FOCUS ON YALE MEDICINE:
THE EVEREST EXTREME EXPEDITION

Technical and Cultural Challenges of Remote Health Care on Everest

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"I have insects in my teeth." Ken and I looked at each other, amused by the novelty of this woman's chief complaint. She then went on to explain the pain and irritation one of her back molars had been causing her for the last month or so.

Little did I know what was in store for me when I was accepted to participate as a member of the Everest Extreme Expedition (E3). We weren't dentists, but by now were certainly no strangers to dental care up at 14,000 feet, in the town of Pheriche, Nepal. Already we had set up two medical clinics prior to this one (one at 8,000 feet in Phakding and one at 11,400 feet in Namche) and among a wide variety of medical ailments, poor dental hygiene and its repercussions ranked high on the list. This was all new to me, a fourth-year medical student from the Yale School of Medicine, but Ken (a physician from New York) was well-schooled in the world of tooth-pulling and cavity-filling. He had traveled the route to Everest many times in the past and knew what to expect. So he did his homework by shadowing his dentist in the States and thus came to Nepal prepared.

Those of us at Yale worked for months at sea level prior to the expedition, researching, preparing, and testing our medical equipment, and running a battery of tests that would later be repeated at various altitudes along the way to Everest Base Camp. In retrospect, our initial plans were quite ambitious, even overly so. Part of our work involved looking at the cardiovascular response to altitude. We were evaluating various physiologic parameters and blood gas measurements; these data were to be correlated with those from Doppler ultrasound studies of the carotid, brachial, and posterior tibial arteries and any changes in vessel diameter or flow velocities through them. Measurements would be taken at rest, after various exercises, and after recovery at several altitudes and after a period of acclimatization at Base Camp.

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\textsuperscript{b}Abbreviations: E3, Everest extreme expedition.
The experienced members of our team told us early on that what we proposed to do would be difficult, if not impossible, to accomplish at altitude. The rest of us were initially resistant to easing up on our research goals, as what we had already put forth seemed straightforward and simple in design. The more we prepared at sea level, however, the more successful Scott (our expedition leader), Jim (our climbing guide), and Ken were at persuading us to scale down our plans for our five weeks at altitude.

As we ascended from camp to camp, through thousands of feet of altitude, I learned that their reasoning was well-grounded in experience. Facilities and resources are limited, and it often requires creativity and patience to solve the most simple of tasks. A problem with the fuel for the generator would halt research for hours. We couldn’t simply write a prescription and have it filled by the pharmacy or take an X-ray to see if there were a stress fracture. If what was needed hadn’t yet arrived by yak, we either had to go without or find a way to work around it. For one pediatric pneumonia case, I crushed up a 500 mg tablet of Biaxin in a makeshift mortar and pestle (a rock and another rock) and, as best possible, divided the powder into eight doses for the child’s mother to administer in water.

Even though we worked with interpreters, communication was often difficult, and I realized just how much of physician-patient interactions are based on non-verbal cues, many of which are grounded in cultural practices and norms. One of our dental patients presented with a large, rotten tooth, which was causing her a great deal of pain. We explained to her and to her daughter that we wanted to pull it, and she agreed. After administering the local anesthetic, however, she suddenly decided she didn’t want it removed; it now felt better. No amount of explaining on our part could convince her otherwise.

Working in the field produces its own set of limitations for any research project or medical work; the high altitude added another level of difficulty for ours. We

Figure 1. The author with Propaq and Cardiodynamics monitoring equipment in the medical tent.
were often our own patients, as increases in altitude brought on headaches, lack of appetite, nausea and diarrhea, a persistent hacking cough, and general fatigue. Our research days were limited, however, and in order to maximize them we pushed ourselves to work despite feeling short of breath simply from bending over or walking briskly for a few feet. The medical equipment didn’t fare as well in this environment either. There had been an eight-month drought in this area of Nepal, and, at the lower elevations, high winds kicked up dust. Even in our medical tents we found our microscopes and ultrasound machines covered in particulate yak dung. Setting up the equipment and getting it to work took ten times as long as at sea level — cable connections were dirty, and the increasingly colder temperatures were inhospitable to many machines. Cardiac monitoring leads don’t stick well to dirty skin. What worked so well at 200 feet became finicky and even ornery at 17,500 feet. When things ran smoothly (if it only took five tries to get everything set up and working in the morning), we were thrilled.

Our daily teleconferences back to Yale were a technological treat. We were excited to present our cases to the physicians back home; their consults were valuable on many occasions, and the application of telemedicine from the remote reaches of the planet to a major medical institution never failed to impress me. We had three emergent cases, all seen live, via satellite, in New Haven.

During the five weeks, our teleconsults covered the diverse fields of pulmonary medicine, endocrine, ophthalmology, and orthopaedics.

Through telemedicine, both sides of the transmission learned that what is routine and simple in one part of the world is not so in another; that what one society prioritizes is not necessarily shared by another; and that with this technology comes a greater responsibility to learn about the populations where it will be utilized.

Taking a break from data collection, I poked my head into the medical tent, where a young Nepalese woman was pointing to the area of her abdominal pain. As I watched and listened to her, I felt a sharp slap on my behind. I turned to find her aged mother behind me, grinning at my shocked surprise, as she pushed me forward to take a better look at her daugher. The Nepalese have a wonderful sense of humor and are truly a delightful, beautiful people. Working with them was a privilege.

Although I learned a tremendous amount through our work on the mountain, E3 proved to be far more than an experiment in telemedicine, high-altitude physiology, or field medical clinics. It was also an experiment in people and culture, all against a spectacular geographical backdrop. Each technical glitch, gap-toothed elderly smile, and additional foot of altitude brought another opportunity to learn. I’ve gained a greater understanding of our bodies’ physiologic changes at altitude but also a greater appreciation for mentally adapting to one’s varied environments. Similarly, I better appreciate the subtle differences in communication between people of differing cultures, which applies directly to people of differing backgrounds right here in New Haven.

Returning to school at Yale, I felt profoundly fortunate for the opportunity and ability to have been a part of such a unique, enriching experience.