Edition 1 Winter 2024

EXPLORE TREME PEDITION MEDICINE

The Journal of the Academy of Extreme Environment Medicine

ISSN pending

Join Australia's only clinical fellowship in Extreme Environment Medicine

www.aeem.com.au

ADVENTURE MED in FOCUS
‘Spring into Science’

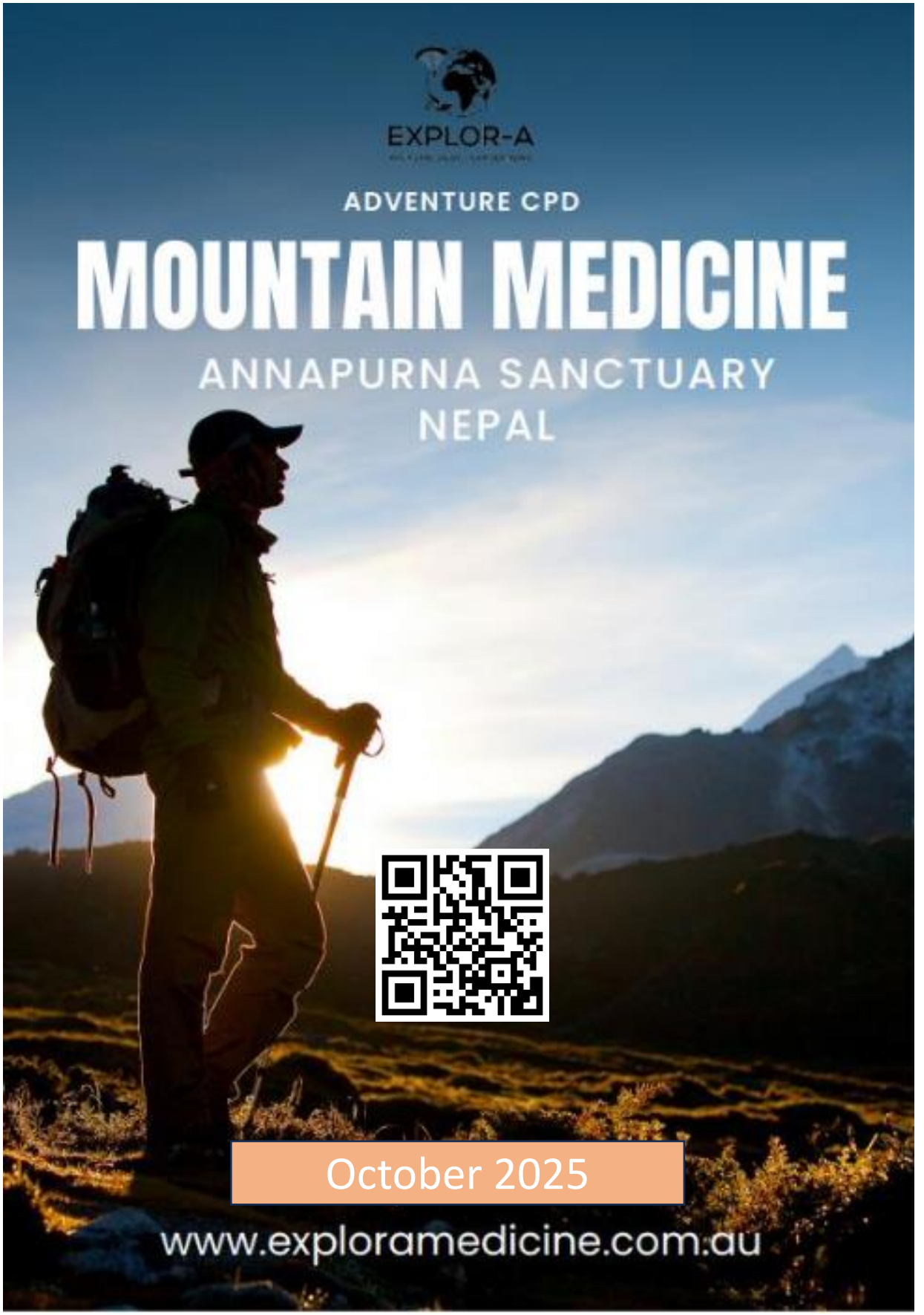
Photo Credit:
National Oceanic and Atmospheric Administration

ADVENTURE MED in FOCUS
‘Field work’

Photo Credit: Susan Smith

ADVENTURE MED in FOCUS
‘Layers of Time’

Photo Credit: Sunny Whitfield


EXPLOR-A
ADVENTURE CPD
MOUNTAIN MEDICINE
ANNAPURNA SANCTUARY
NEPAL
October 2025
www.exploramedicine.com.au

EXPLORE TREME PEDITION MEDICINE
The Journal of the Academy of Extreme Environment Medicine

ExMedicine is a free-to-access, open-source publication that is committed to providing industry-relevant literature and information to enhance the development of extreme environment medicine through the sharing of information.

Cover image courtesy of unsplash

Regular Columns

Features

Editor's note

Welcome to the inaugural edition of ExMedicine.

ExMedicine is the official industry journal of the Academy of Extreme Environment Medicine. First and foremost, I must extend our sincere gratitude to the community of people who got right behind the Academy in the early days. We had over 300 members join the Academy in the first 4 weeks as well as just over 20 fellow candidates sign up.

Currently we are halfway through the pilot phase of the academy where we aimed to build the structures more robustly, establish the aims and set the boundaries to enable a strategic direction for both the academy and this publication to take shape

It is also important to recognise that the Academy was not created as a peak body. We recognise and extend our full support to the Australasian Wilderness and Expedition Medicine Society (AWEMS) as the peak body of wilderness medicine in Australasia. Rather, the Academy was established to create a community of like-minded people and to provide more opportunity and to create a professional pathway through a fellowship program for recognition in extreme environment medicine. Our goal with this industry journal is to create, publish and share as much information in the extreme medicine space as we can and build this community.

We have some fairly lofty goals but within the next 12 months the Academy plans to:

- ✓ Grow our member base and fellow candidates.
- ✓ Accredit more programs for fellow credit.
- ✓ Deliver a monthly public lecture.
- ✓ Publish a biannual industry journal.
- ✓ Record a monthly podcast.
- ✓ Facilitate an annual conference (with a difference).
- ✓ Host a member based LMS for fellow credit tracking and CPD

Australia covers some of the most remote and inhospitable terrain on the planet, and with so many aptly qualified and experienced people working in these environments, we are well placed to deliver some of the finest remote medicine educational opportunities on the planet. We aim to encourage this southern and international community to come together and grow this space and grow the opportunities in extreme environment medicine from our own perspective.

As the Principal Fellow of the Academy of Extreme Environment Medicine I am standing-in as the interim editor-in-chief of

EXPLORE TREME PEDITION MEDICINE
The Journal of the Academy of Extreme Environment Medicine

Editor's Note (cont)

ExMedicine until we find a more appropriate and experienced person to lead the publication.

Welcome again to the inaugural edition of ExMedicine and welcome to the Academy of Extreme Environment Medicine.

Cheers

Sunny

Principal Fellow

Interim Editor-in-Chief

EXPLORE TREME PEDITION MEDICINE
The Journal of the Academy of Extreme Environment Medicine

Join Australia's only clinical fellowship in Extreme Environment Medicine

www.aeem.com.au

Welcome to the Jungle
Tips & Tricks with Andy Hughes

Want to ask Andy question??
Questions can be sent to hello@exploramedicine.com.au

What are three items you would carry on an expedition regardless of where you are going?

This is a great question and one that not asked enough. Regardless of where I might be going, I would always carry the following items.

1. Foil blanket

A foil blanket is a pretty versatile piece of kit. It can be used for warming a patient, improvised waterproofing a pack and you can even make temporary goggles to protect your eyes in the sand or snow. It is possible to use improvise a pelvic binder or an arm sling. It can be used as a hat, ground sheet or signaling device and it can be used to catch and collect water. I've even seen it used as an improvised carry strop !

2. Leather man

This is a no brainier for me as the survivalist in me says it can cut, saw and pinch to make heaps of other tools.

3. Carabiner

Yep, a good old carabiner can be a very useful piece of kit. I can make a rope but I sure cant make a metal carabiner. It can be used to hook up bag for clinical interventions or hang my gear. It can make a 2:1 and it can be used as a windlass for an improv TQ. If things get bad, a carabiner makes a mighty fine set of knuckle dusters to so if that pesky bear comes near, I am going down swinging.

Wild Research Made Read-Easy with Sophie Fontaine

Want to ask Sophie a research question??
Questions can be sent to hello@exploramedicine.com.au

Prolonged critical avalanche burial for nearly 23 hours with severe hypothermia and severe frostbite with good recovery: A case report

https://sjtrem.biomedcentral.com/articles/10.1186/s13049-024-01184-3

This case report details the treatment and recovery of a 53-year-old previously healthy male skier who was buried in an avalanche for 23 hours. Upon rescue, he had a core body temperature of 23.1°C and reduced conscious state, having sustained severe frostbite injuries. These were partially treated in an intensive care unit with rewarming and aggressive frostbite management. Fortunately, he didn't sustain tissue loss but 10 months post-accident was still requiring treatment for neuropathic pain.

Current literature exists surrounding frostbite management in avalanche survivors and a reported 50% mortality rate that is dependent on factors such as burial duration, airway patency and degree of injury. However, more work needs to be done to create general consensus of optimal timing and dosage of frostbite treatment in specifically hypothermic patients such as the one in this case.

Reflections on Wild Medicine
with Dr. Edi

Want to ask Edi question??
Questions can be sent to hello@exploramedicine.com.au

Extreme Environment, Wilderness and Expedition Medicine: A coming of age in Australia?

It seems to me like a lifetime ago that I was involved at the birth of Medex, when we traipsed off to Nepal as the 1994 British Mountain Everest Medical Expedition, put a team atop Pumori, a pair on the summit of Everest and ran several parties of volunteer trekkers ragged at base camp on stationary bicycles with nose pegs and other such high altitude research antics.

When we first started the Tasmanian Expedition Medicine courses back in 2006 there was nothing else like it in Australia. By then the UK had developed the first Diploma in Mountain Medicine and the alpine countries of Austria, Switzerland, Italy and France were already doing detailed research in high altitude settings and the USA's Wilderness Medical Society was already well established. I guess it hasn't been the only time that being on the other side of the world has meant that Australia has lagged behind!

We continued to develop different offerings through the Utas program, and at times WEM have come and gone with their 4 day courses and RescueMED brought what is now termed WLS:MP to Oz. Then Covid hit and, well, we all have our own version of lived experiences with that little nightmare. AWEMS was sitting waiting for the fuss to blow over and is now looking healthy and planning for its third face to face conference. The Academy of Extreme Environment Medicine was similarly hibernating and it too has finally been able to launch.

In 2024 I see a healthy and mildly competitive landscape offering diverse courses of different lengths and skill levels covering many of the sub-disciplines that sit under the title of wilderness, expedition and extreme environment medicine. Unlike the northern hemisphere, where the field is still very much dominated by doctors, we have a truly multi-disciplinary approach which is I believe entirely fitting.

For those of you new to this field and just finding your feet, there is now a national peak body (AWEMS) and considerable choice in education and training. I think we can say that wilderness, expedition and extreme environment medicine has come of age in Australia.

