

PART 1. EXPEDITION PLANNING

1 The Expedition Physician

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SIX LITERS

In 1988, I was asked to serve as expedition doctor on the first American ascent of Kangchenjunga, the world's third highest peak. I had provided medical support for numerous smaller expeditions of one to two weeks, but this trip was going to be different. Kangchenjunga was proposed as a three-month expedition into a then relatively little traveled region of Nepal. The Kangchenjunga region in 1988 was still closed to trekkers and required a climbing permit to access. Base camp was approximately 15 days by foot from the nearest road head, and in those days there were no satellite phones for security. This was to be my first significant expedition and as the launch date grew closer, I became increasingly apprehensive.

I was responsible for providing medical care and support to a 30-person expedition made up of climbers, Nepali porters, and Western support trekkers. A couple of mountain medicine handbooks existed in the late 1980s, but these references said little about operational issues of expedition medicine. How much intravenous fluid should an expedition like this carry? I had no clue. I realized that big expeditions carried intravenous fluids, but how much? That was another question. I quickly realized that the wilderness medical textbooks were completely inadequate for answering many practical questions. With mild consternation, I called my friend and mentor Dr. Peter Hackett. "Peter, I'm going to Kangchenjunga for three months, how much intravenous fluid should I take?" Peter responded calmly, "I don't know, just bring whatever you think you'll need." "Thanks, Peter." I then called my good friend, Howard Backer, and he suggested that I "ask Hackett." I went on to another mentor, Dr. Gil Roberts. Gil was living in Berkley in the late 1980s and had been one of my early mountain medical heroes. He was the physician on the first successful American Everest expedition in 1963, along with Whittaker, Hornbein, Bishop, Jerstad, and Unsoeld. Gil was known for being a bit of a nihilist, but he was clearly the reference I needed. I phoned him and queried, "Gil, how much intravenous fluid should I bring to Kangchenjunga?" "Well, Howard, it doesn't

really matter. Anybody that's going to live is going to live, and anyone that's going to die is going to die." I politely thanked Gil for his advice and dejectedly hung up the phone. Finally in complete desperation, I went to the appendices of Chris Bonington's books. The Brits, being very compulsive, typically included appendices, which carefully indexed the contents of the expedition medical kits. Unfortunately, these early British expeditions were much larger than ours and carried vast quantities of intravenous fluids (50 liters plus). Well, ultimately I empirically decided on 6 liters. This seemed like an adequate quantity for fluid resuscitation of one, moderate, nonsurgical trauma patient, or some form of moderately severe medical illness resulting in fluid loss or dehydration. On Kangchenjunga, we ended up using none of it. (See Figure 1.1.)

Coincidentally, shortly after my return, I was hired as a medical operations consultant for NASA. NASA was working then on Space Station Freedom, which was the conceptual forerunner for the international space station (ISS). At that time, Space Station Freedom was developing the capability for producing intravenous fluids via "ultra-filtration." They developed a process for converting drinking water into sterile water. Electrolyte salts were added to individually produce a variety of crystalloid solutions as needed. I was invited to speak at a large consultants' meeting in Houston. NASA was interested in my experience as a wilderness medicine doctor.

In due course, I was called to the podium and questioned in front of a very impressive group of international scientists and physicians. "Dr. Donner, on board Space Station Freedom we can produce intravenous fluids via ultra-filtration. As you know, ultra-filtration technique requires some time to produce these fluids. Our question for you is how much intravenous fluid should we have on hand, available to use immediately?"

Intimidated as I was by the caliber of scientist waiting for my reply, I managed to softly stammer, "uh, six liters." This somewhat arbitrary answer has personified my philosophy ever since; that is, expedition medicine is often an inexact discipline.



Figure 1.1. Medical training on Kanchenjunga.
Photo courtesy of Howard Donner.

