

EVEREST EXPEDITION MEDICINE

– *Written by Guy Cotter, New Zealand*

I own a high-altitude mountain guiding company, Adventure Consultants Ltd, based in the alpine town of Lake Wanaka in the South Island of New Zealand. We operate expeditions to the world's highest peaks over 8,000m, including an annual Expedition to guide people to the summit of Mt Everest in Nepal. We have facilitated a total 319 people standing on the summit and I have been fortunate to achieve five summits myself. Our calendar includes expeditions to all of the Seven Summits (being the highest mountain on each of the seven continents), and we also offer guided ascents and instruction courses from Chamonix in France.

I completed my training as a mountain guide in New Zealand through the International Federation of Mountain Guides Association (IFMGA) system. The training program and qualification originated in France and IFMGA certification is considered the equivalent to the skill-set of a professor, based on the multi-year training and certification requirements. Additional to mountain guiding skills, the IFMGA training program includes avalanche training (level 6), which includes meteorological proficiency, as well as wilderness emergency first aid training.

The mindset of a trained and qualified mountain guide is to utilise their skills and

experience to avoid accidents in the first instance. A guide will carry minimal medical and rescue equipment and be well aware of what rescue and medical response he or she can provide in the event of an accident or medical event they are presented with.

Weight is the enemy in the mountains, and there is no way a guide can carry equipment to cover every possible contingency. The heavy load would slow a party down and actually cause the incidents we are trying to avoid. Instead, we are aware of the limitations of our rescue and medical supplies, and will make decisions based on the resources at hand.

MEDICS ON EVEREST TRIPS

While this approach is appropriate for mountain guiding on lower elevation peaks around the world, the transition to remote location, and high-altitude guiding, is profound. Guides must take responsibility for the well-being of the group for expeditions up to two months in duration and therefore the guides are often forced to make difficult decisions around any medical events or accidents. At any given time, there are hundreds, if not thousands of groups in remote locations around the world, being managed by guides who do not possess a high degree of medical training, but are none-the-less, regularly dealing with health

issues and injuries. In a perfect world we would have a medical professional on every departure but the associated cost is often the limiting factor. The outdoor recreation industry is generally a low-margin venture and cost can be a barrier to having additional people in a team (in this case a medic). If there is a medic, but they are not highly trained in the specific field the group is undertaking (in our case mountaineering), there may be a requirement for additional safety personnel to look after the medic and that only adds to the cost and increases the group size.

With Everest base camp being at 5,300m asl, the impacts of high altitude places a lot of stress on each person's physiology and minor illnesses are extremely common, especially as the world's highest mountains are in third-world countries where hygiene is compromised. Gastrointestinal complaints and respiratory issues are very common due to the poor hygienic practices in the lodges we use for accommodation on the approaches to an expedition base camp, and most especially on the trek to Everest base camp. Exacerbating these issues is the multinational population of trekkers and climbers arriving from around the world that pass on their illnesses to staff at the lodges, who then pass it on to every trekker passing through. By contrast, I led an



Image 1: Evacuation at altitude is no simple task.



Image 2: Frostbite – a significant concern

expedition to Mt Dhaulagiri in 2017 where we were a self-contained group utilizing our own cooking and camping facilities. There were no lodges to stay in and we did not encounter locals or other trekkers in the region. As a result of our isolation, we all remained healthy for the entire expedition.

When working in the high-altitude expedition arena, we must be vigilant around the health of our entire team including our clients, staff and local contractors such as Sherpas and porters. On an expedition to Mt Everest with 10 clients, we would have around 50 local staff (Sherpas, cooks, base camp staff etc) in addition to a base camp manager, a cook, and a medical practitioner. On a daily basis there might be 20-30 porters arriving with supplies and sometimes members of the public or friends of expedition members arrive into our base camp. Every one of these individuals may be suffering minor to major illnesses or are susceptible to injuries, and we must have strategies to avoid contamination of our climbing team and be prepared to respond to those events.

