



E-Magazine

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Blooming Pohutukawa on from a recent hike to Whites Beach, West Coast Auckland. Angela Coward

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College of Air and Surface
Transport Nurses
Section of the New Zealand
Nurses Organisation



COASTN Committee 2021



COASTN committee 'face to face' meeting via zoom, November 2021.

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Hi Everyone,

Thank you to all who have contributed to this edition of the e-mag, the dates seem to roll around a little too quickly for many (including myself), hence the lateness of this edition once again. Special mention to Maura for her incredibly interesting account of her trip to Nepal something many of us think we might like to do one day and never get around to—and also her article addressing and explaining attitude sickness. Check out the case study presented by Luci from the Waikato NICU flight team highlighting the needs for team work and communication in what was a challenging transfer.

The committee recently held our regular meeting on zoom, this is usually a face to face meeting and although we have all become quite used to zoom meetings we do all certainly miss actually meeting in person. One point that came up for discussion was a 'rebranding' so to speak of the college name and logo. As part of our work towards strengthening our focus around Maori health and well being we have engaged the Te Rūnanga kaumātua to assist with te reo Māori naming and the tikanga and koha of ingoa (naming) for the college. In line with this, we will be looking to change the logo that we currently use and we plan to seek submissions from you, the COASTN members when it comes time to design a new logo, keep an eye out for the next edition of the e-mag for more details.

As a flight nurse based in Auckland I am sure that I speak for many others in the region who are looking forward to getting back to some sort of every day normalcy after such a long lockdown. Afterall there are only so many picnics in the park in the rain that one can organise before that social privilege wears remarkably thin! Here's hoping for a safe summer holiday season.

Angela.



COASTN Chair report - November/December E-mag

Hi to everyone from down South. We have just completed a national COASTN committee meeting & I am once again struck by how lucky we are in the South Island to have escaped the ravages of prolonged lockdown our Waikato & greater Auckland colleagues have been experiencing over the last 90+ days. Don't get me wrong – my colleagues & I are still bracing for the arrival of Covid (with current modelling predicting the week of Christmas or New Year for us to be seeing/dealing with cases locally) but we realise our good fortune to be able to live normally with few restrictions. Having recently assisted family members of patients travel from within the restricted/locked down areas of NZ to Dunedin to visit critically unwell whanau has given me a new appreciation for the decision-makers within Government & Health – trying to make rules that are workable yet ostensibly exist to protect the majority of New Zealanders (and subsequently, health professionals) from the ravages Covid-19 can create within hospitals that may already be struggling with a lack of resources (beds, equipment, staff.....). To our colleagues across the North Island – we understand your challenges and consider ourselves to have been very fortunate thus far.....

The pandemic has led a lot of us to develop & embrace new skills & technologies. Just ask Taz our fantastic COASTN Flight Nurse Course coordinator – who has managed to split the course (in order that it was not postponed for a second time), ably transferred the “lecture” component of the course to the Zoom platform (including small breakout room sessions) and is busily planning the practical skill component which will see course participants & tutor helpers meet in person. In the interim course participants will be working hard on their written assessment pieces. During these challenging times COASTN members & patient flight/transfer services have had to rethink some of their processes & procedures: it is not always possible or prudent to just jump on a plane & travel off into the sunset to collect or drop-off people requiring differing levels of care from what is available locally, or requiring repatriation – a lot more planning & logistical support such as rapid Covid swab processes) need consideration. For some services – especially those involved in international retrieval & repatriation workloads & work practices have changed immensely, impacting not only professional lives but the personal circumstances some of those colleagues face (in terms of social isolation while awaiting testing, constant testing protocols, living & working in PPE in less than ideal physical conditions to name a few). At this stage these challenges are likely to remain ongoing, and no doubt there will be new ones arising too.

As you are aware NZNO has notified members of its issues with costs outweighing income & signalled the need for budgetary constraints to be introduced. COASTN national committee is being responsive to the call for increased fiscal responsibility – especially in light of the fact core funding to colleges & sections is likely to be significantly reduced, and so the annual plan furnished to are protocols/pathways. So – consider whether this is something you wish to be a part of and watch out for nomination paperwork that will be circulated with AGM paperwork (being undertaken in February).

As this will be the last newsletter pre-Christmas I wish everyone a safe & happy festive season – working or not – to all of the COASTN membership, their whanau & friends. Take care, enjoy the upcoming summer, and here's to good health, wellbeing & vaccination enabling us as normal as existence as possible.