Air Rescue in Te Waipounamu

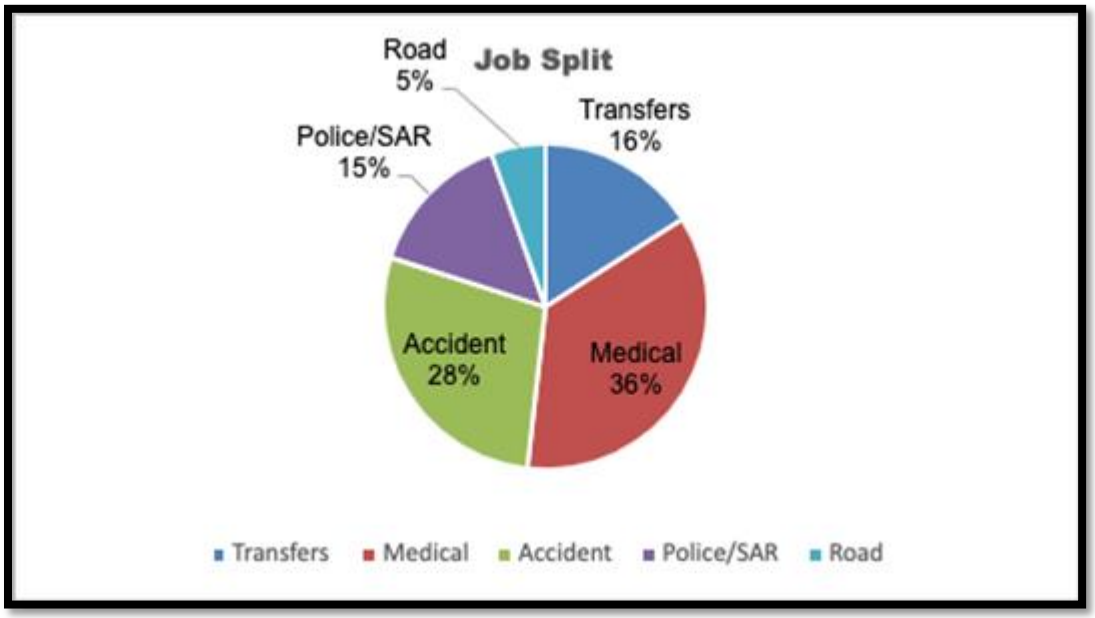
Words by Matt Jeffery

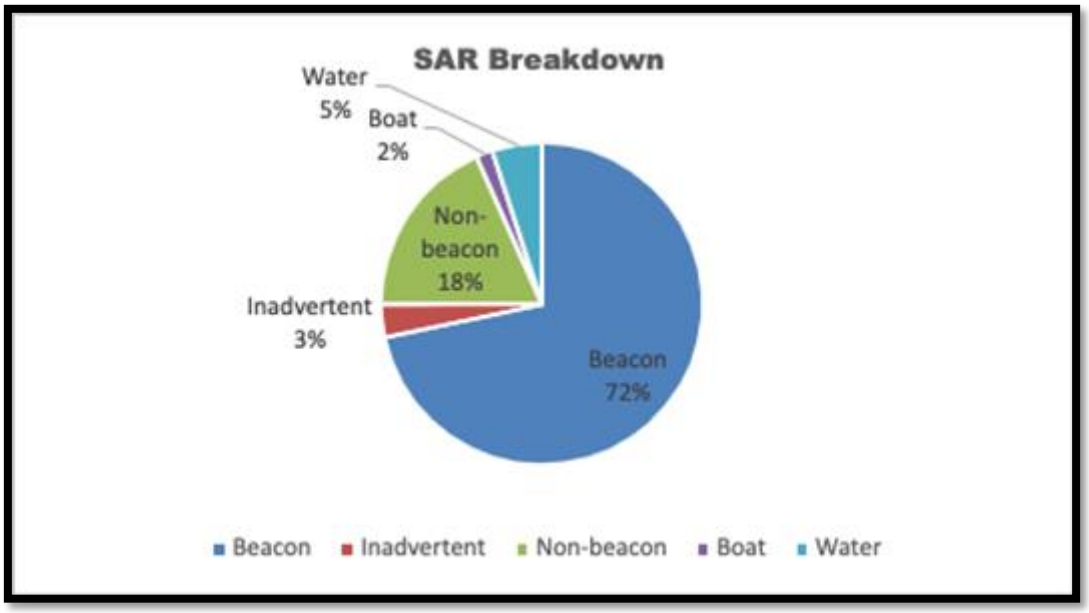
Te Waipounamu, Aotearoa, is a truly distinctive region boasting rugged coastlines, vast rural landscapes, dense forests, and towering alpine peaks. With a population of 1.1 million residents and attracting 2 million visitors annually, most drawn by outdoor exploration, the South Island of New Zealand offers a playground for adventure. However, due to the challenging topography and considerable distance to tertiary hospitals, the community relies heavily on air rescue services. There are currently eight rescue helicopters stationed at bases in Nelson, Christchurch, Greymouth, Queenstown, and Dunedin, making this provision one of the highest per capita in the world.

While air rescue services have been in operation since the 1980s, a significant shift occurred in 2022 when St John, the major national ambulance service provider, withdrew its provision of paramedics to the Helicopter Emergency Medical Services (HEMS) sector due to the increasingly specialised nature of the role. Consequently, the air operators were required to hire a full complement of crew and establish clinical governance for the 50 flight paramedics across the South Island. Crews are held to high standards, with the scope of practice encompassing prehospital emergency anaesthesia, mechanical ventilation, chest decompression, blood transfusion, and the recent introduction of Prehospital Aeromedical Ultrasound (PHAMUS).

A typical crew makeup for a mission includes a pilot, a paramedic/crew member, and a critical care paramedic. However, for specific interhospital transfers or alpine rescues, specialist teams may be required. The helicopters utilised vary between BK117s and the newer H145 machines. While most flights operate under visual flight rules (VFR), some bases are equipped for Instrument Flight Rules (IFR) flights, enabling access to patients in a broader range of weather conditions. Capabilities include daytime winching from land, boats, and water, as well as night winch operations. Paramedics undergo dual training in either night vision systems and rescue winch operation or "going down the wire."

In 2023, the Roa Rescue Helicopter, based on the West Coast, was dispatched 385 times, and treated 288 patients. Of these missions, 8% required winching, 22% necessitated night vision goggles, and 2% involved prehospital emergency anaesthesia. A breakdown of the types of jobs attended can be seen below:





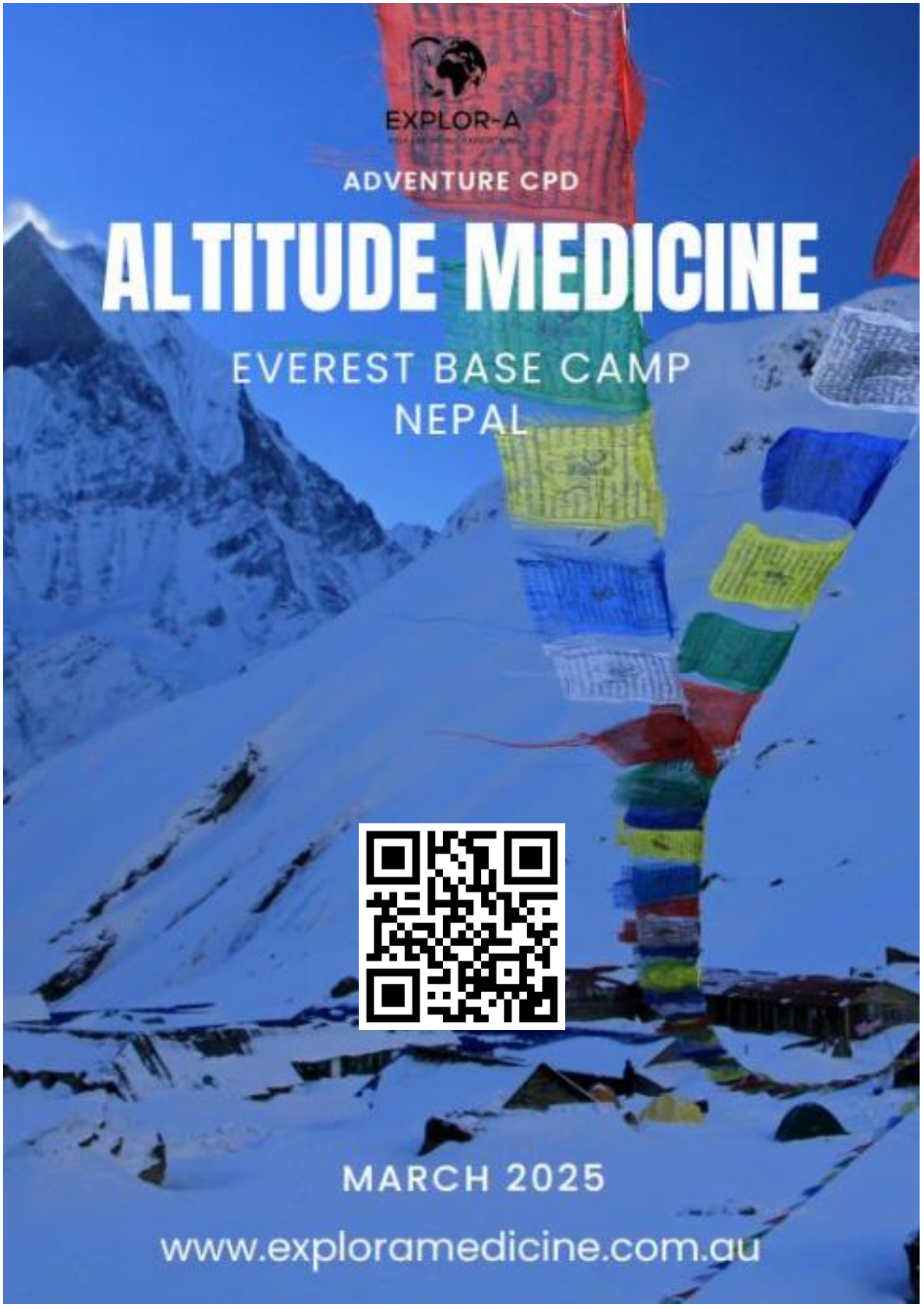
On a typical day, the team arrives at 0745 for handover and equipment checks before needing to meet the 10-minute skids-off requirement from the time of the call. Following checks and a quick coffee, cases are discussed, and a short medical or flight operations topic is reviewed. At 0900, the bases convene on Zoom to discuss the day's weather, crew compositions, limitations, and aircraft restrictions. Daily tasks include base and gear maintenance, CPD activities, and simulation-based training. At night, crews are on-call and available to be in the air within 20 minutes. It's worth noting that while there are some amazing jobs, there is also a significant amount of downtime and crew members - typically outdoorsy and action-oriented individuals, need to remain engaged and productive.

It could be argued that any job in a helicopter is an example of austere medicine due to the confined cabin, poor lighting, and limited access to help and resources. This is particularly emphasised at night and requires well planned patient care. For example, trauma patients on the West Coast require an hour-long flight across Ka Tiritiri-o-te-Moana (the Southern Alps) to arrive at definitive care. The most favoured jobs among the crew are those 20% involving search and rescue. This entails flying into remote areas and providing care on the hillside or from mountain huts. While a small part of the role, the access a helicopter provides makes this a fundamental aspect of the job, ensuring others can enjoy the outdoors with the knowledge that rescue is available if needed.

For those interested in the role, previous experience in the outdoor environment or diversification from typical paramedic work is highly sought after. While operators can set minimum fitness and swimming standards, prior austere environment experience is ideal, as it's challenging to train broader skills when operating a 24/7 service. It's also important to acknowledge limitations and defer to expertise when conditions or terrain demand it. Fortunately, through collaboration with the Rescue Coordination Centre, joint operations utilising the skills of Alpine, Canyon, and Land Rescue teams are highly rewarding.

