



# **WILDERNESS MEDICINE FIELD PROTOCOLS**

*For Use in Wilderness Context Only.*

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# WILDERNESS MEDICINE FIELD PROTOCOLS

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Wilderness Medicine is not a new concept. It was practiced for tens of thousands of years before modern civilization developed. The healers of centuries past were limited by circumstance to generic diagnoses and simple and adaptable equipment and treatments. A patient's medical problem was just a small part of a much larger picture that included weather, terrain, hazards, predators, mobility, and limited supplies of food and water.

Only in the past two centuries or so has civilized medicine been able to eliminate the environmental obstacles to providing care, allowing healers to focus on the medical problems before them. Aside from the occasional disaster situation, a hospital emergency department is free of wind, rain, rocks, and slope angle. The lights are always on and the temperature is ideal, and the patient's medical problem is the only issue the staff needs to worry about.

This freedom from wants and fear led to an explosion of medical knowledge and technology. The dramatic influence on morbidity and mortality is evident almost everywhere in the world. In one of the most effective medical developments of the 20<sup>th</sup> century, Emergency Medical Services systems have extended some of these sophisticated technologies and procedures to communities far removed from the hospital.

However, while emergency medicine has changed dramatically in recent history, the wilderness has not. In truly wild places, the wind, rain, snow, and rock present just as much of a challenge to the medical provider as it did ten-thousand years ago. The patient's medical problem remains just a small part of a much larger environmental picture. The same can be said of urban disasters, combat, and high angle rescue situations in which access to definitive medical care is delayed.

In some cases, helicopters are able to pluck people from peril and deliver them intact to the hospital. In most cases, it is the medical officer on the ground or rock face that is required to deliver care, sometimes for hours or days. The professionals and volunteers who are expected to provide this service need a scope of practice, standard of care, and regimen of training that works in a context of delayed access, difficult evacuations, and limited diagnostic and treatment resources. The re-emergence of the art of wilderness medicine has gone a long way toward providing that framework.

As the field grows, wilderness medical providers need to be free of the expectation that the techniques and equipment available and appropriate to the ambulance are going to be equally useful in the wilderness. On the other hand, they also need to be free to apply techniques and principles that may not be allowed or appropriate for use by street EMS providers. The development and use of Wilderness

Medical Protocols defines a scope of practice and standard of care in specific cases where the needs of wilderness and disaster rescue teams differ from the current practice and protocols of street EMS.

Acceptance of the concept by the medical and EMS establishment in the United States has been variable and sometimes controversial. This is understandable, considering that the protocols authorize basic level field providers to use techniques and medications typically reserved for licensed medical practitioners. A Wilderness First Responder, for example, may be allowed to reduce dislocations and “clear” spines where the paramedic or EMT on-scene cannot.

However, the use of such protocols has increased significantly in recent years. Large organizations like Outward Bound have been using wilderness protocols for over two decades with good results. A number of state and federal agencies have adopted and used wilderness protocols as well. The experience from the field indicates that well-trained providers at the WFR and WEMT level can safely and effectively use these techniques.

Conventional First Aid and EMT curricula are designed for an urban environment and assume the availability of 911 communications as well as rapid transport to a hospital. Backcountry outfitters and experiential educators have found the conventional medical protocols do not address the specialized wilderness context of delayed rescue transport in remote areas, prolonged exposure to severe environments, and the limited availability of medical equipment.

## Wilderness Protocols

These protocols have been developed for use by appropriately trained individuals that regularly work in remote environments. They are based on the principles taught by Center for Wilderness Safety in Wilderness EMT (WEMT), Wilderness First Responder (WFR), Wilderness Advanced First Aid (WAFA), Wilderness First Aid Afloat (WFAA), and Wilderness First Aid (WFA) courses.

- Protocol 1 — *Administration of Emergency Medication for Anaphylaxis*
- Protocol 2 — *Wound Cleaning + Debridement*
- Protocol 3 — *Cardiopulmonary Resuscitation in Remote Settings*
- Protocol 4 — *Spinal Injury Assessment + Clearance*
- Protocol 5 — *Reduction of Dislocations*
- Protocol 6 — *Administration of Emergency Medication for Asthma*

Please see each protocol’s description for scope of practice permitted for various certifications.

## Authorization Criteria

Authorization for use of these protocols is granted to employees of the above-named employer only under the following conditions:

1. The employee is on the job for the above-named employer.
2. The transportation time to a hospital exceeds **sixty minutes**.
3. The employee holds a valid and unexpired Wilderness EMT (WEMT), Wilderness First Responder (WFR), Wilderness Advanced First Aid (WAFA), Wilderness First Aid Afloat (WFAA) or Wilderness First Aid (WFA) certification from the Center for Wilderness Safety, and the employee follows the materials, skills and protocols learned in their course. WAFA and WFA/A certified employees may only use protocols 1, 2, 4 and 6. WFR and WEMTs may use all 6.

