Personal

Wilderness

Medical Kit

Allegheny Mountain Rescue Group

Version 3.0 10/13/15

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Comments to:

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# Authorization for Use

In summary, to be authorized to use this kit under Allegheny Mountain Rescue Group (AMRG) Standing Orders, AMRG Members must be credentialed by AMRG either as a Wilderness EMT (to carry and use the Minimum and Search Modules) or as a Wilderness Medic (to carry and use the Advanced Module).

To be credentialed as a Wilderness EMT requires EMT-Basic and additional wilderness training as a Wilderness EMT. To be credentialed as a Wilderness Medic requires an Advanced EMT, EMT-Paramedic, Physician Assistant, Registered Nurse, CRNA, CRNP, podiatrist, oral surgeon, physician, or osteopathic physician certification or licensure, and again additional wilderness training.

Details of credentialing of Wilderness EMTs and Wilderness Medics are to be found in the AMRG Medical Policy Manual, specifically in the section “AMRG Medical Accreditation Policy,” available at [conovers.org/ftp](http://conovers.org/ftp).

# Sources and Methods

This specification is adapted and updated from the Personal Wilderness Medical Kit document produced by the Wilderness EMS Institute, version 2.0 of 2001, with permission. All of the original footnotes and comments from the WEMSI list are retained, as they offer insight into why certain items were either included or left out. Given this continuity with the two major editions of the WEMSI kit, the numbering for this first edition of the AMRG kit starts at 3.0. The prior versions of the WEMSI kits are available in the medical section of the ASRC Archive at [asrc.net](http://asrc.net).

Personal medical kit recommendations are sometimes based on controlled clinical trials, but many of the changes lie more in the Art of Medicine or in engineering. The extensive footnotes provide the reasoning for the choices.

There were several major changes between version 1 and version 2 of the WEMSI Personal Wilderness MedKit list, and these provide useful background on why certain items appear or do not appear in this list:

* The Sawyer Extractor was removed (controlled trials of this snakebite treatment found it useless).
* IM ketorolac (e.g., TORADOL) was taken off the list, as it has virtually no advantages over oral ibuprofen (see endnotes).
* Tubex injections and syringes were taken off the list, as the containers leak when overheated.
* A one-way valve was added to the advanced kit, to provide some protection during mouth-to-endotracheal-tube ventilation.
* A small skin stapler was added, for scalp wounds and for minor lacerations.
* Droperidol was added as a multi-purpose replacement for both prochlorperazine (e.g., COMPAZINE) and haloperidol (e.g., HALDOL) for sedation, nausea, and migraines *(though now it carries a “black box” warning recommending an EKG to check for QT interval prolongation before administration, a bit problematic in the wilderness.)*
* Midazolam (e.g., VERSED*)* was added to the Advanced Kit, for procedural sedation (and for behavioral emergencies – 5-8 mg of intramuscular midazolam will do a good job of sedating the average adult homicidal maniac in about 5-10 minutes) and for control of seizures.
* Other items removed included ciprofloxacin (e.g., CIPRO), bisacodyl (e.g., DULCOLAX), bismuth subsalicylate (e.g., PEPTO-BISMOL) and cyclobenzaprine (e.g., FLEXERIL).

The WEMSI Personal Wilderness MedKit fared well since Version 1 was first made public in 1995. Though no commercial supplier has ever sold a medical kit based on this listing, search and rescue teams and SAR team members around the world (the primary targets of the WEMSI list) and other outdoor enthusiasts have created and used kits based on the WEMSI list.

This document is more narrowly focused on the needs of AMRG in Pennsylvania. However, we make it public in the hopes that it, as with the WEMSI Personal Wilderness Medical Kit on which it is based, may be helpful to others, and in particular AMRG’s sister groups in the Appalachian Search and Rescue Conference.

To this end, we include and update all of the prefatory material and endnotes of the original. Those wishing to critique the list (which is welcomed), or use it as the basis for a personal or team kit, may find this informative.

Proposed major changes from version 2.0 of the WEMSI kit include (references in the footnotes to the medication in the kit list below):

* Added acetaminophen (TYLENOL) as there is evidence that acetaminophen combines well with an NSAID (like the naproxen (ALEVE) that is in our kit) to provide superior analgesia to either the NSAID or acetaminophen alone. This is without the sedative effects of an opioid narcotic like the hydrocodone in the VICODIN tablets in the prior kit. When the patient is assisting with the rescue, or the person being treated for pain is a team member, avoiding the sedative effects of a narcotic may be important.
* Added ondansetron oral dissolving tablets (e.g., ZOFRAN ODT) for nausea and vomiting.
* The recommendation for a Sam-Splint was changed to a couple of improvised splints made from plastic cut from gallon milk jugs combined with duct tape or adhesive tape. These are cheaper (free), much lighter and smaller, and almost as useful.
* Added a military CAT (Combat Application Tourniquet).
* Added a Tick-Twister for tick removal.
* Added two 4”x4” QuickClot Combat Gauze pads for control of hemorrhage.
* SQ needles were eliminated and IM needles increased to 4, as epinephrine, which was traditionally given SQ, we now know should be given IM instead (more reliable absorption).
* Added a set of King LT airways to the Minimum Module.
* Added tranexamic acid i g.
* Changed from topical LOTRIMIN to oral fluconazole (DIFLUCAN) for athlete’s foot, yeast intertrigo, or yeast vaginitis.
* Got rid of HUMIBID-DM as dextromethorphan is basically useless for the cough of a cold; naproxen, which is already in the kit, is far superior.
* Added zinc gluconate lozenges for treatment of a cold, based on the Cochrane Review recommendations.
* Eliminated sustained-release first generation antihistamine and replaced with a long-acting second-generation nonsedating antihistamine.
* Pain meds: (1) the daily outpatient dose of acetaminophen (e. g., Tylenol) has been (2013) decreased to 3000 mg (3g) daily – it used to be 4g daily; and the recent (2014) change of hydrocodone from Schedule III to Schedule II, meaning that hydrocodone and oxycodone have the same prescribing requirements, and (3) a general impression among emergency physicians that oxycodone is a slightly superior opioid analgesic, which is backed up by at least some data. Therefore, we have changed from Vicodin to having separate acetaminophen and oxycodone, which matches the current prescribing practices of at least a number of academic emergency physicians.
* Skin glue (cyanoacrylate) has been used for repairing minor lacerations for many decades, is available over-the-counter, and has been found to be safe and effective, so we have added some to the kit.

# Choosing a Wilderness Medical Kit: The Basics

Choosing the contents of a wilderness medical or first aid kit is hard. But if you are putting together such a kit, you may look to this document for help.

This list might not be exactly what you need for ***your*** medical kit. But we hope you find this document, with all of its principles and explanatory notes, a good starting place for designing your own kit.

As we said, assembling a medical kit is hard. But there are many ways to make it easier. You can simply get a list from someone authoritative and assemble a kit based on that. But it may make more sense for you to ask certain basic questions, and then assemble a kit based on the answers.

Some obvious questions, but ones worth asking out loud at the beginning, are:

* **Who** is going to use the kit, and what is his or her level of training? *For AMRG in Pennsylvania, these are people trained Wilderness EMTs, who also have EMT-basic or EMT-paramedic training or higher, and who have authorization from our physician medical director to carry and use the kit as part of a wilderness EMS agency/SAR team, and on personal wilderness outings.*
* **Who** will the kit provide for – how many? And are there any **special needs** (e.g., pregnant women, diabetics, small children, dogs, horses)? *For AMRG, the kits will be used to provide initial care for the subjects of wilderness and backcountry search and rescue operations, including lost person searches and mountain and cave rescue operations. The kits will also provide care for members of field teams, or outing groups, possibly including dogs and horses, when they are remote from standard medical care.*
* **How long** will the kit have to provide medical care for these people? *For AMRG, the kit design is for the most common sort of mountain and cave search and rescue operations in the mid-Appalachian region – tasks usually lasting 4-12 hours, rarely lasting longer, perhaps up to a day or two without resupply. It may be used for longer personal trips, such as backpacking trips.*
* **Where** will the people be going? For instance, there’s no need for altitude-related medications if they’re just in the Appalachian Mountains (where altitude illness is exceedingly rare), and no need for anything for snakebite if they’re hill-walking in Ireland or Britain, where there are essentially no poisonous snakes. *For AMRG, given the kit may be used for personal trips outside of our service area of Pennsylvania and nearby states, the answer is “in any wild or backcountry area or cave in North America, exclusive of the Arctic.” However, this kit is not designed for foreign travel, or for extended trips or large groups.*
* **How much** can they carry? If it’s a river rafting trip, a fairly heavy kit is OK, but if it’s for a long backpacking trip along the Appalachian Trail, where it’s usually possible to get to a road and to a hospital within a day or so, a lighter kit is in order. *For AMRG, the answer from the field is “if we gotta carry this around with us all the time, up and down mountains and through cave crawlways, it’s gotta be small and light.”*

Asking those questions is just the beginning. Next comes a delicate balancing act.

For example: reconciling the team doctor (who wants you to carry everything including four bags of IV fluids at 2.2 lbs. a bag) and the team members (fanatically weight-conscious backpacker-type ones who cut the handles off their toothbrushes and the margins off their maps and who want a kit that weighs less than an ounce).

Another example: we had considered adding an ampoule of 50% dextrose to the kit. But it is very heavy, and fragile, and in almost all cases, you can get some oral glucose or other food into any hypoglycemic patient in the wilderness. For that matter, instant glucose test strips weigh very little; however, they have to be kept in an airtight container that is fairly large, and have a short shelf life when exposed to heat (as in a pack or car in the summer). Since almost all wilderness patients need glucose or food calories, we did not include glucose test strips in the kit, either.

If you’re considering adding something to a wilderness medical kit, start with these three estimates as an initial screening tool:

* **What is the usefulness-to-weight ratio?** A portable CT scanner is very useful but who’s going to carry it? A couple of fluorescein strips are not as useful as the CT scanner, but weigh (and bulk) basically nothing. And things change: it used to be that laryngoscopes, which are quite useful, were either (1) very heavy, or (2) disposable version that were just terrible to work with. But now (see the list below) you can get a small, lightweight $10 disposable laryngoscope that rivals or bests standard hospital laryngoscopes.
* **What is the usefulness-to-bulk ratio?** For instance, a set of the three adult sizes of the King LT airway would be fairly light, but have to be stored unbent. The set only weighs a few ounces, but the irregularly-sized package of 3, even if you fold over the edges of the packages and neatly nest them, measures 11”x5”x1”.
* **What is the usefulness-to-cost ratio?** In areas with rattlesnakes (including the AMRG area), it might be nice to carry crotalid antivenom. But it’s $2,000 a vial, and you need to carry 6 vials to handle a bad envenomation. And they expire rapidly. Many hospital pharmacies don’t carry it. They band together to share the cost and one hospital stocks it and will rush it to the other hospitals as needed. But some very useful drugs – think morphine for severe pain – are dirt cheap.

## Force Protection vs. Patient Care

Depending on how you look at it, there are two types of first aid/medical kits. First are those that are just for minor problems and are very lightweight and small. By including some lightweight additions, mostly over-the-counter and prescription medications, it's still quite light and, provided the person carrying it knows what they're doing, much better for "force protection."

Then there are kits for taking care of someone who is badly injured or ill, that are bigger and heavier. These can be *relatively* small, ranging up to humongous.

The goal for this kit is to be a blend of both, while still staying manageably small and light.

Certainly the role of the Wilderness EMT or Wilderness Medic in force protection is an important one. But I think you can also argue that our Wilderness EMTs and Wilderness Medics are our first-line medical providers for search subjects.

Once an extrication team shows up with the "kitchen sink" there is more medical stuff to work with.

But will this "kitchen sink" include prescription or over-the-counter medications that may improve patient care, such as oral antibiotics for an open fracture? Unlikely. For an organization like ours, we have talked about keeping a kit at a hospital pharmacy and having them keep the medications updated. That's a possibility, but the Blue Ridge Mountain Rescue Group’s experience with such a kit is that it never makes it to the side of a patient.

And, a selection of medications can be quite small and lightweight if you leave out stuff like amps of D50 (50% dextrose). So, to statistically make it more likely that these meds make it to the patient, having WEMTs and Wilderness Medics carry these things with them makes sense.

And, what happens if something bad happens to a team member? Force protection, too, needs to consider more than Band-Aids and colds.

