

40 YEARS OF WISDOM



WILDCARE

Working In Less than Desirable Conditions And Remote Environments



Franklin R. Hubbell, DO

Representative cover

For a special pre-press price of **\$60** (40% off)*

The new **textbook** on **wilderness medicine** written by Dr. Frank Hubbell, the pioneer of this medical discipline and the founder of SOLO, the premier school of its kind in the US

335 pages | 100s of photos, illustrations, charts, and diagrams | a clear, concise writing style | gorgeous layout | designed to **TEACH**

This is no average, boring, textbook!

* Order now from soloschools.com

Let's take a sneak peek

Frequent sidebars provide useful additional information.

Primary Assessment: step by step

This is a quick, hands-on exam that seeks to answer the most basic questions about your patient's condition. You have arrived on the scene, made some basic safety decisions, attempted to communicate with the victim, and made initial physical contact—they are now your patient. And you probably did all this in about 30 seconds. It's time to roll up your sleeves and get on with the ABCs.



Visually inspect the airway.



Perform a head-tilt chin-lift.



Give rescue breaths through a mask.



RECOVERY POSITION

If you need to leave an unconscious person for a few minutes or a few hours, the recovery position—if he or she maintains a patent airway—can help.

A **APPROACH AND ASSESS**—Determine your patient's level of consciousness. Are they conscious and responsive or unconscious and unresponsive?

- Look: Are their eyes open, and do they track movement?
- Listen: Ask, "Hey, how are you doing?" Do they respond to you?
- Feel: Touch the skin on the back of their hand or give them a sternum rub. Do you get a response?
- Talk to the patient—they may be able to hear even if they cannot respond.

AIRWAY—Assess the quality of your patient's airway. If they responded verbally during your initial contact or when you determined their LOC, then their airway is open and functioning. If they are unresponsive, your first job is to open their airway.

- Look: Open and visually inspect their airway. Is it clear? What color is it?
- Listen: Can you hear air moving in and out?
- Feel: Put your ear to their mouth—Can you feel air moving in and out?

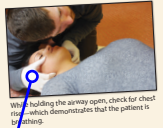
AIRWAY ACTIONS

- To open the airway, perform a head-tilt/chin-lift (this moves the musculature of the tongue forward and opens the airway):
 - Move the head into proper anatomical position.
 - Tilt it slightly back (exaggerated).
 - Gently pull the lower jaw (mandible) forward.
- Is the airway clear? If not, log roll the patient into the recovery position. This allows any blood, fluid, or vomitus to drain.
- Is the patient spontaneously breathing?
 - If the patient is breathing, move on to B.
 - If the patient is not breathing, begin rescue breathing.

RESCUE BREATHING

- Give two rescue breaths and check for a pulse.
- If they have a pulse, continue to give rescue breaths every 4–5 seconds until they begin breathing.
- If the patient has no heartbeat, initiate CPR (see next spread).
- If the patient does not respond within 30 minutes, stop all resuscitation efforts.

B



While holding the airway open, check for chest rise, which demonstrates that the patient is breathing.



Log roll the patient into the recovery position.



BVM

BREATHING—Assess the quality of your patient's breathing—are they breathing often enough and deeply enough to get an adequate supply of oxygen?

- Look: Do you see their chest rising and falling?
- Listen: Is their breathing clear and without adventitious breath sounds (wheezing, gurgling, or snoring)?
- Feel: Can you feel the patient's chest rise and fall as they breathe? Is the rate normal (10–30 breaths per minute (bpm))?

If you answered YES to all of the breathing questions, move on to C. If you answered NO to any of the breathing questions, take action.

BREATHING ACTIONS

- Log roll your patient into the recovery position to help clear and maintain an open airway—gravity will help drain fluids and allow the tongue to fall forward and open the airway. Swipe their mouth, if necessary.
- If their breathing does not improve sufficiently, or it is too fast (>30bpm) or too slow (<10bpm), control their respirations with a pocket mask using mouth-to-mask ventilation at a rate of 12–20bpm.

Now move on to C.