Toni 😊

NELSON REGION UPDATE

Tania Parr

Hello from Sunny Nelson!

Its been a busy time in our neck of the woods, with multiple flight transfers every day – it's a rare sight for us to not have any jobs on!

We've managed last month to hold our annual flight training days for our flight nurses and the flight midwives from both Nelson and Wairau. We hold these over 2 days with the group split in 2 so that we can keep our service running while doing the training updates. These are really valuable days where we all get to meet together, share ideas, go over Health and Safety, have a refresh on the rotor wing, and listen to some interesting speakers. This year we had a session on communication, and how we might deal with different personalities, and people who are stressed or in stressful situations. A focus on infection control with a Covid twist of course was on the agenda, and the always valuable scenarios and how we might deal with emergency situations in the air. We were lucky to hold these days in our new hangar at Airport House.



Speaking of the new Hangar, we have an official opening and Blessing of the new Hangar on 17th November. We will have a hangar breakfast to celebrate after a full blessing and Karakia with members of the GCH team, NZ Flying Drs Trust, and Nelson Marlborough Health management, as well as our pilots and flight nurses.

We now have our 3 flight coordinators hooray!! Lara, Margaret and myself hold the flight coordinator phone Monday-Friday, Lara and Margaret working 2 days per fortnight, and myself 6 days per fortnight – I must say, I'm loving having the support, and the ability to get back out flying again! Our 2 new flight nurses have completed their 10 buddy flights, and are now flying solo. Its so great to have them part of the team.

Christmas is coming so so fast this year! I hope you all get to spend some valuable time with your families over the Christmas/New Year period, and I hope you all stay safe.

Nga mihi nui

Tania Parr



WHANGANUI FLIGHT TEAM

AMELIA BEARHEART

**Follow @amelia_bearheart
adventures with the team
around NZ.**



CHRISTCHURCH FLIGHT TEAM

Germaine Sanford

CHRISTCHURCH

Canterbury Air Retrieval Service (CARS)



Hi Everyone,

It's hard to believe Christmas is so close, the year seems to have disappeared quick! Our team has kept busy this year both in the air and on the ground with ongoing COVID preparedness, and training. I think it's fair to say PPE in the aircraft is a much more common accessory these days and swabs can really complete the week! Our team has grown to continue to provide a 24/7 acute retrieval service for our area and beyond. The RSV outbreak over winter saw us carrying many more paediatric patients. The data certainly tells a story with nearly 50% of our calls and retrievals being done outside of the Mon-Friday daytime hours within the last 6 months.

It will be interesting to see where Health NZ leads us, and I am feeling hopeful that it will lead to even better collaboration with matching of skill mix and aircraft across the country as we all transport patients at their most vulnerable.

I am so grateful to the more experienced nurses of the flight team who have provided much mentorship and encouragement to the newer members of our team as they have 'grown their wings' this past year. As experience across our service has grown we have also been continuing to align with COASTN standards particularly regarding education, training and maintenance criteria. Four members of the team undertook Aeromedical education this year, adding to the experience within the team.

Of course, we would not be going anywhere without the amazing pilot team, and the New Zealand Flying Doctors Trust who are so supportive of the work we do.

Have a happy and safe holiday season, from our team to yours.

Germaine



Hi from the team at NZAAS, as we finally welcome summer and (almost) being let off the leash that has kept us within a very small radius of the supercity during our free time anyway!

We have been keeping relatively busy on a daily basis and have increased our service capability with the introduction of our PTS transport service here in Auckland. The vehicle has capacity to take a full medical team of five staff and is equipped with the Stryker Power Pro XPS stretcher. Although still in its infancy, the introduction of the road service has streamlined our transfers somewhat already, with a dedicated driver and guaranteed intra-operability of equipment from aircraft to road.

From all of us here at Auckland, we wish you all a safe and happy festive season.

Angela and the team at NZAAS.



WAIKATO NICU FLIGHT TEAM

Avryl Way

We are in the middle of a busy but exciting time on NICU here at Waikato. Not only are we continuing to retrieve and transport many babies but as a team we are implementing changes too. Our newest SMO Miranda Bailey-Ward has taken the reins and is our lead for retrieval and transport. Miranda has a wealth of knowledge and is highly experienced in this area. Miranda's experience includes but is not limited to working with Piper, The Royal Children's Hospital in Melbourne and Medstar. Our lead nurse Chad is about to move in a different direction and will be training as a nurse practitioner next year and I have now taken the role as lead nurse, to work alongside our Nurse Practitioner lead Sally Overington and Miranda.