For more information or to share ideas, stories, or learnings, please get in touch.

All images courtesy of the author published with permission.


EXPLOR-A
ADVENTURE CPD
ALTITUDE MEDICINE
EVEREST BASE CAMP
NEPAL
MARCH 2025
www.exploramedicine.com.au

Meet Rowena Antarctic Doctor

I am an anaesthesiologist and retrieval medicine doctor. I am fortunate to be part of a wonderful team of Polar guides who facilitate guests to experience Antarctica by ship., on the ship Ocean Endeavour with Intrepid Travel. The expedition guides educate, entertain and co-ordinate and safely enable people to land in Antarctica and surrounds. I have completed two seasons and four trips to the Antarctic region. I have travelled to the Antarctica Peninsula, beyond the Antarctic Circle, to South Georgia and the Falkland Islands. Our trips depart and return to Ushuaia, Argentina. The aim to allow guests to safely land on Antarctica and enjoy zodiac cruises, usually at two sites per day. We are proud to impart knowledge about Antarctica wildlife, history and geology and to empower our guests to leave as Ambassadors for Antarctica, sharing our acquired understanding with others about the precious and fragile environment we have visited. One of the greatest joys for me, is the bond, love and kindness shared by the guides, as we bring our diversified and extensive skills to the team and then provide an incredible travel experience for the guests.

As the doctor on the ship I am responsible for the wellbeing and provision of medical support to the Expedition Team and two hundred passengers. There is a second doctor on board who cares for the ship's crew. In emergencies we support each other. There are no employed nurses, however, the expedition guides, who have various training from Basic First Aid to Wilderness First Responder qualifications, become my support.

There are some unique challenges associated with provision of medical care on these expeditions. These include caring for an older demographic of passengers, often with limited mobility; the remoteness and lack of additional outside medical support, in emergency and life-threatening clinical situations; and, obviously no access to tertiary hospital level equipment, facilities and specialist clinical input., which many part-time ship doctors may be used to. Furthermore, there are 350 humans living on an isolated ship and contagious diseases, especially gastroenteritis and upper respiratory tract infections, can spread rapidly, if not correctly managed.

The most commonly encountered presentation is for seasickness, especially in the first two days of the journey. As we leave the port of Ushuaia, Argentina, we must firstly cross Drake Passage. This passage is about six hundred miles in distance, to the Antarctic peninsula, and we can sometimes impact with large swells, to eight meters, but swells are usually around three to four

meters. Approximately, a quarter to half of the passengers require advice and medication for seasickness during the Drake Passage crossing, even when most are heeding the advice of taking anti-emetics prophylactically.

The next most common medical presentations are with are vomiting and “diarrhoea, usually gastroenteritisURTIs, folincluding slowed by and sore throats, rhinorrhoea and sinusitis symptoms. The second most common complaint is vomiting and diarrhoea from gastroenteritis. Isolation procedures have to implemented upon the guests and their fellow cabin members to minimise the spread of gastro-enteritis, and there are protocols for respiratory infections. Fortunately, the respiratory protocols are now more relaxed than during the post-Covid season.

During clinic hours, for an hour per day, many presentations are with general medical conditions. Doctors carry a radio as we are required be available at all times for acute cases. Many acute presentations are for minor trauma with bruises and musculoskeletal injuries, sometimes lacerations. The expedition doctor also has to be capable of providing medical assistance on shore landings, and we have an onshore medical pack which we take with us. It is part of our job to assess the site for potential medical hazards. At landings there is usually the option of a hike to explore the site so I carry aspirin, GTN and salbutamol, which I’m pleased to say I’ve yet to use.

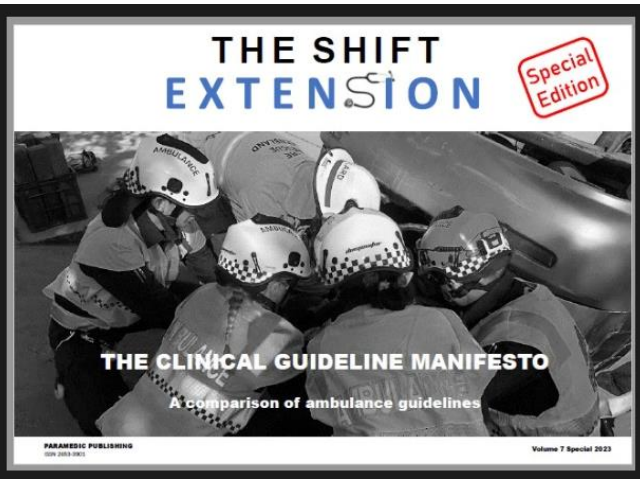
All passengers undergo medical screening prior to being accepted for the journey. Unfortunately, the enthusiasm some passengers have for the trip means their

past medical history is not always fully disclosed. There are usually one or two life-threatening medical or surgical emergencies per travel season. Some those we have managed have included an acute on chronic airway obstruction, severe asthma, anaphylaxis and coagulopathy. and massive haematemesis. In the situation of a life-threatening emergency, which isn't improving, plans have to be made to expediate the passenger to definitive care. The stress can be quite palpable when we are so isolated.

It is the caring for a very sick passenger in this remote location which makes this job unique. Due to the location remoteness, (sometimes as far south as 66 degrees latitude), the options we consider may include, re-routing the ship directly to the Shetland Islands, (where air retrieval may possible), heading back to Ushuaia directly, or arranging to transfer the passenger to an alternative ship heading back to Argentina. In the situation of a medical emergency, the doctor, the medical director in the company, the Expedition Leader and the Captain of the ship work together to find the best option for the affected passenger. These situations can be testing and require great communication, leadership and team work.

Tourism in Antarctica is growing and many passengers are older people. This creates a new space in which we must provide medical care. I adore Antarctica with its stunning wildlife, its remoteness, and its natural icy and glacial beauty. At times, the medicine can be challenging, but for these reasons I am so very pleased for these opportunities and proud to stand with the expedition team in providing such wonderful experiences for our guests.

For more information or to share ideas, stories, or learnings, please get in touch.



A Humanitarian Reflection

Deployment to the Rohingya refugee camp and genocide.

Words by Dr Kate Beacher

I've sat here staring at my computer screen for the past hour, wondering how on earth I can put words to the emotions and the colours and the stories that a week ago, I was immersed in. How I can possibly choose one moment, one emotion, one second when time stopped moving forward and kairos ruled our clocks.

I try a different method instead; I write a list. The top 5 moments, I tell myself. And I'll let you, the reader, choose your own. Because I can't. Because each of these single moments influenced the way that I perceive not only the world – our world - but myself; humanity; beauty; compassion…. And what really matters.

1. Alambar's eyes. Alambar, a 65 year old woman who hasn't eaten since she arrived in Bangladesh two months ago because the grief and horror she has witnessed have caused her such a depth of despair that she is quite literally, fading away. She cannot stand. She cannot even fit a paediatric blood-pressure cuff around her arm because she has wasted away to such a small size. Who, after doing an initial medical assessment, responded to just being held close, and safely. Whose eyes showed her pain, her loss, her grief, her ache. The loss of her world. Her grasp on my arm, a plea evident in her eyes. A connection, invisible, strong, pure, a song of safety, of heart and of love. Compassion. The impact of holding her tightly, until her tense body became relaxed, until her tightness softened, until her soft moans of pain became wrenching body shakes and then sobs. Until all that was between us, all the medicine that she needed, was -cour… from the Latin, meaning heart. Compassion and caring. And in that moment, the strength and power of love, of listening and of caring, surmounted everything else. We took Alambar to the hospital a bit later to re-feed her, and fill her body with nutrition so that her mind might subsequently have a chance of healing. The whole team carried her, a stretcher of 6 people keeping her safe. Alambar's eyes were almost my undoing. Whilst the Red Cross staff looked after her beautifully and ensured she was assessed and cared for with the deepest measures, the only thing I did throughout that process was to hold her hand. She and I don't speak a common language; except for the language of the eyes, and the heart. A stronger language, perhaps, than the spoken word. Her eyes

spoke her story, her body spoke her pain…. And her words? The only words that Alambar spoke (to me, through the translator) were; that although she has no daughters, she felt that I was her daughter.

Alambar's words and her eyes almost broke me.

2. That messages like this became the norm:

"Hi Kate, just now we found a severely injured young man who is staying in a makeshift settlement near Nayapara camp and near the river. A rocket hit his feet and he seems to have received very limited treatment. Can you guys see him?"

"Hi guys. Still in Bangladesh? Heads up that the Myanmar military is resuming attacks, encircling villages, shooting as of a couple of hours ago. And boat prices have gone down so wouldn't be surprised if a new flux starts of people in bad shape. Will keep you posted".

3. Sitting staring into the killing zone near the border. That we spent half a night (before almost being arrested then escorted off the peninsula) staring across the water straight into the Myanmar killing zone. That we sat, talking with a Bengali Border Force Major drinking tea, who began our conversation by talking about aliens and cricket, then posed his dilemma of allowing us to stay in location to receive refugees straight from the boat and providing medical and psychological care before transporting them to a camp; and in that way implicitly condoning and possibly "risking" them telling their family and friends in Myanmar that they were received with care and compassion;…. balanced with his role of protecting Bangladesh's border. That the moral and the legal, the right and the wrong, the implications and precedents vs the current necessities all become blurred and lost along the way. What is right? What is human? What is legal? And what should he – and we – have done?

4. Minara, a beautiful little one who held my hand on my last day, and led all of us out of camp safely through the warren of tents and tracks. The one whose shy smile overrode her nervousness, whose muddy dress failed to inhibit her agility as she jumped, giggled, and made sure we stayed on track, for hours on end. Who was all of about 7 years old, with no parents, no siblings. Whose eyes lit up when we played bubbles, and whose smile I still see in my dreams.

5. The man who had been shot two months prior with the bullet remaining embedded in his femur. The man whose operation we organised and facilitated, after an adventurous and handmade stretcher carry through the camps and a week in town and rehabilitation. The man whose family cried when he came back, because he could stand up (relatively) pain-free – and had a chance of mobility that for the rest of his life that he wouldn't have had otherwise.

6. Toslima's Mum. I think if you asked the others in our team, they would talk to you about Toslima… This truly sends shivers down my spine; the care and the seriousness of her condition in his face. The responsibility he feels for her and her family, and the helplessness in the big scheme of the situation. Toslima, our gorgeous 11 year-old whom the Red Cross had asked us to transport to Cox's Bazaar College Hospital; and who the hospital had acknowledged that was so ill that she would have to be transported

to Chittagong because the chances were strong that she had polio…. And whose family we had to tell to duck down and hide when we drove past every Army check-point because “they were Rohingyas” and weren’t technically allowed to have the care that we could organise outside the camps. And yet, the following day, without our intervention at the hospital more from luck than plan, the family wouldn’t have been entitled to level of medical care that Toslima needed. Because they were Rohingyas. It shouldn’t take one conversation by Westerners to trump three attempts by the family to receive a card that affords medication and transport to a higher level hospital care for a child, who over the course of 3 days had contracted a fever and become paralysed.

For many of our team, it was Toslima. For me, it was her mum. The fear in her eyes. The stubbornness, the helplessness, the love for her only child. The fear.

7. And most of all?! A Rohingyan and a Bengali greeting... A shake of your hand, and a touch of their heart. Over and above everything else; it is this simple cultural gesture that stuck with me and embedded itself into me. How does a stateless people still – despite horror, tragedy, grief, and incomprehensible pain – still greet you with a smile, shake of the hand, and a touch of their heart.