The above specified protocols have been authorized for use by Center for Wilderness Safety for WEMT, WFR, WAFA, WFAA and WFA trained employees of the employer named here, provided they meet the requirements of the authorization criteria listed below.

## Important Note

This document is not designed to be used as a reference for wilderness medical providers. Providers should refer to their original course textbooks for complete information on the use of these protocols.

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Organization

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Date

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Authorized Representative

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Position

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Medical Advisor

## — FIELD PROTOCOL 1 —

### ADMINISTRATION OF EMERGENCY MEDICATION FOR ANAPHYLAXIS

Anaphylaxis is an allergic reaction that has life-endangering effects on the circulatory and respiratory systems. Anaphylaxis is an almost immediate, rapidly progressive multisystem allergic reaction to a foreign protein injected into the body by stinging and biting insects, snakes, and sea creatures or ingestion or inhalation of food, chemicals, and medications.

Early recognition and prompt treatment, particularly in a wilderness setting, is essential to preserve life. The onset of symptoms usually follows quickly after an exposure (minutes after a sting or bite, within 30-60 minutes following ingestion). Rebound or recurrent reactions can occur within 24 hours of the original episode.

In addition to shortness of breath, weakness and dizziness, victims also frequently complain of a sense of impending doom, cough, chest tightness, trouble swallowing, abdominal cramps, or generalized itching. Physical findings include rapid heart rate, low blood pressure, and other evidence of shock, upper airway obstruction (stridor) and lower airway obstructions (wheezes) with labored breathing, generalized skin redness, hives, and swelling of the mouth, face, and neck. Epinephrine should only be administered to patients having symptoms suggestive of an acute systemic reaction (i.e., generalized skin rash, difficulty breathing, fainting, or facial swelling).

1. Inject 0.3 mg of 1/1000 epinephrine into the lateral aspect of the deltoid, or the anterior aspect of the thigh (either subcutaneous or intramuscular). \*
2. Maintain an open airway and position of comfort. Initiate either positive pressure ventilations (PPV) or full cardiopulmonary resuscitation (CPR) as indicated.
3. Repeat epinephrine injections every 5 minutes if condition worsens; or as needed.
4. Administer antihistamine by mouth (50 mg of diphenhydramine HCl every 4-6 hours for an average adult) so long as the patient is awake and can swallow.
5. Consider Prednisone 60 mg/day (or equivalent dose of an oral corticosteroid).
6. Evacuate to definitive care if safe to do so. Consider an advanced life support intercept.
7. If evacuation is not possible, monitor carefully for biphasic reaction. Repeat treatment per protocol as necessary.

Because a rebound reaction can occur, all victims of an anaphylactic reaction should be evacuated. Rebound reactions should be treated in the same manner as the initial reaction, using epinephrine in the same dosage.

## Note:

The preferred concentration of epinephrine for IM injection is 1 mg/1 ml. Although the lateral mid-thigh is preferred, an injection into the deltoid may be the only practical option.

Commercially available auto-injectors such as the EpiPen deliver 0.3 mg as a standard adult dose or a 0.15 mg for a smaller person or child (less than 55 lbs.; 25 kg), depending on body mass. The auto-injector is the most user-friendly device, but also the most expensive. Epinephrine is also supplied in 1 ml ampules, and vials of various sizes, for a fraction of the cost. CWS graduates at the WEMT and WFR level are trained in the use of syringes, needles, vials, and ampules for this purpose.

For patients weighing less than 55 lbs. (25kg), the doses are: epinephrine 0.01 mg/kg or the appropriate auto-injector; diphenhydramine 1mg/kg; and prednisone 1 mg/kg. Multiply the weight in pounds by 0.45 to get the weight in kilograms.

The organization may need a prescription from a medical advisor to obtain the injectable epinephrine, syringes and prednisone used in the protocol. Antihistamines do not require a prescription in the United States and Canada. It is essential for prescribers and organizations to be familiar with state, provincial, or national regulations that may address the prescribing of medication and the acceptable means of injecting epinephrine.

## Authorization

The above specified protocol has been authorized for use by Center for Wilderness Safety for **WEMT**, **WFR**, **WAFA**, **WFAA** and **WFA** trained employees of the employer named on page 3 of this document, provided they meet the requirements of the authorization criteria listed in this protocols packet. Only those certified as **WEMT** and **WFR** are permitted to manually administer epinephrine via syringe (as opposed to an auto-injector).