HOLD ON, WE'RE GETTING AHEAD OF OURSELVES—TM ALL ALONE HERE!

I'm only on it and I'm already in trouble. I'm tired and I don't have any of that fancy equipment you keep talking about. BVM? Naahhh—whatever—the quality here should do!

Do the best you can until you have help.

If you're alone in a remote setting without a dedicated provider, consider a BVM on a backcountry. It's not perfect, but you can breathe across the face and start by opening their airway, and with that you can breathe. It's not perfect, but it may be the best you can do.

Maybe you will be able to do so because for them for an extended period of time. Or you may be able to do so for a short time. Or you may be able to do so for a mixture of the above.

The unfortunate reality is that you may happen to be the only one who is able to do so. You are alone in a remote setting and you are all you've got. It's not perfect, but you are prepared for every possible emergency situation. Learn the skills for the team, bring the appropriate personal first aid and rescue equipment, and be ready to help. That's the way you can do it.

SOFT TISSUE INJURIES

Controlling bleeding

- Direct Pressure:** Apply pressure directly over the wound and compress to stop the bleeding.
- Pressure Dressing:** To maintain constant pressure, place thick, and then wrap it with an elastic bandage.
- Digital Pressure:** The rate spurting arterial bleeding may require digital pressure by placing a gloved finger directly into a wound to compress the lacerated artery and stem the flow of blood. Once bleeding has been controlled for 20–30 minutes, stop applying pressure so the wound can be inspected and cleaned.
- Tourniquet:** The last resort—but can be life saving.

SIGNS AND TREATMENT OF A SKIN INFECTION

- Early**—localized to the skin and wound area
 - Red (rubor)—dilated capillary beds, increased blood flow to the area.
 - Warm (calor)—due to the increased blood flow.
 - Swollen (tumor)—due to increased blood flow.
 - Tender (dolor)—due to swelling.
- Late**—severe and potentially life-threatening
 - Pus formation—a collection of white blood cells, may be draining from the wound.
 - Spreading up the extremity—due to infection traveling up lymphatics.
 - Swollen lymph nodes—infection has reached the lymph nodes.
 - Fever and chills—a sign that the infection is spreading systemically.
- Treatment of skin infections**
 - If possible soak in hot water with Epsom salt or dilute iodine solution.
 - Apply moist heat packs.
 - If the wound is closed, but swollen, gently open so it can drain.
 - The patient may need to be on an antibiotic, if lymphangitis or lymphadenitis is present (see, if any).

Long-term wound care

WOUND INSPECTION, CLEANING & BANDAGING

- Wound inspection and cleaning**—Once bleeding has been controlled for 20–30 minutes:
 - Remove dressings and closely inspect the wound.
 - Check circulation, sensation, and motion (CSM) distal to the injury.
 - Debride, removing any foreign material in the wound like sticks, grass, etc.
 - Clean around the wound with soap and water or with a dilute solution of iodine.
 - Clean the wound by irrigation with a forceful flow of sterile water or a dilute solution of iodine by using an irrigation syringe or water bottle.
- Dressing and bandaging**—Cover the wound with dry sterile dressings, and keep the area clean and dry.
 - Change the dressings every 12 hours, and examine the wound for signs of infection.
 - If the wound is dirty or you are unable to keep it clean and dry, cover the wound with a dressing soaked with change it every 6 hours.
 - Protect from further injury, freezing, and from contamination by proper bandaging.
 - If there are impaired CSMs distal to the injury, do all of the above, then splint (if applicable) and evacuate.

WOUND CARE DON'TS

- Don't tightly close a wound with butterfly bandages or suturing.
- Don't fill the wound with an antibiotic ointment.
- Don't leave a pressure dressing in place for more than 30 minutes.
- Don't allow the wound to freeze.
- Don't be afraid of causing a little pain to properly clean a wound.

Specific injuries

CONTUSIONS

- Rest, ice, compression, and elevation (RICE) to limit swelling.
- Protect and watch injury closely in cold weather as it will freeze quicker than undamaged tissue.