EXPEDITION MEDICAL MINDSET

Common Sense

The most important single attribute that an expedition doctor can possess is common sense, everything else can be learned. In Chapter 2, Dr. Forgey provides a well-thought-out and comprehensive chapter on the subject of preparing the expedition medical kit. You might keep in mind that ultimately no reference can provide a cookbook formula for successful medical preparation. Some textbooks provide algorithms for calculating drug types and quantities. “Let’s see, I have 14 folks on a 9 day trip, I will therefore need 114 ibuprofen tablets.” The arithmetic approach ignores the infinite nuances and intangibles of real-world expedition environments. A well-known, and well-respected, expedition physician came to one of my lectures years ago, at the start of her career. I was giving a talk on high-altitude illness. I described the ubiquitous nature of high-altitude cough, and the multiple etiologies, including dusty trails, smoke-filled guest houses, irritation to the respiratory mucosa secondary to cold dry air, and generally increased ventilation at altitude. Because of the high incidence of cough, I recommend bringing an adequate amount of cough drops on any high-altitude sojourn. She did some math . . . 30 members in her expedition, three months out, about 8 cough drops per person per day. The math resulted in a total of $30 \times 90 \times 8$ or 21,600 cough drops! This resulted in a number of dedicated porter loads entirely for cough drops, as well as a persistent legend of cough drops from that Everest expedition continuing to materialize around the Khumbu for years thereafter. Integrate a meticulous analytic assessment with a more generalized gestalt, based on knowledge, clinical experience, and, always, a bit of guesswork.

Complex Variables

The variables on any expedition are complex, making generic advice on “what to take” moot without an operational context. Major considerations should include

- The environmental extremes of the trip (e.g., arctic, high altitude, tropical, desert)
- Time of year (i.e., climatic conditions and disease conditions)
- Specific endemic diseases
- Your medical expertise (i.e., specialty and expertise of the expedition medical officer)
- The medical expertise of the other expedition members (i.e., neophyte tourists, a group of guides, other doctors)
- The total number of expedition members, including ancillary staff (i.e., porters, local guides, expedition staff)
- Duration of trip
- Team demographics (i.e., age and gender)
- Known preexisting medical problems of individuals within the group
- Distance from definitive medical care (e.g., are you traveling in the Alps or the Karakoram?)
- Availability of communications (i.e., cell phones, radios, satellite phones, tele-medicine capability)
- Availability and timeframe of rescue (i.e., organized rescue groups, proximity of airfields, availability and capability of helicopters and fixed-wing aircraft)
- Medical kit weight and volume limitations (i.e., will the kit be carried on your back, on others’ backs, or on pack animals, sleds, rafts, or boats?)
- Who assumes the responsibility for providing local health care (i.e., on the trek in and out)

HEROIC FANTASY

Dr. Gil Roberts (see earlier reference) once stated that it was “heroic fantasy” to assume that an expedition doctor has the ability to manage any possible medical event occurring on a large expedition. Gil’s hardened pragmatism runs counter to the idealized belief system with which many of us enter medicine. Get used to the idea that, at times, the medical needs of your patients may exceed your ability to do anything. This can be disconcerting for Western doctors who have been indoctrinated with the idea that something can always be done. Despite his slightly jaded view, Gil often pointed out that the single thing an expedition doctor should unfailingly be prepared for, and capable of, is providing pain relief. Remember that even when you can’t fix it, you can generally help patients feel better. (See Figure 1.2.) Pay special attention to the discussion of analgesics in Chapter 3.

You Can’t Carry a Hospital Formulary on Your Back

The process of organizing and obtaining the medical equipment for an expedition requires an enormous amount of planning and forethought. No matter how much equipment is ultimately hauled in, you cannot possibly prepare for every conceivable illness or accident. Philosophical approaches vary from “carry a SAM® Splint and some duct tape” to a collection that would stagger the local porters or sink a raft. Surgical types inevitably anticipate trauma, while internists favor meds. I frequently speak at wilderness medicine conferences on the subject of expedition medical preparation. Often, when I finish my talk, a small group of mildly irate looking doctors collect beneath the podium, “Uh-oh, what did I do wrong,” I muse. Some specialists become indignant that I would suggest certain medications and leave out others. The anesthesiologist might remark, “I can’t believe you recommended bringing