Note that prednisone is a schedule III prescription anabolic steroid, and if carried by the organization (employer), it may require a prescription from a medical advisor. It is essential for prescribers and organizations to be familiar with state, provincial or national regulations that may address the prescribing of medication.

## — FIELD PROTOCOL 2 —

### WOUND CLEANING + DEBRIDEMENT

In the management of all wounds, bleeding must be controlled using well-aimed direct pressure with whatever means are necessary. Control of severe bleeding is a higher priority than wound cleaning. Once bleeding has been controlled:

#### Open Wounds

1. Cleaning a wound will involve a combination of the following procedures in an order that seems appropriate:
  - a. Explore the wound and remove foreign material as completely as possible.
  - b. Wash the surrounding skin with soap and water or other specified cleanser.
  - c. Irrigate the wound with water clean enough to drink. Water preparation can be accomplished by filter, chemical, ultraviolet, or reverse osmosis. Water of questionable quality should be sterilized by creating a 1% povidone iodine solution.
2. High risk wounds (imbedded debris, devitalized tissue, bites, open fractures, deep structure involvement) should be irrigated with large amounts of water under pressure (e.g.: using a 30 or 60cc syringe with an 18-gauge catheter). If the wound cannot be completely cleansed of foreign material or the quantity of irrigation water is insufficient, rinse the wound with 1% povidone-iodine solution. DO NOT use pressure irrigation on puncture wounds where irrigation fluid cannot easily drain away.
3. Cover the wound with a sterile bandage but allow for drainage. Splint or otherwise immobilize high-risk wounds if safe to do so. Do not close a high risk wound with sutures or tape.
4. Change the bandage and clean the wound at least daily.
5. If an infection develops (e.g., red, tender, swollen, drainage of pus), irrigate with clean water, allow for drainage, and apply warm compresses. Infected wounds should be evacuated to medical care promptly.
6. High-risk wounds require tetanus prophylaxis every five years, all others every ten.
7. Animal bite wounds require risk assessment for rabies exposure. The probability of rabies varies by geographic location. Check with state or local health agency for recommendations. Prophylaxis should be administered as soon as possible, but a period of several days between the bite and immunization is considered safe. Antibiotic prophylaxis may also be indicated.

## Shallow Wounds (Abrasions + Burns)

1. Cleanse the wound<sup>44</sup> with soap and the cleanest water available.
2. Apply an antibacterial ointment or cream and cover with a sterile bandage.
3. Immobilize wound area if possible.
4. Inspect the wound and change the bandage daily.

## Impaled Objects

Impaled objects should be removed in the field and the wound cleaned as soon as practical. Exceptions include objects in the globe of the eye, and situations in which removal would result in significant tissue damage, intractable pain, or bleeding that cannot be controlled.

## Discussion

Field providers are often rushed to evacuate an open wound because of the perception that wound closure (sutures) must be accomplished within six or eight hours of injury. In the EMS context with short transport times, it makes sense to bandage and transport an open wound for care in the clean and controlled environment of a hospital or clinic. However, it is not so much the time to closure that matters, as it is the time to wound cleaning.

Early and complete wound cleaning substantially reduces the chance of later infection. In the remote environment where definitive care will be delayed, thorough irrigation and debridement of an open wound reduces the urgency of evacuation and leads to a better long-term outcome.

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## — FIELD PROTOCOL 3 —

### CARDIOPULMONARY RESUSCITATION IN REMOTE SETTINGS

This protocol applies only to normothermic patients (core temperature > 90° F, 32° C) in cardiac arrest. Chest compressions are to be initiated for patients in cardiac arrest as evidenced by pulselessness. To be effective, CPR must be started promptly and be provided in a consistent and quality manner. Even then, its benefits in a wilderness or remote setting are limited.

CPR should *NOT* be started, or *may be discontinued* at some point after initiation:

1. Cardiorespiratory arrest after submersion in water for more than sixty minutes in the absence of a source of air such as SCUBA equipment or an air pocket.
2. Obvious lethal injury such as decapitation, exsanguination, or massive head injury.
3. Where cardiac arrest persists continuously for over 30 minutes of sustained CPR.
4. Where rescuers are at risk of injury or death.

### Special Circumstances

**HYPOTHERMIA** – Chest compressions should NOT be performed on any individual suspected of being hypothermic. Regardless of whether or not a pulse is found, ONLY positive pressure ventilations (mouth-to-mask or rescue breathing) should be administered due to the possible fragile electrical state of the heart. Ensure that ABCs are checked for a full 60 seconds on any patient considered to be hypothermic (core temperature <90°F; 32°C). Evacuate to definitive care slowly and carefully and rewarm the patient's core, continually checking the warming mechanisms to ensure they remain effective.