I meet you, I see you, I feel you.

But that’s not just it. It’s our team; and Moslem (our fixer and all-round superstar), too. Every day, these are the people that ground me, make me laugh, make me want to cry, and keep me strong. Every day and every night we lean on each other not just for the physical carriage of our patients – and our humour – but for the shared pain. The shared heart. The swings and the roundabouts. The confidence that if you are drooping and on the way to falling, there are 7 other people within about 3metres of you; and a bunch of others keeping us safe and supported from back home. These people. A kalaeidoscope of personalities; and a cacophony of experience. But I think what stands us all apart – and therefore together – is the belief that this world, our world, is one world. That though we cannot do everything, we can do something. And we will.

So if you ask me what the most significant, important, courageous and real lesson I learnt throughout the refugee camps in Bangladesh? It is this:

That love is all there is.

I meet you, I see you, I feel you.

Connecting the Unreachable
Telemedicine in Extremes

Words by Kai Müller

Introduction

A groundbreaking telemedicine research project is underway in Antarctica, achieving a major milestone in healthcare access for remote locations. Led by expedition leader Kai Müller and supported by the Institute for Remote Area Risk And Medicine (IRARAM), an expert team will conduct the first-ever use of SpaceX's Starlink satellite internet for telemedicine purposes on the icy continent. With reliable high-speed internet connectivity being a persistent challenge in Antarctica, this project aims to revolutionise the quality of medical data exchange and treatment in this extremely remote environment.

The Project aims to evaluate the feasibility and the effectiveness of using Starlink to enable telemedicine consults and intensive care unit (ICU)-level data transfers in the harsh Antarctic conditions.

The research will have profound implications for the future of telemedicine, proving the capabilities of new satellite internet options for delivering quality medical care in challenging locations globally.

Project Overview

The ‘Connecting the Unreachable’ project focuses on demonstrating Starlink's potential for enabling high-quality medical care and consultation in extremely remote polar locations where internet connectivity has previously been impossible.

The expedition team aims to set up a specialised telemedicine station on a ship travelling in Antarctica. The hardware setup will utilise Starlink terminals to connect to the low Earth orbit satellite network. The team has designed the station to be completely power independent, with solar panels and a wind turbine providing continuous electricity during the long polar nights. This ensures continuous internet connectivity to facilitate real-time audiovisual consultation and/or transmission of medical data.

A key goal is transferring ICU-level relevant data to medical specialists at collaborating institutions. By linking the team's on-site medics with off-site medical expertise, they

will possibly optimise medical decision making and resource utilisation.

Overall, through on-site testing and data gathering, the project aims to demonstrate Starlink's effectiveness as a platform for delivering quality telemedicine services in the planet's most remote locations. The learnings will help guide future implementations of satellite-enabled telehealth networks globally.

The Setup

The equipment required for this ground-breaking project utilises SpaceX's Starlink satellite internet in conjunction with renewable power sources to enable continuous communication capabilities in the harsh Antarctic environment.

The Starlink hardware provided by SpaceX allows for high-speed, low-latency internet through a network of satellites in low Earth orbit. This provides the connectivity needed to transmit medical data and enable telemedicine consults, even in extremely remote locations like Antarctica.

To ensure continuous operation of the Starlink equipment and other electronics, the project will utilise two renewable power sources - Powerfilm solar panels and a Shine wind turbine. The solar panels can charge batteries during daylight hours, while the wind turbine generates additional power around the clock from Antarctic winds.

This combination of Starlink satellite equipment and renewable off-grid power sources provides a setup engineered for the challenges of Antarctica and in the future other remote locations without access to infrastructure. It enables the continuous, real-time communication necessary for evaluating Starlink's capabilities for telemedicine without relying on local power infrastructure or fuel-based generator

Data Transfer

The project focuses on transferring ICU-level relevant data to an external “medical overwatch” to optimize the use of medical resources with the expertise of professionals in secure locations. The Starlink setup allowsfor high-bandwidth, low-latency data transfers not previously possible in such remote environments. Specifically, the researchers are transferring the following types of data:

- ✓ Vital signs from medical devices including heart rate, blood pressure, oxygen saturation, respiratory rate, and temperature. This allows constant monitoring from medical professionals remotely.
- ✓ High-resolution ultrasound and x-ray imaging to obtain more diagnostic information and detect issues early.
- ✓ Images can be quickly transferred and interpreted by radiologists around the world.

- ✓ telemedicine consultations. Doctors can visually assess patients and communicate in real-time.
- ✓ Electronic health records to seamlessly share medical histories, allergies, medications and more. This prevents dangerous medical errors.

By leveraging Starlink's capabilities, the project will enable real-time monitoring, rapid expert consultation, and data-driven decision making. Rather than relying solely on the limited on-site medical personnel and equipment often found and instead tap into expansive medical resources through data sharing.

Project Goals

The primary goals are multi-faceted:

- ✓ Revolutionise the quality of data exchange in remote locations by utilising Starlink's high-speed, low-latency broadband internet via satellites,
- ✓ Enhance healthcare interventions in extreme environments by connecting isolated patients and on-site medics to external medical expertise.
- ✓ Provide insights into potential of Starlink performance and reliability in the harshest conditions and challenging locations globally.

By accomplishing these ambitious goals, the project aims to open up new possibilities for leveraging technology to improve healthcare access and quality for those in isolated areas across the planet.

Methodology

The research team will set up the Starlink hardware and infrastructure on an expedition cruise ship, to test multiple locations in Antarctica. This will involve configuring the satellite terminals, solar panels, batteries, and other equipment to enable continuous connectivity.

They will then conduct extensive tests by streaming different types of medical data over the Starlink connection. This includes high-resolution photos and videos, vital signs from medical devices, ultrasound and x-ray imagery, and two-way audio/video consultations. The team will then gather quantitative performance metrics on latency, bandwidth, reliability, and stability of the connection under different weather conditions and levels of network congestion. Qualitative feedback will also be collected through surveys and interviews with the on-site medical personnel.

Demonstrating Potential of Starlink Platform

The research project will highlight an innovative approach to tele-consultations, tele-mentoring, and medical education that can be enabled by Starlink.

A second potential phase will allow for more extensive testing of video consultations, medical data transfers, and overall network performance across longer distances in the harsh polar environment.

Conclusion

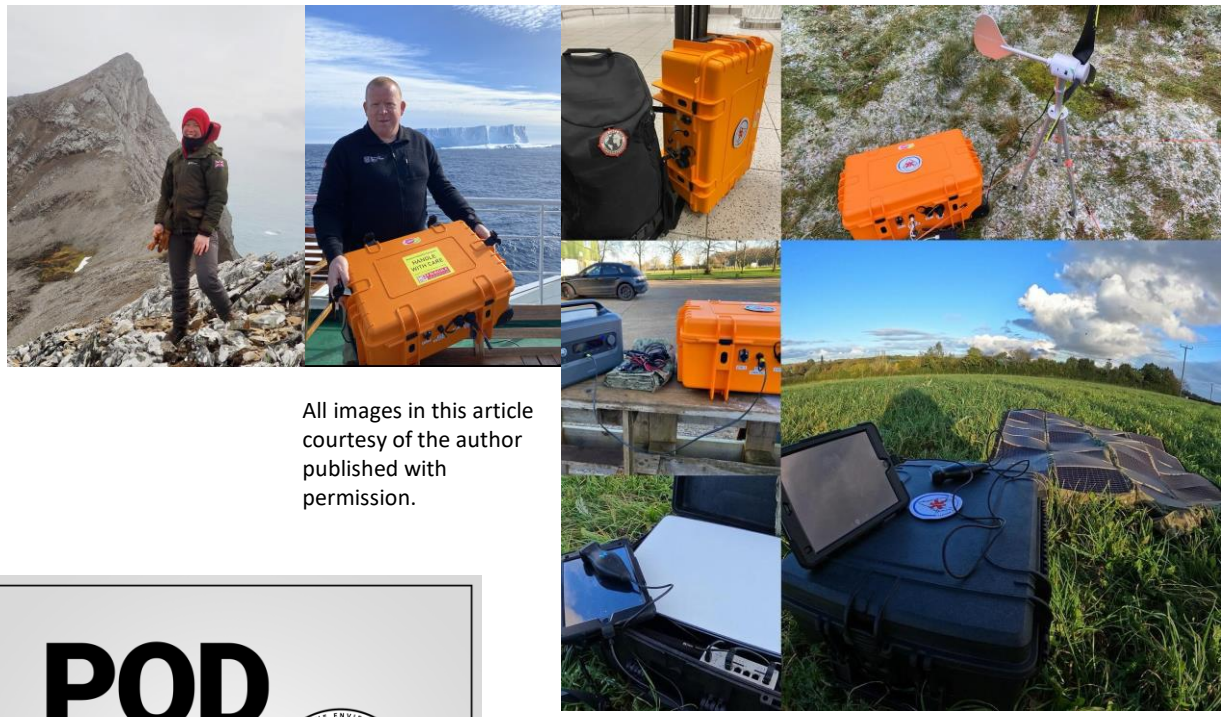
The research in Antarctica will show that with the right technology, quality healthcare can be delivered anywhere on the planet by bridging geographical divides with Starlink telemedicine. Overall, this pioneering project will demonstrate the vast potential for Starlink and telemedicine to transform healthcare delivery in extreme environments. The research will provide a model that can be adapted and implemented around the world, advancing telemedicine capabilities to reach the previously unreachable.

With thanks to the International Association of Antarctica Tour Operators who assisted our team in transportation and finding a base of operations for this project.

Project Members

- Kai Müller
- Tim Belfall
- Dr. Katharine Ganly
- Dr. Hannah Evans

For business cooperation please contact: k.mueller@polarmedic.net - +47 98 76 76 20



All images in this article courtesy of the author published with permission.


AUSTRALASIAN WILDERNESS & EXPEDITION MEDICINE SOCIETY
DIVING DEEPER
AWEMS 2024 CONFERENCE
THURS-SAT
OCT | 10-12 | 2024
CRYSTALBROOK RILEY, CAIRNS QLD
JOIN US WHERE THE RAINFOREST MEETS THE REEF!
DIVE INTO THE DEPTHS OF WILDERNESS & EXPEDITION MEDICINE, WITH WORKSHOPS AND PRESENTATIONS LED BY INDUSTRY EXPERTS.
'AUSTRALASIAN WILDERNESS AND EXPEDITION MEDICINE SOCIETY'
EVENT PAGE: 'DIVING DEEPER' - AWEMS CONFERENCE '24
@AUSTRALASIANWEMS
@AWEMSOFFICIAL


EXPLOR-A
ADVENTURE CPD
AVALANCHE MEDICINE
MOUNT HOTHAM
AUSTRALIA
JULY 2025
www.exploramedicine.com.au

The 60 Miler: A medical account of the expedition to complete Australia's longest ocean swim.

Dr Dan Lack
Lecturer - University of Tasmania Healthcare in Remote and Extreme Environments

On the 14th of March 2024 Dean Summers completed the longest ocean swim in Australia's history. The 96km (or 60 miles), 31-hour journey from Newcastle to Sydney, on the first attempt, was a masterclass in extreme athleticism and expedition preparation.

As the expedition doctor for the swim attempt, I felt that I was prepared for most eventualities, including the expectation of multiple attempts, and in the end did little more than be a spectator to one of the most inspiring achievements I have seen.