ABRASIONS

- Clean, debride, and wash thoroughly with soap and water.

LACERATIONS

- May bleed profusely or require pressure dressing.
- Control bleeding and maintain hemostasis for 20–30 minutes.
- Cleanse well with copious irrigation.
- To treat a large gaping wound, control bleeding, cleanse with irrigation as usual, approximate the edges, but do not close tightly.

AVULSIONS

- Control bleeding.
- Rise under flap with sterile water irrigation; place flap in proper anatomical position and bandage.

AMPUTATIONS

- Wrap the amputated part in a moist sterile dressing and seal in a plastic bag.
- Immerse the bag in the water and evacuate both the patient and the part to the hospital.

PUNCTURES

- Gently irrigate to cause some bleeding to flush out wound.
- Monitor for infection. This is the most likely wound to become infected.

IMPALD OBJECTS

- Use common sense; if easily removed, remove it.
- Impaled objects may be removed if it is an antiseptic hard to cut off, or if it is in the cheek or the face (or the other eye—bustocks).
- An impaled object should be bandaged in place if it is in the skull, face, or neck, in the chest (possibly penetrating the lungs), in the abdomen (possibly penetrating the abdominal cavity and damaging organs).

BURNS

Get the heat out

- Remove clothing over and around the burn site; cool with cold water for at least 15 minutes.

Burns by degree

- Superficial:** First and second degree burns
 - The area of the burn will turn red and may form blisters, but the patient has full sensation.
 - Cool the burn with water for 15 minutes.
 - Protect the burn with a dry, sterile dressing.
 - Evacuate if the burn area is more than the size of the patient's palm.
 - If the burn area is large and painful, cover with moist dressings for comfort during evacuation.
- Deep:** Third degree burns
 - The area of the burn may be red, white, charred, and blistered, and the patient will have no sensation—the burn is deep enough to destroy the nerves.
 - All deep burns must be evacuated.
 - Cool-soak the burn with water for 15 minutes.
 - Cover with a moist dressing and waterproof bandage to prevent evaporation.
 - Hydrate—force fluids as burns can cause severe dehydration.

BLISTERS

- Use sterile techniques; deflate the blister; then protect with moleskin, antibiotic ointment, and tape.

Bandaging skills

MATERIALS

Dressing: Sterile material put directly onto a wound site.

Bandage: Piece of material that holds the dressings in place.

Cravat: A large triangular piece of material that is used in very clever ways to hold dressings.

Elastic bandage: Elastic material 2"–6" wide that can be used to hold dressings and also to apply compression.

SPECIFIC BANDAGES

Scalp bandage: To hold a dressing on the scalp (or to look cool).

Temporal/fore: To hold a dressing on the side of the head, to support the jaw.

Shoulder: To hold a dressing on the shoulder or upper arm and maintain range of motion.

Arm sling: To support the shoulder, upper arm, elbow, forearm, or wrist.

Hip: To hold a dressing on the hip or buttocks and maintain full range of motion of the hip.

Knee: To hold a dressing on the knee and maintain full range of motion (or to pad the knee if you plan on spending a lot of time kneeling).

Sprained ankle: To support a sprained ankle, or for an ankle hitch for a traction splint.

NEWSLETTER SUMMARY

Straightforward: no endless paragraphs, just concise text—the words you need, where you need them.

Crisp images that clearly show appropriate technique.

We've gone to great pains (ouch) to make the book visually fascinating as well as informative.

Section summaries put all the crucial stuff in one place.

MUSCULOSKELETAL ANATOMY & PHYSIOLOGY

Bones
Provide structure, protection, motion, calcium storage, and red blood-cell production.

Muscles
Provide the power for movement by contracting. Give our body form (cosmesis).

Ligaments
Tough, fibrous bands that span the joints and attach bone to bone. They help hold the joints together and control range of motion.

Tendons
Attach muscle to bone or muscle to muscle. They span the joints to help facilitate movement. They operate in conjunction with ligaments, bones, and nerves to do work.

