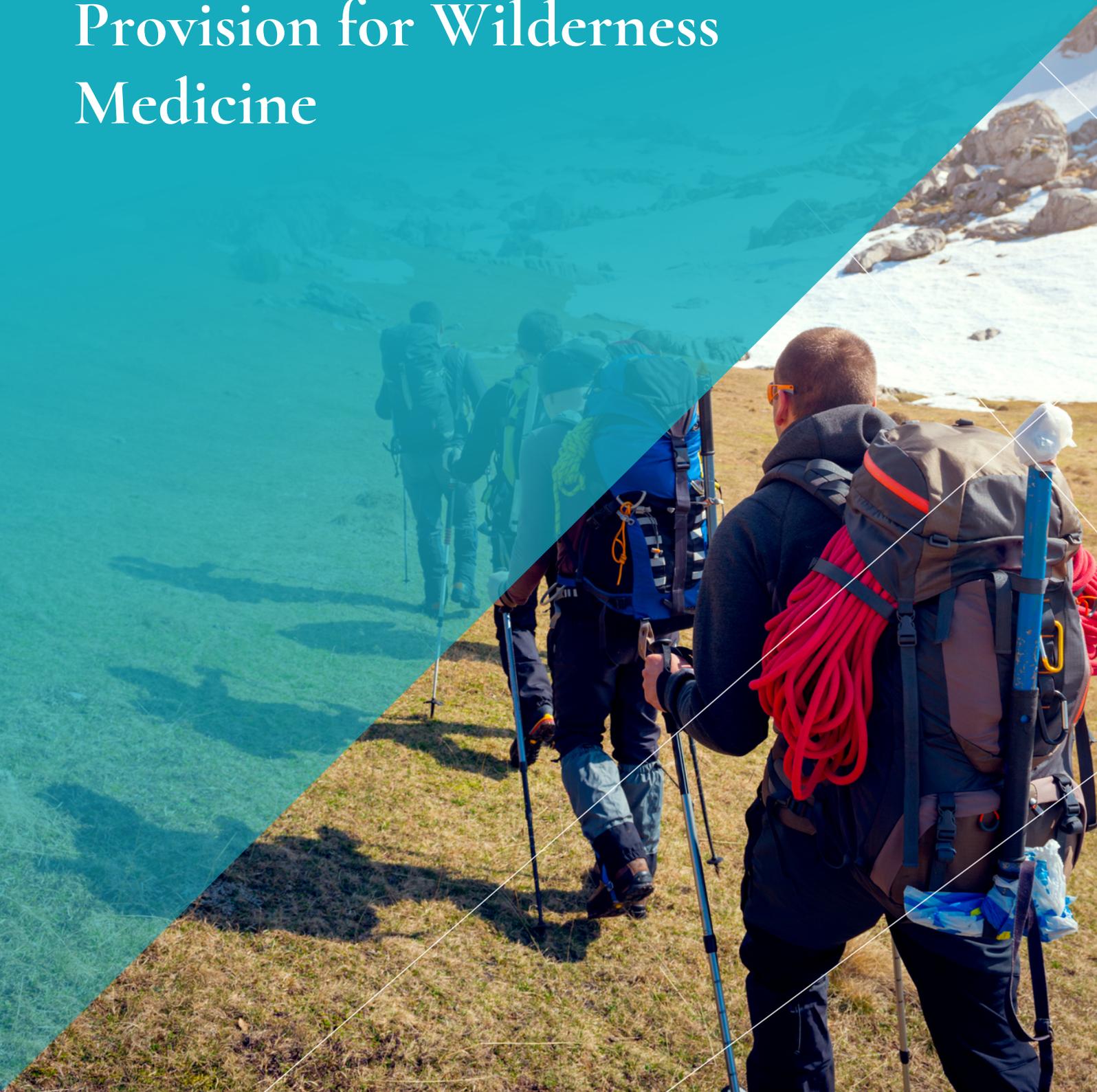




FACULTY OF PRE-HOSPITAL CARE
THE ROYAL COLLEGE
OF SURGEONS OF
EDINBURGH

Updated Guidance for Medical Provision for Wilderness Medicine



Faculty of Pre-Hospital Care, Royal College of Surgeons of Edinburgh Updated Guidance
for medical provision for wilderness medicine

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Foreword by Dr David Hillebrandt Vice President International Society of Mountain Medicine, GP and Pre Hospital Care doctor.

