Wilderness Medicine Part 1: Your Medical Kit

From the 9th Southeastern Wilderness Medicine, sponsored by Southeastern Wilderness Medicine and the University of Tennessee College of Medicine in Chattanooga

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Expedition medical kit: needs impossible to predict; depends on — specialty of health care professional (eg, surgeon, emergency medical technician, nurse, paramedic); distance from definitive care; demographic of group; preexisting diseases; endemic diseases in area; environment makes difference; no definitive list of what to bring; each individual on expedition should bring own medications; impossible to treat all conditions in wilderness, but should be able to alleviate pain

Pain medication: acetaminophen and oxycodone (Percocet) and hydrocodone recommended; acetaminophen with codeine not highly effective and has high side-effect profile; “designer” nonsteroidal anti-inflammatory drugs (NSAIDs) recommended (eg, meloxicam [Mobic]); new systems for delivery of narcotics available (eg, with fentanyl [Fentora] buccal tablets, can obtain intravenous [IV] doses)

Infectious diseases: common ones in wilderness include upper and lower respiratory tract, gastrointestinal (GI), and soft tissue; azithromycin — for respiratory infections; almost perfect expedition drug due to low side-effect profile; well tolerated and compliance easy; serum concentration of entire course lasts ≈10 days; good soft tissue and skin penetration

GI: dysenteric diarrhea — fluoroquinolone (eg, Cipro) no longer first-line treatment; invasive; treat patients who appear and feel ill; associated with fever and stomach cramps; problem with fluoroquinolones increasing number of resistant cases (primarily due to Campylobacter), so addition of macrolide indicated; speaker’s empiric approach to diarrhea to start with quinolone and if no improvement seen, consider macrolide; some travel medicine physicians start with azithromycin, especially in Thailand, India, and Nepal; methicillin-resistant Staphylococcus aureus (MRSA) — also present in wilderness; question of whether to start with drug that covers MRSA or first-generation cephalosporin; in immunocompetent patient with uncomplicated low-grade infection, start with cephalosporin; capsule form not ideal for expeditions (tend to melt and disintegrate); doxycycline — recommended if unsure about kind of infection (best second-line drug for most infections [eg, Rickettsia, Mycoplasma, psittacosis, spirochetes, Leptospirosis]) — not a reasonable treatment choice for malaria; if concerned about malaria, malarone recommended; consider cost of drugs; tinidazole — previously unavailable in United States, but presently approved by Food and Drug Administration; related to metronidazole but has lower side-effect profile; more efficacious than metronidazole; single 2-g dose taken on night 1 and repeated on night 2; indicated for protozoa; in patients with subtle chronic bloating and gas with intermittent diarrhea, speaker recommends empiric antiprotozoal agent, typically after they fail course of other medication

Respiratory: metered-dose inhaler (MDI) recommended (does not freeze unless temperature <30°C); individuals on expeditions with cough often treated with cough medication (not effective) but reactive airway component often present, so MDI with β-agonist (eg, albuterol, salmeterol) recommended (indicated in treatment and prophylaxis of pulmonary edema); nosebleeds — topical nasal vasoconstrictors include oxymetazoline (Afrin) and phenylephrine (Neo-Synephrine), common in wilderness; first, let patient blow nose to expel clot, then give spritz of topical nasal vasoconstrictor in each nostril and hold pressure in sitting position; when patient lying down, head in dependent position, and when patient stands up, metabolism increases; application of ice on nose appears beneficial; device for nasal packing (Rhino Rocket) recommended; can also apply vasoconstrictor on nasal pack; lubricate nose first before packing; apply nasal packing in both nostrils to avoid asymmetric pressure on septum; leave nasal packing for >48 hr and start patient on broad-spectrum antibiotics; improvisational technique — Foley

Educational Objectives
The goal of this program is to improve the management of emergencies and common medical problems in the wilderness. After hearing and assimilating this program, the clinician will be better able to:

1. Describe the factors that determine the contents of an expedition medical kit.
2. Treat common infections with the appropriate antibiotics.
3. Prepare the expedition medical kit for easy passage through customs.
4. Utilize high-estrogen oral contraceptive pills as emergency contraception and for dysfunctional uterine bleeding.
5. Recommend methods and tips for preventing foot blisters.