morphine without mentioning fentanyl or ketamine.” The psychiatrist might wonder why I only reference Haldol in my discussion of major sedatives. “Why don’t you include newer agents such as Zyprexa or Symbyax?” The unhappy truth is that you can’t carry an entire hospital formulary on your (or a porter’s) back. Additionally, there is benefit in the concept of “tried and true” (i.e., using medications that you are familiar with from your daily practice). I continue to use ciprofloxacin (Cipro) in my medical kits. I am frequently asked why I don’t use a third-generation quinolone such as levofloxacin (Levaquin). Clearly, newer third- and fourth-generation quinolones provide an increased spectrum against gram negative, and even some anaerobic, bacteria. These current generation quinolones could potentially be used as the ultimate expedition “super drug.” Unfortunately, a few third- and fourth-generation quinolones were taken off the market following reports of serious adverse side effects. Side effects are problematic on expeditions, especially when the selection of backup drugs is limited, so I often choose to keep it simple. Ultimately, the choice of what to take will be individual, based largely on personal preferences and subjective “style.” This element of “artistic license” is to some extent, what makes expedition medicine both challenging and fun. The recommendations in this, or any, book on expedition medicine should be viewed as guidelines, not gospel.

You’re Definitely Forgetting Something

Years ago a friend of mine, Dr. Alan Gianotti, now an experienced expedition physician, called me late one evening. He explained that he was leaving the next morning for Pakistan on his first full-scale climbing expedition to the Karakoram. “Howard, I’m calling you because I’m really worried that I’m forgetting something.”

After a short pause I responded, “Alan, I hope this will make you feel better, you’re *definitely* forgetting something.” My response to Alan, though flippant, was communicating a point. It is unrealistic to assume that you can travel to a remote region, on the other side of the planet, remain in isolation for three months, and manage to prepare for every conceivable illness or accident.

Another friend of mine, Brian Horner, served as medical officer on an extensive climbing expedition in the Antarctic. Unfortunately the large aircraft they were using for expedition support crashed on landing in poor visibility. Brian found himself confronted with the critical task of caring for multiple trauma patients with extensive injuries for many days. When Brian returned from that expedition, I asked him if there was anything, from a medical perspective, that he wished he had done differently. He replied, “Absolutely, I wish I had brought more morphine.” He went on to say that he had included a typical quantity of narcotics, which were completely



Figure 1.2. Gil Roberts and Sherpa on Everest 1963. Photo courtesy of Erica Stone.

exhausted during the first few hours. For the next few days, Brian cared for these patients without any resources for providing analgesia. In retrospect, it is unlikely Brian could have anticipated a mass-casualty scenario extending for many days. Should we respond to Brian's experience by routinely including 50 ampules of morphine on every expedition? Ultimately, the expedition doctor must expect that there are risks on expeditions that are not entirely predictable. These risks cannot always be planned for or entirely mitigated against.

Common Things Are Common

Remember, "Common things are common." It is natural to assume that patients in exotic locales will develop exotic disease entities. The reality is, patients in exotic places more typically develop fairly ordinary diseases. For example, before you make the diagnosis of schistosomiasis, consider more common causes of fever, cough, abdominal pain, or diarrhea. Include schistosomiasis in your differential, but initially, consider the common. Expedition populations are typically reasonably healthy, immune competent individuals. First-line treatment should reflect that.

General Guidelines for Expedition Drugs

- When possible, choose medications with low side-effect profiles (e.g., tinidazole over metronidazole).
- Choose medications with limited contraindications (e.g., Augmentin is contraindicated in penicillin-allergic patients). Do you want to carry additional drugs because a subset of your patients won't tolerate penicillin?
- When possible, choose medications that have multiple indications (e.g., drugs like Benadryl and prednisone have multiple uses on expeditions).
- Choose medications that have favorable dosing schedules (e.g., azithromycin over erythromycin). Compliance will markedly improve and you will greatly reduce the weight and volume of the medical kit.

If You Can't Steal Samples

Physicians with bulging sample cabinets may tend to favor anything they can get for free. Try to keep in mind what actual costs are if expedition members are paying the bill. Zymar (gatifloxacin) is an ideal drug for corneal ulcer, but should you provide a \$60 antibiotic for routine pink eye? Consider bringing inexpensive drugs when possible and reserve the expensive "big guns" for serious indications. You may need to sequester them so that they remain available when really needed.

Often medicines are considerably more economical when purchased outside the United States. This is

especially true in developing countries. You might look into the availability of commonly used drugs in the destination country. Quality control of foreign drugs can be an issue, and this should be investigated before arrival when possible.

What's Going On Up There?