We have more recently welcomed Lela Yap, a fellow who has returned to New Zealand from Canada. Lela has been kind enough to let me share with you a brief summary of how she came to be so passionate about retrieval.

Lela's first transport was an adult patient by rotary during her third week as a fully-fledged newbie house officer. She said she was excitedly terrified, and it was also her first time ever flying! It must have made a real impression on Lela as she continued to transport patients of all ages around New Zealand. Now having the flight bug, Lela wanted to find opportunities on a larger scale with a dedicated transport team. So off she went with her family to SickKids Acute Care Transport Service (ACTS Team). This team transports patients from birth-18 years servicing the enormous population within the Ontario province, transporting nationally and internationally to as far as Europe. Lela experienced land and air travel in all kinds of weather from snow and ice to sweltering humidity. At times wearing Covid PPE, a kind of torture, Lela says, that she wouldn't wish on anyone!

During her time away Lela has participated in, led and presented on Quality and Improvement Initiatives, a scholarly pursuit Lela feels transport medicine lends itself so well to. Work covered areas such as CMAC Intubation, Ultrasound in transport and SBAR inter-hospital communication standards. Whilst away Lela achieved many goals including developing international networks and has now returned to New Zealand to share her knowledge and experiences.

Waikato NICU are extremely fortunate that both Miranda and Lela chose us to share their knowledge and mountain of experience with. We are already reaping the benefits of their expertise as we work to update standards and implement changes for our service.

We are now registered with GAMUT, a data collection initiative. This will give us live reporting using quality measures and allow us to not only evaluate our service, but benchmark against other services around the world. Protocols and processes are being updated, the After Critical Event (ACE) tool for debrief sessions is being used at the end of retrievals and a whole new design of documentation is being used. Lastly, we are really excited about starting the lengthy process of purchasing new equipment and uniforms. Fingers crossed the ball just keeps rolling!

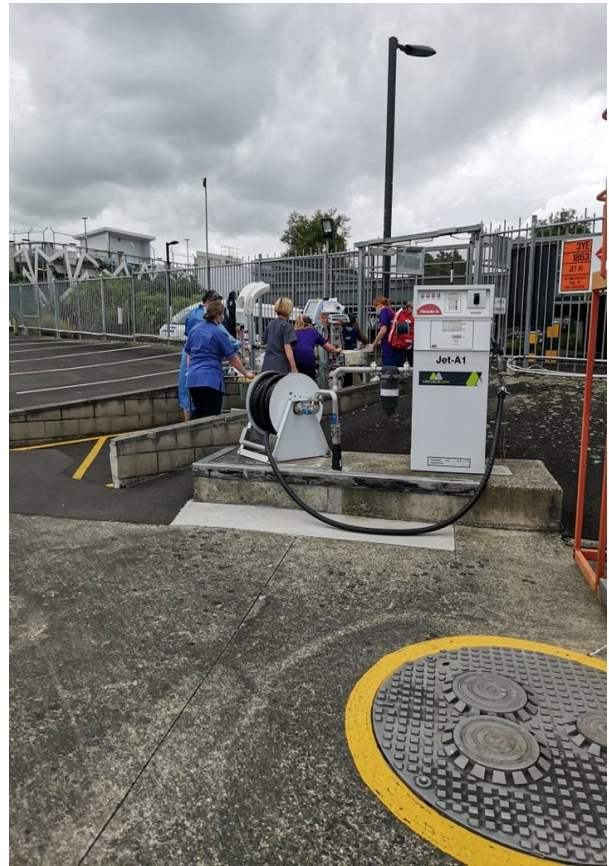
I feel extremely privileged to be working alongside such an amazing team of dedicated nurses, nurse practitioners and medical practitioners.

Keep safe and happy flying.

Avryl Way, with thanks to Lela Yap for her contribution.

WAIKATO NICU TRANSPORT

Luci Gravatt



Teamwork.

The call came in from Tauranga. A term infant had been born flat, through thick meconium. The APGAR scores were low. They were struggling to intubate. The blood gasses were terrible.

There was also an infant that was scheduled for repatriation today to the same place. Was it possible to get that baby ready in time, so that leaving Waikato would not be delayed? You betcha! The coordinator, bedside nurse and registrar moved heaven and earth to get that baby packed into the transport rig, ready to go when the orderlies arrived to take us to the helipad.

Lela and I went through our roles on the way and prioritised the first tasks: I would set up the transport ventilator and nitric while she received the update and assessed the baby.