When you look at Dean Summers it's hard to see the athlete peeking out from behind the 64 years, barrel chest and generous belly. What does jump out is confidence and experience. Dean is one of the world's elite ocean swimmers having swam all but one of the "Ocean 7" crossings (LongSwims, 2024). He is also a retired sea-farer so his connection with the ocean is extensive, intimate and passionate. This is what made this expedition so memorable.

Preparation = Success

In addition to Deans multi-year physical preparation, which is no doubt the biggest factor, there was extensive preparation by the expedition team to ensure Dean has the best chance of success. The swim had been attempted twice within the last 40 years, with both attempts failing, one due to the shark cage breaking apart, and the other due to unexpected winds and currents. Critical to Deans success were a detailed nutrition plan, world class ocean current and weather forecasting, the use of shark shield technology, real time current monitoring and confidence in the medical plan.

Nutrition

Under "English Channel rules" (Association, 2024) Dean cannot touch anyone or anything while in the water, and be aided by only speedos, goggles, cap and grease. The nutrition plan, designed by a trusted sports nutritionist, dictated feeds every hour supplied as liquid in bladders, or solids handed to Dean if the conditions allowed. There was a crew member assigned to recording fluid and calory intake which could be used to track any changes in intake. This combined with monitoring of Deans stroke rate would trigger conversations with the team (including the nutritionist by phone) on

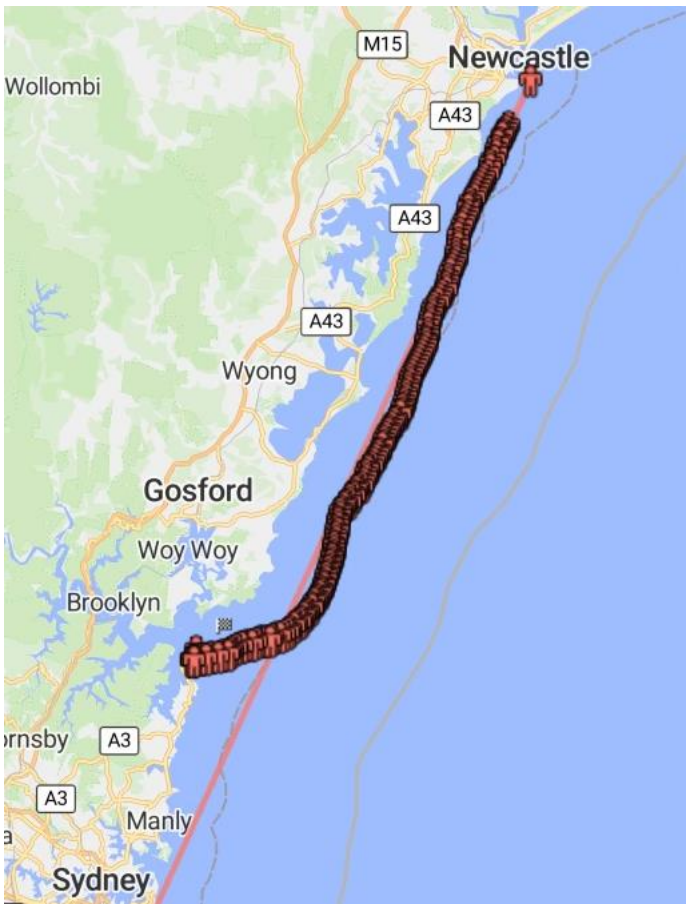
changes to feed timing or quantity.

Current and Weather Forecasting

The crew had 2 false starts where the weather windows opened, and then quickly closed. Behind these windows was a word expert in ocean current modelling. The ideal conditions would include no, or northerly winds and swells, and as much southerly current as possible. Compared to previous attempts, the technology and knowledge to optimize these conditions is far superior. Suzie Moroney's attempt in 1999 was aborted due to foul weather, which was easily avoided in 2024. During the course of the swim there was minimal winds, a NNE swell of about 1 meter and anywhere from 0 to 1 knot of southerly current; almost ideal conditions. Monitoring of real time forecasts and actual currents by the expedition team enabled subtle course changes to maximise currents (see Image 1).

Shark Shields

In 1981 Des Renford was the first to attempt this swim. His attempt was aborted due to his shark cage breaking apart. Despite the fact that shark encounters are statistically rare, I don't blame someone who is in the open ocean for 31 hours wanting some form of protection against sharks. Dean was sponsored by Ocean Guardian who make shark shield devices that can be suspended beneath a kayak as a long wire giving off electrical currents that repel sharks. The kayaker paddles next to the swimmer to provide some protection against sharks, as well as direction guidance, and a bit of company. The effectiveness of the technology seems to hold up in the literature (Huveneers, 2018) and Dean has experience during a Hawaiian swim of a 14-foot oceanic white tip shark swimming for hours just out of reach of the shark shields effect.



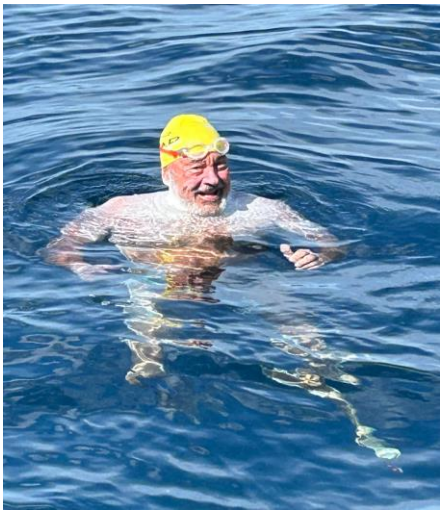
The major considerations for Dean were shark encounters, hypothermia, dehydration, marine stinger reaction and respiratory compromise from chronic sea salt inhalation. Focus on massive hemorrhage control, fluid resuscitation and stabilizing massive histamine response and inflammation were prioritized. The support boat had the capability of warming fluids quickly while emergency airway support was also available.

The challenge of regular medical assessment was expanded beyond the expedition doctor with data coming from the kayakers, who would be spending the most time with Dean, and Deans coach onboard the support vessel being the most valuable assessment tool. Given Deans past experience of achieving longs swims while in an altered cognitive state (hallucinating and reduced consciousness while maintaining strong stroke rates), significant weight was given to the net change in Deans nutritional intake, stroke rate and engagement with the kayakers. This was then fed back to the doctor for a team-based assessment of his medical progress.

The biggest planning challenge in any medical event involving Dean was getting him back to the boat quickly and safely. This would be achieved by stabilization by the kayaker, followed by the support boat maneuvering close and Dean then being dragged onto the 'lilypad' foam platform at the stern of the boat (see Image 2). This pad allowed for incredibly efficient moving of people on and off the boat in the conditions experienced.

Summary

As we hope with any expedition, the planned-for disasters did not happen, everyone got home safely, and we were able to witness history being made. In addition, our support of Deans swim then enabled increased awareness and fundraising for a mental health charity that support sea farers (Hunterlink, 2024).



Medical Summary

Mucositis:

31 hours of salt water sucked the life out of Deans oral mucosa. Treated with fresh water.

Blue Bottle Stings:

x hundreds. Treated with oral antihistamines and steroid.

Reflux:

1 x pack of QuickEze for the support vessel captain (surely that chest pain was reflux?!

Top Right: Dean in the water.
Below: Safety Team

Fever at Sea: Deciphering a Non-Specific Febrile Illness in a Superyacht Passenger Off Papua New Guinea - A Case Study

Dr Benjmain Dunton MD, BHlthSc(Sp&ExSc), GradDipHlthRemExtEnv
Rural Generalist Registrar (ACRRM), Fellow Candidate Academy of Extreme Environment Medicine (AEEM)

Introduction

As the world's population grows and their collective desire for adventure increases, more holidaymakers are exploring tropical destinations worldwide. These idyllic settings offer an escape from the bitter cold of winter and the monotony of urban life. However, travel to these areas presents a unique set of challenges, including the risk of tropical infectious diseases, extreme environmental conditions that stress the bodies of those unaccustomed, and often, remote locations with limited access to medical care. It is now essential for healthcare professionals to understand the common causes and management strategies for acute febrile illnesses in tropical environments. Those working in non-tropical regions need to be equipped for conducting pre-departure assessments and for evaluating and managing febrile patients returning from travel. Similarly, health professionals in tropical regions must be adept at caring for febrile travellers, particularly in isolated and resource limited settings.

Case Presentation

- Patient Information

This case concerns a male over 65, from North America or Europe, with a medical history including obesity, dyslipidaemia, hypertension, mild fatty liver disease, and benign prostatic hypertrophy. His medications comprise antihypertensives, a statin, and tamsulosin-dutasteride for prostate management, with no reported allergies.

- Situation

During a 14-day luxury superyacht cruise around Papua New Guinea's remote islands, a 168-foot vessel hosted approximately 8 guests and 12 crew members, including the captain responsible for medical care. The vessel was equipped with a comprehensive medical kit that approached, but fell short of, the full requirements for Category A vessels as outlined by the UK Maritime and Coastguard Agency (MCA).1 This discrepancy was likely due to a provision permitting adjustments based on the recommendations of a qualified health professional to suit the needs of the crew and specifics of the voyage. Furthermore, in the absence of an onboard medic, the captain had access to international maritime medical support. A private plane was utilised to transport guests to the yacht and was stationed on standby in Northern Australia for the duration of the cruise.

The cruise offered guests yacht-based activities such as snorkelling, diving, and jet skiing, along with occasional land-based adventures such as jungle hikes and white-water rafting. Throughout the journey, the health of all staff and the other guests remained stable with no acute illnesses reported. However, despite the voyage's location and occasional land excursions into dense jungle, no malaria prophylaxis was provided to guests or crew, underestimating the mosquito exposure risk during onshore activities in Papua New Guinea. Furthermore, no preventative measures against insect bites were taken for land excursions, and guests were not informed about the risks of mosquito-borne diseases prevalent in this tropical region.

- Clinical Assessment

The focus of this case, a gentleman in his late sixties, started experiencing a mild headache and lethargy the evening before my examination. Upon my return from a remote health patrol, I received a phone call informing me that the vessel was en route to port for medical care due to the patient's worsening condition. Over the course of the day, his headache intensified, becoming severe, accompanied by high fevers peaking at 39.8°C, rigors, and tachycardia with heart rates ranging from 100-120 beats per minute, all while his blood pressure remained normal. The patient reported no other symptoms in the previous 2-3 days, and neither the guests nor the crew had observed any further symptoms before this deterioration.

Upon boarding the yacht, a thorough examination and history revealed numerous mosquito bites within the past 14 days. The individual reported no respiratory, urogenital, gastrointestinal symptoms, skin lesions, recent introduction of new medications, or recreational drug use. The examination confirmed the patient's account, noting only subtle suprapubic tenderness and persistence of the tachycardic but normotensive state, with fevers slightly reduced to the 38°C range after paracetamol.

- Diagnostic Assessment

Before boarding the yacht, informed by the patient's condition and the Papua New Guinea setting, I prepared a list of differential diagnoses, aiming to refine this through clinical evaluation and bedside testing. The primary considerations for fever in a visitor to Papua New Guinea included acute tropical and non-tropical infectious diseases, alongside rare non-infectious causes such as medication side effects, hypermetabolic states like thyroid storm, or inflammatory conditions such as vasculitis.

I requested and reviewed the yacht's medical supplies list, noting an absence of malaria rapid diagnostic tests (RDTs) and antimalarial medications. This review enabled me to gather these crucial supplies, in addition to an intravenous cannula and fluids, before heading to the yacht, ensuring preparedness for as many potential diagnoses as possible given the limited resources available in town. I directed the crew to give the patient paracetamol and promote oral hydration to control fever and maintain fluid balance, while I made to the yacht.