Also remember that dictum "Search is an Emergency." The subject is assumed to be injured or ill until found.

And anyone who wants to be credentialed as a WEMT or Wilderness Medic, and assume the privilege of being able to provide advanced care in the backcountry, also assumes an obligation to carry a bigger medical kit than someone who has not aspired to this privilege. It just goes with the job. Yes, a nice tiny buttpack is great for short tasks in nice weather. And indeed, I (Keith Conover, AMRG Medical Director) have a tiny kit I keep in my buttpack when I go dayhiking ([conovers.org/ftp](http://www.conovers.org/ftp/), and look for Everyday Emergency Kit).

But when you are taking medical responsibility for team members, and part of that responsibility is providing Force Protection to keep the other members of the team going, and given Search is an Emergency, there is an obligation to take a bit more stuff. And, if you find the patient, and it's a place like Dolly Sods Wilderness Area, how long until the litter and the big MedKit reaches you?

If we have a bunch of credentialed WEMTs and Wilderness Medics, then it's reasonable to at least hope that some of the other search teams with WEMTs or Wilderness Medics will show up before the litter and team kit do, and so it's reasonable to not include much in the way of gauze pads or big bandages, for example. If you've got 3 Wilderness EMTs at the scene soon after the find, you've got 3 kits' worth of gauze pads.

So, part of the answer is "suck it up and carry a bigger kit or don't bother getting credentialed." But the other part of the answer is that carrying a bigger kit is the right thing to do.

On the other hand, we *do* need to critique any addition to the kit. And a set of King LTs (airways that are a good substitute for an endotracheal tube), in particular, is fairly bulky. A reasonable pair of questions are "how often will it get used?" and "if I need it and don't have it, will the patient die?" For a set of King LTs, the answers are probably "rarely" and "yes." A final question is "if I don't have it, can I improvise?" and I think the answer to that is "no." Oral and nasal airways just don't compare to a King LT, either.

Which is a very long way of saying "Even our Wilderness EMT-Basics should carry a set of King LTs even if it makes their MedKit and pack a bit bigger." There are suggestions that we just carry a single middle size of the King LT (fits people 5-6 feet tall), however, a lot of outdoorspeople are taller than six feet, and a fair number are adolescents less than 5 feet tall, so we finally settled on a whole set of three adult sizes.

If a patient needs a chest tube, a King LT would probably work as an improvised alternative, another reason to carry at least one.

Here are some more detailed guides to choosing items and assembling your medical kit, though there competing principles that must be delicately assessed and balanced.

## Durability

Wilderness medical kits must withstand crushing and drop shocks. The degree of protection depends on the environment. For standard mountain search and rescue, the padding of a soft case, one that can be inserted in a waterproof bag, may be acceptable. For cave rescue, though, a waterproof and crushproof case such as those made by Pelican, or a surplus ammunition box, is much more appropriate. For kits that may be used in both settings, the kit can be in a soft nylon organizer case[[1]](#endnote-1), inserted into a waterproof plastic or nylon bag[[2]](#endnote-2) (or even just a pack with a good raincover) for mountain rescue, and inserted into a Pelican or Otter hard case or ammo box for cave rescue.

Wilderness medical kits must also withstand temperature extremes – medications that require refrigeration or a controlled room temperature, or that are dangerous when frozen and rewarmed, are not acceptable.

Wilderness medical kits must also be usable despite occasional outdated medications – medications that are unsafe when outdated, such as tetracycline, are not acceptable. Medications that still have significant potency after expiration are ideal for wilderness kits. (Most drugs are still good for a year or two after their expiration date, if not grossly abused or kept at extreme temperatures, but there are exceptions.)

## Flexibility

Wilderness medical kits must have the equipment and medications to handle common and serious problems. But to save weight, equipment and medications should have multiple uses. Medical kits used by search and rescue team WEMTs should be usable for dogs and horses, as these animals are often part of the SAR effort.

Ideally, a SAR medical kit should separate into smaller modules – so as not to have to carry entire kit on every task, especially if it is a “bash” team trying to get into a patient as quickly as possible – also to be able to divide the kit among team members. See the *Organization* section below for a solution for this.

Although a SAR medical kit may be used just in one area, it should be adequate for mutual aid requests to other regions. For example, a North American SAR WEMT kit should carry medications for high altitude illness. One can argue that even teams in the Appalachian Region of the Mountain Rescue Association. These “out of region” medications could theoretically be left out except for out-of-region responses. On the other hand, they don’t weigh much. And, a high-altitude out-of-region response might come during an in-region operation – meaning that WEMTs can’t go home to get the medications that they’ve left out. And suddenly going to altitude without taking *Diamox®* or another prophylactic medication is definitely ***not*** a good idea.

## Kit Capabilities

There are two main targets for the AMRG Personal Wilderness Medical Kit.

**Subject/Victim/Patient:** The first target of the kit is the search subject or rescue victim. The WEMT should have enough equipment and drugs, within the context of a kit that weighs only a pound or two and isn’t very bulky, to provide stabilizing care for most severe wilderness injuries and illnesses. A team with a larger medical kit will usually arrive within a several hours, and with some items from a standard EMT kit (BP cuff and stethoscope, bandages and dressings, splints), and maybe some IV fluids, the WEMT can provide reasonably good care from most common wilderness injuries and illnesses.

**“Force Protection”:** The second target of the kit is the field team’s members. WEMTs should have enough medication to start treatment for common problems in the field, then for members to get home, get an appointment with their family doctor, and have the condition re-evaluated. If we consider caring for the victim “bringing the hospital to the patient” then this might be “bringing the urgent care center to the team member.” Considering the realities of both SAR operations and getting appointments with office-based doctors, enough for about a week of treatment seems reasonable. (We used to say three days but physician office appointments are harder and harder to get.) The goal of such care is to prevent serious problems that might evolve if the condition is not treated early: for example, an untreated urinary tract infection (common with dehydrated team members, female or male) that proceeds on to pyelonephritis. It is also return such team members back to functioning so as to continue to carry out the mission, or at least to avoid a difficult carry-out.

## Expense

Some SAR team members will have to purchase medications with their own money – many SAR teams can’t afford to issue expensive kits to their WEMTs. Team WEMTs with self-purchased medications generally use their kits for personal trips as well as for SAR operations.

Samples are often available through physician offices, or from manufacturers, which may help decrease the cost of members’ kits.

Even if the team issues everything in the kits, few SAR teams have much money, so medications and equipment must not be too expensive.

## Safety

Any wilderness medical kit should contain instructions on the safe use of its medications. It is quite possible that the WEMT becomes injured, and a team member with less training will need to use the kit. A reminder about uses and dosages is always appropriate for anything that isn’t used on a regular basis.

There are (at least) two good approaches to this. First, the physician medical director, or prescribing physician, can provide detailed standing orders for the use of medications in certain situations, and a copy of these should be placed in the medical kit. Second, a list of medications, both those in the kit as well as common medications carried in wilderness traveler’s kits, their common indications, contraindications, dosages, and any cautions, provides a useful reference. Standing orders should be provided by the WEMT’s physician medical director.

## Accountability and Security

Physicians should be reluctant to prescribe or issue medication to WEMTs unless the medications are managed in an acceptable way.

There are two ways for a physician to provide medications for wilderness medical kits.

The most common arrangement for EMS systems is for the physician to ask a pharmacy, usually a hospital pharmacy, ***issue*** the drugs to each WEMT. For wilderness teams’ kits, ome drugs are available cheaply by mail-order, and the physician may simply order and issue some such drugs to WEMTs. Consult with the local Drug Enforcement Administration office, and with a hospital pharmacist experienced in dealing with ambulance services if you choose this pathAn alternative is to ***prescribe*** most drugs for each individual WEMT, expect the WEMT to obtain most of the over-the-counter and prescription drugs from a retail pharmacy, and use the kit for personal use while in the wilderness. The WEMT may then use these personal medications for others when needed.

There are several legal justifications for using personally-prescribed medications for others. All are predicated with the context: this is for situations in the backcountry, where routine medical care and even ambulance services are inaccessible. This is a scenario not envisioned by the framers of relevant legislative law, and there is little if any relevant case law (common law), so a prospective legal analysis must rely on relevant legal principles. Here is a summary of our current thinking in this regards.

Strictly speaking, if the WEMT is not a physician, giving even an aspirin to another person is a violation of the various states’ Medical Practice Acts and could be considered as the crime of practicing medicine without a license. However, when done under a state Emergency Medical Services act as part of a formal EMS system, or done via a physician’s orders under a broad delegated practice provision in the state’s Medical Practice Act such as in Pennsylvania, giving medications to others is lawful.

If medications were prescribed by the WEMT’s physician Medical Director for personal use, and then that same physician, either by direct communication or via standing orders, authorizes their use for another patient, one can argue that this is simply an authorized change in the prescription. Given the AMRG Medical Director is a licensed physician in Pennsylvania, and that Pennsylvania has a very broad delegated practice provision, this is the legal justification for AMRG’s use of personal wilderness medical kits in Pennsylvania. As far as a physician prescribing a medication for a patient who he or she has not seen: there is precedent for this in Pennsylvania and some other states. In Pennsylvania and some other states, if a physician sees and treats a patient with a sexually-transmitted disease, the physician may prescribe medication for the partner without having seen him or her: *Statutory language does not preclude a third-party partner from being a “consumer” or an “individual entitled to receive the drug.”* [<http://www.cdc.gov/std/ept/legal/pennsylvania.htm>] This is not true in the nearby states of Ohio and West Virginia, where such prescribing is prohibited; in Virginia, Maryland, Delaware, and New Jersey, the situation is legally ambiguous. One could, however, argue that if the WEMT contacts the AMRG Medical Director and obtains the patient’s assent to be treated by the WEMT under the Medical Director’s control, a doctor-patient relationship has been established and prescribing medication is lawful regardless of a state prohibition of third-party prescribing.

Others may also take over-the-counter or prescribed medications from a WEMT’s kit via the “stump” method: the WEMT places the aspirin on a tree stump or rock, and describes the indications, contraindications, and cautions for the medication. If the other person takes the aspirin off the stump or rock and then swallows it, then the WEMT cannot be accused of practicing medicine without a license. This may seem a thin legal fiction but the vast majority of lawyers consider this a fairly ironclad protection against claims that the WEMT might be practicing medicine without a license. The WEMT may even assist the other person in taking the medication, particularly if it is, for example, an intramuscular injection of epinephrine for life-threatening beesting anaphylaxis. AMRG WEMTs operating in other states may facilitate other’s medical care using this method. And, WEMTs may find legal protection for their rendering care under the various state “Good Samaritan Laws,” and more importantly, under the common-law principle (“doctrine of necessity”) that requires one to provide care up to one’s capacity when aiding an individual in distress – lest one be guilty of gross or willful negligence.

This “personal prescription” method is the primary approach that AMRG has taken, although we may issue certain medications that may be obtained more cheaply in bulk. AMRG also authorizes credentialed WEMTs and Wilderness Medics to use the kit for family and friends, but only when in the backcountry, and all uses must be reported and reviewed through the AMRG QI process.

Many medications in wilderness medical kits are available in inexpensive generics without a prescription – over-the-counter or “OTC.” While it is possible to issue OTC medications to each WEMT, the extra cost may be unwarranted. If each WEMT is responsible for replacing OTC medications as they become outdated, it may also make sense to make each WEMT responsible for replacing prescription medications, too. If so, require WEMTs to inspect their kits on a regular basis, perhaps once every few months, and replace drugs or equipment that are outdated or damaged. Drugs and equipment used for patient care should be replaced immediately.

This document provides a place to note the expiration date of medications, as well a checkbox to use during inspections. A PDF as well as a Microsoft Word version of this document are downloadable from [amrg.info](http://amrg.info) and then the expiration date can be filled in on one’s computer, and a copy placed in the kit for inspections.

Especially for scheduled drugs (“narcotics”) that are prescribed or issued, it is important to document usage, and to document when drugs are “wasted” or destroyed. The local DEA office and a local hospital pharmacist can help set up procedures to meet federal and state requirements. In general, scheduled drugs must be kept secure. During wilderness travel, two small, lightweight travel locks, one each on external and internal nylon cases provides the dual locking that is usually required; although this is not much of a deterrent, keeping the kit in one’s pack in the backcountry is probably better security than a heavy steel box in an urban ambulance. However, when a kit is ***not*** in the backcountry, it is imperative you keep it secured as well as possible.

