episode of chest pain in a team member is clearly due to trauma or a muscle strain, or to gastroesophageal reflux, or to pneumonia or bronchitis, the team member may walk out or continue with the task. If there is any doubt, treat as a serious condition (e.g., myocardial infarction, pulmonary embolism, pneumothorax, aortic dissection) and proceed with an evacuation. Any team member who had chest pain in the field should be evaluated by a physician on return to civilization.

Wilderness First Aid/Wilderness First Responder: evacuate patient.

Asthma

If a team member has an asthma exacerbation, first ask if the patient has his or her own medicine to take. Several cups of coffee, tea, or caffeine-containing soft drink will help asthma, though side effects are prominent (sweating, tachycardia, tremor, irritability). If the team member shows signs of severe respiratory distress, and an Epi-Pen™ is available, show the team member how to use it, and assist if necessary.

Lung Infections

Treat suspected pneumonia or bronchitis the same:

- **Postural Drainage** is designed to help bring up lung secretions in those who are having difficulty doing so on their own. This includes those who are very weak from exhaustion, starvation, severe illness, or other injury. The technique is simply to assess where the pneumonia or secretions are located in the chest, and then position the patient with this part uppermost (i.e., on one side). Tilt the patient in the slightly head-down position. If you can't tell which side is the source of the phlegm, have the patient alternate lying on the left and right sides.
- **Chest PT** (strictly speaking, chest PT includes a variety of techniques, however, it is commonly used to refer to clapping) is pounding moderately on the chest, with cupped hands. The action comes from the wrist, with alternate clapping of the hands. You may use a minute of this clapping every hour or two to loosen the phlegm.
- **Deep Breathing Exercises** help in clearing secretions from the bronchial tree. By directing the patient very specifically in expanding the lungs, you may encourage the patient to take a deeper breath, opening sections of the lung to drain.
- **Coughing** is an important method of clearing secretions. Because of pain or tiredness, patients may not want to cough. By explaining and encouraging coughing, you can promote drainage. Have patient hold the chest or painful areas to protect them from severe pain during coughing.
- If the patient is sick enough to need chest PT and deep breathing/coughing exercises, you should evacuate promptly but not hastily.

Deep Venous Thrombosis

A classic deep venous thrombosis (clot) in the leg is characterized by swelling in one (and only one) leg and ankle, with mild redness and warmth. The calf is swollen compared with the unaffected calf and is tender to deep palpation (compare with the unaffected calf). If the foot is forcibly dorsiflexed (pushed up), the resulting traction on the calf may cause pain. Sometimes, you can feel the tense, clotted veins behind the knee or in the upper calf or posterior thigh ("cords"). If there is any suggestion the patient might have a deep venous thrombosis, the patient should be evacuated for medical evaluation. Walking on a deep venous thrombosis is actually good for it. The pumping action of walking helps prevent the clot from growing. Having the patient walk out is recommended.

There are several things you can do to prevent deep venous thrombosis in litter patients, who are often at high risk for multiple reasons: trauma, immobilization, or dehydration. If the patient is conscious, you can prompt the patient to alternately tighten and relax the legs. If you have a long wait because some of the rigging isn't ready, and the patient doesn't have a suspected spine injury, untie the patient and let him or her move around a little. Try to hydrate the patient as best you can. There is one final thing that you can do. ***Be careful of your leg tie-in.*** Anything tight around the leg or ankle will decrease venous flow and promote clotting. If you can leave room for the patient to wiggle his or her legs, that's even better.

CPR

Start CPR in a pulseless victim well away from a road unless one of the following contraindications is present:

- If cardiac arrest is due to trauma;
- If a drowning victim has been immersed for more than an hour, even in cold water;
- If Advanced Cardiac Life Support is more than an hour away;
- In cases of unwitnessed cardiac arrest, when there is no way of knowing when it began;
- Persons who appear dead because of:

  * Rectal temperatures that are the same as that of the environment;

  * Rigor mortis or dependent lividity; but, only in a non-frozen patient; or

  * Lethal injuries, such as decapitation, massive head or chest injuries, or a severed trunk.