The nitric wouldn't work. I rang another retrieval team member and we worked through some troubleshooting. The Bio-Med Tech joined the call, but verbal descriptions were not getting us

anywhere. So we had a video call (isn't technology great?!) so they could see what I was seeing. With their help, I managed to get the nitric working, just in time to connect to our sick little patient.

A Paeds Registrar popped in and offered to help: A second PIV would be great!

Maybe Tauranga was happy to see us leave (sorry about the mess we left behind!) but they were invaluable in the efforts to keep the infant stable before we arrived, and while we were preparing to leave. The nurses in Tauranga were wonderful: They prepared Glucose and Dopamine infusions, sent blood gasses and assisted with x-rays.

There were text messages and phone calls between us and Waikato NICU for advice and updates.

The trip back was hard work: The infant had saturations in the 70s most of the flight. Lela and I worked through the differentials: Oxygen? 100%. Nitric? 20ppm. Pneumothorax? Air entry looks equal. Blood pressure? Low, turn up the Dopamine. We decided to abandon the ventilator in favour of using the neopuff with nitric. There was a little improvement. Very little. So we sent our own SOS to the Waikato NICU.

The rotor-wing crew was keeping up with our conversation in the back, they were aware we needed this baby at Waikato as soon as possible, and were able to expedite the helicopter shutdown: That 30 seconds felt like a moment, and we were able to start the unload to where our team was waiting to help.

The neonatal team that met us on the helipad was such a relief. There were nine of them, two orderlies, two bedside nurses, the SMO, the Nurse Practitioner, the Clinical Director, even the coordinator and educator that had already finished their morning shifts. I believe many of them actually ran up the hill, pushing equipment, rather than navigating the maze of corridors indoors.

The long, slow shuffle back to NICU was a circus: the inosys and nitric tank were tethered to the bulky Ohio and shuttle by tubing and cords. Doorways and lifts and corners were bottlenecks that required coordination to navigate. Several people ran up or down nearby stairs to meet the crew as they exited lifts.

When we arrived in NICU, another whole new team were waiting to take over the next list of tasks, to save this little one's life.

We gave everything we had to this retrieval, the mammoth task of getting this baby back to Waikato was genuinely successful because of the support and help that we received. I am so proud of the teamwork: Lela and I, the referral team at Tauranga, our air crew, our receiving team on the Helipad and in the NICU: such an awesome collective collaboration – Ka mau te wehi!

Luci Gravatt.

AEROMEDICAL RETRIEVAL COURSE REVIEW

Francine Buick

I feel very grateful to have been able to participate in the COASTN Aeromedical Retrieval Course this year, which was held over 3 days on zoom due to covid restrictions. I learned an incredible amount of valuable information in those days and highly recommend the course to any flight nurse! There were many guest speakers that discussed topics such as Crew Resource Management, Gas Laws, FW & Rotary Wing Pilots' perspectives, & Stressors of Flight. It was great to meet and collaborate with other flight nurses from across New Zealand, despite it being on a computer. Plans are in place to attend the HUET and simulation days in March next year in Auckland and I'm very excited to meet everyone in person. It is a real privilege to be able to work in this capacity as a nurse and this course has deepened my knowledge of aeromedical retrieval nursing and fuelled that fire in my belly to fly.

Francine Buick

EVEREST TRIP AND ALTITUDE SICKNESS

Maura Skilton

Whanganui Flight Team

In April 2019, my husband and I had the privilege of joining other family and the Whanganui tramping club on a 15 day guided trek to Everest Base Camp.

Our journey started ordinarily enough with flights from Whanganui-Auckland-Hong Kong- Kathmandu. We had a rest day doing touristy things and safety briefing with our guides. Following our last sleep with clean sheets, flush toilets and a shower, we endured a hair-raising 4 hour drive to the village of Manthali . The road to Manthali features in video clips of "Worlds Most Dangerous Roads". Manthali is where our adventure began. We were scheduled to fly from nearby Ramechhap airport to :Lukla. Bad weather had disrupted most of the previous days flights. So, we joined countless other trekkers in the heat and dust, beside piles of rubbish, discarded beer bottles and a dead dog, for our turn for the 20 minute flight to the Lukla, the starting point for treks to Everest Base Camp.