## Organization

The organization of any kit will be contentious whenever more than one person is involved. However, most people will agree that making the kit modular, so that a lighter subset can be carried in certain circumstances, or the kit can be divided among different people, is valuable. (See Figure.)

The **Minimum Module** is to always be carried by Wilderness EMTs, even if on a rapid response for a rescue, or on a small, highly mobile scratch (“hasty”) search team. The design of several commercial medical kit bags allows a pouch which can Velcro into a larger bag. However, the Minimum Module along with the Advanced Module is big enough that many WEMTs carry two full-size nylon first aid bags, one with the Minimum and Advanced Modules, and another with the Search Module.

The **Advanced Module** is for those with ALS (Advanced Life Support) skills – the ability to start Ivs and give IV or IM medications, and to perform digital intubation. The Advanced Module is an enhancement to the Minimum Module – every WEMT with advanced training (EMT-Intermediate/EMT-Advanced and above) and accreditation to perform advanced skills should carry this additional module whenever on a search and rescue operation.

The Search Module should be carried by WEMTs when going on a search, as opposed to rescue, task. The Search Module is carried for most search tasks, especially if the team is fairly large or will be in the field for an extended period. For some searches, both cave and above ground, it may be appropriate to “stage” a full kit, including the Search Module, at a central location, easily accessible to all search teams. For a large team that may split up, several WEMTs may each take a Minimum Module with only one WEMT carrying the full kit, including a Search Module.

## Packaging

One can simply dump all of the supplies on this list in a nylon stuffsack. However, most people prefer something that keeps things a bit better organized.

Empty first aid kit bags used to be available from suppliers such as Atwater-Carey and Adventure Medical Kits, however now these companies only sell such bags filled with supplies. While you can purchase such a bag and dump out the items not on this list, this may be expensive. An alternative is to use toilet kit organizers. The ones offered by REI seem a bit stiff, which might afford a bit of protection, but will be harder to pack in a pack. The more-flexible Eagle Creek Pack-It Wallaby Toiletry Kit for $35 looks to be a reasonable size for the Minimum + Advanced Modules. Outdoor Research also offers three sizes of Outdoor Organizers, the largest of which (#3) looks suitable.

For above-ground rescue, just putting these bags in a plastic bag (a large Aloksac brand bag is fairly tough and highly waterproof) or a silnylon dry bag, deep in your pack, should be adequate protection. For caving, you can put the entire contents into a Pelican case, ammunition box, or Tupperware box that can be sealed with duct tape.

For pills, it is ideal to have prescription medications in separate blister packaging from the hospital pharmacy, with an expiration date marked on each tablet’s packaging. Some nonprescription medications are also available in blister packaging. Most but not all of the blister packs have expiration dates on them. You can use a laundry marker or Sharpie to put expiration dates on each individual pill’s packaging if needed. For pills not available in blister packages, it’s easy enough to put some in a tiny zipper-lock plastic bag (often you can get them free from your local hospital pharmacist). Print up a label (doesn’t have to have a sticky back) on your computer with the name and strength of the pill, and the expiration date. Cut out the label, “laminate” it with some clear tape, and place inside the zipper-lock bag with the pills to provide a good label. Or, just write on the plastic bag with a Sharpie (laundry marker), though this needs to be renewed regularly as it wears off.

Some drugs come only in ampules that are opened by snapping off the top. They have the advantage of being very compact and light, but the disadvantage that they are fragile and difficult to pack. Small vials with rubber plugs on the top, covered by flip-off lids, are probably superior – however, many drugs are only available in snap-off ampules, so you need to develop packaging for this.

People have tried many different means of packaging. Most of these have been on small packages people find in their “junk” boxes and therefore can’t generally be reproduced by others. What you need is something that is:

* cheap, or easy to make
* provides moderate protection against breakage (note that the outer packaging of one’s medical kit should also provide some protection, so this inner packaging need not be “bombproof” or “caveproof”)
* light
* not bulky

Some have made a package using the cardboard “rack” in which ampules are shipped in the box. This can be cut down to the right size for the number of ampules. you can then cut off a piece of stiff 3/8” closed-cell foam the same size as the “rack” and use duct tape to tape it on the front of the rack. Duct-tape the bottom, but leave the top open. You can then slide the ampules in from the top. They seem to stay in just fine without taping the top. You could tape some foam or an additional piece of stiff material to the back to provide additional protection, especially from flexing that might break the neck of the ampul. But that would add to the bulk and weight.

For storing medication vials and ampules, many are pleased with a tiny Plano fishing tackle box *3213-09 Small Two Sided Pocket-Pak Organizer*, available inexpensively from many sports stores or online. It has small compartments the perfect size for two small medication vials, and with a tiny bit of padding in each small compartment, provides shock protection, as well as organization. With some modification (cutting) with a hot soldering iron or a tool such as a Dremel drill with a small cutting saw, the larger vials of ceftriaxone and water for dilution will fit into the larger compartments of this box.

Putting fluids such as StingEeeze™, povadone-iodine and tincture of benzoin into smaller bottles can save weight and bulk, provided they don’t leak inside of the kit. StingEeze™ can be repackaged in a 4cc eyedropper bottle, available from suppliers such as from [www.fisherscientific.com](http://www.fisherscientific.com/) (Cat No. 0300710A) and povadone-iodine solution (and benzoin, if you’re willing to risk your entire kit being glued together, see list footnotes below) can be repackaged into eight-mL Nalgene bottles, available online.

# “Do I really need to carry all this on a search?”

Searchers, especially experienced ones, like to travel light and fast. They don’t want to burden themselves with things that are seldom used. This generates lots of discussion when they are asked to carry a bigger medical kit.

## Types of Kit

Depending on how you look at it, there are two types of first aid/medical kits. First are those that are just for minor problems and are very lightweight and small, basically Band-Aids, moleskin and acetaminophen. By including some lightweight additions, mostly over-the-counter and prescription medications, it’s still quite light and, provided the person carrying it knows what they’re doing, much better for Force Protection.

Then there are kits for taking care of someone who is badly injured or ill, that are bigger and heavier. These can be *relatively* small, ranging up to humongous. Generally, you thinks of such kits as team kits, ones that accompany the litter to a patient during a rescue, or perhaps are part of a “bash” team that rushes ahead of the litter to reach the patient as soon as possible.

The goal for this kit is to be a blend of both, while still staying manageably small and light.

C:\draw\AMRG-Medkit-Overview.emf

# Minimum Module[[3]](#endnote-3) Prescription-only items are noted by **** Names are U.S. generic and TRADE NAMES. Common non-U.S. generic names indicated in {brackets}

|  | Exp[[4]](#endnote-4) Date | # | Item and size/strength | | | Usual Dose[[5]](#endnote-5) |
| --- | --- | --- | --- | --- | --- | --- |
| **Pain Meds[[6]](#endnote-6)** | | | | | | |
|  |  | 10 | naproxen 220 mg tablets (e.g., ALEVE)[[7]](#endnote-7) | Pain or cough:  ii PO, then i PO BID | | |
|  |  | 24 | acetaminophen {paracetamol} (e.g., TYLENOL) 500 mg tablets[[8]](#endnote-8) | Pain: ii PO TID, max 3000 mg a day | | |
|  |  | 12 | **** oxycodone 5 mg tablets[[9]](#endnote-9) | Pain:  i-ii PO Q4H PRN | | |
|  |  | 12 | **** prochlorperazine 10 mg (e.g., COMPAZINE)[[10]](#endnote-10) | i PO QID prn migraine, nonspecific headache or nausea | | |
| **Allergy Meds** | | | | | | |
|  |  | 1 | **** injectable epinephrine {adrenaline} anaphylaxis kit (EPI-PEN) (may omit if have advanced module with injectable epinephrine) | anaphylaxis:  i injection | | |
|  |  | 1 | **** albuterol {salbutamol} inhaler[[11]](#endnote-11) | asthma/bronchitis:  ii-iiii puffs Q3-4H PRN | | |
|  |  | 1 | spacer (holding chamber) for inhaler[[12]](#endnote-12) |  | | |
|  |  | 6 | di­phen­hy­dra­mine 25 mg tablets (e.g., BENADRYL)[[13]](#endnote-13) | allergy/sedation:  i-ii PO Q4H PRN | | |
|  |  | 21 | ****dexamethasone 4 mg tablets[[14]](#endnote-14) | allergy/asthma:  16 mg PO x1; Poison Ivy: 6 mg PO QAM x 14 | | |
| **GI Meds[[15]](#endnote-15)** | | | | | | |
|  |  | 12 | loperamide 2 mg. tablets (e.g., IMODIUM-AD) | diarrhea: ii PO, then i PO q loose BM up to 7/day | | |
|  |  | 4 | meclizine chewable 25 mg. tablets (e.g., BONINE, ANTIVERT)[[16]](#endnote-16) | motion sickness: i PO TID PRN | | |
|  |  | 4 | **** TRANSDERM SCOP transdermal scopolamine patches | motion sickness: i to skin Q3D | | |
|  |  | 5 | **** ondansetron oral dissolving tablets, 4 mg (e.g., ZOFRAN ODT) | nausea or vomiting: i SL QID | | |
|  |  | 20 | famotidine tablets 20 mg (e.g., *Pepcid-AC*)[[17]](#endnote-17) | | reflux/hyperacidity: i-ii PO BID PRN  Anaphylaxis Hives: i-iiii PO QID PRN | |
| **Bites and Stings[[18]](#endnote-18)** | | | | | | |
|  |  | 1 | STING-EEZE solution 4-15 cc bottle [[19]](#endnote-19) | beesting: apply once | | |
| **Cardiac Meds** | | | | | | |
|  |  | 4 | aspirin 325 mg (5 gr.) tablets[[20]](#endnote-20) | chest pain: i PO | | |
|  |  | 1 | **** bottle nitroglycerine {glyceryl trinitrate} spray (e.g., NITROLINGUAL)[[21]](#endnote-21) | chest pain: i spray SL Q3’ PRN | | |
| **Antibiotics Etc.** | | | | | | |
|  |  | 6 | **** azithromycin 250 mg tablets (e.g., ZITHROMAX)[[22]](#endnote-22) | infection: ii PO, then i PO daily | | |
|  |  | 1 | **** 3.5 g tube polymyxin/bacitracin (e.g., POLYSPORIN) or bacitracin ophthalmic ointment[[23]](#endnote-23) | wounds: to skin BID | | |
|  |  | 1 | mild liquid soap 30 mL bottle, e.g., HIBICLENS; or, a small piece of solid soap (to save weight) ; or, a small (e.g., 8 mL) bottle of waterless hand sanitizer[[24]](#endnote-24) | | | |
|  |  | 1 | Povadone-iodine solution 15 mL bottle (e.g., BETADINE)[[25]](#endnote-25) | | | |
| **Thermometer** | | | | | | |
|  |  | 1 | digital thermometer (may substitute Radio Shack or similar continuous-reading digital thermometer) | | | |
|  |  | 1 | spare battery for above | | | |
|  |  | 10 | thermometer covers for above[[26]](#endnote-26) | | | |
| **Misc.** | | | | | | |
|  |  | 4 | thiamine (vitamin B-1) 300 mg. tablets[[27]](#endnote-27) | starvation, prior to refeeding: i PO | | |
|  |  | 4 | **** haloperidol 5 mg. tablets (e.g., HALDOL) | sedation: i-iiii PO | | |
|  |  | 2 | packets GATORADE powder, each to make ½ or 1 liter | | | |
|  |  | 4 | pair exam gloves[[28]](#endnote-28) | | | |
|  |  | 1 | pocket CPR shield | | | |
|  |  | 1 | 1” (by at least 10 yards) waterproof adhesive tape[[29]](#endnote-29) | | | |
|  |  | 10 | crushable ampules of tincture of benzoin[[30]](#endnote-30) | | | |
|  |  | 6 | sterile cotton applicators (“*Q-tips®*”) | | | |
|  |  | 1 | 3” by 5 yds (stretched) elastic bandage (e.g., ACE, COBAN, VET-WRAP) | | | |
|  |  | 1 | 3” by 5 yds (stretched) conforming roller gauze (e.g., KLING) | | | |
|  |  | 8 | medium-size (e.g., 3” x 3”) gauze pads[[31]](#endnote-31) | | | |
|  |  | 2 | 4x4” QuickClot Combat Gauze pads.[[32]](#endnote-32) | | | |
|  |  | 2 | OB-type compressed vaginal tampons[[33]](#endnote-33) | | | |
|  |  | 3 | small pieces of clear adherent dressing (e.g., TEGADERM, OPSITE)[[34]](#endnote-34) | | | |
|  |  | 3 | #11 scalpel blades, sterile | | | |
|  |  | 1 | string for ring removal | | | |
|  |  | 1 | paper clip, medium size[[35]](#endnote-35) | | | |
|  |  | 2 | large safety pins | | | |
|  |  | 1 | nylon zipper bag or equivalent for MedKit | | | |
|  |  | 1 | waterproof contents/protocols/standing orders[[36]](#endnote-36) | | | |
|  |  | 5 | one-pint freezer-style zip lock plastic bags (if not available elsewhere in SAR pack) | | | |
|  |  | 2 | skin staplers[[37]](#endnote-37) | | | |
|  |  | 1 | Combat Application Tourniquet (CAT) [[38]](#endnote-38) | | | |
|  |  | 1 | Set of 3 adult sizes of King LT airway[[39]](#endnote-39) | | | |
|  |  | 1 | One-way valve for King LT or endotracheal tube[[40]](#endnote-40) | | | |
|  |  | 5 | AMRG Patient Record Forms[[41]](#endnote-41) | | | |
|  |  | 5 | AMRG Patient Record continuation sheets | | | |