Expedition and wilderness medicine is a constantly evolving field. Try not to let the conventions of those who have gone before you inhibit your creativity. I am often amused when teaching wilderness medicine courses that students feel uneasy about improving on a system or concept that I am teaching. Students should be encouraged to advance the field, and think independently. On my first expedition (see previous discussion) to Kangchenjunga, I went through each organ system systematically and reflected on how I could improve on the medical kits of my mentors. In the early 1980s urine beta-HCG test kits were becoming compact and user friendly. I wondered how I would manage a female support trekker on that expedition. For example, 15 days from the closest road head, a reproductive-aged female suddenly develops lower quadrant pain and/or vaginal bleeding. My first thought was "I need to know whether that patient is pregnant." The ability to rule out complications of first-trimester pregnancy (e.g., an ectopic pregnancy) would be key in any emergency department evaluation of those symptoms. Interestingly, I was not aware at that time of anyone carrying urine beta-HCG tests in their expedition kits. I threw one in and have continued to include it since. Ultimately I recommended that NASA include this capability for both space shuttle and space station. I was told recently that incredulous reporters still call Johnson Space Center from time to time and inquire, "We notice you're flying urine pregnancy kits on the space station and shuttle, what's going on up there?"

Why You Shouldn't Carry White Powder in Small Zip Lock Bags, and Other Customs Issues

One of the common expedition medical questions I receive is, "How do you get all of these medicines through customs?" The following suggestions will increase your odds of experiencing a relatively seamless customs experience:

- Don't carry white powder in zip lock bags. As obvious as this may sound, it is amazing how tablets of all sorts tend to break down with humidity and then slowly disintegrate in zip lock bags. A poorly identified zip lock bag, with pulverized white medicine inside, presents a rather suspect impression to a customs official. (See Figure 1.3.) Try to be meticulous with your drugs. Place your medicines in clearly labeled zip lock bags or medicine vials. If you choose



Figure 1.3. Pulverized ibuprofen in Patagonia. Photo courtesy of Howard Donner.

to use zip locks, protect them from physical damage inside of a sturdy kit or case. The more organized the kit looks, the less dubious the customs' officials seem to look.

- Carry a copy of your medical license. Showing a customs official a photocopy of your medical license carries a bit more credibility than stating, "But I'm a doctor, really."
- Present a letter of introduction. Customs officials seem to love embossed stationery or letters embellished with gold seals. These blank forms can be easily purchased through most office supply stores. Even if you're not traveling with the National Geographic Society, you can print up your own letter on embossed stationery. Introduce yourself as the expedition doctor for the "2008 blank blank expedition." As long as your name is on the letter, along with a signature from the sponsoring foundation (such as a friend of yours), custom officials seem to relax.

Despite all of your best efforts, remember that horror stories exist, and there are no absolute guarantees. Keep your fingers crossed.

ATTITUDES

Issues of Control

Most physicians revel in control. Most of us strive to avoid the unexpected and feel most comfortable when we can exert control over our surroundings. The

inability to control outcomes in the expedition environment can catch the uninitiated physician off guard. In our customary practice, virtually everything possible is done for every patient, under every circumstance. I once cared for a young porter in the Himalayas who developed sudden onset of severe abdominal pain. He was carrying goods between villages in the Annapurna region and was not connected with any expedition. On physical exam, it was obvious that he had developed an acute abdomen. I explained to the patient that he needed immediate air evacuation to Kathmandu where he could be evaluated and treated by a surgeon. There was a small airfield, with evacuation capability, a few hours' walk down the trail. I wasn't quite ready for the patient's response. He said that he could simply not afford to fly to Kathmandu. He understood that he might die, but he also understood that when a person lived in the mountains, a surgical problem would probably result in death. That was simply the reality of living in a remote mountain region, and he seemed relatively comfortable with the notion. A group of us (Western trekkers) ultimately collected funds and financed his flight to Kathmandu. None of us were emotionally prepared for the alternative.

Differences in Fundamental Values

On another occasion, I treated a patient at the Himalayan Rescue Association clinic in Manang with a severe necrotizing fasciitis involving his forearm. I started the patient on a combination of emperic intravenous antibiotics. He also received extensive daily surgical debridement in our clinic. Despite our efforts, he developed fever and chills and began to deteriorate. (See Figure 1.4.) I asked our interpreter to inform his family that we needed them to collect enough money to fly the patient to Kathmandu. Although many Nepali families would not have had the means, this family did. Our interpreter discussed the options with the patient and his family. The family then asked, "If he goes to Kathmandu, is there still the possibility that he might die?"