In this remote part of Papua New Guinea, diagnostic options were limited, a malaria RDT was weakly positive for mixed infection (both P. falciparum and non-falciparum species). The absence of urine analysis, dengue, and typhoid RDTs, and non-operational x-ray equipment at the local hospital further constrained diagnostic capabilities. The leading diagnosis in a man over 65, presenting with severe headache,

fever, and rigors after a 14-day trip to Papua New Guinea, was malaria, supported by the weakly positive RDT. Differential diagnoses included urinary tract infection, dengue fever, typhoid fever, and rickettsial infection, but the lack of specific tests for these conditions required reliance on clinical judgment and the patient's response to empirical treatment.

Management

Initial management involved administering paracetamol for fever and promoting oral hydration. Following assessment, targeted interventions began, including intramuscular artemether (3.2mg/kg) for suspected malaria, chosen for its once daily dosing effectiveness and practicalities of administration in a human resource limited setting.2 Concurrently, to cover potential bacterial infections, ceftriaxone 2g was given intramuscularly, empirically addressing alternative causes of fever including urinary and respiratory infections, typhoid, rickettsial diseases, and meningococcal infections.3-6 Oral artemether/lumefantrine was also supplied for continued treatment after reaching a higher-level medical facility, anticipating potential delays in accessing malaria treatment in non-endemic regions.

To prevent hypoglycaemia, in the absence of glucose monitoring, the patient was advised to consume one glass of sugar-added fluids for every two of water. The yacht crew monitored the patient every 6 hours for signs of deterioration, with thresholds set for seeking further medical assistance. Arrangements were made for expedited transfer to an overseas tertiary healthcare facility using the gentleman's private plane, ensuring timely and safe transportation.

Follow-up and Outcomes

The patient showed improvement overnight, with reduced fever and tachycardia, but remained in a suboptimal location for ongoing management. Given the continued effect of the administered artemether and ceftriaxone, no further doses were given pre-transfer. Stable and afebrile, he was deemed fit for travel without medical escort on his private plane from Papua New Guinea. He remained stable during the flight and recovered well at the tertiary facility, though the precise cause of his fever—be it malaria, dengue, or another organism, was never communicated back to Papua New Guinea.

Discussion

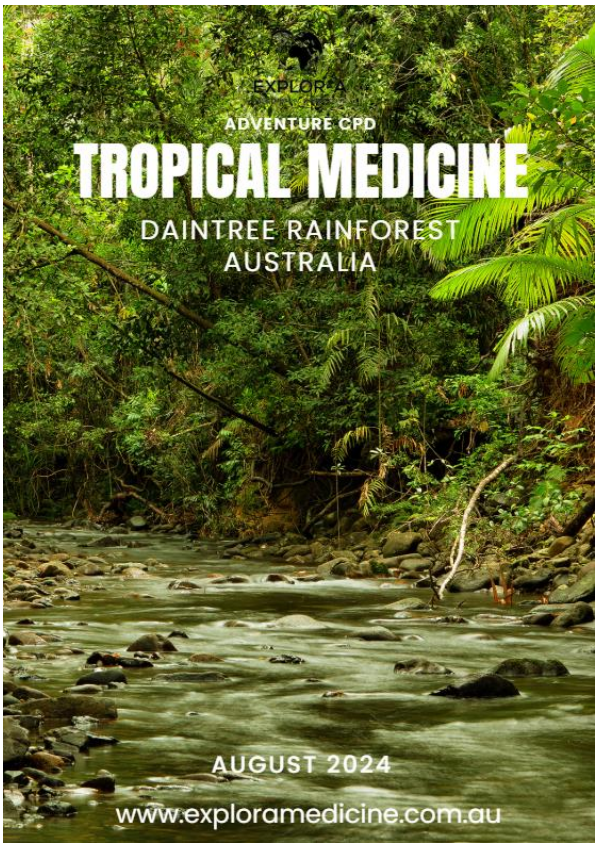
In this case, I navigated through various diagnostic and therapeutic decisions with limited support and access to resources. Reflecting on this experience, a thorough review of the diagnostic and management processes has shed light on potential improvements and modifications to my clinical practice. These insights aim to better patient outcomes in similar situations encountered in the future. The details provided in the subsequent sections aim to share this knowledge with other healthcare professionals working in or aspiring to work in similar tropical environments.

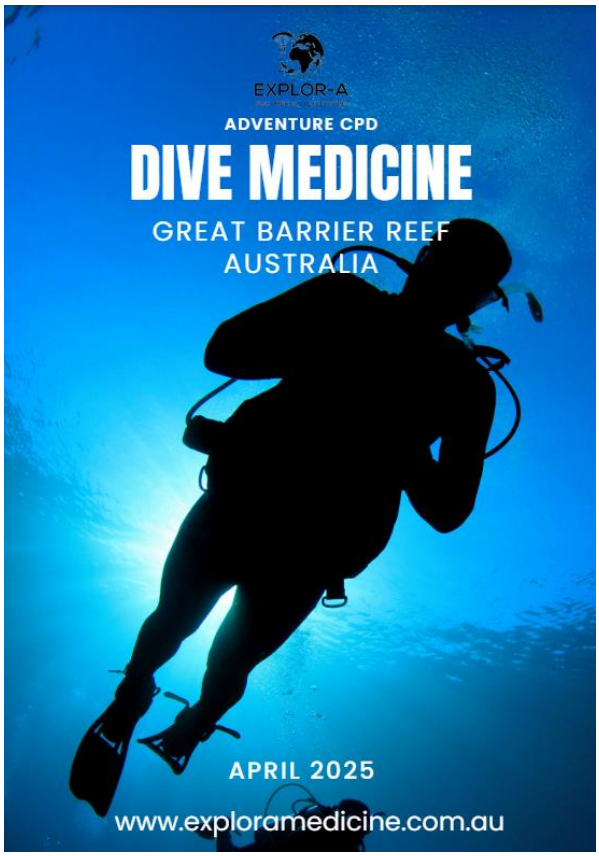
Febrile Illness in Tropical Environments

This case underscores the difficulties in diagnosing and treating acute febrile illnesses in remote tropical settings like Papua New Guinea, highlighting the need for a comprehensive list of differential diagnosis for travellers with fever and nonspecific symptoms. In such cases, non-tropical infectious diseases, including respiratory and urinary tract infections, are the most prevalent cause, accounting for 39% of cases.7 Tropical infectious diseases follow closely at 33%, whereas non-infectious


RescueMED
Wilderness Medical Specialists
RescueMED, founded and operated by Kerryn Wratt, alongside a number of diverse medical professionals delivers high-quality medical care services in remote, wilderness, and austere environments. Providing professional development for doctors, nurses, outdoor professionals and paramedics who want to enhance their skills in remote or wilderness environments.
RescueMED focuses on hands on practical learning with specific attention to a varying aray of environments and the medical complaints that can occur within.
UPCOMING COURSES
• WRM:Canyon, Australia 14 - 18 Oct 2024
• WRM:High Counrty, New Zealand 20 - 23 Nov 2024
• WLS:MP, Australia 2 - 5 Dec 2024
• WRM :Marine, New Zealand 30 July - 3 Aug 2025
Find more info on our website
www.rescuemed.com.au
ACCREDITED ACTIVITY
ACRRM CPD ACCREDITED ACTIVITY 2023-2025
Wilderness Medical Society


AUSTRALASIAN WILDERNESS & EXPEDITION MEDICINE SOCIETY
DIVING DEEPER
AWEMS 2024 CONFERENCE
THURS-SAT
OCT | 10-12 | 2024
CRYSTALBROOK RILEY, CAIRNS QLD
JOIN US WHERE THE RAINFOREST MEETS THE REEF!
DIVE INTO THE DEPTHS OF WILDERNESS & EXPEDITION MEDICINE, WITH WORKSHOPS AND PRESENTATIONS LED BY INDUSTRY EXPERTS.
'AUSTRALASIAN WILDERNESS AND EXPEDITION MEDICINE SOCIETY'
EVENT PAGE: 'DIVING DEEPER' - AWEMS CONFERENCE '24
@AUSTRALASIANWEMS
@AWEMSOFFICIAL


EXPLOR-A
ADVENTURE CPD
TROPICAL MEDICINE
DAINTREE RAINFOREST
AUSTRALIA
AUGUST 2024
www.exploramedicine.com.au


EXPLOR-A
ADVENTURE CPD
DIVE MEDICINE
GREAT BARRIER REEF
AUSTRALIA
APRIL 2025
www.exploramedicine.com.au

causes of fever represent a mere 0.5% of febrile illnesses in travellers to tropical regions.7 Malaria stands out as the predominant organism to cause fever in travellers to tropical regions (22%), with a mortality rate of 0.2-0.5% and contributing 25-55% of infectious disease deaths among travellers, hence testing for and treating malaria is essential.6-10

Dengue fever follows as the second most common organism to cause fever among travellers to tropical areas, constituting 5.2% of cases, yet it presents a significantly lower mortality and complication rate compared to malaria.6-9 Other significant tropical diseases include enteric fever (typhoid and paratyphoid) and rickettsial infections.6,7,9 Less common causes, accounting for under 2% of cases, include schistosomiasis, helminthic infections, amebiasis, viral haemorrhagic fevers, brucellosis, melioidosis, and borreliosis.7

To summarise, the primary causes of a fever in a traveller on a short (<2 week) tropical holiday include; 6-14

- Non-tropical infectious diseases 39% - e.g. Respiratory and urinary tract infections
- Tropical infectious diseases 33% - Five most common are;

1. Malaria 22%
2. Dengue fever 5.2%
3. Enteric fever (Typhoid & Paratyphoid fever) 2.3%
4. Rickettsial infections 1.7%
5. Leptospirosis 0.4%
6. Non infectious diseases 0.5%

The incubation periods for these tropical infectious diseases are; 6-17

- Malaria 6-90 days
- Dengue fever 4-8 days
- Enteric fever 3-60 days
- Rickettsial infections 2-21 days
- Leptospirosis 3-30 days

Field Diagnosis of Tropical Infectious Diseases

Rapid Diagnostic Tests (RDTs) have revolutionised the diagnosis of acute febrile illnesses in resource-limited tropical settings, providing accurate in-field confirmation of major causes like malaria, dengue, and typhoid. For malaria, RDTs show remarkable sensitivity and specificity, particularly for Plasmodium falciparum, with rates exceeding 95%, facilitating immediate and targeted treatment that significantly improves patient outcomes in remote areas.6,13,18 Dengue RDTs demonstrate a sensitivity range of 76-93% and impressive specificity over 98%, while Typhoid RDTs, such as Typhidot, achieve sensitivity of 95-97% and specificity above 89%.13 By minimising the necessity for complex laboratory tests and streamlining the diagnostic workflow, RDTs have expedited the delivery of disease-specific treatments, significantly reducing the morbidity and mortality linked to these infectious diseases.

Field Management of Acute Febrile Illness in a Tropical Environment

Managing undifferentiated fever in travellers to tropical regions involves a systematic evaluation for various potential diagnoses, with an emphasis on identifying localising symptoms to quickly narrow down the possibilities.9 The Quick Sepsis-related Organ Failure Assessment (qSOFA) and similar tools are crucial for identifying patients at risk of severe sepsis and rapid deterioration needing urgent care and empirical antibiotics.9

Malaria testing using RDTs or blood smears is mandatory for all travellers to endemic areas, with positive cases treated immediately with artemisinin-based therapies.9 If malaria is ruled out, available dengue and typhoid RDTs should be performed, with positive results treated accordingly.