# AdvancedModulePrescription-only items are noted by **** Names are U.S. generic and TRADE NAMES. Common non-U.S. generic names indicated in {brackets}

|  | Exp Date | # | Item and size/strength | Usual Dose |
| --- | --- | --- | --- | --- |
|  |  | 1 |  tranexamic acid 1 g[[42]](#endnote-42) | Trauma patient without isolated brain injury  who has or is at risk for significant hemorrhage:1 g IV over 10 minutes but only if can be given in the first 3 hours after trauma. |
|  |  | 8 | **** morphine sulfate 10 mg/mL, 1 mL vials[[43]](#endnote-43) | pain:  2-10 mg IV Q10’-Q4H PRN  5-10 mg IM Q½-4H PRN |
|  |  | 4 | **** naloxone 1 mg/mL, 1 mL ampul (e.g., NARCAN) | excess narcotic: 1-4 mg IV/IM |
|  |  | 1 | **** midazolam 5mg/mL, 10 ml vial (e.g.,VERSED)[[44]](#endnote-44) | sedation: 3-5 mg IV Q10’  seizure: 14 mg IM |
|  |  | 1 | **** ceftriaxone 2 g powder, and sterile water 10 mL, for reconstitution (e.g., ROCEPHIN)[[45]](#endnote-45) | infection/open fracture: 2 g IV/IM |
|  |  | 2 | **** epinephrine 1:1000, 1 mL ampul:  substitutes for EPI-PEN in basic kit | anaphylaxis/severe asthma: 0.3-0.5 cc SQ Q10’ |
|  |  | 2 | **** diphenhydramine 50 mg/1 mL vial (e.g. BENADRYL) | allergy: 50-100 mg IV/IM |
|  |  | 4 | **** droperidol 2.5 mg/mL, 2 mL vial[[46]](#endnote-46) | sedation/nausea: 2.5-10 mg IV/IM |
|  |  | 2 | **** dexamethasone 10mg/mL, 10 mL vial (e.g., DECADRON)[[47]](#endnote-47) |  |
|  |  | 6 | alcohol prep pads, in foil | |
|  |  | 2 | **** 1 cc syringes[[48]](#endnote-48) | |
|  |  | 2 | **** 3 cc syringes | |
|  |  | 4 | **** IM needles | |
|  |  | 2 | **** 14-18 ga, long, over-the-needle IV catheters[[49]](#endnote-49) | |
|  |  | 1 | venous tourniquet (for starting IV) | |
|  |  | 2 | saline lock[[50]](#endnote-50) | |
|  |  | 1 | 20 cc bottle saline flush solution | |
|  |  | 1 | **** 6.0 mm endotracheal tube[[51]](#endnote-51) | |
|  |  | 1 | **** set of 3 adult sizes of King LT airways. | |
|  |  | 1 | Pulse oximiter[[52]](#endnote-52) | |

# Search Module[[53]](#endnote-53) Prescription-only items are noted by **** Names are U.S. generic and TRADE NAMES. Common non-U.S. generic names indicated in {brackets}

|  | Exp Date | # | Item and size/strength | Usual Dose |
| --- | --- | --- | --- | --- |
| **Pain Meds** | | | | |
|  |  | 8 | phenazo­pyridine hydro­chloride tablets, 95mg (e.g.,AZO-MAXIMUM STRENGTH (97.5 mg), AZO-STANDARD, BARIDIUM, NEFRECIL, PHENAZODINE, PRODIUM, PYRIDIATE, PYRIDIUM, PYRIDIUM PLUS, SEDURAL, URICALM, URISTAT, UROPYRINE, URODINE, UROGESIC )[[54]](#endnote-54) | UTI symptoms: ii PO TID |
| **Cough, Cold, Allergy[[55]](#endnote-55)** | | | | |
|  |  | 1 | 15 mL squeeze bottle oxymetazoline nasal spray (e.g., AFRIN)[[56]](#endnote-56) | nasal congestion: i spray BID PRN |
|  |  | 8 | 12-hour sustained-release pseudoephedrine tablets 120 mg. (e.g., SUDAFED) | nasal congestion: i PO BID PRN |
|  |  | 8 | fexofenadine 180 mg. tablets (e.g., ALLEGRA)[[57]](#endnote-57) | allergy symptoms: i PO Daily PRN |
|  |  | 25 | zinc gluconate rapid-dissolving lozenges (e.g., ZICAM COLD REMEDY RAPIDMELTS)[[58]](#endnote-58) | URI symptoms: one dissolved in mouth every 3 hours while awake |
| **Eye** | | | | |
|  |  | 1 | **** 1 mL dropper tube tetracaine ophthalmic solution | painful eye exam: 2-20 drops |
|  |  | 3 | fluorescein strips[[59]](#endnote-59) | as needed |
|  |  | 1 | **** 2 mL dropper bottle cyclopentolate ophthalmic solution 0.5% or 1% (e.g., CYCLOGYL) | corneal abrasion or snowblindness: ii gtts Q3-4H |
|  |  | 4 | sterile cotton applicators (“Q-tips”) |  |
| **Allergy** | | | | |
|  |  | 1 | **** 15 g tube fluocinolone acetonide cream 0.2% or similar high-strength steroid cream or lotion (e.g., VALISONE, BENI­SONE, LIDEX, KENALOG, ARISTOCORT, UTICORT, SYNALAR) | allergic rash/insect bites: apply to rash QID PRN |
|  |  | 1 | 1 oz. tube topical anaesthetic (anti-itch) cream containing pramoxine (e.g., AVEENO CALAMINE & PRAMOXINE ANTI-ITCH CREAM, ITCH-X FAST-ACTING ANTI-ITCH GEL, or GOLD BOND MAXIMUM STRENGTH MEDICATED ANTI ITCH CREAM.)[[60]](#endnote-60) | itching or skin pain: apply to skin Q4H PRN |
| **Altitude Etc.[[61]](#endnote-61)** | | | | |
|  |  | 6 | **** acetazolamide tablets 250 mg (e.g., DIAMOX) | preventing AMS: ¼ tab (62.5 mg) PO BID treating AMS/HACE: 250 mg PO BID |
|  |  | 6 | **** nifedipine capsules 10 mg (e.g., PROCARDIA, ADALAT) | HAPE:  10-30 mg PO QID |
| **Misc.** | | | | |
|  |  | 1 | fluconazole tablet 150 mg (e.g., DIFLUCAN)[[62]](#endnote-62) | fungal skin infection: apply BID-QID yeast vaginitis: i mL intravaginally daily |
|  |  | 1 | pair small sharp scissors (not necessary if available on WEMT’s pocket knife) | |
|  |  | 1 | pair fine-point splinter forceps (not necessary if available on WEMT’s pocket knife) | |
|  |  | 2 | sections of relatively flat plastic cut from a gallon milk bottle, or equivalent flexible splint such as SamSplint[[63]](#endnote-63) | |
|  |  | 2 | 3” x 4” pieces of moleskin[[64]](#endnote-64) | |
|  |  | 10 | small adhesive bandages (e.g., 1” x 3” *Bandaids*, *Coverlet*) | |
|  |  | 5 | medium-size “suture strips”[[65]](#endnote-65) | |
|  |  | 1 | Tick Twister[[66]](#endnote-66) | |
|  |  | 3 | individual single-use cyanoacrylate skin glue ampules[[67]](#endnote-67) | |

# Optional Module This provides some general ideas for items that Wilderness EMTs or Wilderness Medics and in particular, emergency physicians, may want to add to their kits; for purposes of standardization, recommend packaging this separately from the other kits.

|  | Exp Date | # | Item and size/strength |
| --- | --- | --- | --- |
|  |  |  | penicillin (e.g., PEN-V-K 500 mg #10) |
|  |  |  | ciprofloxacin (e.g., CIPRO 250 mg #12) |
|  |  |  | caffeine pills[[68]](#endnote-68) |
|  |  |  | trimethoprim/sulfamethoxazole (e.g., BACTRIM, SEPTRA){sulfatrim}[[69]](#endnote-69) |
|  |  |  | DURAGESIC patches |
|  |  |  | ketamine |
|  |  |  | IV thrombolytic[[70]](#endnote-70) |
|  |  |  | An ultraviolet PhotonLight[[71]](#endnote-71) |
|  |  |  | Small flat Fresnel-lens plastic magnifier[[72]](#endnote-72) |
|  |  |  | a pocket otoscope and ophthalmoscope |
|  |  |  | prescription pad |
|  |  |  | Rapid Rhino or similar epistaxis tampons |
|  |  |  | a Foley catheter[[73]](#endnote-73) |
|  |  |  | local anaesthetic: bupivacaine lasts longer than lidocaine, which has advantages as a means of analgesia, e.g., for digital blocks. Recommend bupivacaine 0.5% 10mL. |
|  |  |  | saw for amputations[[74]](#endnote-74) |
|  |  |  | Kelly clamp |
|  |  |  | needle holder |
|  |  |  | suture material |
|  |  | 12 | bisacodyl tablets 5 mg. (e.g., DULCOLAX)[[75]](#endnote-75) |
|  |  | 1 | 6.0 size endotracheal tube[[76]](#endnote-76) |
|  |  | 1 | Aluminum endotracheal tube stylet |
|  |  | 1 | Gum elastic bougie |
|  |  | 1 | **** laryngoscope, lightweight disposable tactical type, with 2 disposable lithium AA cells[[77]](#endnote-77) |