Lukla runway

Lukla is one of the world's highest commercial airfields in regular use. It is also regarded as one of the most dangerous airfields. There are 4 main factor that make airports challenging: High altitude, high mountain terrain, poor weather and short runway. Lukla has all 4. The airport sits at an altitude of 2860 metres. The high altitude reduces the amount of power generated by the aircraft and reduces lift for take-off. The lower air pressure also reduces resistance to slow the plane down on landing. There are mountains all around, reducing opportunities and space for missed approach or go around routes. The runway is 527 metres. The good thing is that it has a 12 degree uphill slope to slow the plane down on landing. The bad thing is a very big stone wall that will stop the plane very quickly if you come in too fast! The 12 degree slope is a good thing on departure as well, as it can assist attaining safe take off speed. The bad thing is, that the end of the runway terminates at a cliff edge. So if you haven't achieved enough speed you fall down the mountain. It is nearly impossible to abort a take-off. The weather is changeable with turbulence and wind shear. Best weather is in the morning. Afternoon flights are frequently cancelled. There are no roads, so the alternative is a 3 day trek from the closest road end. One hundred and twenty thousand passengers passed through Lukla airport in 2019. There are 20-30 flights between

dawn and dusk. The Civil Aviation Authority have stringent minimum requirements for aircraft and pilots. Small turboprop aircraft and helicopters only. Pilots must have one years experience in flying in Nepal and 100 short take off -landing flights. They must also have 10 Lukla flights with a certified instructor. At the time of our trip there were 4 Nepali airlines flying there, using Dornier 228 or De Havilland Twin Otter aircraft. I observed and timed air movement patterns. If it was a passenger plus cargo flight. Both engine were shut down. The aircraft was unloaded and re-loaded with passengers and cargo (rubbish, empty gas bottles recycling passengers and luggage) in 15 minutes. If it was a passengers only flight, the right engine was kept running. People and luggage unloaded, re-loaded, from the left. The doors were closed and aircraft moving within 6 minutes of stopping. Lukla airfield was built by Sir Edmund Hillary in 1964. He purchased this precious land from the local village for \$US2560, then plied the villagers with potatoes and beer to "foot stomp" the soil down to make a semi flat surface for the runway. Unfortunately there have been quite a number of tragedies including one causing the death of Sir Ed's wife Louise and daughter Belinda in 1975. In fact there was another fatal crash 4 days before our arrival. The plane and helicopter were clearly visible as we landed. Sensibly our Chief Guide did not tell us about this beforehand.

Everest has at least 3 names. The Nepali name for Everest is Sagarmatha, and the mountain is in Sagarmatha National Park. But everyone seems happy to call her Everest. Tibetans call the mountain Chomolungma and Chinese Zhumulangma Feng.

The trek to Everest Base Camp (EBC) is only 62 km, but it ascends from 2860 metres at Lukla to 5100 metre to the tents at base camp. There is also a bonus 400 metre option of climbing Kala Pather, a nearby peak suitable for trekkers who wish to have a better view of Mt Everest. People not acclimatised to altitude need to ascend slowly (about 400m vertically each day) to minimise the harmful altitude mountain sickness (AMS). We walked for 10 days to reach EBC and returned in 4 days. We asked for a female to guide us, Her name was Pemba Sherpa (all sherpa's have the surname of Sherpa and most originate from the village of Lukla and are all related). She was 32, not married, pretty, very fit, capable and very shy. Pemba was in charge of 3 other guides and 4 porters who carried our 14 kg bags. We were provided with very clean sleeping bags and down jackets. We only had to carry a day pack with water, camera and spare warm clothes. Our trip included accommodation in trekker hotels or "Tea Houses" and 3 meals each day. We were advised to avoid meat except tinned fish and only drink the water the guides had filtered. The westernised menus included Dhal Bhat, omelettes, rice, porridge, soup, potatoes, bok choy, Nepalese dumplings called Momos.

Like many New Zealanders I had read and heard about altitude sickness and its tragic consequences and wondered how it would affect me. I was 59, ran mountain trails, but have a background of asthma. I carried a borrowed pulse oximeter which was passed around each evening for everyone to check their oxygen saturations. It became a game of who can match Pemba (never went below 94 %). Some surreptitiously warmed their hands near the dung fuelled potbelly stove, others practiced active deep breathing before putting the monitor on their fingers. Everyone felt fine and chirpy on the first day. and the first half of the second day. We couldn't stop two farmer husbands talking and "mansplaining" all their agricultural observations. However, by lunchtime (3100 m) the farmers were quiet and the 12 person group was well spread out. At the village of Namche Bazaar (3400 m) everyone seemed tired, but said they were feeling fine. Knees and backs were sore. I had a dry cough and through the thin walls could hear others coughing dur-

ing the night. Appetites were still good, with everyone cautiously enjoying the unfamiliar menu.