I replied, "Yes, he could die even if he goes to Kathmandu." The family talked for a moment with the patient and then responded.

Our interpreter stated, "He doesn't want to go."

Incredulously I asked, "How can he not want to go?"

Our interpreter explained that the patient was worried that if he went to Kathmandu and died, his soul would remain lost and have difficulty returning to his family. The patient felt much more comfortable remaining at his home to die, even though evacuation would have most likely guaranteed survival. This episode reminded me that the most fundamental structure of human nature is often culturally based, and may offer surprises to Western physicians.



Figure 1.4. Debriding a necrotizing fasciitis in Manang, Nepal. Photo courtesy of Howard Donner.

Nonlinear

Linear-thinking Western expedition doctors may at times become frustrated working in developing countries with what could be perceived as a nonlinear approach to problem solving. In the world of expedition medicine, assume that frustration “comes with the territory.” Many Westerners seek out adventure travel under one condition . . . that there is no adventure. On an expedition, be advised that adventure and chaos coexist, as do unforeseen trials and tribulations. There will be porter strikes, flat tires, landslides, and annoyances that can’t even be imagined. On one trip in the Himalayas, I attempted to bring a large tank of medical oxygen up to a high-altitude clinic. The trek in was nine days. When the porter and his load of oxygen finally arrived at the clinic (nine days by foot later), alas, the oxygen cylinder was empty! It had not been filled at the supplier despite his assurance to the contrary. At times like this, it is often best to embrace the Nepali expression “Ke Garne,” roughly, “Oh, well, what can you do?”

Lost in Translation

The complexities of language can be perplexing when providing medical care abroad, especially when the situation requires more than one interpreter. Once in Nepal, I needed to speak to an ill patient from Tibet. I went from English to Nepalese through our English/Nepali interpreter. From there we went through a Nepali interpreter who was fluent in the local dialect. We then had to go from the local dialect into Tibetan via a third interpreter. I remember inquiring “Does it hurt when he urinates?” The question passed through the three interpreters, eventually reaching the patient. Soon the three interpreters, the patient, and the patient’s family were arguing and talking very excitedly in three

dissimilar languages. After a minute of this, I stopped my interpreter and asked, “Please, what are they saying?” The interpreter paused, looked at me, and quietly replied “No.” I was clearly losing something in the translation, but hey, “Ke Garne.”

Feed It to the Yaks

When practicing medicine on international expeditions, you may feel overwhelmed by the plethora of medications that are completely unfamiliar to you. Even with the help of a physicians’ desk reference (PDR) or similar work, you will find that many medications found in international settings simply don’t exist in the North American database. My colleague Dr. Eric Weiss once told me, “If you are having trouble typifying unknown drugs, feed them to the yaks and categorize the medicine based on the yaks’ reaction.” Laughing in the face of frustration serves as a handy defense against despair. (See Figure 1.5.)



Figure 1.5. Used much streptomagma lately? Photo courtesy of Howard Donner.

Clinical Fundamentals

One of the most gratifying elements of expedition medicine is that the focus returns to clinical fundamentals. Clinical laboratory, imaging, and referral are not typically options in the expedition environment. You learn to rely on history and clinical findings. You may become so accustomed to treating routine illnesses without tests that it may seem odd when you return. Your hospital-based colleagues may order stool cultures for every case of “garden variety” diarrhea and you may find yourself longing for the commonsense and empirically based medicine that you practiced in the mountains.

Occam’s Razor

In medical school, we are indoctrinated with the concept of “Occam’s razor.” Occam’s razor suggests, “When given two equally valid explanations for a phenomenon, one should embrace the less complicated formulation.” Or in simpler terms, “All things being equal, the simplest solution tends to be the best one.” In my experience, this does not always hold true in the expedition environment. For example, it is quite common to see a patient with both altitude illness and a concomitant viral syndrome. It is the combination of infectious and environmental disease that puts the patient “over the edge,” bringing them to your tent. Similarly, you may see a patient with high-altitude pulmonary edema and pneumonia in combination, yet our clinical conditioning suggests we should assume it’s either one or the other. On an expedition, you may be treating a combination. On high mountains, the reality is that most patients have some combination of malnutrition, dehydration, insomnia, exhaustion, hypo- or hyperthermia, anxiety, and hypoxia in addition to their chief complaint.