# Notes (new notes since version 2.0 are in *italics*)

•Outline End

1. Atwater-Carey, Adventure Medical Kits, and other suppliers sell filled organizer bags designed for medical kits, or one may employ toilet-kit or similar organizers from suppliers such as REI or Outdoor Research. [↑](#endnote-ref-1)
2. The Aloksak brand of tough but very light zipper-locking waterproof plastic bags, designed for diving, may be used to waterproof one’s organizer cases; while not at all crushproof, nor as durable as Otter or Pelican boxes, they are reasonably durable as long as one keeps them away from sharp objects, and very light. [↑](#endnote-ref-2)
3. Some have suggested to move 2/3 of each of the analgesics, etc. into the search kit, but this makes the kit as a whole more cumbersome; also, it makes it more likely that the minimum kit will be out of a medicine when needed. [↑](#endnote-ref-3)
4. *Some of the* *over-the-counter (OTC) medications recommended for this medical kit do not have expiration dates stamped on them. For such medications, we recommend that WEMTs enter an expiration date two years from the date purchased and inserted in the medical kit.* [↑](#endnote-ref-4)
5. *These are adult doses. If pediatric doses are needed, consult a physician or advanced practitioner (midlevel: CRNP, PA).* [↑](#endnote-ref-5)
6. In Minimum Kit because: Wilderness EMTs may need to give oral pain medications to the injured to assist self-rescue. [↑](#endnote-ref-6)
7. Oral pain medications may allow a patient to self rescue and thus are part of the Minimum Kit. The Advanced Kit contains injectable narcotics but a basic provider might have to use the kit and thus should have access to oral medications. *For all intents and purposes, naproxen has the same side effects and efficacy as ibuprofen, but can be taken only twice a day as compared to ibuprofen which really needs to be taken four times a day. Naproxen is also available without a prescription as an inexpensive generic. Some feel that choline/magnesium salicylate (e.g., TRILISATE), although a prescription drug, may be a better drug than naproxen. Some also argue for meloxicam (e.g., MOBIC), a once-a-day prescription NSAID. However, at present, these are still minority opinions, and the majority recommend staying with an inexpensive OTC drug.* [↑](#endnote-ref-7)
8. *Combining an NSAID (non-steroidal anti-inflammatory drug) such as naproxen with acetaminophen likely provides better pain relief than either separately, without the sedation caused by the opioid narcotic hydrocodone in the VICODIN tablets in the kit, which may be important for patients assisting with rescue, or for team members who may need to continue the task. Here is a summary of the evidence for this:  
   Are acetaminophen and a NSAID combined superior to either?   
   - Review of literature says yes.  
    [Ong, C. K., et al. (2010). "Combining paracetamol (acetaminophen) with nonsteroidal antiinflammatory drugs: a qualitative systematic review of analgesic efficacy for acute postoperative pain." Anesth Analg 110(4): 1170- 1179.]   
   - No   
   [Bondarsky, E. E., et al. (2013). "Ibuprofen vs acetaminophen vs their combination in the relief of musculoskeletal pain in the ED: a randomized, controlled trial." Am J Emerg Med 31(9): 1357-1360.]   
   - Yes, if you believe the drug company   
   [Merry, A. F., et al. (2010). "Combined acetaminophen and ibuprofen for pain relief after oral surgery in adults: a randomized controlled trial." Br J Anaesth 104(1): 80-88.]   
   - No.   
   [Dahl, V., et al. (2004). "Ibuprofen vs. acetaminophen vs. ibuprofen and acetaminophen after arthroscopically assisted anterior cruciate ligament reconstruction." Eur J Anaesthesiol 21(6): 471-475.]  
   - Yes, in mice   
   [Miranda, H. F., et al. (2006). "Synergism between paracetamol and nonsteroidal anti-inflammatory drugs in experimental acute pain." Pain 121(1- 2): 22-28.]* [↑](#endnote-ref-8)
9. Some suggested sublingual morphine as a noninjectable stronger narcotic; I've not been able to find any morphine products marketed for this use, nor any good information on any pill formulations that could be used this way. Also suggested was Duragesic® slow-release fentanyl patches; however, they take a long time to build up, and thus are not very appropriate for immediate acute pain. They might be acceptable for long-term pain relief during an evacuation, but that's not the purpose of this personal wilderness medical kit. They might make a good addition to a team kit. *In light of our attempts to lighten the kit, and the time span for which the kit is designed, we decreased the number of hydrocodone/acetaminophen tablets. We also changed to the newer formulation with 325 mg of acetaminophen instead of 500 mg. Some prefer to prescribed oxycodone and acetaminophen separately, but oxycodone is a Schedule II instead of Schedule III controlled substance, and thus more difficult to prescribe and issue.   
     
   UPDATE: Oxycodone and hydrocodone are now (2014) both Schedule II narcotics with the same prescribing restrictions, and given that oxycodone is a slightly better analgesic, there is no reason not to switch. Given that acetaminophen outpatient dosage has been decreased (2013) from 4g daily to 3g (3000 mg) daily, administering the acetaminophen and the narcotic separately makes sense.* [↑](#endnote-ref-9)
10. *Prochlorperazine (COMPAZINE) is now well-established in the emergency medicine literature as the main treatment for migraine headaches, far better than NSAIDs or acetaminophen, though those may have some additional benefit. Its close relative metoclopramide (REGLAN) has also been shown highly effective for non-migraine headache as well. [Friedman, B. W., et al. (2013). "A Randomized Trial of Intravenous Ketorolac Versus Intravenous Metoclopramide Plus Diphenhydramine for Tension-Type and All Nonmigraine, Noncluster Recurrent Headaches." Annals of emergency medicine 62(4): 311-318.e314.]  
    Migraines and nonspecific headaches are exceedingly common. And, posttraumatic migraines are quite common as well (migraine-type headache, even in someone with no history of migraines, after a blow to the head). Thus, this in the Minimum Module so that Wilderness EMTs will have an oral treatment for such problems. If a patient is vomiting, ondansetron ODT should be the first line, but if the vomiting is from a migraine, then it can be followed by oral COMPAZINE and naproxen and acetaminophen.* [↑](#endnote-ref-10)
11. Comment> I would recommend using a metered dose inhaler rather than RotoCaps in a wilderness environment. Though it is controversial, many of my pulmonary colleagues think there are potential problems using RotoCaps in humid (i.e., coastal, rainy, the South in the summer) environments. When humid, the particles may aggregate and not be deposited effectively in the distal airways.  
    Reply> Interesting. I hadn't heard about this. A dispenser and the four rotocaps that fit inside (with a little trimming of the blister packages) is less than half the size of a metered-dose inhaler, and about a fourth the weight. And remember, we're asking people to carry this stuff with them \_all\_ the time. Is the extra weight worth it? Ask your pulmonary friends, add in your own memories of carring a pack during a long search, and please get back to me with your thoughts.  
    Another commenter also queried whether there would be problems with the Rotohaler working well in the field.  
    Re-Reply> When I queried the attendings I have heard express skepticism over the use of powder inhalers in the past, none of them could provide a reference to support their claims. On searching the literature, I could find little objective data to substantiate this as a big problem. In fact, the best article (Hiller et al, J. Pharmaceutical Sci 1980; 69(3):334-7.) indicated that ALL aerosols tested had increases in particle size at high humidity and that MDI's [Metered Dose Inhalers] tended to be MORE unstable than powder-generated aerosols! Given these facts, I retract my concerns about use of powder inhalers and vow to distrust all of my attendings for at least 6 mos.  
    I still think MDI's might offer some advantages in terms of # of doses per oz. and more universal knowledge of technique, but I don't feel strongly enough to recommend one system over the other. The point may become moot over the next few years as CFC's are banned in other products and the price of MDI's goes up (maybe a lot) since the propellant will be less widely available. *As of the time of this comment, the Ventolin brand of inhaler seems superior for this kit, as (1) it has a numerical meter to tell how many doses are remaining, and (2) when the end cap is on, an interlock prevents it from accidentally discharging inside the kit, which has been a problem with other designs. Repeated triggering of these other inhalers has resulted in an empty inhaler in the kit.*  [↑](#endnote-ref-11)
12. *There is now excellent evidence that inhalers work better, and with fewer side effects, with a spacer. [Cates CJ, Welsh EJ, Rowe BH. Holding chambers (spacers) versus nebulisers for beta-agonist treatment of acute asthma. Cochrane database of systematic reviews (Online) 2013;9:CD000052.] Traditional spacers are very bulky, and too bulky for most wilderness medical kits. However, Thayer manufactures a folding cardboard spacer that, according to their data, works as well as other brands. If kept in a zippered plastic bag, it should work well for any wilderness medical kit. In its sealed plastic bag, the spacer weighs less than an ounce (~25g) and measures 4x6x1/8” (11x15x0.3cm). On 3/29/15, I was able to buy a box of 25 for $42.50 including postage, or about $1.70 each.*  [↑](#endnote-ref-12)
13. Comment> Does one need two sedating antihistamines (BENADRYL and CHLORTRIMETON? Perhaps SELDANE would be preferable to the latter.  
    Reply> 1. Don't like the SELDANE/erythro interaction.  
    Reply> 2. Seldane is a poor antihistamine for acute (as opposed to chronic) use.  
    Reply> 3. We wanted both a short, strong-acting antihistamine (diphenhydramine=Benadryl®) for acute short reactions (beestings, dystonic reactions, etc.), and something longer-acting for more long-lived problems (rhinitis, poison ivy, etc.) and Chlor-Trimeton 12 mg extended pills are the least sedating good Q12H antihistamine we could find. *See comments below under the Search Module entry for ALLEGRA. SELDANE was withdrawn due to side effects, but better nonsedating antihistamines are now available cheaply over-the-counter.* [↑](#endnote-ref-13)
14. In Minimum Kit because: may be needed to treat bronchospasm or allergy, and the epi and albuterol will wear off in relatively short order (hours).   
    Comment> I would recommend more prednisone tablets. 60 mg is one dose for an asthma exacerbation.  
    Reply> Agree. Increased from 6 to 20 of the 20 mg tablets to allow multiple large doses for problems such as high altitude cerebral edema, severe allergy, or severe asthma.  *Prednisone is available in 10 mg, 20 mg, and 50 mg tablets. The usual dose of prednisone for severe asthma or allergy is 40-60 mg daily, and lower doses are rarely needed, so switching to 50 mg tablets decreases the weight and bulk of the kit slightly without any significant increase in expense. The usual dose for severe Poison Ivy is 14 days, and as prednisone pills are small and light, this was increased to 14 pills so as to allow one to give an entire course for severe Poison Ivy, which in susceptible individuals can crop up in a matter of hours.   
    There is now evidence that dexamethasone, in a single dose of 16 mg for adults or adult-sized children, is superior to 5 days of prednisone for an asthma exacerbation: slightly better efficacy, much better side effect profile.   
    [Keeney, G. E., et al. (2014). "Dexamethasone for Acute Asthma Exacerbations in Children: A Meta-analysis." Pediatrics 133(3): 493-499.]  
    Given the better side effect profile, it makes sense to switch to dexamethasone for poison ivy as well; the dosage would be 6 mg daily, preferably in the morning with the normal endogenous cortisol peak for 14 days. The number of pills here, which can be broken in half, is adequate for a full course for poison ivy.* [↑](#endnote-ref-14)
15. In Minimum Kit because: motion sickness, vomiting and diarrhea may all immobilize a rescuer. [↑](#endnote-ref-15)
16. Comment> I think Compazine® suppositories might be preferable to pills, but I recognize the storage problems etc.   
    Reply> People can grind up a pill, mix it with an M&M from their gorp, or some antibiotic ointment, and make their own suppository.Comment> GI: Isn't meclizine an Rx in the U.S.?  
    Reply> If bought as Antivert®, yes; if bought as Bonine®, no. [↑](#endnote-ref-16)
17. *Famotidine is an inexpensive, highly effective method for controlling gastritis or reflux – extremely common problems during SAR operations due to lack of sleep, stress, and excess caffeine consumption. Famotidine tablets are considerably lighter and smaller than enough antacid tablets to provide a similar effect.   
    Increased the size of famotidine (e.g., PEPCID) tablets to 20 mg, and the size to 20 mg as this strength is now available over-the-counter. Rationale: large doses of H2 blockers are highly effective and a mainstay of ongoing treatment of anaphylaxis (or simple hives) after the epinephrine has worn off; much more effective than H1 blockers such as diphenhydramine (e.g., BENADRYL) and has the advantage of being non-sedating, making it easier for the patient to assist with evacuation. Also, moved this to the Minimum Kit due to the indication for anaphylaxis. Since we have a H2 blocker, and Imodium plus an antibiotic are better treatment for gastroenteritis, we eliminated bismuth tablets as superfluous.* [↑](#endnote-ref-17)
18. In Minimum Kit because: bites and stings occur unpredictably and these treatments must be applied immediately to be of any use. Local sting treatment is included because the pain from multiple stings may be disabling to a rescuer. The Sawyer Extractor used to be listed here but controlled studies show it has no significant effect to remove poisonous snake venom. [↑](#endnote-ref-18)
19. Comment> Is Sting-Eeze of proven efficacy?  
    Reply (KC)> No good scientific evidence I'm aware of, but anecdotally it works like a charm. It's a witches' brew of all available OTC anesthetics and sting relievers. I've used it with good success myself; it really helps. *Fifteen cc’s is a lot to carry for something that is used in 0.5cc doses, max. It is easy to repackage some of this in a small dropper bottle, in 2013 8 mL dropper bottles were $2 each in lots of 25 online.  
    We have Sting-Eeze for acute treatment of stings; it also works for the acute treatment of local itch. However, the components include benzocaine, which, if used regularly on the skin, tends to result in allergy. Therefore, though not as potent a local anaesthetic, we have a cream with pramoxine for longer-term use. See* [*conovers.org/ftp/Poison-Ivy.pdf*](http://www.conovers.org/ftp/Poison-Ivy.pdf) *for more including a list of references.*  [↑](#endnote-ref-19)
20. In Minimum Kit because: aspirin so important in the early treatment of unstable angina or MI, which is becoming more common in the wilderness. *We have decreased the number, relying on naproxen and hydrocodone as analgesics, and reserving aspirin for use in chest pain. While it is common to administer two 81 mg chewable ASA tablets for chest pain, there is no evidence that giving chewable ASA vs. oral ASA improves outcomes, and the chewable tablets are far more fragile than the “regular” tablets.* [↑](#endnote-ref-20)
21. Comment> Advanced stuff: I would add sublingual nitroglycerin and/or paste to the list.  
    Reply> They don't last long in a pack, especially in the summer and if being kept in a car trunk; keeping things updated in a SAR pack is a big problem, too. We decided to simply rely on nifedipine for vasodilation, coronary disease, etc. *See below   
    Nitroglycerine spray reputedly has a longer shelf life, and better heat resistance, than the pills. Also, nifedipine is much out of favor for the treatment of chest pain, due to the hypotensive effect. Therefore, we have moved nifedipine to the altitude section, because it is still invaluable for high altitude pulmonary edema, and added nitroglycerine spray.* *When going to altitude, the nifedipine and acetazolamide can be transferred to the Minimum Kit if desired.  
    NTG is also useful for treating flash pulmonary edema from hypertension, and there’s nothing else easily portable to treat this condition. While not likely, one can imagine a local volunteer with poorly-controlled hypertension on a task developing such a problem in the field. Nitroglycerin spray used to be quite expensive, however, on September 20, 2013 the FDA approved a generic version, and we expect this to be available soon at a reduced cost.*  [↑](#endnote-ref-21)
22. Both erythromycin and ciprofloxacin originally in Minimum Kit because: might have patient with open fracture and wish to administer oral antibiotic immediately; might have team member with severe diarrhea who needs ciprofloxacin immediately; antibiotics may be lifesaving if the patient is ill with a serious infection rather than injured.   
    Comment> Rather than erythro, you might consider one of the newer macrolides. Azithromycin, though costly, offers the advantages of good GI tolerance (and we're in the woods after all) and the ability to carry a 2 week course in 6 pills.  
    Reply> Yes, but Zithromax® [azithromycin] is \_very\_ expensive, and these people need to buy their own drugs. If it were the same cost as erythro, would agree. It's also pregnancy category B, unlike Biaxin® [clairythromycin], so azithromycin is a better choice for that reason. However, unlike erythro, azithro is not a pediatric medication.  
    Many others suggested azithromycin as an alternative, and that samples are available; but doubt we can get enough samples for all who will need it.  
    Decreased from 40 to 24; this will provide 6 days of 250 QID, or 3 days of 500 QID. Resisted the temptation to go with just 500 mg tablets; 250 mg tablets allow spacing doses better for those with GI intolerance.  
    *We had initially not considered azithromycin because of cost, but it now less expensive, covers most bacterial and atypical pathogens likely to affect team members in the backcountry, is safe in pregnancy and infancy, has few side effects, and can be taken once a day, improving compliance. Azithromycin is also now used routinely in all pediatric age groups, another argument in its favor. Some recent references include the following:*  
    *1. Hopkins S  
    Clinical toleration and safety of azithromycin  
    Am J Med 1991; 91:40S-45S   
    2. Kuschner RA, Trofa AF, Thomas RJ, et al.  
    Use of azithromycin for the treatment of Campylobacter enteritis in travelers to Thailand, an area where ciprofloxacin resistance is prevalent  
    Clin Infect Dis 1995; 21:536-41   
    3. Juckett G  
    Prevention and treatment of traveler's diarrhea  
    Am Fam Physician 1999; 60:119-24, 135-6   
    4. Hoge CW, Gambel JM, Srijan A, Pitarangsi C, Echeverria P  
    Trends in antibiotic resistance among diarrheal pathogens isolated in Thailand over 15 years  
    Clin Infect Dis 1998; 26:341-5*