To address the health needs of our annual expedition to Mount Everest we invite the voluntary participation of a medical doctor who is eager to develop their expedition medicine skills. Another option at Everest base camp is to sign up to use the medical clinic operated by the HRA, Himalayan

Rescue Association. However, we find our health needs are better met by an in-house physician because we can respond immediately to a person at the first signs of deteriorating health and bring them back to full health sooner.

PREVENTION IS BETTER THAN CURE

When we have completed the approach trek via the Khumbu valley over the 9 days it takes to get there, we treat our base camp as a safe haven where any ailments can be treated and eliminated. We focus on the health and well-being of all climbers and staff by constantly reinforcing hygienic practices, especially in our kitchens from where illness can spread most rapidly.

This is a constant challenge with our local staff, many of whom have not yet adopted a full understanding around hygienic practices, even after regular training. A staff member in the cook team will not readily disclose that they have an illness and will continue working instead of seeking medical help. Taking time off just because of a gut or respiratory issue might make them feel they are neglecting their duties instead of recognising that their well-intentioned diligence might end up infecting the entire camp.

Solid human waste is removed from base camp and buried down valley, however liquid waste remains and has contaminated

some of the water sources at base camp. We treat all our water with a sophisticated electrical filter that needs to be emptied every night to avoid being damaged through the overnight freezing process.

MEDICINE ON EVEREST

The expedition doctor will encounter a wide range of medical complaints throughout the two months we are there for the climbing season. There have been occasional catastrophic events resulting in major injuries and fatalities such as an avalanche on the icefall in 2014 that killed 16 and injured many. The following year there was an even bigger event when a 7.8 magnitude earthquake hit Nepal that caused an avalanche that hit base camp that killed 18 people and injured many more. But these events are very rare and the expedition doctor will generally be dealing with a wide spectrum of lesser complaints.

Some seasons have a very high proportion of respiratory illness, usually picked up from a lodge somewhere on the approach to base camp. On other seasons there might be a higher presence of GI issues contracted along the way. In addition to the day to day ailments (GI and respiratory) one would expect on an expedition to Everest, we need to be vigilant of the issues around hypoxia, AMS, HAPE, HACE and frostbite.

Acute Mountain Sickness (AMS)

AMS, is extremely common and we all get to experience it on an expedition to one degree or another. The constant challenge in our acclimatisation is to push our bodies to adjust to the altitude, whilst avoiding the worst of the AMS because of the symptoms that are detrimental to us such as lassitude, lack of appetite, insomnia, headaches and high respiratory and pulse rates. A first-time high-altitude climber with AMS may suspect they are about to slide into one of the more serious high-altitude conditions, but more seasoned veterans recognize the first onset of symptoms and look after themselves well to avoid deteriorating. This would include additional hydration, rest, perhaps descent to lower altitudes, and NSAIDs.

The standard acclimatisation program follows the general rule of ascent rates of 300 meters or 1000 feet per day. However, safe locations to position the camps on the mountain are limited and usually separated by 1000 meters of elevation. The responding acclimatization strategy is to allow several days to ‘pre’-acclimatise prior to moving up to that higher altitude, and then ensure rest days after arriving there.

A high-altitude climbing mantra is to ‘climb high – sleep low’, the process where we gradually expose ourselves to the higher altitudes, but return back to a lower altitude to rest until we are ready to move up to that higher altitude. After initial recovery at the higher camp, we would climb higher again before returning to base camp to rest. With the thicker atmosphere at base camp (compared to the elevation we had climbed up to on the mountain) we tend to sleep well and enjoy a healthy appetite for a few days before we return once again to the mountain and push to the next highest camp.

High Altitude Pulmonary Edema (HAPE)

The most common of the severe altitude conditions we encounter is HAPE (High Altitude Pulmonary Edema), and I can safely say that I have never seen HAPE occur without the patient having first been suffering a respiratory illness such as a severe cold. This is significant in that the history will enable us to anticipate a deterioration in a person with a cold who is still climbing to higher altitudes. Of course that makes complete sense, but when you have a person committed to climb Everest, they will push themselves further than



Image 3: Climbers leaving at night to mitigate the risk of traversing the Khumbu icefall.