In the backcountry, discontinue CPR if, after 30 minutes of effort, you can detect no evidence of spontaneous pulse or respirations, and if CPR cannot be continued throughout the evacuation. For certain situations, the possibility of resuscitation with Basic Cardiac Life Support is high, so continue CPR for more than half an hour:

- Cold water immersion less than an hour (hypothermia and possibly the mammalian diving reflex tend to slow metabolism)
- Avalanche burial;
- Arrest after known hypothermia;
- Lightning or arrest secondary to electric shock.

Abdominal Pain

Acute Abdomen:

Anyone with severe abdominal pain, spasm of the abdominal wall muscles (guarding), and moderate to severe tenderness of the abdomen has an "acute abdomen."

Evacuate anyone with an acute abdomen as quickly as possible, because the patient might need surgery.

For pain control, evacuate and transport with the hips and knees bent to relieve some pain from abdominal wall muscle spasm.

Less-Severe Abdominal Pain

Wilderness EMTs and above:

- Milder abdominal pain does not need to be managed so aggressively, but you need to do a careful history and physical exam.
- If you can discuss the case with a Group medical command/direction physician, follow the physician's orders regarding evacuation.
- Otherwise, you must form a tentative diagnosis, at least as far as the severity of the problem, and decide whether to evacuate or not based on the diagnosis.
- Repeated abdominal exams (e.g., every 2-3 hours during the night if stationed at a camp-in, or during a continued task) are probably your best tool to decide how serious the problem is.

Wilderness First Aid/Wilderness First Responder:

- Evacuate immediately.

Vomiting and Diarrhea

Motion Sickness

Instruct person to fix vision on the horizon or on a distant object. If the person has an over-the-counter motion sickness medication such as chewable meclizine (e.g., Bonine®) in his or her wilderness first aid kit, encourage him or her to take it.

Gastroenteritis:

- Gastroenteritis is a general term for irritation of the stomach or intestines, which may result in cramps, diarrhea, or vomiting.
- The most serious consequence of diarrhea is dehydration, which may even progress to shock. Therefore, the most important treatment for diarrhea is **fluid replacement**. (Oral rehydration is discussed above, see page 23.)
- After infectious diarrhea, adopting an appropriate diet may prevent the diarrhea from lingering. Start clear fluids as soon as possible, even if patient is still vomiting, because they are almost totally absorbed, leaving no residue to form stool and prompt an unwanted bowel movement.
- If patient tolerates clear liquids, the victim should start eating as soon as possible. Food will stimulate regeneration of intestinal enzymes, and will increase water absorption..

- Give good dietary advice to the person: Avoid greasy foods, as diarrhea washes out the digestive chemicals needed to absorb fat. Avoid spicy foods *if* the person says they tend to cause loose bowel movements at the best of times (e.g., barbecue sauce or Thai food). Diarrhea washes certain enzymes out of the gut, and it takes three or four days for these to regenerate. Eating foods that require these enzymes will cause diarrhea, even if the infection is gone. The enzymes are those responsible for absorbing ***fruit and milk sugars***, so avoid these sugars. Avoid milk, milk shakes, ice cream, or fresh fruit or fruit juices for three to four days. High-fructose corn syrup in soda/pop may also be an issue. The lactose has all been fermented in yoghurt, and the bacteria in yoghurt helps recovery for diarrhea. The victim may eat and drink items containing table sugar, as found in sherbet, gelatin desserts, and soda drinks, and dextrose, as found in Gatorade™ and similar drinks.

Urinary Tract Infection

The classic symptoms of cystitis (infection of the urinary bladder) include:

- dysuria (burning on urination);
- frequency of urination; and
- urgency of urination (having to go ***right now***).

Other symptoms may be associated with cystitis:

- incontinence of urine (dribbling of urine, especially with coughing or sneezing); and
- blood in the urine ("hemorrhagic cystitis")

Instruct any person with suspected cystitis to drink ***lots*** of fluids and to urinate frequently in an attempt to wash out the infection. Evacuation is not necessary unless the patient's discomfort requires it.