Cartilage
Provides cushioning between bones at the joints. Acts as a lubricated, durable cap on the ends of bones so that the joint can flex and rotate smoothly with little friction. Provides durable support for muscle in areas where more flexibility than what bone offers is needed.

Joint detail

Bursa
A fluid-filled sac that reduces friction between the joint capsule and synovial lining.

Joint capsule and synovial lining
The joint capsule is a double-layered structure that surrounds the joint. The synovial lining is a single layer of cells that produces synovial fluid.

Synovial cavity (synovial fluid)
The lubricant in the joint space, produced by the synovial lining of the joint capsule, reduces friction, provides shock absorption, facilitates nutrient and waste transportation.

Muscle

Tendon

Ligament

Functionality

MUSCULOSKELETAL FACTS

At birth, we have over 300 bones; as we grow some of these fuse together so we end up with 206.

The human hand has 27 bones; the skull has 29; the whole leg has 31.

The largest bone is the femur (upper leg), the smallest is the stapes bone in the middle ear.

The femur is so strong that it can withstand axial loading (compression along the length of the bone) of over 3,000 pounds.

Most of the bones in the human body are about 75% water.

We replace our entire skeleton approximately every 7 years (virtually every cell in our body in fact).

The human body has 230 moveable and semi-moveable joints.

There are approximately 630 skeletal muscles in the human body, almost all occurring in symmetrical, bilateral pairs (i.e., each side of your body has one of each muscle).

Each of us has approximately 43 muscles in our face—and the theory is that it takes fewer muscles (i.e., less effort) to smile than to frown.

Each of us has approximately 4,000 tendons and 900 ligaments. No wonder we weaken and grow so much as we age.

Unlike muscle, which is constantly perfused with fresh blood, tendons and ligaments are not well vascularized—they take much longer to heal.

Bones are made up of living cells that form a composite that is stronger than aluminum. Calcium and phosphate, in a matrix with collagen, creates an elastic protein called calcium hydroxyapatite. The skeleton is constantly remodeling itself utilizing two types of cells: osteoblasts are constantly rebuilding new bone, and they are followed around by osteoclasts that are constantly resorbing bone. These cells allow the bones to heal and strengthen in response to stressors.

APPENDICULAR SKELETON

Shoulders
Arms
Pelvis
Legs
Hands and feet

Injuries to the appendicular skeleton range from minor (e.g., fractured finger) to the serious (e.g., fractured femur).

Bones of the hand
• Carpals
• Metacarpals
• Phalanges

Femur
Tibia
Fibula

AXIAL SKELETON

Bones of the head (cranium)
Spine
Ribs

Injuries to the axial skeleton can be particularly dangerous because of the potential for damaging the underlying brain, spinal cord, heart, lung, and other vital organs.

Bones of the foot
• Tarsals
• Metatarsals
• Phalanges

Assessment and Management of Traumatic Injuries

building a traction splint

- attach ankle & waist hitches**
 - Use cravats, webbing, belts, or cord.
 - Use an S-hitch around the foot—this is both secure and comfortable. Boot on, or boot off? Boot-on provides stability and warmth and keeps the S-hitch from compromising circulation, but makes it impossible to monitor CSMs at the toes. Boot-off allows you to monitor CSMs, but provides no insulation, little stability, and can be uncomfortable. Use your judgment.
 - The waist hitch is a simple loop around the injured leg at the groin. If you have a coffee mug or a similar container with a handle, place it on the outside of the patient's hip and tie the waist hitch through it.
- attach the traction support**
 - Find a straight stick, ski pole, or similar object that is at least one foot longer than the patient's leg, and place it along the outside of the patient's leg.
 - Attach the hip end of the stick to the waist hitch by tying it directly, or placing it in the mug (mentioned above).
 - Tie a cord (or similar material) to the far end of the stick and attach it to the S-hitch with a trucker's hitch.
- apply mechanical traction & secure**
 - Make a smooth transition between manual traction and mechanical traction—any interruption can cause spasms and pain. Secure the splint to the leg, making sure there is sufficient padding (for comfort).
 - Wrap the leg with two 6-inch elastic bandages, beginning at the ankle and ending at the hip—this helps stabilize the splint, reduces swelling, and keeps internal blood loss to a minimum (25% of blood volume can be lost into the fracture).
 - Add stabilization by tying the injured and the uninjured legs together.
 - Monitor for signs of shock as well as circulation distal to the site of the injury.