In 2014 the Royal College of Surgeons of Edinburgh Faculty of Pre-Hospital Care (FPHC) were getting at least two enquiries a week asking for guidance about what skills an expedition medic should possess. This is in line with the numbers of approaches to established expedition doctors regularly asking the same question. Like most medical questions “it depends...” There was an obvious need for some information and the FPHC established a working party which published its guidance on the provision of wilderness medicine [1]. These guidelines have now had their first review in conjunction with Fellows of the Royal Geographical Society (RGS).

This working group is made up of representatives from many aspects of the UK expedition world including ocean sailors, kayakers, mountaineers, divers, jungle and desert fanatics, youth leaders and commercial expedition companies. All are united by their enthusiasm for working in remote and austere environments and their insight into the realities of working in these conditions. The working group members had experience of enjoying adventure on all continents of the world and from well below sea level to 8848m.

The group enjoyed challenging discussions around the topics but we were all united on one point: Whatever expedition you undertake as a medic, your own personal skills in the environment backed by the confidence and ability to live with your decisions. If you expect to be providing dramatic lifesaving medical skills on an expedition you are most likely in the wrong place with the wrong people attempting the wrong objective. Medical planning for an expedition involves preparation for situations that you will spend the whole trip trying to avoid. Once away it is most likely to involve hand holding, acting as a sounding board for members and managing conditions such as blisters, travellers' diarrhoea, fungal skin infections and mild AMS but having the confidence, reserve and ability to cope in the rare event of severe illness, trauma or even death which may involve a personal friend.

We appreciate that expeditions come in many shapes and forms. There is always a medical and ethical duty of care but it may be dealt with differently when dealing with a group of young people, a commercially run trip with adults or a group of friends pushing the limits of exploration or their sport who all fully understand the environmental and inherent risks.

After much thought and a small bit of evidence we can now present a revised matrix of medical skills potentially needed by a medic and related to skill levels ranging from a first aider to an established doctor. It also takes into account the time to reach any back up care. We hope this will give you food for thought. Ponder it but do not hesitate to approach expedition leaders for advice since this is one branch of medicine where most enthusiasts are keen to share their knowledge. Above all get out into your chosen environment and enjoy building up your skills and ability to make decisions when operating in a challenging situation. If you do become involved in the expedition medical world do keep your day job since you will not be making any money and not be able to retire early! When you do eventually retire you will have great memories of working with great people in great places.

David

Introduction

The initial panel brought together in 2015 by the FPHC aimed to;

1. Provide guidance to ensure the best possible medical care for patients within the geographical, logistical and human factor constraints of an expedition environment.
2. Give aspiring and established expedition medics a 'benchmark' of skills they may need
3. Facilitate expedition organisers in selecting the most appropriate medical cover and provision for their planned activities.

During 2019 this guidance has been reviewed and rewritten to make it more relevant and accessible for Wilderness Medicine providers.

Key themes from original guidance

- Medical planning
- Clinical governance
- Risk management
- Medical threats
- Human factors
- Medical kit
- Cardiopulmonary resuscitation

Changes in 2019 guidance

- Revised “skills framework” involving expedition experience
- Consideration of broader competencies rather than specific medical skills
- Suggested changes to expedition risk matrix

The suggested system of medical planning has not been changed and seeks to enable expedition leaders to identify the potential medical risks and their mitigation. The scope of practice for wilderness medicine covers elements of primary healthcare, pre-hospital emergency medicine and preventative medicine. The expedition skills framework should enable expedition providers and potential expedition medics to evaluate the basic competencies needed of an expedition medic on a specific expedition or similar types of expeditions.

This advice is particularly aimed at aspiring or inexperienced ‘expedition medics’ though all levels of expedition medic, leader and organiser who may be responsible for delivering or managing the delivery of remote medical care for participants might find something of interest here. The expedition medic should be someone equipped with the appropriate spectrum of skills and experience in the expedition context and need not be a qualified doctor – in fact the majority may not be a registered healthcare professional at all though ultimate top level/backroom cover will be under a registered medical practitioner.

Keywords;

Expedition
Risk assessment
Medical planning
Travel Medicine
Wilderness Medicine

Background

The Oxford English dictionary defines an expedition as “a journey undertaken by a group of people with a particular purpose”. This definition highlights the broad scope of expeditions and de facto, expedition medical planning. Medical care provided in the austere environment is often referred to as “wilderness medicine”. This was described by Backer and was defined by its remoteness, physiology, need for improvisation and dependence upon clinical examination and judgement [2]. The scope of this guidance is intended to cover the planning and competencies that facilitate the understanding of the challenges described by Backer and therefore the delivery of good quality clinical care.