If a person with suspected cystitis develops high fever, vomiting or significant back pain, evacuate immediately: these suggest pyelonephritis, an infection of the kidneys.

Testicular Pain

Men may develop pain in the testicles without direct trauma. All such cases should be evacuated, as an ultrasound is needed to rule out testicular torsion. Torsion is when the testicle twists enough in the scrotum so as cut off the blood supply.

Wilderness EMTs and above: you may try to see if you think it is testicular torsion, and attempt to untwist the spermatic cord prior to evacuation. Remember to twist outwards like opening a book.

Vaginal Bleeding

If a team member has

- small amounts of unexpected menstrual bleeding, or
- during expected menses has more than normal menstrual flow, but
- less than a pad an hour, and

- no pain worse than usual menstrual cramps, then
- check for orthostatic lightheadedness or tachycardia.
- If no orthostatic lightheadedness, she may continue with the task.

If the flow is more than usual but no more than to soak a pad every hour or so, or if the pain is more than the team member's usual menstrual period cramps (***dysmenorrhea***), but no orthostatic lightheadedness and no tachycardia, send her back to base.

If the flow is more than a pad an hour, or if she is orthostatic, evacuate immediately.

Kidney Stones

Kidney stone pain can be debilitating and prevent self-evacuation. If you suspect a team member has a kidney stone, arrange for immediate evacuation. If the person does not have adequate pain medications in his or her wilderness first aid kit to control the pain, consider asking for a more advanced provider to respond into the field to provide pain relief so the team member will then be able to walk out.

Educate the person to strain the urine to try to collect the stone, and have the patient take the stone to his or her family doctor for chemical analysis. The prevention diet and treatment for kidney stones depends on the chemical constitution of the stone.

Diabetes

Standard first aid training teaches that any sick diabetic should be given sugar, because it will make insulin shock better and will not harm someone who is hyperosmolar or in ketoacidosis.

If a diabetic does not improve with sugar, start oral rehydration, preferably with WHO Oral Rehydration Solution (see oral rehydration, above).

Allergic Reactions

Some allergic reactions, especially to bee and wasp stings, may cause a severe allergic reaction, sometimes severe enough to kill in minutes.

Some people may have ***a generalized allergic reaction*** to things such as certain medications, stings, plants, foods, or other materials in the environment. This reaction is not limited to the area of contact with the allergen. Its most prominent sign is an itchy rash. With some allergies, especially those to medications, the rash may be made up of many flat, itchy, red macules (tiny patches). In other cases, a wheal-like rash (hives, also known as urticaria: like mosquito bite wheals without the bite), which may occur over the entire body.

Anaphylactic reactions are characterized by wheal (hive) formation that is very severe. As with milder hives, the primary problem is leaking of fluid from capillaries. In anaphylaxis, though, the leakage is so massive that volume depletion and shock may result. The leakage in the lungs may cause wheezing, and leakage in the mucous membranes of the airway may cause airway obstruction from swelling.

Danger signs for progression toward anaphylaxis include:

- syncope (unconsciousness);
- orthostatic lightheadedness;
- tachycardia or bradycardis;
- lip swelling;
- hoarseness; and
- wheezing or shortness of breath.

If the person has either an Epi-Pen or injectable epinephrine in his or her wilderness first aid kit, encourage him or her to use it, and assist if necessary.

If the person has diphenhydramine (e.g., Benadryl®), famotidine (e.g., Pepcid®), ranitidine (e.g., Zantac®) or cimetidine (e.g., Tagamet®) in his or her wilderness first aid kit, encourage him or her to take it.

You should evacuate all with severe allergic reactions, with the route and method based on the seriousness of the reaction.

Crush Injury and Myoglobinuria

Crush Syndrome

When a person is trapped under a rock in a cave, or in a building collapse, rescue too often ends with sudden death. Though the person has survived days of entrapment, the sudden release from entrapment allows "evil humors" (various poisonous waste products, including potassium and lactic acid) to escape into the blood. The entrapped limb may also act like a sponge, soaking up precious intravascular fluid, causing sudden shock. This "crush syndrome" is well-recognized, and can be prevented.