Our days followed a pattern. Up at 6 am. Bags packed and ready for the porters by 6.30 am. Porridge and cup of black tea for breakfast. On the track by 8 am. Walk slowly. Wait in the sun for others to catch up. Enjoy the differentness of it all. We shared the well worn rocky trail with yaks, mules, and porters with massive loads in baskets slung from their heads. We walked past Buddhist temples or "Stupa". Hundreds of fellow trekkers click clacked along with their walking poles. Tibetan prayer flags and scarves fluttered in the wind, bringing us good karma as we crossed sturdy bridges above swiftly flowing streams far below. We played spot the antipodeans, the only ones wearing shorts! In the evenings we were offered warmish water in a bowl for "washy washy". No shower for 16 days. Every night was clear and cold. Wet washing was frozen on the line in the morning. Some nights washing was frozen on the line by 6.30 pm!

At 3800 m, I had a persistent frontal headache and dry cough. My appetite and sense of taste was blunted, so the lunchtime garlic soup was bland. I could no longer run up hill. My night-time O₂ saturations were 85%. Night time sleep was disturbed. The oxygen saturation range amongst our group of 8 trekkers at this altitude ranged from 92 % to a worrying 75 % for my 60 year old husband, Ross. His walking pace had slowed considerably, finishing each day 1-2 hours after most of the group. He was accompanied by 1-2 guides at all times. Ross had the same headache as the rest of us, but was quite dusky, tired and uncharacteristically quiet, but ate dinner and drank plenty of water. On the morning of day 5 Ross insisted he was able to continue if he could walk slowly at his own pace and not be hurried. We watched his slow progress up the trail with 1 porter and 1 guide. Taking 3 or 4 steps then resting on his walking poles. Ross walked for more than 90 minutes to negotiate the first hill. We reached the same ridge top in 20 minutes. We had discussed options with our guides. Riding out on a donkey or pony was discarded as the maximum weight for them to carry was 80 kg. A yak can carry 90 kg. so, a strong yak would do. Getting farmer Ross to agree to riding what is essentially a cattle beast was probably not going to fly! The experienced guides felt helicopter evacuation was not yet necessary and Ross was safe to continue supported by the guide and porter. By the time we reached him at the ridge top, Ross was a bit irritable with limited insight into the reality of his situation and reduced exercise tolerance. I stepped back and left discussions on options to other trust-

ed group members. The weather and forecast was good, so we all continued on. The 5km walk to the next village that usually takes 2 hours lasted 6 hours for Ross. Dawa, our chief guide arranged for him to descend slowly back down the trail towards Lukla. He would be accompanied by 1 guide and a porter. They were instructed to stay with him. Ross recounted his journey. One person behind pushing him up the hill and the other pulling him from the front. Dawa was not successful in finding Ross a seat as part of a back load on a helicopter. And Ross was not willing to pay \$US 1250 for a helicopter evacuation flight all the way back to Kathmandu! The group collectively insisted I continue on with them to EBC. But I did catastrophise somewhat about him having a stroke, MI or dying of a PE on the way back down the hill!

So, we parted company and continued towards the Khumbu Valley. If you can visualise the southern alps on steroids. Add yaks, mules, donkeys, Waikato rugby cow bells, stupa, prayer stones and flags. Then add villages of Otago goldfields stone huts complete with stone walled paddocks of potatoes and bok choy; you have EBC trail. We stayed in villages where stone masons used hammers and chisels to chip glacial boulders into straight edged blocks for new trekker hotels. My sister and I attempted to copy women in a paddock breaking up soil and planting potatoes using a mattock. They laughed at our efforts and replanted the potatoes afterwards. Our excitement at nearing EBC was tempered somewhat as we stopped at the Chukla Lare stone memorials and contemplated the tragic loss of life in pursuit of climbing Sagamatha. Most prominently American Scott Fischer and Kiwi Rob Hall, who succumbed to hypothermia during a blizzard in 1996.



Memorial to Rob Hall at Dughla Pass



The sign says it all



Our group of farmers, nurses and trampers at EBC April 25, 2019.