After ruling out malaria, dengue, and typhoid fever, if possible, commence empirical antibiotic therapy with ceftriaxone (100mg/kg/day IV or IM) and doxycycline (5mg/kg/day), with the option to add azithromycin (10mg/kg/day), pending transfer for further assessment and management.13 Upon reaching a suitable healthcare facility, repeat malaria testing is essential to ensure there is no missed diagnosis. If the patient's condition worsens in the field, start empirical malaria treatment with parenteral artemisinin-based therapy and the aforementioned antibiotic regimen, including azithromycin, until transfer to a well-equipped healthcare facility.

Learning Points

- Seek predeparture health assessments, vaccinations, and travel advice from a tropical medicine specialist.
- Non-tropical infections are the main cause of fever in travellers to tropical areas.
- Malaria is the most common tropical disease causing fever in these travellers.
- Dengue, Typhoid and Rickettsial infections are other significant causes of fever in these travellers.
- Tropical diseases often initially present with non-specific symptoms including headache, fever, rigors and malaise.
- Use rapid diagnostic tests for malaria, dengue, and typhoid when available. Plan to secure a supply in advance.
- Diagnosing illnesses in tropical environments can be challenging. When faced with uncertainty or a severely ill or deteriorating patient, opt for broad treatment. This should include artemisinin-based therapy for malaria and antibiotics including ceftriaxone and doxycycline, with azithromycin as an optional addition to the regimen if necessary.
- Initiate early communication with transportation, retrieval services, referral hospitals, and global health agencies. For unwell travellers in tropical areas, the optimal care location is typically elsewhere. Promptly transferring the patient to a suitable medical facility is crucial for improving outcomes.

Conclusion

This case highlights the challenges of delivering medical care in remote tropical locations, where the range of possible illnesses expands but access to diagnostic testing diminishes, complicating accurate diagnosis. A broad understanding of potential causative agents enables the implementation of wide-ranging treatment protocols to optimise patient outcomes. Key in this setting is the early identification and treatment of malaria, coupled with swift transfer to improve patient outcomes. However, clinicians must remember that most acute febrile illnesses in these regions are caused by infections common to non-tropical areas.

Optimising care for acutely febrile travellers in remote tropical settings requires a broad knowledge base and skill set, foresight in planning and anticipatory decision-making, effective utilisation of limited resources, and coordination of evacuation for at-risk or deteriorating patients.

Regardless of how big their boat is.

Reference List

1. Maritime and Coastguard Agency (MCA). Merchant shipping notice: MSN 1905 (M+F) Amendment 1 – Ships' medical stores. Southampton, United Kingdom: Maritime and Coastguard Agency; 2012 [cited 2024 Mar 11]. Available from :https://assets.publishing.service.gov.uk/media/60ae23d48fa8f520c949b676/MSN_1905__M+F__Amendment_1_ships__medical_stores.pdf

2. Medicins San Frontieres. Essential drugs: Drugs potentially dangerous or obsolete or ineffective – Artemether injectable. Medicins San Frontieres; n.d. [cited 2024 Mar 11]. Available from: https://medicalguidelines.msf.org/en/viewport/EssDr/english/artemether-injectable-16682453.html

3. Dryden M, Miller A, Morgan C, Warrell DA. Treatment: infectious diseases. In: Johnson C, Anderson S, Dallimore J, Imray C, Winser S, Moore J et al. Oxford handbook of expedition and wilderness medicine. 2nd edition. Oxford (United Kingdom): Oxford University Press; 2015. P 455-514.

4. Therapeutic Guidelines. Early intervention for sepsis and septic shock: prehospital management. Melbourne: Therapeutic Guidelines; 2020.

5. Lokida D, Hadi U, Lau CY, Kosasih H, Liang CJ, Rusli M et al. Underdiagnoses of rickettsia in patients hospitalized with acute fever in Indonesia: observational study results. BMC Infect Dis [Internet]. 2020 Dec [cited 2024 Mar 11];20:1-2. DOI: 10.1186/s12879-020-05057-9

6. Fink D, Wani RS, Johnston V. Fever in the returning traveller. BMJ [Internet]. 2018 Jan [cited 11 Mar 2024];25;360-369. DOI: 10.1136/bmj.j5773

7. Buss I, Genton B, D'Acremont V. Aetiology of fever in returning travellers and migrants: a systematic review and meta-analysis. J Travel Med [Internet]. 2020 Dec [cited 2024 Mar 12];27(8),1-12. DOI: 10.1093/jtm/taaa207

8. Leggat PA. Assessment of febrile illness in the returned traveller. Aust Fam Physician [Internet]. 2007 May [cited 2024 Mar 12];36(5):328-333. Avaliable from: https://researchonline.jcu.edu.au/2795/1/2795_Leggat_2007.pdf

9. Thwaites GE, Day NP. Approach to fever in the returning traveller. NEJM [Internet]. 2017 Feb [cited 2024 Mar 12];376(6):548-60. DOI: 10.1056/NEJMra1508435

10. Wilson, M. Fever in the returned traveller, CDC yellow book 2024: post travel evaluation. Centers for Disease Control and Prevention [Internet]; 2023 [cited 2024 Mar 12] . Available from: https://wwwnc.cdc.gov/travel/yellowbook/2024/posttravel-evaluation/fever-in-the-returned-traveler

11. NSW Agency for Clinical Innovation. Emergency care institute, New South Wales: returned traveller. NSW Agency for Clinical Innovation; 2024 [cited 2024 Mar 12]. Available from: https://aci.health.nsw.gov.au/networks/eci/clinical/clinical-tools/infectious-diseases/returned-traveller#:~:text=Severe%20respiratory%20symptoms%20associated%20with,%2C%20such%20as%20Legionnaires'%20disease

12. NSW Agency for Clinical Innovation. Incubation periods of common travel-related infections [Internet]. NSW Agency for Clinical Innovation; 2024 [cited 2024 Mar 12]. Available from: https://aci.health.nsw.gov.au/__data/assets/pdf_file/0007/286837/Incubation_periods_of_common_infections.pdf

13. Singhi S, Chaudhary D, Varghese GM, Bhalla A, Karthi N, Kalantri S et al. Tropical fevers: management guidelines. IJCCM [Internet]; 2014 Feb [cited 2024 Mar 12];18(2):62-69. DOI: 10.4103/0972-5229.126074

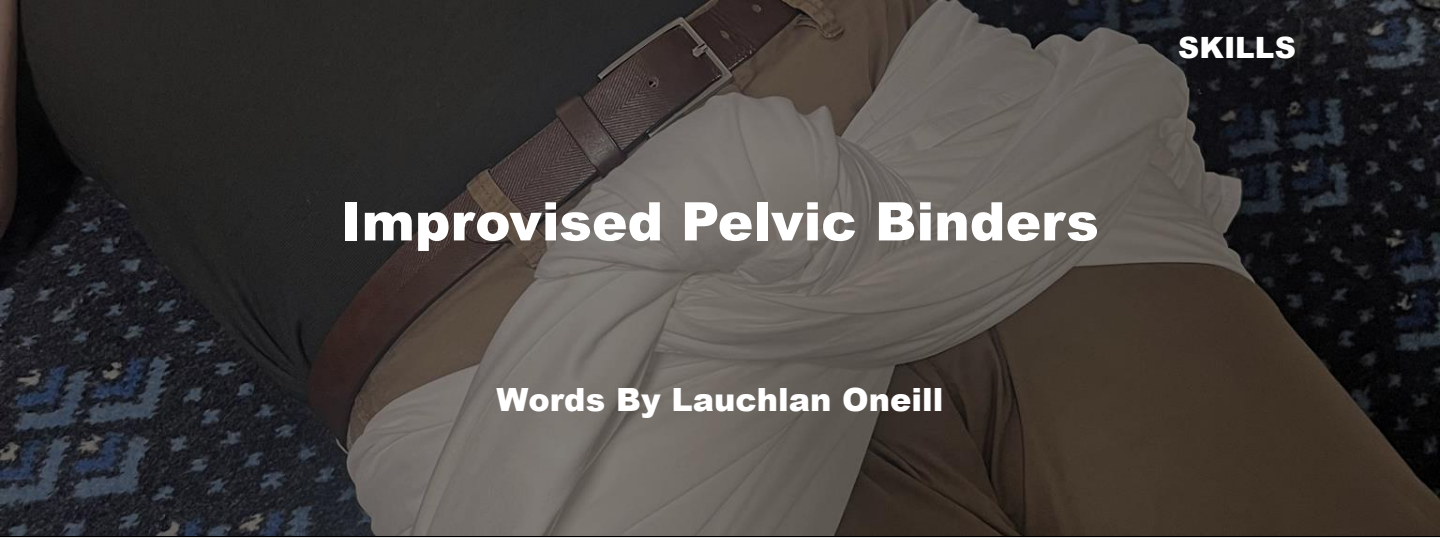
14. Wilson M. Evaluation of fever in the returning traveller. UptoDate [Internet]; 2023 [cited 2024 Mar 12]. Available from: https://www-uptodate-com.

15. Rathi N, Rathi A. Rickettsial infections: indian perspective. Indian pediatr [Internet]. 2010 Feb [cited 2024 Mar 12];47:157-64. DOI: 10.1007/s13312-010-0024-3

16. Mahajan SK. Rickettsial diseases. J Assoc Physicians India [Internet]. 2012 Jul [cited 2024 Mar 12];60(7):37-44. Available from: https://www.researchgate.net/profile/Sanjay-Mahajan-2/publication/235618717_Ricketsial_diseases/links/58f619554585158514b54ef9/Ricketsial-diseases.pdf

17. Haake DA, Levett PN. Leptospirosis in humans. Curr Top Microbiol Immunol.[Internet]. 2015 [cited 2014 Mar 12];387;65-97. DOI: 10.1007/978-3-662-45059-8_5

18. Mukkala AN, Kwan J, Lau R, Harris D, Kain D, Boggild AK. An update on malaria rapid diagnostic tests. Curr Infect Dis Rep [Internet]. 2018 Dec [cited 2024 Mar 12];20:1-8. DOI: 10.1007/s11908-018-0655-4



Improvised Pelvic Binders

Words By Lauchlan Oneill

Introduction

Pelvic fractures are thought to occur in approximately 5-16% of patients with blunt trauma, particularly resulting from motor vehicle accidents and falls from significant height (2)(4). Even relatively minor pelvic fractures have the potential to be life threatening. Pelvic fractures are associated with increased mortality with several studies estimating approximately 10% increased mortality compared with similar trauma presentations without pelvic fractures (8). Standard management of a suspected pelvic fracture is the application of a pelvic binder in order to stabilise the pelvic ring and minimise blood loss.The pelvic binder decreases bleeding primarily by decreasing the space within the pelvis, limiting the amount of blood able to be lost in the space and promoting tamponade (9).

Numerous studies have been conducted on the accuracy of placement of pelvic binders, finding pelvic binders are often incorrectly placed. Studies have indicated binders are often placed too high which, while often rendering the device ineffective in reducing the fracture, may also cause compromise to soft tissue and nerves if required to remain on for over 6 hours (10). High placement also results in the binder being over the gluteal muscles, requiring greater force to adequately reduce the fracture (11). The correct placement for a pelvic binder is over the greater trochanter (?image, fig 2 from ref 11). An easier landmark in males is for the top of the binder to be at the level of the base of the penis.

Unfortunately, purpose built pelvic binders are not often available in an expedition setting due to their occasional and specific use. There are several simple and accessible improvisational methods for creating a pelvic binder in a pinch with varying degrees of effectiveness. It is also important to note these improvised binders should be checked intermittently as they may loosen due to material stretching or slippage.