The stress of release from entrapment may also contribute to renal failure (kidney failure). Renal failure can occur even if the patient is still producing urine. Renal failure causes death over the course of several days, as waste products build up in the blood.

You can help prevent hyperkalemia, acidosis, shock, and renal failure by preventing dehydration. If a patient is already dehydrated from long entrapment, ***rehydration*** prior to release is essential. Intravenous fluids are ideal but you won't always have them; give oral fluids if the patient meets the requirements described above (see page 23).

Crush injury releases much potassium into the blood, and high levels may make the heart stop. Athletic drinks like Gatorade usually contain some potassium, so salty water or salty lemonade would be better. A liter of water with two fast-food salt packets is a reasonable fluid. Adding lemonade or other flavored sugary drink mixes makes it taste batter, and will actually speed absorption of the salt.

Myoglobinuria and Hemoglobinuria

Myoglobin is an O_2-carrying molecule found in muscles. It is similar to the hemoglobin molecule found in red blood cells. Myoglobin and hemoglobin are toxic to the kidney. Hemoglobin in red blood cells and myoglobin in muscle cells are necessary, but hemoglobin and myoglobin are toxic when free in the blood.

With crush injuries to muscle and other soft tissues, and with severe burns, large amounts of myoglobin are released into the circulation.

After lightning strikes or severe burns, hemoglobin may be released from thousands of damaged red blood cells. The loose hemoglobin can cause problems similar to myoglobin.

When dehydration causes concentration of urine in the kidney, the high levels of myoglobin or hemoglobin in the urine are known as *myoglobinuria* and *hemoglobinuria*. Myoglobin is dark brown, and with myoglobinuria, the urine looks very much like tea. Hemoglobin is a bit more red, but still dark. These large proteins tend to clog up the microscopic tubules in the kidney. The best solution for this is dilution, by increasing the amount of urine, by hydrating.

If you are caring for or transporting a patient, and based on the mechanism of injury you suspect myoglobinuria or hemoglobinuria, check the patient's urine. If it is brown or tea-colored, start treating for possible myoglobinuria, increase oral (or intravenous, if using an IV) fluids as necessary to maintain a urine output of 100 mL/hr (4 mL/kg/hr in children) unless there are definite signs of fluid overload.

Compartment Syndrome

Muscle compartments are groups of muscles bounded by walls of tough fibrous tissue. Compartment syndrome is caused by blunt trauma to a muscle compartment. The most common compartment to develop compartment syndrome is in the anterior compartment of the lower leg.

Swelling from trauma causes pressure in the compartment to build up. The pressure finally gets to be more than the pressure inside the veins; the veins collapse, and blood can no longer leave the compartment. This sets up a vicious cycle where increasing pressure holds the veins more tightly closed, causing increased pressure, which holds the veins even more tightly closed, and so forth.

When pressure in the compartment exceeds the pressure in the capillaries, muscle perfusion stops; this will cause severe muscle pain and tenderness over the compartment. The increasing pressure damages sensory nerves traveling through the compartment, so you will find numbness over the compartment and distal to it. For the anterior lower leg compartment, this is in the web space of big toe. Finally, arteries traversing the compartment collapse from the pressure. For the anterior lower leg compartment, the patient may lose the dorsalis pedis pulse.

Diagnose compartment syndrome by looking for the following:

- severe pain, swelling, and tenderness in one compartment of an extremity;
- later, a progression of findings: the patient loses sensation distally, then loses motor strength distally, and finally, loses the distal pulse.

It is important to **diagnose suspected compartment syndrome early**, before muscle damage becomes irreversible, and before nerve and artery compression. Pain out of proportion to the initial injury, and tenderness all up and down one part of an extremity, are keys to diagnosis. The ultimate way to confirm the diagnosis is with a device called a Stryker compartment pressure monitor, which actually measures the pressure in the compartment.

If you think a patient has compartment syndrome, and you face a long evacuation time such as with someone entrapped in a cave, try to have a emergency physician or surgeon brought in to operate on the leg, or arrange urgent evacuation and transportation to a trauma center. Suspected compartment syndrome is a good time to call for a helicopter to speed treatment.