The practice of wilderness medicine occurs in many environments and this document is not intended to provide specific advice to specialist expeditions (e.g. deep cave exploration or the first ascent of a new technical climb). The competencies discussed consider pre-hospital and primary care skills relevant to medical providers on expeditions in remote areas with some consideration of more specialist environments.

Death and serious injury or illness on expeditions is thankfully rare. Aside from extreme sports in the wilderness, the risks faced by participants on a well-planned expedition are equivalent to those faced by an active person living in the UK. For example, road traffic accidents cause approximately 50% of unexpected deaths on expeditions per annum [3]. Anderson and Johnson (2000) reviewed the data from 246 expeditions with 1263 medical problems (gastrointestinal disease 30%, medical problems 21%, orthopaedic problems 19%, environmental problems 14%) and a 10% evacuation rate [4]. Sadly, no more recent data is available in the published literature. Even on potentially high threat expeditions to Denali in Alaska, medical incidents were rare with only 3.5% of 24,079 climbers requesting medical assistance and only 15% of these requiring evacuation by the National Park Service [5]. It is worth bearing such figures in mind when planning an expedition, and considering the relatively low prevalence of problems, whilst being mindful of the potentially higher impact should they occur. In addition to medical provision the expedition medic will be responsible for the dental health of participants as well as environmental health. Dental problems, in particular, present a potential burden to the expedition with one expedition reporting 50/309 (16.5%) of expedition members suffering dental symptoms potentially treatable with a simple dental first aid kit [6].

This consensus document not only provides guidance on the clinical competencies required of the expedition medic but also on other pertinent aspects of the role such as medical planning, risk management, human factors, clinical governance and medical kits.

Expedition Skills Framework

The framework below outlines a spectrum of skills needed to join an expedition in the role as a medic. The term ‘medic’ in this document is not ‘doctor specific’ but includes anyone who is taking responsibility for the provision of medical care to participants on an expedition. The framework is designed for use by both expedition medics and commercial organisations recruiting expedition medics as guidance on the minimum competencies that may be needed by those fulfilling the role of a medic on an expedition.

Level of practitioner

The 'levels of practitioner' has been modified from the original paper, which used the Faculty of Pre-Hospital Care (RCSEd) A-H levels, to reflect the differences in medical skills and experience required for an expedition medic vs a UK based pre-hospital provider/practitioner. The clinical experience suggested does not follow a pre-hospital theme due to the vast differences in pre-hospital work in the UK vs expedition medicine. For example, skills such as thoracotomy and anaesthesia are unlikely to be useful in most expedition scenarios however, an understanding of complex mental health complaints, musculoskeletal, sports injuries or rashes is likely to be very useful.

Critical care and pre-hospital emergency medicine (PHEM) skills may be required for doctors to assist with repatriation or evacuation to definitive care, or in expeditions where surgical or anaesthetic facilities are available. This should be specified within the expedition brief.

Competencies Framework

The table below gives a range of non-technical (NT), expedition experience (EE), activity proficiency (AP) and wilderness medical skills (WM) that should be taken into consideration depending on the expedition terrain, ability (physical/mental) of participants, activity undertaken, and transfer time to definitive hospital care.

The skills proposed can form the basis of a personal logbook recording participation in activity and experiential learning as well as courses and teaching. Future developments may include development of an app-based logbook for providers and 360 degree feedback on expedition medic performance or feedback from expedition leaders.

Appendix A contains specific clinical competencies (please see attached). Whilst not exhaustive, expedition providers could view and use this as a guide when recruiting expedition medics and for expedition medics and aspiring expedition medics to use the competencies to assess the merit of expedition medicine training courses on offer and plan continuing professional development.

Figure 1. Skills framework and key

Skills are divided into four broad categories (which are explained in detail in table 1);

- Non Technical (NT) showing a demonstration of teamwork, leadership and good situational judgement
- Expedition Experience (EE)
- Activity Proficiency (AP)
- Wilderness medical expertise (WM)

Core skill		
NT	1	Worked in teams within UK
	2	Had led teams in the UK
	3	Worked in an overseas expedition as part of leadership team
	4	Overseas expedition leader responsible for the team
EE	1	Travel experience
	2	Expedition experience – not specific to environment
	3	Expedition experience – specific to environment