Assessment and Management of Traumatic Injuries

BANDAGING SEQUENCES

SCALP

- 1
- 2
- 3
- 4

TOOTHACHE

- 1
- 2
- 3

SHOULDER

- 1
- 2
- 3
- 4
- 5

Throughout the book we have relied on the artistic genius of our resident artist, Ted Walsh—and in many instances, his anatomy and treatment drawings do a far better job than photos ever could.

FX

Treating closed, in-line fractures

- These are common fractures that are relatively easy to treat in the field.
 - There is no associated wound, relatively little soft tissue damage, and typically little or no circulatory impairment.
 - The most common fractures involve the humerus, radius/ulna, tibia/fibula, fingers, or toes.
 - A femur fracture, even if closed and in line, is a serious injury—field treatment and evacuation should be done as quickly as possible (see next section).
 - Traction-in-line is not necessary (the bones are already in anatomical position), although gentle TL can reduce spasms and relieve pain.
- SPLINT** in anatomical position.
 - CONSIDER** administering pain medication.
 - EVACUATE** (monitor CSMs distal to the injury).



A traction splint (background image) is reserved for a broken femur only—fracture and potentially very serious injury—see next section.

Simple fractures (left, above) are treated simply. The bones are already lined up, so all you have to do is splint the fracture to stabilize the limb, provide pain mitigation, and get the patient to the nearest hospital.

Angulated fractures are serious. Deformity is and by misalignment damages BS, so much more than an in-line fracture does and it can compromise circulation to such an extent that the limb may not flow, a limb will at risk, without help, a limb will likely die after 60 hours.

Treating closed, angulated fractures

- Angulated fractures are more complicated than closed, in-line fractures because the fractured bone ends are not in anatomical position and will need to be realigned before splinting.
- They can be accompanied by significant soft tissue damage, which can cause internal bleeding, impair circulation, and put the limb at risk.

- INSPECT CIRCULATION** by checking pulses, color, temperature, and sensation distal to the injury site. If any of the problems described below occur during treatment or evacuation: stop, reassess the situation, and solve the circulatory problem—otherwise, the limb is at risk.

- Pulses**
- For an arm fracture, check the radial pulse at the wrist.
 - For a leg fracture, check the posterior tibialis pulse, posterior to the medial malleolus, and/or the dorsalis pedis pulse on the top of the foot (the latter shown).
 - Compare the pulses between limbs (e.g., arm to arm, ankle to ankle)—they should be equal in strength.

- Color, temperature, and sensation**
- If circulation is impaired, you can anticipate that the extremity will become pale, cool to the touch, and that paresthesia (pins and needles sensation) will develop and eventually evolve into numbness. (Note skin color change in photo.)

- If circulation is impaired...**
- If your initial evaluation of pulses and color/temperature/sensation shows that circulation is impaired distal to the site of the injury (lack of pulses), inspect the injury to determine the cause. Early on, circulation is typically limited by deformity at the site of the injury—correcting this problem requires realigning the angulated fracture into proper anatomical position (see Step 2, next page).

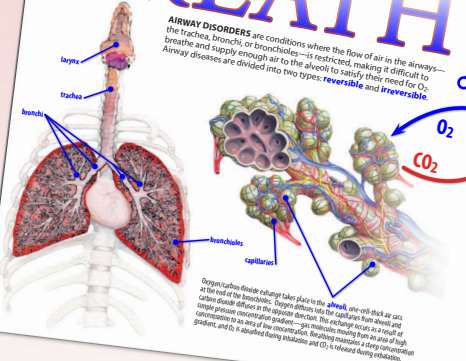
We take subjects like trauma really seriously, devoting 125 pages to things like fractures, dislocations, and sprains.

shortness of BREATH

Our understanding of how the respiratory system works (and how to make it work better) has constantly changed over the years, and treatments can't keep pace as well—you won't get much help from your long function for 30 years these days.