**LIGHTNING** – CPR should be administered immediately, when safe to do so, to all lightning strike victims who appear breathless and/or pulseless. Respiratory paralysis may continue long after cardiac activity returns.

**COLD WATER SUBMERSION** – CPR should be administered immediately to any unconscious (and not breathing and/or pulseless) patient who has been submersed in cold water (70°F; 21.1°C) for less than one hour.

### Authorization

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## — FIELD PROTOCOL 4 —

### SPINAL INJURY ASSESSMENT + CLEARANCE

In an urban context all patients that are involved in a traumatic event that may have caused a spine injury are treated as though they are spine injured. In a wilderness context, clearing a potential spine injury when there is a positive mechanism for such an injury requires careful evaluation that focuses on patient reliability, nervous system function, and spinal column stability. Adequate time must be allowed for the evaluation. Repeat examinations may be necessary.

1. Assess for mechanism of spine injury. If positive or uncertain mechanism exists, protect the spine by whatever method is available. This could include but is not limited to hand stabilizing in the in-line position.
2. Do a thorough evaluation including a history and physical examination. To rule out a spine injury the patient must meet all of the following criteria:
  - a. Patient must be reliable. The patient must be cooperative, sober, and alert, and must be free of other distracting injuries significant enough to mask the pain and tenderness of the spine injury.
  - b. Patient must be free of significant spine pain and tenderness consistent with a spinal injury.
  - c. Patient must have normal motor/sensory function in all four extremities:
    - Finger, hand, or wrist motion (check both hands)
    - Ankle or great toe motion (check both feet)
    - Normal sensation to pain and light touch in all four extremities
    - If reduced function in one particular extremity can be attributed with certainty to a condition unrelated to a potential spine injury (wrist fracture, for example), that deficit alone will not preclude ruling out a spine injury, because the motor/sensory assessment contain built-in redundancy.
3. If the spine cannot be cleared, spine injury remains on the problem list and must be appropriately managed and followed up as part of patient care and evacuation. This may include stabilization and carry, assisted self-extrication, or other means of reducing the risk of further injury pending medical evaluation and treatment.

### Authorization

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## — FIELD PROTOCOL 5 —

### REDUCTION OF DISLOCATIONS

This protocol specifically applies to dislocations of the shoulder, patella, and digits resulting from an indirect force; all other potential dislocations should be treated as one would treat any other potentially unstable joint injury (i.e., splint in a position that maintains stability and neurovascular function while facilitating transport). A history confirming that there has been no direct injury to the affected joint and an examination with findings consistent with a dislocation must be obtained prior to treatment. The following procedures should be stopped if pain increases and/or resistance are encountered.

#### **Anterior Shoulder**

Any manipulative technique that is performed slowly and gently on an awake and cooperative patient is generally safe. For the purposes of this protocol the Cunningham, External Rotation, Baseball, Hanging, and Scapular Manipulation are described. These techniques can be used in sequence or in combination as needed to achieve a successful reduction. Discontinue the procedure if pain significantly increases and/or if physical resistance is encountered.

Neurovascular status is documented before and after reduction. Non-emergent medical evaluation is advised but may be delayed by up to 10 days if distal circulation and sensation has returned to normal.

#### **Cunningham Technique:**

This technique encourages muscle relaxation which may allow the humeral head to return to normal position without additional manipulation. The patient is positioned sitting upright with the shoulders back and chest out facing the practitioner. The patient's arm remains adducted (against the body) while the hand is placed on the practitioner's shoulder (right dislocation, right hand on practitioner's left shoulder). The practitioner massages the trapezius, deltoid, and biceps muscles until reduction is achieved.

#### **Hanging Traction:**

Have the patient lie face down with the affected arm hanging, unsupported, over a ledge. Secure approximately 10 to 15 pounds to the patient's upper arm or wrist and allow the weight and gravity to fatigue the muscles until the shoulder is reduced. This typically takes upwards of 20 to 30 minutes or more.

**External Rotation:**

This is essentially the same as the Cunningham technique with the addition of manipulation. The practitioner gently applies external rotation of the patient's arm with the elbow remaining adducted against the chest.

**Baseball Position:**

With the patient supine and while still sitting adjacent to the dislocated shoulder, apply gentle traction to the arm to overcome muscle spasm. Gradually abduct and externally rotate the arm until it is at a 90-degree angle to the patient's body. This is most easily achieved by keeping the elbow in the 90 degrees of flexion throughout the maneuver. Hold the arm in this position ("baseball throwing position") and maintain traction until the dislocation has been reduced.