East Meets West

We live in a culture where the relationship between those who practice allopathic medicine and those who practice alternative medicine is sometimes acrimonious. Fortunately, the chasm between these fundamental approaches to medicine seems to be narrowing. The first time I worked in Nepal, I was apprehensive about how I would interface medically with the local Lamas’ practice of Eastern Tibetan medicine. I feared it would be “us against them.” To my great surprise and relief the interplay between our Western clinic and the local Lamas’ medicine was virtually seamless. When we had patients suffering from chronic conditions such as depression or intractable diseases such as cancer, I would often bring these patients to the Lamas. When the Lamas had patients with medical conditions that they felt uncomfortable with (e.g., trauma or infectious disease), they would often bring their patients to us. We adopted a

philosophy and policy of “best tool for the job.” It’s a shame it can’t be that painless in the States.

Intangibles

As stated earlier, there are times in the expedition environment when, apparently, nothing can be done. Some years back, I was called into a village where a young Tibetan mother was laboring unsuccessfully. The patient was tachycardic and weakening, and her labor was not progressing. I was traveling with a nurse practitioner who had worked as a midwife back in the States. I turned to her and said, “You’re a midwife. Do something.”

She then turned to me and replied, “You’re the doctor. You do something.”

I had the sudden realization, that despite my years of medical training, I was confronted with a situation where I had little to offer. No means for an emergency c-section, no availability of oxytocin, no vacuum extraction or forceps. I realized that I was unprepared to change the fate of this mother and her unborn child. Luckily for all, there was a Tibetan local in the crowd who came to me and politely said, “Doctor sahib, I have a powder that comes from a fish from a sacred lake in Tibet, sometimes we use it when the baby does not come.”

I immediately replied, “Give it to her!” He disappeared and returned minutes later with a small satchel of some unknown dried substance and gave it to the patient. I realize that this scenario sounds improbable, but within 30 minutes the mother was laboring actively and within an hour she was delivering her baby. The infant was initially a bit limp, but following warming and towel stimulation, he “pinked up” and ultimately fared well.

To this day, I wonder what was in that “potion.” Was it something tangible, such as an oxytocin analog, or perhaps something more enigmatic?

Remain open to new realms.

EXPEDITION MEDICINE 101

I’m often asked how one becomes competent as an expedition doctor. There is no single pathway, but this section will serve as an informal guide. There is no single specialty that prepares a person for expedition medicine. Generally, any primary care specialty such as family, internal, or emergency medicine will offer the broadest background. Historically, expedition doctors have come from essentially every discipline. Rescue doctors in the Alps, for example, are usually trained as anesthesiologists. No matter what your training, for most doctors, there is a general set of skills and knowledge that will enhance your competency in the expedition environment. If you’re uncertain, review the following fundamentals before heading into the great unknown.



Figure 1.6. The Gamow bag saves lives at altitude. Photo courtesy of Howard Donner.

Tropical and Travel Medicine

Become familiar with the medical aspects of preparing for foreign travel. You will generally be considered the expert source for any questions regarding appropriate immunizations, malaria prophylaxis, and so on. These disorders can often be prevented if the team is instructed on specific precautions and prophylactic agents.

Familiarize yourself with the specific endemic diseases common in the area of your expedition, for example the local malaria risk, exotic diseases, local animal and arthropod hazards (e.g., dogs, snakes, scorpions, leeches). Depending on your destination, review common travel-acquired illnesses such as yellow fever, hepatitis, dengue, typhoid, paratyphoid fevers, meningococcal disease, and Japanese B encephalitis.

Learn all you can about intestinal protozoa and the all-pervasive diarrhea in travelers. Review preventative methods such as appropriate camp hygiene and other measures. Learn how to differentiate clinically between dysenteric and nondysenteric diarrheas, including when to treat conservatively and when to incorporate anti-infectives. Develop expertise in the principles of water disinfection methods, and be able to advise on which techniques provide efficacy for the specific pathogens in your part of the world.

See Chapter 17 for more information.