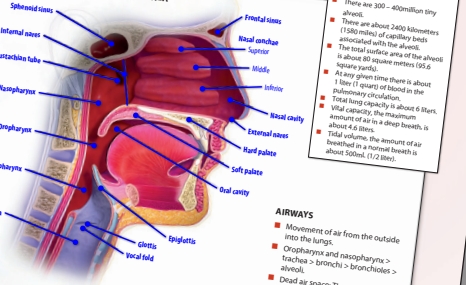


AIRWAY DISORDERS are conditions where the flow of air in the airways—the trachea, bronchi, or bronchioles—is restricted, making it difficult to breathe and supply enough air to the alveoli to satisfy their need for O₂. Airway diseases are divided into two types: **reversible** and **irreversible**.



Oxygen-carbon dioxide exchange takes place in the **alveoli**, and will stick as long as they're moist. Oxygen diffuses into the capillaries from alveoli and carbon dioxide diffuses out. **Surfactant** coats the alveoli from alveolar cells to keep them from collapsing. **Surfactant** also helps to keep the alveoli from sticking together. **Surfactant** is made up of phospholipids and proteins. **Surfactant** is a surface-active substance that allows the lungs to expand and contract freely.

ANATOMY DETAIL: NARES TO TRACHEA



LUNG STATISTICS

- There are 300–400 million tiny alveoli.
- There are about 2400 kilometers (1500 miles) of capillary beds associated with the alveoli.
- The total surface area of the alveoli is about 80 square meters (900 square feet).
- At any given time there is about 1 liter (1 quart) of blood in the pulmonary circulation.
- Lung capacity is about 6 liters.
- Vital capacity, the maximum amount of air in a deep breath, is about 2.5 liters.
- Tidal volume, the amount of air breathed in a normal breath, is about 500 ml (1/2 liter).

AIRWAYS

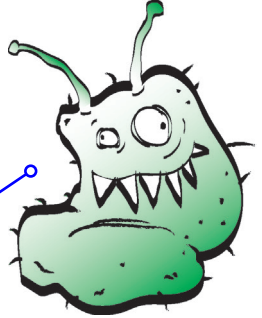
- Movement of air from the outside into the lungs.
- Oropharynx and nasopharynx > trachea > bronchi > bronchioles > alveoli.
- Dead air space: The space occupied by air that is in the trachea, bronchi, and bronchioles. You have to move at least 150 ml of air to get to the alveoli.
- O₂ and CO₂ exchange occurs at the level of the alveoli.
- The trachea, bronchi, and bronchioles are made of smooth muscles and are held open by cartilaginous C-shaped rings.
- The airways are lined with cilia and goblet cells. By secreting mucus and beating the cilia, they help to trap and remove dirt particles, pollen, and other debris in the air we breathe. This debris is then swept up and out of the airway by the cilia in a rhythmic, wave-like motion referred to as the mucociliary escalator. Constantly sweeping upward, this motion moves the mucus and trapped particles up and out to help the airway clean.
- During inhalation the air in the way to the alveoli is warmed to the core temperature, becomes 100% humidified, and is scrubbed clean, trapping contaminants in the mucus lining the airways.

RESPIRATORY MUSCLES

- The primary muscles of respiration are the intercostal muscles and the diaphragm.
- There are also accessory muscles, the pectorals major and minor, the larynx, and the diaphragm.
- Contraction of these muscles expands the lungs, creating low pressure in the lungs that draws the air in.
- Inhalation is an active process—contraction of the muscles pulls the lungs open.
- Exhalation is a passive process—the muscles relax and the lungs recoil due to their inherent elastic properties. This is a potential that allows the lungs to expand and contract freely.