Faculty Disclosure
In adherence to ACCME Standards for Commercial Support, Audio-Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and is not a proprietary business or commercial interest. For this program, Dr. Donner and the planning committee reported nothing to disclose. In his lecture, Dr. Donner presents information related to the off-label use of a therapy, product, or device.
catheter used to tamponade posterior bleed; fill with air and figure out method to apply traction without causing necrosis of end of nose; over-the-counter natural cough drops recommended; prednisone recommended for asthma, marine exanthem, and exposure to poison oak

**Customs:** organize kit; label vials with one kind of medication inside; bring licenses

**Ophthalmologic improvisation:** to avoid photokeratitis, use emergency space blanket or duct tape for sunglasses; if refractive lenses lost, punch several holes in duct tape and place on sunglasses (more effective in bright light); if eye loupe not available, can use pair of eyeglasses over another one to increase magnification (arithmetic); roll-up sunglasses; cobalt blue light-emitting diode as ophthalmic illuminator (Bluminator); conjunctivitis (allergic or viral) usually self-limited; antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxifloxacin or gatifloxacin [Zymar]) for corneal ulcer in allergic or viral (usually self-limited); antibiotic (moxi

**Caffeine:** with ibuprofen, indicated for headaches; beneficial for staying alert in all-night rescue; modafinil (Provigil) or armodafinil (Nuvigil) — originally used for narcolepsy; improves wakefulness without “jitters” associated with coffee

**Cardiovascular:** speaker recommends nitrates if no contraindications present and no longer administers β-blockers; with transducer attached to iPhone held to chest, able to obtain lead 1 electrocardiography (ECG); miniature automated external defibrillator and cardiac monitors in near future; aspirin in kit recommended

**Gynecology kit:** urine β-human chorionic gonadotropin (β-hCG) test — used to rule out complications of possible first-trimester pregnancy; rules out symptomatic ectopic pregnancy; may be negative in pregnancy; in patient with abdominal pain and/or vaginal bleeding with positive β-hCG, ectopic pregnancy until proven otherwise (medical emergency), but if β-hCG negative, observe patient for few days; high-estrogen oral contraceptive pills used for dysfunctional uterine bleeding and as emergency contraception; fluconazole (Diflucon) effective for vaginal yeast infections but requires 2 days to see effects (in interim, steroids beneficial)

**Gastrointestinal kit:** constipation — common; recommend hydration first; for predisposed patients, bulk agents recommended (eg, psyllium seed); magnesium tablets if stool softener ineffective; medicated hemorrhoid pads (Tucks) also beneficial; electrolyte replacement or oral rehydration solution (ORS) for patients with protracted diarrhea and vomiting and blood loss; jeevan jal (“water of life”) inexpensive (World Health Organization formula for ORS); most sports drinks hyperosmotic (contain more sugar for better taste); new techniques for water disinfection (eg, ultraviolet radiation) available

**Blisters:** most common medical problem; proper fitting shoes or boots important; fit shoe in evening (feet swell during day; fit in evening more similar to natural swelling of feet when active) and use same socks planning to use on trip; insole orthotic — beneficial to evenly distribute pressure over palmar surface of foot, resulting in less movement and less potential for blisters; sock layer combinations — reduce friction (thin snug-fitting synthetic or blended sock as liner, middle layer for insulation so inner layer moves back and forth against middle insulation, rather than skin moving against liner sock, creating additional sliding surface); toe clenching — from oversized toes; increases trauma to top portion of toes; treat “hot spots” before they occur; toe pads (Ouch Pouch) — used by ballet dancers; cover ball of foot; thin layer of gel material inside fabric pouch; protect toes; prophylaxis for hot spots — ensure that socks not bunched up; retie laces to evenly distribute pressure over foot; remove material (eg, small rocks) in boots that can add to blister; lamb’s wool padding recommended; blister prevention patch (eg, Engo) reduces friction in specific targeted locations inside shoes (placed on shoe, not on foot); minimize moisture (increases friction); avoid wet skin; socks have waterproof breathable membrane (eg, SealSkinz); keep feet clean (dirt increases friction); gaiters keep dirt off feet; reducing perspiration in feet — anti-perspirants and talcum powder often used; problem with talcum powder that it may clump, increasing friction; reducing chafing — beneficial to use anti-chafe wax (eg, Bodyglide) or chafe-free powder (eg, Asics) on feet and thighs; moisturizing ointment (eg, Bag Balm) too sticky and tends to attract dirt; tape — reduce folds and wrinkles which lead to high-pressure or friction areas; cut tape corners to round them; avoid “dog ears”; cut long enough to extend beyond border of blister; avoid overlapping tape (adds to thickness and may cause friction); apply tincture of benzoin before taping; liquid adhesive (Mastisol) used by plastic surgeons to make tape stickier; tape that conforms to skin and sticks well with fewer bulges (eg, Kinesio Tex; expensive) Management: aspiration better than letting blister spontaneously break; choose gravity-dependent part of blister and prick with sterile needle several times, then apply compressive dressing to prevent blister from refilling; technique used by military personnel is to aspirate blister and reinject (using syringe and needle) tincture of benzoin; moleskin — bulky, sticky, and not ideal wound dressing; better for creating raised surface around blister to keep sock or shoe away from blister; not used by speaker