	4	Extensive expedition experience, planning and leadership team
AP	1	Some exposure to activity
	2	Moderate experience / Basic Qualification eg PADI open water, Competent Crew, Led climber, Off-piste skier
	3	Advanced: Over 100 hours completed, Dive Instructor, Off shore / competitive sailor, Lead climber / confident ski tourer
	4	Expert: Instructor or elite level
WM	1	Advanced First Aid training with a recognised provider. a. A minimum of 16 hours is essential, 2-4 day course specific to wilderness environment
	2	Advanced / Extended care practitioner training – non prescribing a. Minor injuries experience in Emergency Department and / or General practice b. Wilderness or Expedition Medicine course c. Desirable: Observer on trauma course (ATLS, ETC)
	3	Doctor or Prescribing Health care Practitioner a. Minimum 4 months emergency medicine experience b. Knowledge and confidence in minor injuries and general practice problems c. Wilderness or Expedition Medicine course d. Desirable: General practice experience, Trauma course (ATLS, ETC), some pre-hospital experience
	4	Highly experienced (usually Doctor) Expedition Medicine practitioner working at Consultant level

It is important to note that wilderness medicine capability forms only one part of the skill set of an expedition medic.

The framework is designed to provide guidance for anyone planning an overseas expedition or intending to take on the role of expedition medic. This is particularly relevant for those where the organisers are deemed to have a higher duty of care, for example where young people or less experienced participants are involved.

Therefore, where high levels of risk are indicated (the red boxes), higher levels of competencies would be required of the expedition medical practitioner.

For OVERSEAS expeditions, where the risk assessment indicates that the role of the expedition medic might be fulfilled by a lay person (i.e. a non health care professional of any sort) forming part of the expedition team we recommend previous experience working in the environment being visited.

Figure 1 - Expedition medic framework: suggested competencies based on time to access definitive medical care and level of risk

Expedition Risk	Low risk	Moderate risk	High Risk
Short transfer < 4hours	NT 1 EE 1 AP 1 WM 1	NT 1 EE 2 AP 1 WM 2	NT 2 EE 3 AP 2 WM 3
Moderate Transfer 4-12 hours	NT 1 EE 1 AP 1 WM 1/2	NT 2 EE 3 AP 2 WM 2	NT 3 EE 3 AP 2 WM 3
Long transfer >12 hours	NT 2 EE 2 AP 1 WM 2	NT 3 EE 3 AP 2 WM 3	NT 3 EE 3 AP 3 WM 4

Medical Planning

The expedition medical plan depends on a fundamental understanding of the risks which are specific to each expedition.

Iserson [7] identified 10 key stages in planning for an extended expedition in a remote location;

1. Optimise workers' fitness
2. Anticipate treatable problems
3. Stock appropriate medications
4. Provide appropriate equipment
5. Provide adequate logistical support
6. Provide adequate medical communications
7. Know the environmental limitations on patient access and evacuation
8. Use qualified providers
9. Arrange knowledgeable and timely consultations
10. Establish and distribute rational administrative rules

An additional key planning stage not included in this original list is knowledge of the planned destination and prevention and treatment of illness and problems associated with the environment and activities being undertaken e.g. malaria, snake envenomation.

All this should be put in place before an expedition departs to mitigate risk. However, there has to be an acceptance that the provision of medical care in a remote location is inherently challenging and likely to be lacking if measured against what would be available in a developed world healthcare setting.

Understanding the expedition participants' medical needs is fundamental. The support for an expedition of extremely fit experienced mountaineers will be different to that for inexperienced trekkers on a charity challenge following similar terrain. Published data can inform estimates of the frequency of likely illnesses, such as altitude illness [4,8,9]. Medication and equipment requirements can then be decided upon. Providing adequate equipment for unlikely events but with serious consequences is more difficult. Unfortunately the reality of medicine in remote areas is that severe illness and injury is often non-survivable. In Snowdonia, North Wales, a retrospective data set of 1100 cases brought to the emergency department concluded "there is little or no scope to save any additional lives from trauma in the mountains of Snowdonia" [9].

Communications, logistical support and evacuation routes are all crucial to medical planning. These factors need to be considered along with the nature of the activity in order to decide on the medical support needed for the expedition. With the improvements in global communications and ability to send images worldwide, expert support for management of conditions such as frostbite can be accessed from remote locations. Such links should be established and tested before an expedition leaves as part of the medical plan where possible.

Consideration should be given to medical plans in the absence of the lead expedition medic i.e. small groups operating from one base location or climbers split across different camps. Diagnostic algorithms for likely conditions such as heat illness or altitude sickness can be placed with medical kits as well as protocols for administration of emergency medication. The lead expedition medic will often be able to communicate emergency medical advice over radio or satellite phone to remote teams, however algorithms should be robust enough for independent use in emergent situations. The role of expedition medic will include briefing these teams in the usage of emergency medical treatments.

Medical planning relies on the ability to assess the likelihood of adverse medical events. This is dependent on published data to detect the underlying rate of injury such as discussed above. It is therefore important that, wherever practicable, the incidence of medical problems during expeditions is well recorded and accessible. This is now facilitated by a range of open access journals or online resources.