    *5. Khan WA, Seas C, Dhar U, Salam MA, Bennish ML*

    *Treatment of shigellosis: V. Comparison of azithromycin and ciprofloxacin. A double-blind, randomized, controlled trial*

    *Ann Intern Med 1997; 126:697-703*

    *6. Shanks GD, Ragama OB, Aleman GM, Andersen SL, Gordon DM*

    *Azithromycin prophylaxis prevents epidemic dysentery*

    *Trans R Soc Trop Med Hyg 1996; 90:316*

    *7. Murphy GS, Jr., Echeverria P, Jackson LR, et al.*

    *Ciprofloxacin- and azithromycin-resistant Campylobacter causing traveler's diarrhea in U.S. troops deployed to Thailand in 1994*

    *Clin Infect Dis 1996; 22:868-9*

    *8. Bessette RE, Amsden GW*

    *Treatment of non-HIV cryptosporidial diarrhea with azithromycin*

    *Ann Pharmacother 1995; 29:991-3*

    *9. Kuschner RA, Trofa AF, Thomas RJ, et al.*

    *Use of azithromycin for the treatment of Campylobacter enteritis in travelers to Thailand, an area where ciprofloxacin resistance is prevalent*

    *Clin Infect Dis 1995; 21:536-41*

    *10. Uchino U, Kanayama A, Hasegawa M, et al.*

    *[Effects of azithromycin on fecal flora of healthy adult volunteers]*

    *Jpn J Antibiot 1995; 48:1119-30*

    *11. Rakita RM, Jacques-Palaz K, Murray BE*

    *Intracellular activity of azithromycin against bacterial enteric pathogens*

    *Antimicrob Agents Chemother 1994; 38:1915-21*

    Some have argued for the addition of various favorite antibiotics: cephalexin, among others. We have resisted the temptation to provide an antibiotic for every conceivable condition, instead trying for one with good gram positive coverage that can be given to just about anyone (azithromycin), and one with excellent gram negative coverage, including all common causes of infectious diarrhea and UTIs.