We reached 5100m EBC on ANZAC day and in traditional kiwi style placed a stone in our packs to take home. What most people do not realise is that you do not get a decent view of the actual Mt Everest! It is hidden behind other peaks. I thought "Is that all there is? I have walked all this way and all I can see is a brief glimpse thumbnail size peak through swirling clouds. They don't tell you that in the brochure!!" I grumpily stomped back to our shitty lodge down the valley. At that point I was disappointed, cold, nauseated, tired, had a swollen face and eyes and a massive headache. My oxygen saturation was in the low 80s. But after schlepping up the Kombu Valley for days I wanted to see more of the bloody mountain. So at 0043 hr I joined my sister, our guide Nema and 2 other trampers to walk up 5500 m Mt Kala Pathar to see the sun rise on Mt Everest. My head was pounding, I tripped over many stones and had to take many rest stops. We had quick photos in the freezing cold and returned. I noticed my verbal responses and conversation was slowed. Like the worst hangover of my life without the fun of the party. Symptoms started to resolve as we descended and at 4000 m, I only had the headache. This reassured me I hadn't suffered a stroke! My sense of perspective returned and I was able to appreciate our personal and group achievements. We made good time and rejoined Ross 4 days later. He had recovered and was supporting the Nepalese economy drinking coffee and eating pastries in Lukla.



Everest is the small peak in the background

Our trip to Nepal and EBC have given us significant memories. My sister and I planned to return for 2021 Everest Marathon which disappointingly has not come to fruition. We have stayed in contact with Chief Guide Dawa. There have been no treks for 2 seasons. His guides, including Pemba remain in geographical isolation with family in Lukla, without income. Therefore they only eat what they can grow themselves. Covid 19 has not reached the village and all are well.

ALTITUDE MOUNTAIN SICKNESS

Altitude mountain sickness (AMS) is a group of symptoms caused by hypoxia. They include: throbbing frontal headache, loss of appetite, nausea, shortness of breath, reduced exercise tolerance, dry cough, frequent urination, ataxia and sleep disruption. As the condition worsens, the cough becomes moist, the chest sounds "rattly", the person becomes "curmudgeonly" then confused. High altitude cerebral oedema (HACE) is a manifestation of brain pathophysiology. While high altitude pulmonary oedema (HAPE) is the hypoxic lung problem. Symptoms usually start to appear at above 3000m. The body can usually maintain arterial oxygenation up to 3000 m. But then low partial pressure of oxygen results in mild tissue hypoxia and the signs and symptoms of AMS.

Barometric pressure decreases with increasing distance above the earth's surface in an exponential manner. Think of it as less weight pushing down on us as we climb up through the atmosphere. The barometric pressure at sea level is 760 mm Hg. This total pressure is the sum of all the gasses present (Dalton's Law of partial pressure.). The gas or "air" we breathe is made up of nitrogen 78 %, oxygen 21 %, argon 0.9 %, carbon dioxide 0.03 %, methane 0.00017% , At sea-level, the partial pressure of oxygen is 160 mm Hg. The barometric of all the gases at 5500 m is 383 mm Hg. The partial pressure of oxygen is 70 mm Hg, roughly half of the available oxygen at sea level. At high altitude the oxygen in the atmosphere is still 0.21 or 21 %, but the gas molecules are further apart. There are less oxygen molecules available with each breath. Despite hypoxia associated with high altitude, over 15 million people live above 4000 m in the Himalaya and South American Andes.

While everyone is at risk regardless of age, fitness, medical history and previous altitude experience, the people most at risk are fit young men.

The current hypothesis is that hypoxia elicits neuro-hormonal and haemodynamic changes resulting in capillary leakage from micro vascular beds, resulting in oedema. The processes of adjusting to hypoxia (acclimatisation) are a series of compensatory changes in multiple organs and body systems that occur over different time courses from minutes to weeks.

Firstly, we increase depth and rate of breathing to increase minute ventilation as part of the hypoxic ventilatory response. This response is triggered by oxygen sensing cells in the carotid bodies to increase alveolar oxygen levels. Concurrent reductions in alveolar carbon dioxide levels create respiratory alkalosis, putting a brake on the respiratory centre of the brain. This stops the breathing rate getting exhaustingly high but ultimately limits respiratory rate and minute ventilation. Respiratory alkalosis causes a left shift in the oxyhaemoglobin dissociation curve, facilitating oxygen loading of haemoglobin molecules in the pulmonary bed. Trekkers with inadequate carotid body response as a result of lung, or kidney disease may have insufficient hypoxic ventilatory response and not adjust well to high altitude.

Within minutes of exposure to altitude the circulatory system aims to increase oxygen delivery to the tissues. The sympathetic nervous system is stimulated to increase heart rate, cardiac output and blood pressure.