Environmental Concerns

Review the current management of cold injury, including prevention and treatment of hypothermia and frostbite for those heading toward cold environs. Consider learning more about heat illness, even if you’re going to colder climes. Heat problems are common in overdressed climbers on sunny days, and, of course, in the tropics and desert. A comprehensive understanding

of altitude problems, such as acute mountain sickness, high-altitude pulmonary edema, and high-altitude cerebral edema, is requisite for those “going higher.” Review the latest drugs used for both prevention and treatment of altitude-related disorders. Become familiar with other high-altitude disorders such as periodic breathing, sleep disorders, retinal hemorrhage, and focal neurological deficits. Gain some experience in the use of the Gamow bag or other portable hyperbaric system. (See Chapter 19 on high-altitude medicine.) Consider other specific environmental concerns (e.g., marine envenomation and motion sickness on an ocean-based trip). (See Figures 1.6 and 1.7.)

Trauma

If it’s been a while since you’ve managed emergencies and trauma, you should consider taking an advanced trauma life support (ATLS) course, which includes a thorough review of the initial evaluation and management of trauma. The course includes hands-on



Figure 1.7. Frostbite on a Nepali porter. Photo courtesy of Howard Donner.

Figure 1.8. Severe injuries on Denali including hemo-pneumothorax, midthoracic spine fracture with cord transection, suspected femur fracture, and hypothermia. Photo courtesy of Howard Donner.



training in important procedures such as endotracheal intubation, needle thoracostomy, and chest tube placement. These skills are key for providing a high level of trauma support on an expedition. If ATLS seems out of your scope, at least consider a course such as wilderness first responder (WFR) or its equivalent. Physicians sometimes wonder if a course like that would be too remedial. Remember that office-based doctors often get that “deer in the headlights” look when confronted with an emergency outside the confines of the office or hospital. These courses teach a systematic approach to evaluating trauma and help students become comfortable with handling and transporting injured patients in the outdoor environment. (See Figure 1.8.)

Orthopedics

You will need to be comfortable improvising splints for common orthopedic injuries and fractures, including the use of the SAM® Splint or other improvised splinting systems. The improvisation and application of femoral

traction should also be learned. Learn to recognize and treat common overuse syndromes that inevitably present as aches and pains on the trail (e.g., “sahib’s knee” and tendonitis). You may also wish to review the use of adhesive tape for stabilizing the inevitable sprains and strains of expedition life (i.e., thumbs and ankles). Many dogmatic axioms such as “splint ‘em as they lie” have become archaic and offer little merit when managing patients far from the road. If that statement surprises you, take a WFR course.

Wound Care

You will need to be adept at wound care management of basic lacerations and abrasions, including the use of suturing material (both skin and deep), surgical staplers, and tissue adhesives (e.g., glue). (See Figure 1.9.) Reexamine the optimal treatment for complicated blisters and burns, including new materials for treatment. Review the surgical management of ingrown toenails, subungual hematoma, and incision and drainage of abscesses.



Figure 1.9. Simple wound repair with tissue adhesive in Patagonia. Photo courtesy of Howard Donner.

Epistaxis

Become familiar with the acute management of epistaxis. This should include techniques and equipment for nasal packing. There are a number of pre-packaged devices that make this much easier.

Wilderness Eye Emergencies

The expedition doctor should become familiar with the management of corneal foreign bodies, abrasions, and infections, including corneal ulcers. Familiarize yourself with the management and prevention of ultraviolet photokeratitis (snow blindness). (See Figure 1.10.)

Dental

My first extended medical experience in the Himalayas was with the Himalayan Rescue Association (HRA). I ran a small aid post in Manang, which is located in the Annapurna region of Nepal. I worked in Manang with an American nurse practitioner named Mariane Gilbert. On our first day of clinic operation, a visiting schoolteacher from the south presented with a severe toothache. He conveyed that he had recently had a molar extracted but felt that “they didn’t get it all out.” On exam there was an abscess surrounding residual roots remaining from the extraction. He was obviously suffering. My first reaction was to simply inform him that he needed to walk to the closest dental clinic, which was approximately three days down the trail by foot. Hearing my advice, Mariane asked me why we couldn’t just do it for him.



Figure 1.10. Severe ultraviolet photokeratitis in Pheriche, Nepal. Photo courtesy of Howard Donner.