Image 4: A relatively minor injury at altitude can result in failure to summit.

they might otherwise. This applies not only to clients, but to guides and Sherpa staff as well trying to do their jobs.

We would generally treat chest infections with antibiotics in the early stages of the infection with the awareness that we

have no idea whether a respiratory issue is viral or bacterial. Yet because people have committed so much to be on Everest there is a strong drive to return people to health as quickly as possible and we would generally treat them as though it's bacterial at the



Image 5: The increased availability of helicopters has facilitated rapid descent in cases of HAPE and HACE.

first instance in the hope we can avoid a deterioration of that person towards HAPE.

Having a baseline of pulse rates and oxygen saturation through the use of a pulse oximeter enables us to ascertain whether a person is stable or improving or deteriorating. This can be a very useful tool for providing an overall snapshot of how a person is performing at altitude. We can analyse whether their acclimatisation trend is on track to go to higher elevations, or whether more acclimatisation at an existing altitude is required. In general though, our modus-operandi is to make every effort to avoid a person suffering a high altitude condition in the first place through a sound acclimatisation program.

When a person does present with HAPE, our first course of action is to get them to lower elevations with the benefit of bottled oxygen. Our climbing regulators max out at 6LPM but it is generally sufficient to get them down if we diagnose it early.

Descent to lower altitudes is a very high priority for us and these days this might

be facilitated by helicopter when possible. A very ill patient, high on the mountain, is a terrible scenario. Additional tools we can utilise is the hyperbaric chamber (known through generic brand names such as the Gamov bag, or the Pressure Altitude Chamber (PAC) whilst wearing an oxygen mask with the addition of the appropriate drugs (Diamox, Nifedipine).

The huge improvements with helicopter capability in the last decade now enables long-line rescues from as high as 7400 metres, the height of Camp 3 on Everest. This has become so reliable that there are now people who would call a rescue to get off the mountain rather than climb down, and we find ourselves having to tell some people to suck it up and walk. Insurance cover is a privilege, and I am not supportive when people abuse the system as it jeopardises the future of insurance cover for legitimate rescues.

Occasionally someone high on the mountain may feel very unwell without showing positive signs of HAPE or HACE

and it may be, they just need a short rest with the benefit of oxygen to help them recover.

The pulse oximeter might show they have quite low oxygen saturation, but if their pulse rate is not excessive that is sometimes a positive sign and further monitoring will help us understand how they are tracking. It appears some people have naturally low oxygen saturation (possibly after a hard day) yet they recover perfectly well, while other people have a naturally high pulse rate which must be taken into account when trying to diagnose the condition.

High Altitude Cerebral Edema (HACE)

I have observed that High Altitude Cerebral Edema (HACE) to be a lot less common of an ailment than HAPE. I attribute this to the acclimatisation strategies we employ as we ensure our schedules have sufficient time at the appropriate altitudes for us to adjust. That would apply to most of us, some people will hit an elevation ceiling from which they can progress no further.

Identifying HACE in its early stages can be sometimes quite difficult whilst climbing the world's highest mountains. It can be difficult for us to recognise symptoms in our clients due to the impacts of blowing wind and snow that make communication difficult. Often the guide will be at the head of the rope and if someone is further back it may be difficult for a guide to recognise symptoms unless obvious balance or behaviour issues are well advanced. Oxygen masks and goggles cover most of a person's face when we are climbing on the summit day and it takes an astute guide to identify changes in behaviour, let alone climb the mountain themselves and attend to all the other requirements of leading the expedition.