    Azithromycin is now a second-line drug for infectious diarrhea, especially in areas where pathogens have developed resistance to quinolones such as ciprofloxacin; azithromycin is also a reasonably good drug for UTIs and therefore we have decided to eliminate ciprofloxacin from the drug list. [↑](#endnote-ref-22)
23. Can also be used as lubricant if needed. *Ophthalmic antibiotic ointment can be used for skin wounds, but not vice versa (the skin formulation is irritating to the eye).* [↑](#endnote-ref-23)
24. Solid soap is not ideal, but is much lighter, and can be combined with some povadone-iodine solution for antibacterial effect. *Waterless hand sanitizer is now widely available in the U.S., and for clearing hands of bacteria and viruses, is reputedly as effective, if not more effective, than soap and water, save for certain pathogens such as Clostridium difficule or norovirus.* [↑](#endnote-ref-24)
25. Comment> Do we need Hibiclens®?  
    Reply> Dunno about Hibiclens; might be nice, but again it's heavy. Plain soap (Dr. Bronner's, or whatever one's carrying) is probably OK.  
    Some suggested using foil packets of povadone-iodine solution; however, we've talked with enough people who've had them explode in their medical kits to stick with the more-rugged 15cc bottles. [↑](#endnote-ref-25)
26. Can use antibiotic ointment as lubricant. *Many have found that heat or pressure in pack medical kits causes the covers provided with most digital thermometers to become unusable. A few small pieces of kitchen plastic wrap wrapped around the thermometer can serve as a substitute. If using a standard digital thermometer, may wrap bits of plastic wrap around the thermometer itself for storage.*  [↑](#endnote-ref-26)
27. Comment> Why do we need thiamine?  
    Reply> To give to people who have been starving for a long time (i.e., weeks) when first feeding them, to prevent cardiovascular collapse. [↑](#endnote-ref-27)
28. No stethoscope is included, as can simply place ear against the chest or abdomen for lung or heart or bowel sounds; and, BP cuff and stethoscope too heavy and of only minor utility compared to the weight. [↑](#endnote-ref-28)
29. Increased from 3 to 10 yards, and added the word "cloth," to allow for taping an ankle securely with the contents of just one personal medical kit. [↑](#endnote-ref-29)
30. This was added due to the great difficulty of getting tape or even Bandaids™ to stick in wet weather. *We tried the standard bottles of benzoin. They leaked. We tried small Nalgene bottles of benzoin. Trying to apply it was a mess. We tried the individually-wrapped swabsticks. They leaked AND dried out. We tried the crushable ampules. They are quite sturdy, and neat to apply, but it takes several of them to coat an ankle for taping, or to coat an area for a large bandage.*  [↑](#endnote-ref-30)
31. Some have suggested the addition of a triangular bandage; however, this can usually be improvised from something such as the tail of someone's shirt; or, duct tape can be used instead. [↑](#endnote-ref-31)
32. *The literature is full of debates and comparisons of different materials for stanching bleeding in the field. QuickClot Combat Gauze is one of the leaders in this competition, and two 4x4” gauze pads weigh almost nothing. They may be unfolded to 8x8” to place over a large bleeding full thickness abrasion or wound, or packed into a bleeding hole. There is 3” x 5 yard z-fold vacuum-pack military version, which might be appropriate for a team kit, but it does weigh, bulk and cost more than the 4x4 pads.* *For a recent review of such dressings:  
    [Smith AH, Laird C, Porter K, Bloch M. Haemostatic dressings in prehospital care. Emerg Med J 2012.]* [↑](#endnote-ref-32)
33. This makes a compact but very absorbent dressing; some suggested adding various types of trauma dressing, but we opted to pick something that was very small, not wanting to increase the size of the kit. Of course, it can also be used as a tampon for a female patient with menstrual flow. [↑](#endnote-ref-33)
34. Several people suggested adding these, as they are ideal field dressings: waterproof but vapor-permeable. *Moved to the Minimum Module both to protect team member wounds against contamination by patient body fluids, and to provide IV site dressings.* [↑](#endnote-ref-34)
35. For trephining subungual hematomas. [↑](#endnote-ref-35)
36. May be downloaded from [amrg.info](http://amrg.info). *Recommend printing on water-resistant paper (e.g., Rite-In-The-Rain paper).* [↑](#endnote-ref-36)
37. *Discussions about the appropriateness of wound closure in the field continue to rage, in the “street” prehospital community as well as in the wilderness EMS community. A detailed discussion is beyond the scope of this document, but the principles that guided us in adding this stapler included: 1) the wilderness is at least as “clean” as most Emergency Departments, at least in terms of virulent and resistant bacteria; 2) delayed primary closure at four days from the initial wound provides excellent results, comparable to primary closure; 3) repairing complex wounds is a skill that takes much training and experience, certainly beyond the scope of a standard Wilderness EMT class; 4) staples are easier to use than sutures, more secure than suture strips for patients or team members who are actively assisting in their own evacuation, stapling of simple wounds can be learned in a few hours, and is a relatively low-risk procedure; and 5) patients can bleed to death from relatively minor wounds, especially scalp wounds, and especially when coagulopathic from hypothermia, during long evacuations. Therefore, we are including skin stapling for simple wounds and badly bleeding wounds, especially scalp wounds. 3M Precise DS-5 staplers are available from many suppliers; in 2013, they were available for $100 for a box of 12*. E*xperience with staplers in the ED has shown that, especially for those without constant practice, and for traumatic irregular wounds, the small and light DS-5 staplers don’t work nearly as well as the larger staplers with wider staples. Some of this is because they are designed to be used in a non-disposable handle, and they are awkward to use without the handle, but the smaller staples are just harder to get across a wound that’s not quite closed. The extra size and weight are more than outweighed by the improved efficacy of larger staplers The 3M Precise Vista 35W stapler, model 3995, is best for our use as its packaged size is less than that of other comparable staplers. Price is comparable to the smaller staplers, less than $10 each in larger lots.*  [↑](#endnote-ref-37)
38. *This tourniquet is easy to apply, and can even be applied using one hand. It works effectively and has saved many lives in the wars in Iraq and Afghanistan.* [↑](#endnote-ref-38)
39. *These airways are easy to learn how to use, hard to use improperly, and almost as good as an endotracheal tube for short-term use. We will ensure all of our Wilderness EMTs are trained in their use.*  [↑](#endnote-ref-39)
40. *An endotracheal tube can be placed (and covered with one thickness of a gauze pad to prevent insect entry) and used without artificial ventilation, for example, in airway burns. However, if mouth-to-ET-tube ventilation is necessary, or mouth-to-King-LT, a one-way valve provides the WEMT protection from contamination from the patient’s airway secretions. One-way valves with filters are available, but are generally bulky and heavy, and provide only incremental protection over a good one-way valve. One small, light one-way valve that works with an endotracheal tube is that manufactured by Laerdal for use with pocket masks; the one-way valves are available separately from many suppliers, including item #36295 at http://www.mooremedical.com.* [↑](#endnote-ref-40)
41. These can be downloaded from [amrg.info](http://amrg.info) and printed locally. *Recommend printing on water-resistant paper (e.g., Rite-In-The-Rain paper).* [↑](#endnote-ref-41)
42. *Tranexamic acid (“TXA”) is now routinely used in military field medicine (and increasingly in civilian trauma care) for traumatized patients in shock. The best evidence at present is that it saves a significant number of lives if given within an hour of major bleeding from trauma, and even up to three hours after trauma it helps, and without clotting complications. However, after three hours, it does not help and may hurt. Since team members may experience trauma and bleeding and the Wilderness Medic may be right there, this is more of a force protection than a patient-treatment medication. The likelihood of a search or rescue team setting out for a search or rescue being able to arrive and administer this within three hours is low.   
    The usual dose is a gram over 10 minutes followed by a gram slowly given over 8 hours. While maintaining a slow IV drip during an evacuation may be problematic, giving at least the first gram over 10 minutes should be manageable during most rescues.*   
    *[Gruen RL, Mitra B. Tranexamic acid for trauma. Lancet 2011;377:1052-4.]  
    [Mitra B, Fitzgerald M, Cameron PA, Gruen RL. Tranexamic acid for trauma. Lancet 2010;376:1049; author reply 50-1.]  
    [Roberts I, Perel P, Prieto-Merino D, et al. Effect of tranexamic acid on mortality in patients with traumatic bleeding: prespecified analysis of data from randomised controlled trial. BMJ 2012;345:e5839.]* [↑](#endnote-ref-42)
43. *Recent studies e.g., [Turturro MA, Paris PM, Seaberg DC. Ann Emerg Med August 1995; 26:117-120. for example] show ketorolac no better for musculoskeletal pain than oral ibuprofen; therefore, we have deleted ketorolac (e.g., Toradol®). In this double-blind, placebo-controlled study, not only were 800 mg of PO ibuprofen and 60 mg IM ketorolac indistinguishable as far as degree of analgesia, they were indistinguishable in terms of time to analgesia!   
    We discussed DILAUDID as a possible alternative to morphine; however, many more people know the dosage for morphine than know the dosage for DILAUDID. And since it is possible, even likely, that this kit might occasionally be used by someone who is familiar with a standard paramedic drug like morphine, but not DILAUDID, we elected to stay with morphine.* [↑](#endnote-ref-43)
44. *Over the years, we have had many discussions about the possible use of midazolam, or another benzodiazepine such as VALIUM. Midazolam acquired a bad reputation when large doses (10-15mg IV push) were used for sedation for endoscopy, without either visual or pulse-ox monitoring of ventilatory status. However, smaller doses (4-6 mg IV push for the usual adult) provide excellent relaxation, sedation and amnesia for common wilderness procedures such as dislocation reduction. And, larger doses (up to 0.2 mg/kg, about 14 mg for an average adult) can be used IM for control of seizures. It may be used in lower dosages IM, 5-8 mg, for sedation, which lasts a couple of hours. It also has the advantage for wilderness reductions that when given IV it wears off in about half an hour, leaving the patient ready to assist in rescue efforts. As a result, we have added a single multidose vial in the most advantageous concentration. This represents more midazolam than is likely to be needed, but is still lighter than an adequate dose in many more containers. Other long-acting benzodiazepines such as ATIVAN or VALIUM were considered, but the short action and rapid IM absorption led us to choose midazolam.* [↑](#endnote-ref-44)
45. Comment> I would consider increasing ceftriaxone to 2 g for a full 24 hrs supply.   
    Reply> Agree. [↑](#endnote-ref-45)
46. *Droperidol is increasingly used for both sedation and nausea, and thus provides a single drug that can be used to substitute for two drugs, prochlorperazine (e.g., COMPAZINE) and haloperidol (e.g., HALDOL)* [↑](#endnote-ref-46)
47. For treating high altitude cerebral edema, asthma or other bronchospastic problems, or severe allergy. [↑](#endnote-ref-47)
48. *We have found that Tubex ampules are not appropriate for most wilderness kits. Many of the ampules, for instance the 10 mg Morphine ampules, are partly filled with air; and, when they get warm, the air expands, pushing out the red rubber plug and emptying the contents of the ampule into one’s pack. Therefore, we have abandoned Tubex ampules entirely.*  [↑](#endnote-ref-48)
49. For relieving tension pneumothorax. [↑](#endnote-ref-49)
50. *By adding saline locks and a saline flush, WEMTs at the scene can start an IV and give multiple doses of IV medications. Too, it is often easier to start an IV before the patient has lost much fluid, and when IV supplies arrive, the IV can easily be inserted into the saline lock. We discussed adding a small bag of IV solution to the search kit – for example, Navy SEAL team members always carry a 250cc bag of Hespan in a pants pocket – but finally decided that for civilian use, the usefulness was not worth the weight.* [↑](#endnote-ref-50)
51. Can be placed by digital technique even without a laryngoscope. Can be used as a chest tube. Can be used for a cricothyrotomy tube. [↑](#endnote-ref-51)
52. If you have the capability to intubate or place a King LT, knowing the oxygen saturation is helpful when you’re deciding whether to intubate. Pulse oximiters have gotten quite small and cheap. You can get a reasonably good pulse ox for $20 from amazon.com. Load it with a couple of lithium AAA cells, mark the inside of the battery compartment with “+” signs with a Sharpie to indicate the battery direction, fill the battery compartment with Vaseline (unfortunately, hides the + signs in the battery compartment). Now you’ve got a reasonably sturdy pulse ox. With a spare pair of AAA lithium cells, it only weighs 3 ounces. If you’re worried about it breaking, a spare is just $20 and 3 ounces. Or, you can get a mil-spec FDA approved model that’s heavier and bulkier for $500. [↑](#endnote-ref-52)
53. A standard addition to a search and rescue kit is a surgical mask and a tiny bottle of eugenol (oil of cloves) – the eugenol may be spread on the mask to mask the smell when dealing with badly-decomposed bodies. While not strictly speaking something needed for medical treatment, some may wish to add this to their Search Module. [↑](#endnote-ref-53)
54. UTIs are more common among women than men. Men: if you'd like to leave this out, please see the comments under antifungals. As this is available without a prescription, we have replaced the prescription version with the over-the-counter version. [↑](#endnote-ref-54)
55. *The need for, or at least desire for, these medications can be supported by a trip to any local drugstore and a look at the shelves. Humibid-DM was taken off the list, as studies of the cough of a cold show that the “active” ingredient, dextromethorphan, has only a barely-detectable effect on the cough of a cold. NSAIDs (non-steroidal anti-inflammatory drugs) such as naproxen, which is already on the list, are much more effective. Honey, too, is much more effective, but large amounts are needed, and the weight would be prohibitive, not to mention what would happen if the honey leaked into your medical kit. See* [*conovers.org/ftp/The-Common-Cold.pdf*](http://www.conovers.org/ftp/The-Common-Cold.pdf) *for a review and references.* [↑](#endnote-ref-55)
56. *As of September 1999, 3 mL "sample" or "travel" bottles of oxymetazoline nasal spray are not available in the U.S. However, AFRIN and some other brands of oxymetazoline nasal spray are now available in 15 mL bottles, which are relatively small and light.* [↑](#endnote-ref-56)
57. We chose both long-acting and short-acting antihistamines because they have different uses. For example, stings or other acute allergic reactions usually need only short term treatment, and diphenhydramine can also be used as a short-acting sedative.  
    *Now that safe nonsedating second-generation antihistamines are available cheaply over-the-counter, we replaced a sustained-release sedating first generation antihistamine with a longer-acting nonsedating antihistamine. According to The Medical Letter (3/18/02) fexofenadine (e.g., ALLEGRA) is essentially nonsedating, while the other two currently available (cetirizine = ZYRTEC and loratadine = CLARITIN) have variable degrees of sedation. And sedation is a big issue for force protection.*  [↑](#endnote-ref-57)
58. Colds are common. Naproxen is good for the cough of colds, oxymetazoline spray is good for the nasal congestion, and an antihistamine such as diphenhydramine may help with the early coryza (rhinorrhea) stage of the cold. Zinc gluconate lozenges such as ZICAM likely will shorten a cold a day or so, and likely decrease symptoms along the way. Colds are common enough and this is effective enough to include it in the kit. See [conovers.org/ftp/The-Common-Cold](http://www.conovers.org/ftp/The-Common-Cold) for a review and references. [↑](#endnote-ref-58)
59. Comment> Eye: Fluorescein strips. Should a blue light be on the list?  
    Reply> Nice, but the fluorescein even works pretty well by daylight or mini-Maglite, and a blue penlight adds a lot of weight for only a little benefit, compared to the fluorescein strips, which weigh basically nothing. [↑](#endnote-ref-59)
60. Some sort of topical anaesthetic for conditions such as poison ivy, stinging nettles, mosquito bites is important for a kit such as this. Sting-Eeze could be used, but it contains benzocaine, which with repeated use tends to make people allergic to benzocaine. Sting-Eeze is still worthwhile for occasional use for acute stings, as the benzocaine is so fast-acting. Many other over-the-counter topical anesthetic agents also cause allergy, including topical diphenhydramine (BENADRYL) and topical lidocaine (XYLOCAINE). However, pramoxine does not cause this, and is highly effective, if not as fast-acting as Sting-Eeze. While Caladryl Clear lotion contains pramoxine, smaller packages of similar medication is available in *Aveeno Calamine & Pramoxine Anti-Itch Cream, Itch-X Fast-Acting Anti-Itch Gel,* and *Gold Bond Maximum Strength Medicated Anti Itch Cream.* [↑](#endnote-ref-60)
61. Oral dexamethasone [e.g., DECADRON] not carried for high altitude cerebral edema, as 30 mg of prednisone is equivalent to the 4 mg dexamethasone dose usually used for HACE. [↑](#endnote-ref-61)
62. LOTRISONE was suggested as an alternative for "shotgun" therapy of itchy rashes or vaginitis. At present, we are still staying with separate antifungal and steroid creams, as more effective and more flexible.  
    One suggestion was to use the new, highly effective antifungal terbinafine (LAMASIL) instead of miconazole. However, it is prescription-only, costs 2 to 10 times as much as miconazole, and there is no information on whether or not it can be used to treat yeast vaginitis.  
    Women reviewing this medical kit have almost universally demanded something for yeast vaginitis. Therefore, we discount suggestions that we drop this medication if the suggestion comes from a man.  
    Over the past decade, it has become more and more common to use oral antifungals for yeast vaginitis; fluconazole (e.g., DIFLUCAN) 150 mg PO x i dose is standard. However, fluconazole has a long list of significant drug interactions and potential serious reactions, and single-dose intravaginal suppositories of clotrimazole 500 mg (or three-dose of miconazole, available without a prescription in the U.S.) seem to have much less in the way of drug interactions and potential serious reactions.  
    *We finally settled on a single dose of DIFLUCAN. It is now extremely widely used for yeast vaginitis, and is likely effective for other common fungal infections such as athlete’s foot and jock itch. The drug-drug interactions are relatively unlikely in the population for which this is likely to be used. It is also much lighter than a topical cream, and much easier to use in the field.*  [↑](#endnote-ref-62)
63. Some suggested the addition of a traction device; however, a traction device can usually (though not always) be improvised with materials at hand.  
    *The recommendation for a Sam-Splint was changed to a couple of improvised splints made from plastic cut from gallon milk jugs combined with duct tape or adhesive tape. These are cheaper (free), much lighter and smaller, and almost as useful.* [↑](#endnote-ref-63)
64. In 2004, Johnson and Johnson introduced a special “blister” line of Bandaids (small adhesive bandages; sticking-plasters in the UK). These tough, very sticky, padded and medicated bandages have become popular recently; while they may at some point replace moleskin, at this point, we still are keeping moleskin (adhesive felt) as part of the kit. *Experience with these blister Bandaids has not been impressive thus far. Also it should be mentioned that Molefoam, which has polyurethane foam rather than wool felt, is a poor substitute for moleskin. There is a Spenco 2nd Skin Blister Kit which is available, and is very soothing for blisters, but not as durable as moleskin. A bit of moleskin applied over dried benzoin will often last for many days of hiking. Moleskin, once the package is opened, should be kept in a sealed zip lock plastic bag to keep the adhesive from drying out.*  [↑](#endnote-ref-64)
65. Removed butterfly strips as suture strips much superior. [↑](#endnote-ref-65)
66. *There a variety of devices for removing ticks. An excellent study in the veterinary literature solidly demonstrates that this device is superior; it is also inexpensive, sturdy, light and small. I can think of no reason why we cannot generalize from this veterinary study to humans. My experience bears out that this is superior to other commercially-available tick-removal devices.*   
    *Zenner L, Drevon-Gaillot E, Callait-Cardinal MP. Evaluation of four manual tick-removal devices for dogs and cats. The Veterinary record 2006;159:526-9*. [↑](#endnote-ref-66)
67. *Cyanoacrylate glues have long been used in surgical repairs, both deep within the body and for skin lacerations. Cyanoacrylate glues are available retail or by prescription as methyl cyanoacrylate (1-carbon chain attached ethyl cyanoacrylate (2-carbon chain), butyl cyanoacrylate (4-carbon chain) and octyl cyanoacrylate (8-carbon chain). The longer-chain octyl cyanoacrylate, sold in the USA under the brand names Dermabond, GluStitch, derma+flex QS, SurgiSeal, FloraSeal, Octylseal, and Nexaband, is probably the best for repair of skin wounds. The longer chain makes the polymerization a bit slower, so there is less heat as it is curing. It is also less irritating to skin than the shorter chains, and in my experience a bit more flexible and longer lasting than the alternatives. Butyl cyanoacrylate is available under the brand names MediBond, MediCryl, PeriAcryl, GluStitch, Xoin, Gesika, VetGlu, Vetbond, LiquiVet, Indermil, LiquiBand, and Histoacryl, and is widely used for human and veterinary surgical repair. In my experience, it’s also not quite as easy to work with than the Dermabond brand of octyl cyanoacrylate, as Dermabond has additives that make it somewhat viscous; helps keep it from dripping off of the laceration (though I use Dermabond all the time and it still drips quite a bit).*