Other first aid treatments have been suggested for compartment syndrome: elevation and cold. There is little or no evidence that either is effective, and at least some reason to suspect that each might actually be harmful. Just get the patient to a doctor who can do a surgical faci

Psychological Management

Pain Management

Pain, even that from major trauma, has a large ***psychological component***. Part of this is perception: the more one concentrates on pain and the consequences of the injury, the more it hurts. Part of this is related to endorphins, narcotic-like chemicals that may be produced in the brain or spinal cord to block pain. These pain control systems are amenable to control in a variety of ways.

Apprehension may accentuate pain, and if the person is worried about the extent and implications of his injuries, a clear statement of the patient's injuries may dispel unwarranted fears and thus reduce apprehension and pain.

Distraction can greatly diminish the perception of pain: you may give an absorbing task to a patient or engage his or her interest in a discussion.

You may invoke imagination to distance a patient from his pain: ask the patient to imagine his favorite place or event as vividly as possible and describe it to you in detail. Imagery in this way can provide powerful pain relief.

If you have the training and the patient has the ability, an extension of this to a light state of hypnosis may serve as outstanding pain control.

Anxiety Management

Many patients are anxious, and rightfully so. Some may even be so anxious as to appear unreasonable, or partially or completely psychotic.

Managing such a patient, or for that matter any patient, includes:

- ***Minimizing sensory overload.*** A rescue scene looks pretty psychotic, even to sane individuals. To someone with difficulty controlling his or her thinking, the chaos can be literally mind-numbing. You can tell the Field Team Leader that a quiet scene is required for the patient's health and safety (which is true).
- ***Channeling patient contact*** through one and only one person (the official medic). This is a good rule for all wilderness patients, but particularly true for those with psychotic features. If you must turn over patient care to another member of the team, always be sure to introduce your relief to the patient, as the patient may develop trust in you and could feel abandoned if you turn care over to another. Introducing your relief will help prevent this.

You must understand that, even though the patient appears confused and may answer inappropriately, ***the patient may still have excellent understanding.*** Therefore, you must continue to talk as if the patient understands, even though the patient's replies seem nonsensical. Sometimes, the patient's body language is a better answer than the words coming out of the patient's mouth. (E.g., nodding the head "yes" despite saying something bizarre.) Communicating with many psychotic patients can be effective as long as you don't give up easily. And, as with the unconscious patient, you always explain what's happening, even if you aren't sure the patient is hearing or understanding.

Some wilderness patients are experienced ***outdoorspeople.*** These people are used to being in situations where they are totally responsible for their own survival and well-being. The change to being strapped into a litter and being dependent on a loud, smelly, scraggly-looking search and rescue team, is likely to provoke anxiety if not downright hostility. Doing whatever you can to respect the patient's dignity will do much to assure cooperation. "Talking down" to such a patient is a sure way to destroy your credibility in the patient's mind.

You will do well to treat such a patient as an equal in intellectual and outdoor terms. For instance, you might explain some details of the search and rescue technique, just as you might teach an experienced outdoorsman who just joined the team. This can be a great confidence-builder for the patient, and can serve as excellent distraction, especially for patients who tend to intellectualize. Intellectualization is a very high level defense mechanism against psychological stress. It might even result, eventually, in a new recruit for the search and rescue team.

Laying on of hands in wilderness search and rescue, or any phase of prehospital emergency medicine, is a touchy subject (pun intended). Palpation is an integral part of the physical exam, as is exposure of the body, and is necessary for the patient's well-being.

Male rescuers worry about homophobia (fear of unwanted homosexual advances by heterosexual men) and female patients' fear of sexual assault (especially with a female being undressed by a group of smelly, unkempt, mostly male rescuers). Female rescuers, too, may worry about their laying on of hands being misinterpreted, whether by male or female patients, but women in American society have less of a tabu about touching others.

In the Emergency Department, patients expect to get undressed and have doctors and nurses poke and prod at various parts of their body, including, for women, pelvic exams, and for men, rectal exams. Doctors and nurses work so much with naked patients and are so used to using their hands in their work that it is no problem for them.