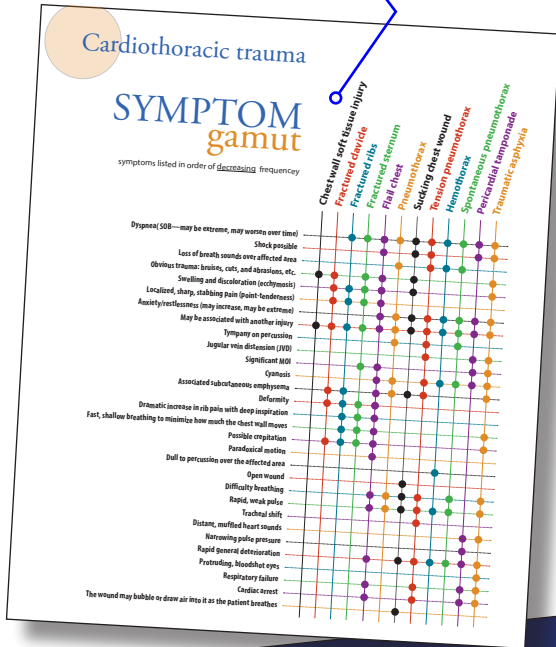
There is much more ATP in mitochondria in the chest muscle tissue.

Medical emergencies, those sometimes-mysterious problems are covered in detail, with lots of anatomy and physiology information to help make the underlying issues clear.



Our powerful, electron-based imagination microscopes allow us to bring you images so detailed that you'll never again wonder what things like the common cold might look like.

Every technical book needs charts and graphs—ours are really good.



WE ARE A NAKED

THE HUMAN ANIMAL

Brains, sweat glands, and fleece made from soda bottles, versus instinct, panting, and a warm burrow

THE HUMAN ANIMAL—Unlike a bull moose, who loves cold climates and has antlers to keep him warm okay, if the hair on his neck and back is not the antlers, as soon as we head toward the poles from San Diego, St. John, or Nairobi, we must make do by bringing with us clothing, shelter, and a heat source—otherwise, we just turn into popsicles.

Thermoregulation
Hydration
Alimentation

If you're standing naked on a Minneapolis sidewalk in January or out in the African bush in the top of summer, your only hope of staying alive (and tolerably comfortable) comes down to three things:

* Of course, you may also need some friendly advice about some basic life issues.

222

WILDCARE™

right into the

of it

THE ANGUILE DU MIDI

(needle of the south) looms far above the town of Chamrousse in the French Alps and towers to the highest peak in the world. It only takes 20 minutes to hike south from the pedestrian elevator in town (1350m/3999ft) to the top of the air and hot tent (1350m/3999ft) to the top of the air and hot tent. Some a committal jet would get you there high in the less than half the time, but you'd stay inside the plane. So instead, you gain so quickly can easily bring on a whole host of altitude-related illness symptoms—like that 14 days to get back down.

Huh? Pretty complicated for stuff you can't even see, isn't it? Altitude-related illness is common above 2400m (8000ft) and ranges from annoying to life-threatening—let's see if we can make some substance out of this whippy stuff.

Like...NO!

THERE'S SOMETHING IN THE AIR
but there's a lot less of it the higher you go—sure, the proportion of oxygen stays the same, it's just that you can't get at it. What? It's like barotrauma: it's a pounds-per-square-inch thing, but this time there's not enough pressure instead of too much, so there's less air no matter how much of it you suck in. Imagine if your arms were too short to reach your mouth—you'd have trouble eating, right? It's like that, kind of.

OXYGEN
THE SUBSTANCE OF THINGS INHALED

- Oxygen gas is colorless. As a liquid (-183°C/-297°F) and a solid (-218°C/-362°F), oxygen is pale blue—neither state occurs naturally.
- Oxygen is the most abundant element by mass in our biosphere: air, sea, and land.
- About 2/3 of the mass of the human body is oxygen.
- At the present rate of creation (by photosynthesis) and consumption (by respiration and decay) the earth's oxygen is renewed every 2000 years.
- Humans inhale more than 6 billion tons of oxygen each year.
- The bright red color of your blood is because of the oxygen attached to your red blood cells. After those blood cells have released their oxygen and picked up carbon dioxide (CO₂), it turns dark red.
- Oxygen exists in nature as dioxygen, O₂, which are two oxygen molecules bound together allowing them to share a pair of electrons that stabilize the molecule. Animals use O₂ to transport electrons between molecules, facilitating the chemical reactions that are essential to life.