    *There is also a mixture of butyl and octyl cyanoacrylate marketed as a “skin protectant” under the Marathon brandname. It is packaged in individual crushable ampules like Dermabond.  
      
    Octyl and butyl cyanoacrylate are FDA-approved for medical uses, ethyl and methyl cyanoacrylate are not – however octyl, butyl and ethyl cyanoacrylate have long been used in medical procedure, both on the skin and deep in the body, prior to and regardless of specific FDA approvals. This is not surprising. The FDA approves medications (including tissue glue) for specific indications. But there is little financial incentive for drug companies to seek FDA approval for all potential uses of a medication. Therefore, in the USA, a large fraction of prescription medications are prescribed or used “off-label,” about 20% overall. See the Wikipedia article on* [*off-label use*](http://en.wikipedia.org/wiki/Off-label_use) *for more.*

    *One problem with cyanoacrylate glues is that, once the container is unsealed, the remaining glue rapidly hardens, no matter how quickly the container is resealed. Therefore, for our intermittent use, single-use containers will be needed.*

    *Of the available cyanoacrylate glues for use in this medical kit, Dermabond is probably best known. However, it costs about $30 for each single-use ampule. Butyl cyanoacrylate is not quite as expensive, at around $20 a single-use container. Both are FDA approved (at least for certain brands) for human skin wound repair, although butyl cyanoacrylate is also available in a slightly-less-expensive veterinary version.*

    *When butyl and octyl cyanoacrylate were FDA approved, they noted that ethyl cyanoacrylate may get warm when curing, and is more irritating to skin than butyl or octyl cyanoacrylate. When used internally, such as for gluing one, ethyl cyanoacrylate doesn’t last as long, but this should not be a problem for skin wound repair. Ethyl cyanoacrylate is not FDA approved for skin wound repair, but has long been used by climbers for minor hand repairs, with no reports of toxicity or injury. And investigations into the toxicity of cyanoacrylates, primarily looking at industrial use, notes skin and mucous membrane irritation, but no other significant toxicity.  
    [Cary, R. (2001). METHYL CYANOACRYLATE AND ETHYL CYANOACRYLATE. Geneva, Switzerland, World Health Organization.]  
    [Leggat, P. A., et al. (2004). "Toxicity of Cyanoacrylate Adhesives and Their Occupational Impacts for Dental Staff." Industrial Health 42(2): 207-211.]  
    [Michaels, C. J. (2004). TEST PLAN AND ROBUST SUMMARY for 2-ETHYL CYANOACRYLATE. Rocky Hill, CT, Henkel Loctite.]*

    *Ethyl cyanoacrylate is much cheaper than the butyl or octyl versions; a package of four Krazy Glue Gel (gel is easier to use for skin repairs) individual tubes costs about $5. It also comes in a light but highly crush-resistant box, which has four individual slots, perfectly sized to store 1 mL ampules, such as epinephrine. Methyl cyanoacrylate is likely more irritating than ethyl cyanoacrylate, and not recommended for wound repair.*

    *Some other liquid bandages use other ingredients, for example, New-Skin Liquid Bandage is a solution of nitrocellulose, and likely not as effective as cyanoacrylate. 3M Nexcare Liquid Bandage Spray contains an unspecified type of acrylate polymer.*

    *During the writing of this note in November 2014, I was fortunate to take a fall and sustain a full-thickness 7 cm avulsion/abrasion of my left knee, which took about a month to heal. Given even the best of these cyanoacrylate glues will crack and come off of a frequently-bent knee in about 2-3 days, I was able to do a comparative test many of the above options. Here are my findings.*

    *3M Nexcare Liquid Bandage Spray, as advertised, didn’t sting at all. And it didn’t solidify in the bottle, even after puncting the seal with the first spray. However, even with a fairly thick application, it only lasted about half a day. Not impressed at all. Too bad, I expected better from 3M.*

    *Krazy Glue Gel is not as gel-like as the 3M cyanoacrylate gel, and is fairly drippy. Both of these sealed the abrasion accetably, but were brittle, fracturing easily with movement of the knee, didn’t stick to the skin that well, and only lasted about a day. The stinging with them was precisely the same as with butyl or octyl cyanoacrylate.*

    *Dermabond (octyl cyanoacrylate) worked well, lasting for about three days, before cracking; it adhered to the skin quite well, being hard to peel off the edges even after cracking over the abrasion, suggesting it would work quite well in a location that didn’t bend much. Indermil (butyl cyanoacrylate) worked almost as well, lasting about two and a half days. Marathon (butyl and octyl cyanoacrylate) worked the best, lasting 3-4 days. It was also less expensive than either Dermabond or Indermil, at $57.15 for a box of ten ampules.*

    *Recommendation: get Krazy Glue singles, keep the glue at home, and fill the slots in the plastic box with three ampules of Marathon Skin Protectant. Make shared purchases of Marathon Skin Protectant to keep costs down.*

    *However, octyl, butyl or ethyl cyanoacrylate, at the MedKit user’s choice based on price and quality, are acceptable for this item.*  [↑](#endnote-ref-67)
68. For caffeine withdrawal headaches. [↑](#endnote-ref-68)
69. Given the recent (2006) surge in community-acquired methicillin-resistant staphylococcus as an important cause of skin infections (abscess, cellulitis), trimethoprim/sulfamethoxazole has emerged as a first-line drug for such infections. And, giving rising levels of resistance to quinolone antibiotics such as ciprofloxacin, treating a UTI with trimethoprim/sulfamethoxazole is in many areas better than using ciprofloxacin. [↑](#endnote-ref-69)
70. Eminase® is at present the best choice, as can be used in a single dose. [↑](#endnote-ref-70)
71. Many lights, for example the popular MiniMag pocket flashlights that used by many SAR team members, provided enough ultraviolet light to make fluorescein fluoresce and make corneal abrasions visible – however, the bright white light also makes the light-sensitive patient squint, making eye examination difficult. Cobalt-filter disposable penlights are widely available, but are either (1) very expensive and heavy, or (2) relatively cheap disposable lights that seldom work when pulled out of a medical bag. An ultraviolet PhotonLight packed in a plastic 35mm film canister with three cotton balls for padding weighs about 20g (less than an ounce), has an almost indefinite shelf life, and given it is an LED light is almost 100% guaranteed to work when needed as long as the battery is not exhausted; however, it is hard to tell when the light is on without fluorescein, so it tends to get put away while still on. The standard white lights do produce enough UV to see abrasions, but in informal testing, the UV lights made viewing corneal abrasions and foreign bodies considerably easier. Note that PhotonLights come in a purple that provides some UV light or a specific UV version that produces mostly UV and only a small amount of purple visible light; the informal tests were with the specific UV version. Bright sunlight provides plenty of ultraviolet, even on a cloudy day, so lights are only needed for dark situation. *Also note that this light tends to turn itself on and kill its battery when simply placed in a medical kit; packaging so as to prevent this is required to make sure it will work when you need it.* [↑](#endnote-ref-71)
72. Until someone invents a 30-gram portable slit lamp, the best backcountry way to examine the eye, and to remove corneal foreign bodies seems to be a fluorescein strip, an LED light, and a small plastic Fresnel lens, seem an appropriate and usable substitute. Credit-card size Fresnel lenses weighing perhaps a gram are available for about US$2.00 from suppliers such as [www.scientificsonline.com](http://www.scientificsonline.com). They do provide enough magnification to remove corneal foreign bodies. Provided enough ingenuity and duct tape, one could even fashion one into a head-mounted magnifier to leave both hands free—combined with an assistant holding the light this would make an a reasonable method for removing such foreign bodies. [↑](#endnote-ref-72)
73. A Foley can be used for many things: as in improvised chest tube, for tamponading nosebleeds, for tamponading penetrating wounds of the neck (see: Weppner J. Improved mortality from penetrating neck and maxillofacial trauma using Foley catheter balloon tamponade in combat. The journal of trauma and acute care surgery 2013;75:220-4.) and as an actual Foley catheter. [↑](#endnote-ref-73)
74. *WEMSI conducted some informal research on methods of amputation in confined spaces – including races between different methods. The winner overall was a two-step process – using a serrated lockback folding knife to cut through skin, tendon, soft tissue; and then using a folding camp saw to cut the bone. This one topic engendered a long discussion on the wilderness-emergency-medicine Internet discussion list – see* [*www.wemsi.org*](http://www.wemsi.org) *for the list archives.* [↑](#endnote-ref-74)
75. It was suggested that we cut down on the number of Dulcolax tablets; though constipation can be disabling, it's not usually as disabling as diarrhea. Changed from 6 to 4. *After long discussion, we elected to move this to the Physician Addendum – although constipation occurs frequently in the outdoors and during SAR missions, and sometimes leads to abdominal pain, constipation is seldom recognized as the cause, and thus the demand for laxative pills is low in the field. A laxative is still appropriate for distribution as needed at the SAR base camp.* [↑](#endnote-ref-75)
76. *As the main kit now contains King LT airways, this and the other airway equipment may be appropriate for those who are quite comfortable with endotracheal intubation (paramedics, emergency physicians and the like).* [↑](#endnote-ref-76)
77. *Originally we had despaired of adding a laryngoscope, as standard ones were so heavy that they far exceeded any reasonable usefulness-to-weight ratio, and the lightweight disposable ones were all terrible designs that didn’t work well. However, an Israeli company is now marketing an inexpensive, disposable laryngoscope that, with two disposable AA lithium cells, is quite light at 4 ounces (120 g; Truphatek TRULite Disposable LED Laryngoscope). Because the blade has a narrow flange, a large-bladed scope may fairly easily be used to intubate a small person. Many also find this model easier to use and a better laryngoscope than the steel models routinely used in EMS or hospitals. There might be an argument that a set of King LT airways would make a better choice than a laryngoscope and an endotracheal tube, but the set of three King LTs, while not very heavy (4 ounces), have a somewhat worse usefulness-to-bulk ratio.* The consensus was finally that the King LTs are a good choice for all Wilderness Medics. The laryngoscope is an option for those who intubate on a regular basis. [↑](#endnote-ref-77)