For the rescuer on the side of a mountain or in a cave, however, the social situation is not nearly so easy. The problem, however, is usually more for you than for the patient. Most wilderness patients are so far removed from their normal environment that concerns of the "real" world seem far away. Having one's clothes cut off and a rectal temperature probe inserted seem inconsequential, at least when compared with the prospect of another night in the wilderness. You should keep this in mind, so that any of your own embarrassment does not become obvious to the patient. However, you should exercise as much discretion as is possible.

Wilderness patients have told, in retrospect, of the most reassuring part of a harrowing rescue: a warm hand on the shoulder. Although, as with everything a rescuer does, common sense and careful observation of the patient is imperative, a good general rule about touching patients is: don't keep your hands off. No one likes to be taken care of by someone who has a "hands off" approach. If the patient finds it objectionable, a person with any powers of observation at all should be able to tell.

Psychological First Aid

You may encounter search and rescue team members having immediate stress reactions, and may be the person best qualified to deal with the situation. Rescuers are quite capable of performing on-scene psychotherapeutic "first aid," following the guidelines presented here.

A ***critical incident*** is any situation faced by an emergency services worker that generates unusually strong emotional impact. These include:

- the serious injury or death of an emergency services worker in the line of duty;
- the serious injury or death of a bystander from an emergency services operation;
- multiple deaths or serious injuries;
- serious injury or death of a child or infant;
- any situation that attracts an unusual amount of attention from the media;
- any loss of life after extraordinary and prolonged search and rescue efforts; and,
- any situation that is charged with emotion and that causes an emotional response that is beyond the normal coping mechanisms of emergency services workers.

The ***immediate stress reaction*** may include physical, emotional, cognitive, and behavioral components. Any of these signs and symptoms may be present. It generally occurs at the time of the incident or within 24 hours. A most important point: ***an immediate stress reaction is the response of a normal person to an abnormal situation, and not a sign of any psychological weakness or chronic psychiatric problems.***

Physical symptoms include:

- profound fatigue and weakness;
- fine tremor or muscle twitches;
- diaphoresis;
- vasovagal orthostatic hypotension or vasovagal syncope (simple fainting);
- nonspecific lightheadedness;
- nonspecific headache;
- difficulty focusing one's eyes;
- nonspecific difficulty hearing;
- palpitations;
- dyspnea and chest pain with or without hyperventilation;

- nausea, vomiting, diarrhea, or abdominal pain; or
- sensation of a lump in the throat (globus hystericus).

Emotional symptoms include:

- anticipatory or generalized anxiety (anxiety about the future, or unconnected with any present danger or fear);
- strong fear or even panic reactions;
- psychological shock (described later);
- survivor guilt uncertainty (guilt over surviving when others have died);
- acute grief reactions;
- depression; or
- intensified or inappropriate emotional reactions to normal occurrences.

Cognitive symptoms include:

- blaming others (sometimes even those who are logically blameless) for the critical incident;
- generalized confusion;
- inability to concentrate;
- inability to perform simple calculations;
- poor attention span;
- memory lapses;
- anomia (inability to find the right words);
- inability to distinguish the difference between serious and trivial concerns;
- inability to make decisions; and
- greatly increased (or greatly decreased) alertness and awareness of surroundings.

Behavioral symptoms are relative to the person's normal behavior patterns, which may vary widely between individuals. They include:

- changes in normal activity patterns;
- changes in speech patterns;
- withdrawal;
- angry outbursts;
- hypervigilance (increased suspicion and attention to one's environment or even outright paranoid behavior;
- changes in interactions with others (i.e., wife, friends, team members);

- increase or decrease in appetite~ or alcohol consumption;
- sleep disturbances, including early morning awakening, early insomnia, hypersomnia, and generalized fatigue; or
- visits to health professionals (possibly including the team medic) for seemingly minor or even nonexistent problems.

Look for those who are showing some signs of stress (even if not a full-blown immediate stress reaction) and try to arrange rest breaks for them. Look for those with immediate stress reactions: a person walking about aimlessly, a person sitting and staring blankly (unless simply exhausted), or a person behaving irrationally.