**Dentistry:** emergency dental kit contains eugenol (main ingredient in oil of cloves) and zinc oxide powder; combine to form cement; use for cracked tooth, if crown of tooth falls off, or filling loose (prevents tongue from moving toward affected area); temporary filling material (Cavit) recommended, but not used if live nerve roots present

**Human tissue adhesives:** do not require sutures; easy to use; over-the-counter cyanoacrylate glue (eg, Superglue) brittle and easily comes off; Dermabond more effective but expensive; problem with thin adhesive strips (Steri-Strip) that they curl off, so glue ends down with Superglue
Standard of care in wilderness: same as that at home; splinter forceps necessary to remove foreign bodies or ticks
Recommended injectables: ceftriaxone (Rocephin)—excellent meningeal penetration; effective for upper and lower respiratory tract infections and pyelonephritis; good soft tissue penetration; no anaerobic coverage, so addition of metronidazole recommended; epinephrine (EpiPen); pain medicine; steroid for altitude (dexamethasone); antiemetic (ondansetron); antihistamine (diphenhydramine) also used as sedative, antimotion sickness drug, and adjunct in anaphylaxis; benzodiazepine

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Suggested Reading
1. The content of an expedition medical kit depends on:
   1. Specialty of health care professional
   2. Distance of expedition from definitive care
   3. Demographic of expedition group
   4. Endemic diseases in area
   (A) 1,3 (B) 2,4 (C) 1,2,3 (D) 1,2,3,4

2. When treating dysenteric diarrhea, the addition of a macrolide is recommended with the administration of a fluoroquinolone because of the increasing number of resistant cases due to:
   (A) Campylobacter (B) Pseudomonas (C) Klebsiella (D) Enterococcus

3. Which of the following antibiotics is the best second-line drug for most infections encountered during an expedition?
   (A) Fluoroquinolone (B) Doxycycline (C) Azithromycin (D) Metronidazole

4. During episodes of epistaxis, the patient should apply pressure on the nose while in a _______ position.
   (A) Sitting (B) Standing (C) Supine (D) Left lateral recumbent

5. Nasal packing for a nosebleed should be left for at least:
   (A) 6 hr (B) 12 hr (C) 24 hr (D) 48 hr

6. A negative urine human chorionic gonadotropin test in a woman with abdominal pain and vaginal bleeding rules out symptomatic ectopic pregnancy.
   (A) True (B) False

7. The following are recommended for prophylaxis of “hot spots” in feet, except:
   (A) Ensuring that socks not bunched up
   (B) Retying laces to evenly distribute pressure on feet
   (C) Applying moisturizing ointment (Bag Balm) to feet
   (D) Removing material (eg, small rocks) from shoes

8. Allowing a blister to break spontaneously is better than aspirating it.
   (A) True (B) False

9. The standard of care in the wilderness is _______ that in the home.
   (A) Lower than (B) The same as (C) Higher than

10. In addition to being an antihistamine, diphenhydramine can also be used as:
    (A) A sedative (B) A treatment for motion sickness (C) An adjunct in anaphylaxis (D) All the above

Answers to Audio-Digest Emergency Medicine Volume 30, Issue 22: 1-D, 2-B, 3-A, 4-C, 5-C, 6-A, 7-D, 8-A, 9-A, 10-C

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