The high altitude hacking cough (Khumbu cough) is caused by low humidity, low temperature, and dust. The persistent cough is accompanied by runny nose, clear or white phlegm. Treatments are to cover the nose and mouth with a close weave mask or buff, to capture warm moist exhaled air. Effectively providing an HME. Sipping warm liquids provides some relief as well.

Non-cardiac pulmonary oedema is caused by leaky alveolar-capillary membranes and pulmonary artery vasoconstriction. Increased pulmonary artery pressure stimulates the hypothalamus to release anti-diuretic hormone, leading to fluid retention.

Cerebral blood flow increases immediately on ascent to high altitude and takes about 1 week to return to normal. The magnitude of increase varies but averages 24 % at 3800 m, hence the persistent headaches we all felt. High altitude cerebral oedema can progress insidiously from irritability to coma over hours to days. Brain MRI showed cerebral oedema in people without AMS symptoms. Death may occur in untreated cerebral oedema despite aggressive treatment due to brain stem herniation. If treatment is delayed, recovery may be slower, leaving victims with persistent neurologic deficit including ataxia.

The pulmonary system reacts with peripheral vaso-constriction, to improve ventilation/perfusion match and gas exchange. However, pulmonary hypertension creates pulmonary oedema and right heart failure.

The renal system's response is to increase excretion of excess bicarbonate ions in an attempt to return the pH back to normal and allowing an increase in minute ventilation. It may take four days for this renal response to become effective at a given altitude. Because trekkers keep ascending this renal compensatory response cannot keep up.

High altitude causes fluid shifts and diuresis. This reduces blood plasma volume leading to haemo-concentration, increasing risk of pulmonary DVT, embolism and stroke. Activation of the renin-angiotensin system increases sodium retention. This increases interstitial fluid volumes, causing peri-orbital and facial oedema. While not a symptom of altitude sickness it did feel a little odd, but at least it got rid of my wrinkles!

Haemoglobin concentration increases after ascent. A fact well known to aspiring Olympic athletes. The initial increase is due to haemo-concentration. But hypoxia promotes production of erythropoietin (mostly in the kidneys) stimulating red blood cell production from the bone marrow, increasing oxygen carrying capacity. It may also increase the body's capacity to buffer lactic acid production.

The prognosis for recovery from altitude mountain sickness and high altitude cerebral oedema are excellent if you descend to lower altitude. It may be safe to re-ascend following 2-3 days of recovery at lower altitude.

Altitude Mountain sickness symptoms can be relieved by a number of prescribed medications.

Acetazolamide (Diamox): A carbonic anhydrase inhibitor. Causes bicarbonate diuresis and metabolic acidosis to re-balance pH.

Calcium Channel blockers (Amlodipine, diltiazem) and type 5 phosphodiesterase inhibitors (Sildenafil/Viagra): Reduce pulmonary hypertension through ion channels.

Dexamethasone: Reduces cerebral oedema.

Nifedipine: Is a vasodilator that reduces pulmonary hypertension.

Salmeterol (Serevent): Long acting broncho-dilator. (green inhaler) Inhaler: Uses epithelial sodium channels to clear fluid from alveoli and interstitial spaces.

Altitude Mountain Sickness on-line reference list.

Altitude mountain sickness definition: https://en.wikipedia.org/wiki/Altitude_sickness

High altitude Mountain sickness pathophysiology: <https://www.google.com/search?q=acute+mountain+sickness+pathophysiology>

Diagnosis: symptoms and treatments: <https://www.healthline.com/health/acute-mountain-sickness>

Signs symptoms and treatments: <https://www.nhs.uk/conditions/altitude-sicknes>

Khumbu cough <https://emedicine.medscape.com/article/300716-overview> <https://www.mountainiq.com/khumbu-cough/>

Partial pressure of oxygen at sea level <https://www.ncbi.nlm.nih.gov/books/NBK493219/#>

High altitude pulmonary oedema: <https://emedicine.medscape.com/article/300716-overview>

Cerebral symptoms AMS: <https://emedicine.medscape.com/article/768478-clinical#b3>



COASTN AGM 2022

SAVE THE DATE.
FEBRUARY 25TH 2022
VIRTUAL MEETING.

More details to follow in the coming weeks.

KEEP AN EYE OUT FOR COMMITTEE MEMBER NOMINATION FORMS AND
DATES.

If you are interested in joining the committee and would like further
information, don't hesitate to contact any of the current members.





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