I came close to succumbing to HACE the first time I slept overnight at Camp 3 back in 1992 when I was preparing to descend next morning. I recognized that I was thinking and moving very slowly and only rallied once I was standing up outside in the fresh air. This event, and later observations, made me realise that most altitude conditions will occur at night when a person is lying down and their respiratory rate is reduced. The ramifications are that if a person falls very ill with a high-altitude illness in the middle of the night, the ability to descend to lower altitude creates its own set of hazards, not only for the patient but for the rescuers also. It appears that dehydration and exhaustion can be contributor to HACE, but those statistics might really be indicating that a person who puts the energy into good hydration is probably well organized with the rest of their systems and more likely to be successful on all levels. We have a mantra when we encounter HACE: Dex (dexamethasone), Diamox (acetazolamide), and down.

Frostbite

Frostbite is one of the potential issues at high altitude yet in my own experience the occurrence on our expeditions is very rare, as we have the approach that avoiding frostbite is preferential to treating it. We teach our climbers how to recognise the history of events that will lead to frostbite. When your digits get cold, respond straight away with additional layers or reheating (or even retreating). The trap people fall into is not realising their digits will lose feeling when they do actually freeze, and you will think you are ok, but you're not.



Image 6: Even experienced climbers can experience frostbite.

The season of 2023 was especially cold and that led to a very high number of frostbite cases amongst all the climbing teams. We had a Sherpa get frostbite while he was carrying a load from Camp 2 (6,400m) to Camp 4 (7,990m). This was the first time in the history of our company (over 30 years) we had ever had a Sherpa receive frostbite. This Sherpa had previously summited Everest nine times with no previous frostbite issues, yet the glove system he used on that particular day wasn't sufficient to protect him. The CIWEC clinic in Kathmandu reportedly had over 200 frostbite cases over

the season, a considerably higher rate of cases than normal.

I did receive a call from a guide I had leading the Everest expedition one year who told me that one of the clients had received superficial frostbite while urinating on the way to the summit. The good news, he said, was that the frostbite was on his fingers.

EVEREST STORIES

On my very first expedition to climb Mt Everest in 1992, a Sherpa with our team took a fall while descending the icefall. His injuries were such that he needed



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evacuation immediately, but cloud had enveloped base camp and there was no question of a helicopter coming that day. Fortunately for us, there was a neurosurgeon on a Spanish expedition who offered to help. On examination of the patient he was concerned about the extent of his head injuries, one eye was dilated and he continued to drift in and out of consciousness with occasional fits of spasms. When the doctor asked me whether we had a drill I was a little taken aback. He told me he might need to drill a hole through his skull. When the search for the drill but was unsuccessful, he then asked if anyone had a very sharp ice screw he could use. I asked him, 'how do you know where to drill the hole?' He looked at me as if I were asking the obvious. 'I'll just drill another hole.' I had a vision of the poor Sherpa's skull being turned into something resembling Swiss cheese by the time the doctor was finished, but luckily he survived the night without receiving such treatment. The helicopter arrived at first light and he was successfully evacuated to Kathmandu, where he made a full recovery.

During another season, we were approached by another team who reported that a porter in their camp had died of methanol poisoning. He had been drinking bootleg alcohol with some other porters and one more was in a serious condition. We didn't have any ethanol, but we did have a mighty fine bottle of vodka that was used by our expedition doctor to intravenously treat the sick porter. The porter was very ill, but he survived.

CONCLUSION

Much has changed with our expedition medicine since we were first on Everest back in the early 1990's which aligns with the increase in helicopter activity. Instead of sending someone home with a suspected but not confirmed illness, we can utilise the helicopters to fly people back to Kathmandu for diagnostics and treatment. If they respond to that treatment they can take advantage of their residual acclimatisation and fly back to base camp to continue to climb through to the summit.

From feedback I receive from those who have filled the role, I think it fair to say that the Everest expedition doctor role is extremely stimulating and rewarding. They are faced with a wide range of challenging medical conditions in a very remote environment, yet they get to enjoy the trust and camaraderie they build with our expedition climbers, guides and Sherpa staff.

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