MOUNT EVEREST
on a perfect May day in 1951, an American and a British climber are finally on top, sucking precious life from an oxygen tank. Most climbers need supplementary O₂ to reach the highest summit on earth—and despite all the editorial license and hype, no one has ever climbed Mount Everest "without" oxygen. Since 1951, approximately 1,500 used oxygen bottles have been removed from the high camp on Everest. Hundreds remain.

Most textbooks are stuffy affairs that take themselves too seriously; we wanted our book to be a bit whimsical—even making things like thermoregulation fun and interesting

The environmental emergencies section is lavishly illustrated and comprehensive; while, in the back of the book we cover some critical side-topics, such as navigation and disaster medicine.

navi·ga·tion

definition
/ . naviˈgāSHən/
noun: 1. The process or activity of accurately ascertaining one's position and planning and following a route

Spring Mountains traverse (Hawaii)
May 2011 - 27 miles, 2 weeks, 1000 lbs. of gear. It's 4000 feet high, and the terrain is extremely rugged. The route was on a steep, rocky slope. The terrain was extremely rugged. The route was on a steep, rocky slope. The terrain was extremely rugged. The route was on a steep, rocky slope.

Life is full of movement: "there and back again" is how Mr. Tolkien said it. We scurry around in our cars and on our bicycles and on foot, never satisfied with here, always wanting to be there—and most about it. We live in an age where if we get misplaced, we're likely to hear a friendly computer voice saying "recalculating," and we're soon back on track. But imagine if you were a battery-powered, satellite-linked, high-tech gadgetry junk had been back in a closet in Toledo—suppose you were here and wanted to be there, and all you had were a few, simple, low-tech tools, and your wits... could you do it?

- Navigation is divided into two general categories: Line-of-sight (LOS) and instrument-based.
- Line-of-sight is exactly as it sounds—we look where we want to go, and then go there, building a stockpile of visual reference points along the way (perhaps so we can return). Two examples are hikers traveling cross-country in the desert (above), and an airplane pilot using Visual Flight Rules (VFR). Instrument-based navigation, on the other hand, can be as complex as the latest GPS technology, bouncing information off satellites—or it can be as simple as a map and compass. So we are here, but we want to be over there; so...how do we make that happen?

The most fundamental need in navigation is to know where you are. In the illustration above, using line of sight navigation, you would see 71 m of Squid Island and Ocean Point. Using latitude and longitude coordinates, you would say, "I'm at 43.8348°N and 70.8348°W." Both descriptions are equally accurate, although the Coast Guard in the middle of a stormy night (of course, in that case, it would likely be better if you were 222 Square Island instead of getting thrashed by waves out to the boat).

Classic line-of-sight navigation in an environment where you know the direction you want to go, but don't have enough natural reference points (in a bank desert, backpack in line and keeping past them, maintaining your heading.



READY?

Special Promotion

\$100 retail price

\$60 pre-press price*

just go to

soloschools.com

Major credit cards and PayPal accepted

WILDCARE™

Working in Less than Desirable Conditions and Remote Environments
By Dr. Frank Hubbell DO • SOLO founder

- 335 pages • full color • ISBN 9780-615-98516-9
- Hundreds of photos, illustrations, and diagrams
- The same information that over 350,000 SOLO students have benefitted from
- Detailed information on: patient assessment, trauma, medical emergencies environmental emergencies and other wilderness medicine topics
- The most comprehensive, detailed, and engaging textbook on wilderness medicine ever written
- Written by the foremost expert on wilderness medicine in the US



Published by
**Stonehearth Open Learning
Opportunities, Inc.**
621 Tasker Hill Rd., Conway, NH 03818
www.soloschools.com

* Offer good through August 1, 2014
Estimated shipping date: August 15, 2014