The first step in managing an immediate stress reaction is to isolate the person from the sights, sounds, and smells of the incident. Having the person face away from the incident, or get on the other side of a vehicle, may be effective. If smells are prominent, move the person upwind. If you determine that the person should not be moved, place an object to block the person's view.

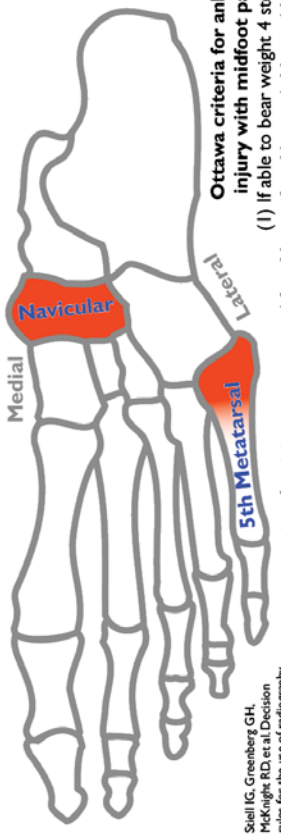
When engaged in on-scene psychological first aid, peers (e.g., other rescuers) can ask "Hey, are you OK?" However, this is ***not*** an acceptable question coming from a mental health worker at the scene. For this kind of psychological first aid, you just need to lend a sympathetic ear. If you need to prompt the person to start talking, start asking about facts first, and only after some rapport is established, start asking about feelings.

When an emergency services worker "breaks down" in the course of psychological first aid, it is important to ***validate*** the person's feelings ("hey, this is pretty hard for ***all*** of us to take.") and ***back off***, going to another person or another topic. Do not abandon the person; monitor him or her, and arrange extra help if it seems necessary.

Group interventions are ***never*** appropriate at a scene where hazards are still a problem. All on-scene psychological first aid should be one-on-one.

♦

Ankle Card: Foot



Ottawa criteria for ankle injury with midfoot pain

(1) If able to bear weight 4 steps at any point after injury, may not need foot X-rays; if unable, needs X-rays. Next:

(2) Palpate for tenderness of the two marked areas; if no tenderness, does not need foot xrays; if tender, needs X-rays

Stiell IG, Greenberg GH, McKnight RD, et al. Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. Jama 1993;269:1127-32.

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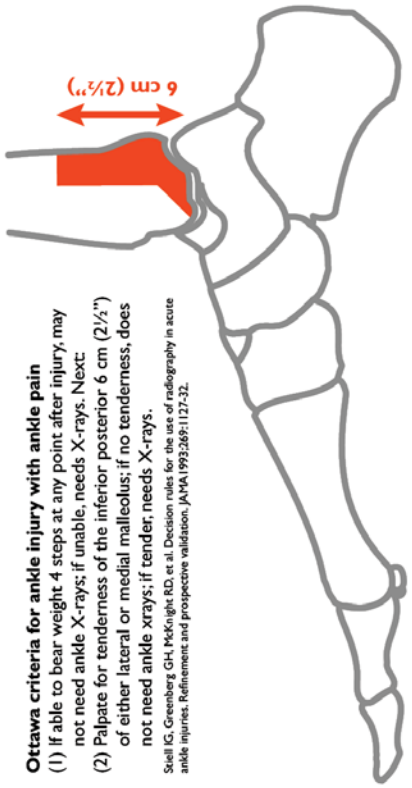
Ankle Card: Ankle



Ottawa criteria for ankle injury with ankle pain

(1) If able to bear weight 4 steps at any point after injury, may not need ankle X-rays; if unable, needs X-rays. Next:

(2) Palpate for tenderness of the inferior posterior 6 cm (2½") of either lateral or medial malleolus; if no tenderness, does not need ankle xrays; if tender, needs X-rays.

Stiell IG, Greenberg GH, McKnight RD, et al. Decision rules for the use of radiography in acute ankle injuries. Refinement and prospective validation. JAMA 1993;269:1127-32.

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