**Scapular Manipulation:**

This procedure may require 2 rescuers. Have the patient either lie face down (as above) or sit upright. Apply traction to the affected arm and bring it forward to shoulder level. While maintaining traction, stabilize the upper portion of the scapula with one hand and rotate the lower tip medially with the other hand. This technique is often an effective adjunct to the other techniques described.

**Note:** If the patient cannot adduct the arm against the chest, techniques such as the baseball position, hanging traction, and scapular manipulation are more likely to be successful.

**Medial Patella**

The following only applies to a medial patellar dislocation (rotated inward, not out):

1. Check and document distal neurovascular function.
2. Have the patient gently straighten out their knee and flex their hip. If the patella has not spontaneously reduced once the knee is fully extended, gently guide the displaced patella medially back into its normal anatomic position. Discontinue the procedure if pain significantly increases and/or if physical resistance is encountered.
3. Stabilize the patella with tape or an elastic wrap.
4. Reassess and document distal neurovascular status.
5. Arrange for non-emergent medical evaluation. Patients may walk out if pain is tolerable.

## Digits (fingers + toes, including thumb)

1. Check and document distal neurovascular function.
2. Apply axial traction distal and counter-traction proximal to the dislocated joint until the dislocation has been reduced. Discontinue the procedure if pain significantly increases and/or if physical resistance is encountered.
3. Splint in the anatomical position.
4. Reassess and document distal neurovascular status.
5. Arrange for non-urgent medical evaluation.

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## — FIELD PROTOCOL 6 —

### ADMINISTRATION OF EMERGENCY MEDICATION FOR SEVERE ASTHMA

This protocol outlines the treatment of an asthma attack causing persistent respiratory distress not responding to the patient's use of a rescue inhaler. This is a high-risk problem that can cause respiratory failure and death from respiratory arrest. Early recognition and prompt treatment is essential. Early recognition and prompt treatment, particularly in the wilderness setting may be essential to preserve life.

Patients who have progressed to severe asthma experience a combination of the following:

- Shortness of Breath (>30 respirations /min)
- Mental status changes (anxious, confused, combative, drowsy, etc.)
- Inability to speak in sentences
- Sweaty
- Unable or unwilling to lie down

If the patient is not responding to or is unable to properly use an MDI (metered dose inhaler), proceed to the following:

1. Inject 0.01 mg/kilogram (up to 0.5 mg) of 1 mg/ml solution of epinephrine intramuscularly (IM) into the lateral mid-thigh. A dose of 0.3 to 0.5 mg is appropriate for the average adult.
2. Maintain an open airway and position of comfort. Initiate either positive pressure ventilations (PPV) or cardiopulmonary resuscitation (CPR) as indicated.
3. Repeat epinephrine injections as soon as every 5 minutes if needed.
4. Prednisone 60 mg/day for an average adult.
5. Have the patient self-administer 6-10 puffs from the MDI/HFA. This may be repeated every 20 minutes for a total of three doses.
6. Evacuate to definitive care if safe to do so. Consider an advanced life support intercept en route (ALS).
7. If evacuation is not possible, monitor carefully and repeat treatment per protocol as necessary.

**Note:** The preferred concentration of epinephrine for IM injection is 1 mg/1 ml. Although the lateral mid-thigh is preferred, an injection into the deltoid may be the only practical option.

Commercially available auto-injectors such as the EpiPen deliver either 0.3 mg or 0.5 mg as a standard adult dose or a 0.15 mg or 0.1 mg for a smaller person (less than 55 lbs.; 25 kg), depending on body mass. The auto-injector is the most user-friendly device, but also the most expensive. Epinephrine is also supplied in 1 ml ampules, and vials of various sizes, for a fraction of the cost. CWS graduates at the WEMT, and WFR level are trained in the use of syringes, needles, vials, and ampules for this purpose.

For patients weighing less than 55 lbs. (25kg), the doses are: epinephrine 0.01 mg/kg or the appropriate auto-injector and prednisone 1 mg/kg. Multiply the weight in pounds times 0.45 to get the weight in kilograms.

The organization may need a prescription from a medical advisor to obtain the injectable epinephrine, syringes and prednisone used in the protocol. It is essential for prescribers and organizations to be familiar with state, provincial or national regulations that may address the prescribing of medication and the acceptable means of injecting epinephrine.

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Note that prednisone is a schedule III prescription anabolic steroid, and if carried by the organization (employer), it may require a prescription from a medical advisor. It is essential for prescribers and organizations to be familiar with state, provincial or national regulations that may address the prescribing of medication.

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