SAM splint + TQ

The most resource intensive of the improvisational methods also has the most evidence associated with its efficacy. By opening up the SAM splint and cutting slits in the distal ends, slots are created which a tourniquet can be slid through. The SAM splint is then positioned under the patient and folded around the pelvis as a normal pelvic binder. Once in position, a tourniquet is connected through both slits and tightened to provide pressure, pulling the pelvis together. If an improvised tourniquet

is to be used, it is essential that a windlass is used, as it should with all improvised tourniquets to ensure adequate pressures are achieved (1). Testing has shown this type of improvised binder both provides adequate pressures and maintains pressures well over time (3).

Sheet

A bedsheet could theoretically be used to create a pelvic binder by wrapping it around the patient and tying it at the front. While bedsheets may not be readily available, the concept still holds with clothing items provided the material is non-stretch (as there is no research available on the efficacy of stretchy material). The major problem with this method is the difficulty in gaining and maintaining sufficient pressures to manage the injury (7). There are two potential but untested solutions for this. The first is to use of two people to maintain pressure on the ends while the makeshift device is clamped (eg. zip ties). This may provide

All images in this article courtesy of the author published with permission.

more pressure although there is uncertainty as to whether a clamp will slip (7). Secondly, a windlass may be used to achieve sufficient pressure. Achieving correct pressures, not over or under tightening, would be a challenge, as would maintaining a relatively flat binder for the prevention of pressure injuries and to ensure pressure is equally distributed across the fabric.

Pants

If long pants are worn by the casualty, it is possible to use them to create an improvised pelvic binder. By cutting the pant legs from ankle up to the greater trochanter, the freed fabric can then be wrapped around the casualty and tied at the front, similar to the method used with a bedsheet (6)(5). As with the bedsheet method, the type of material may have a significant impact. Also as with the bedsheet, the use of a clamp or windlass is more likely to create sufficient pressures, though the trial conducted on this method reports sufficient pressure achieved with a reef knot (5).

If there is an injury requiring a pelvic binder when no commercial products are available, there are several options. Main points to remember are to use what materials are readily available, use a windlass to create adequate pressure if possible, and recheck the tightness of the binder regularly in cases of prolonged extraction due to slippage or fabric stretching.

References

1. Altamirano, M.P. et al. (2015) 'Role of the windlass in improvised tourniquet use on a manikin hemorrhage model', Journal of Special Operations Medicine, 15(2), p. 42. doi:10.55460/dtpo-g5og.

2. Chesser, T.J.S., Cross, A.M. and Ward, A.J. (2012) 'The use of pelvic binders in the emergent management of potential pelvic trauma', Injury, 43(6), pp. 667–669. doi:10.1016/j.injury.2012.04.003.

3. Howe, T.J. et al. (2023) 'Mechanical assessment of proprietary and improvised pelvic binders for use in the prehospital environment', BMJ Military Health [Preprint]. doi:10.1136/military-2023-002398.

4. Lee, C. and Porter, K. (2007) 'The prehospital management of pelvic fractures', Emergency Medicine Journal, 24(2), pp. 130–133. doi:10.1136/emj.2006.041384.

5.Loftus, A. et al. (2017) 'Combat trousers as effective improvised pelvic binders a comparative cadaveric study', Journal of Special Operations Medicine, 17(3), p. 35. doi:10.55460/1p7e-2ol4.

6. Shertz, M. (2023) Improvised pant-leg pelvic binder, Crisis Medicine. Available at: https://www.crisis-medicine.com/improvised-pant-leg-pelvic-binder/ (Accessed: 30 March 2024).

7. Sinha, S. et al. (2015) 'A bed sheet is not as effective as a pelvic circumferential compression device in generating pelvic compression in patients with a suspected pelvic fracture', Trauma, 17(2), pp. 128–133. doi:10.1177/1460408614568831.

8.Bonner, TJ. et al. (2011) 'Accurate placement of a pelvic binder improves reduction of unstable fractures of the pelvic ring', The Journal of Bone and Joint Surgery. British volume, 93-B(11), pp. 1524–1528. doi:10.1302/0301-620x.93b11.27023.

9. Tullington JE, Blecker N. Pelvic Trauma. [Updated 2023 Aug 8]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK556070/

10. Sathy, A.K. et al. (2009) 'The effect of pelvic fracture on mortality after trauma: An analysis of 63,000 trauma patients', The Journal of Bone and Joint Surgery-American Volume, 91(12), pp. 2803–2810. doi:10.2106/jbjs.h.00598.

11. Tiziani, S. et al. (2022) 'Does the accuracy of prehospital pelvic binder placement affect cardiovascular physiological parameters during rescue? A clinical study in patients with pelvic ring injuries', OTA International: The Open Access Journal of Orthopaedic Trauma, 5(2S). doi:10.1097/oi9.0000000000000186.

ACADEMY OF EXTREME ENVIRONMENT MEDICINE

EST. 2020

SHOP NOW

FOR

Academy Merch


AUSTRALASIAN WILDERNESS & EXPEDITION MEDICINE SOCIETY
DIVING DEEPER
AWEMS 2024 CONFERENCE
THURS-SAT
OCT | 10-12 | 2024
CRYSTALBROOK RILEY, CAIRNS QLD
JOIN US WHERE THE RAINFOREST MEETS THE REEF!
DIVE INTO THE DEPTHS OF WILDERNESS & EXPEDITION MEDICINE, WITH WORKSHOPS AND PRESENTATIONS LED BY INDUSTRY EXPERTS.
'AUSTRALASIAN WILDERNESS AND EXPEDITION MEDICINE SOCIETY'
EVENT PAGE: 'DIVING DEEPER' - AWEMS CONFERENCE '24
@AUSTRALASIANWEMS
@AWEMSOFFICIAL

POD EX TREME PLORE PEDITION MEDICINE

First episode dropping soon…

MEDIA KIT

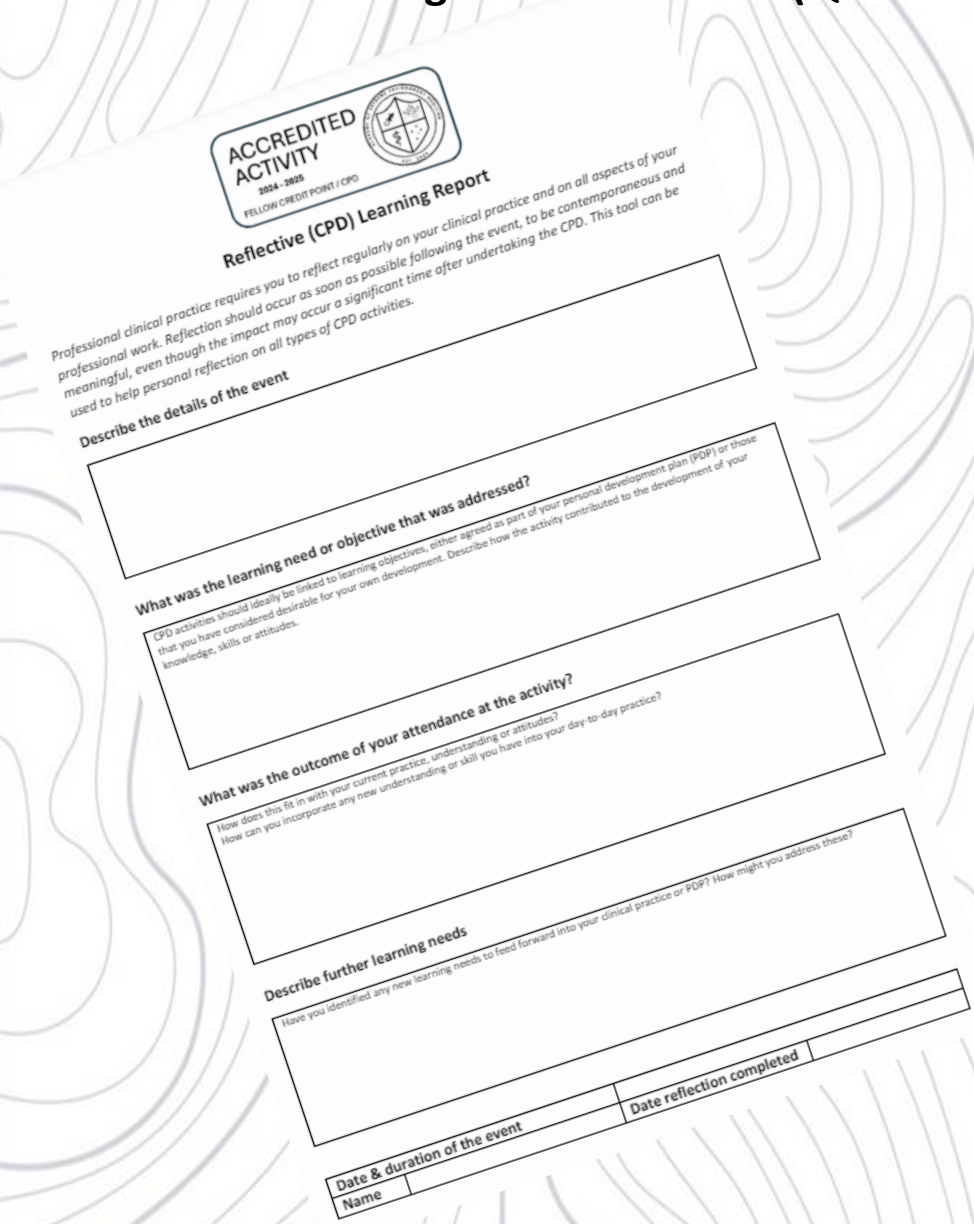
Size	Size	Investment
Inside Cover Page	210 mm wide x 297mm deep	$1395.00
Inside Back Cover Page	210 mm wide x 297mm deep	$1395.00
Back Cover Page	210 mm wide x 297mm deep	$1395.00
Full Page	210 mm wide x 297mm deep	$995.00
Half Page	190mm wide x 134mm deep	$595.00
Quarter Page	94mm wide x134mm deep	$395.00

Approximate Monthly Impressions: 1500 - 3000

EXPLORE TREME PEDITION MEDICINE
The Journal of the Academy of Extreme Environment Medicine

CPD Capture Forms

Make your attendance count towards your CPD or fellowship candidacy by using one of our free capture forms found at the bottom of the About Page on our website (QR code below).



ACCREDITED ACTIVITY
2024 - 2025
FELLOW CREDIT POINT / CPD

Reflective (CPD) Learning Report

Professional clinical practice requires you to reflect regularly on your clinical practice and on all aspects of your professional work. Reflection should occur as soon as possible following the event, to be contemporaneous and meaningful, even though the impact may occur a significant time after undertaking the CPD. This tool can be used to help personal reflection on all types of CPD activities.

Describe the details of the event

What was the learning need or objective that was addressed?

CPD activities should ideally be linked to learning objectives, either agreed as part of your personal development plan (PDP) or those that you have considered desirable for your own development. Describe how the activity contributed to the development of your knowledge, skills or attitudes.

What was the outcome of your attendance at the activity?

How does this fit in with your current practice, understanding or attitudes?
How can you incorporate any new understanding or skill you have into your day-to-day practice?

Describe further learning needs

Have you identified any new learning needs to feed forward into your clinical practice or PDP? How might you address these?

Date & duration of the event	Date reflection completed
Name	

EXPLORE TREME PEDITION
MEDICINE
The Journal of the Academy of Extreme Environment Medicine