Clinical Governance in Expedition Medicine

Clinical governance is the framework used to maintain and improve standards of medical care, in which 'organisations are accountable for continuously improving the quality of their services and safeguarding high standards of care...' [10].

There are several domains to clinical governance that all have a part to play in an expedition setting:

- Risk management
- Continuing professional development
- Evidence based and effective clinical care
- Audit
- Patient satisfaction

These features remain applicable during the pre-expedition, expedition, and post-expedition phases and should not be viewed as optional simply because a practitioner is working outside the health system of the UK. Participants in an expedition should have care provided by someone working within an appropriate scope of practice.

Responsibility for clinical governance rests with both the expedition medic and the expedition organisers. For instance, the organisation must ensure that it carefully selects the expedition medic, that it provides them with timely and accurate pre-expedition screening information about the participants and the nature of the expedition and that it encourages a culture of openness through the sharing of [medical] risk assessments and post-expedition [medical] reports. The expedition medic is responsible for maintaining their own personal and medical competencies, for precise and robust documentation and for the safe usage and maintenance of medical kit and equipment. Both are responsible for reporting identified problems of any nature and recording these in such a way that incidents can be learned from and mitigated against in the future. Clinical audit should be encouraged.

It is good practice to have a written agreement between the expedition medic and the expedition organisation. An example of such is the UIAA's Model Contract for Health Care on Trekking and Expeditions [11] (Appendix B).

Other factors that the expedition medic and expedition organisers should agree on are listed:

- Provision of medical kit and supply/resupply
- Work place and distant supervision of expedition medics
- Responsibility for arranging the provision of specialist medical advice
- Security and ownership of confidential medical information
- Responsibility for development and use of Medical Standard Operating Procedures
- Standardised medical record keeping
- Insurance provision for all participants, especially travel and repatriation insurance

In addition, all registered healthcare providers should discuss any proposed expedition with their professional indemnifiers before taking it on.

The most widely accepted tool for benchmarking good practice in the delivery of overseas expeditions is British Standard BS 8848 (2014) [15]. See Appendix E.

BS 8848 aims to reduce the risk of injury or illness on overseas ventures by specifying the safety requirements that have to be met by providers of these activities including educational visits, fieldwork, expeditions, and adventurous activities outside the UK.

BS 8848 gives expedition providers that comply with the requirements of the Standard, a way of being able to demonstrate to participants, leaders, and other interested parties that their venture provider is following good practice to manage safety on the venture.

Medics wanting to participate in an expedition or organising an expedition themselves would be well advised to check that the venture is BS 8848 compliant.

Risk Management

Pre-emptive risk management is essential for managing safety while on expeditions. An understanding of the terms used in risk management is needed to manage risk appropriately.

A threat is something that can cause harm. This may be harm to an individual, to property or to the expedition itself. For example malaria may constitute a threat to an individual, theft is a risk to property and a hurricane may represent a threat to all three. The result of the threat is the consequence of that occurrence.

Likelihood: This is the chance of a threat occurring. For example, acute mountain sickness (AMS) is a threat to which climbers in Scotland will not be exposed to. However for the Himalayan mountaineer AMS is a threat to which he or she is vulnerable.

The likelihood multiplied by the consequences gives an index of the threat [12]. The assessment of the threat must take place within the context of the expedition. With this context comes the important concept of residual risk. Residual risk describes the risks that remain despite mitigation attempts. For example while driving a car, a driver may mitigate the risks of crashing by ensuring the car is roadworthy, not driving at night and not exceeding the speed limit. However the threat of error by another driver causing an accident is difficult to mitigate. This is known as a residual risk.

Once a threat has been assessed and is deemed to be above the threshold of risk for an expedition, steps may be taken to reduce the impact of the threat. There are three main ways to mitigate risk:

1. Remove or diminish the threat
2. Reduce the exposure to the threat
3. Take measures to reduce the impact of the threat

For example, an expedition to the Honduran jungle may consider the threat of envenomation by snakebite. The threat may be diminished by ensuring everyone on the expedition wears boots. The exposure to the threat can be reduced by running a teaching session about the snake habitat and how to avoid coming into contact with snakes. The impact could be reduced by ensuring timely evacuation is available to a facility where appropriate care is available. These measures may change an unacceptable risk into a risk accepted by the expedition.

Risk assessment should be carried out at three levels; generic risk assessment for the activity, a daily risk assessment documented for the activity and local conditions and then dynamic risk assessment during the course of the activity.

Incidents that cause harm should be documented, as should 'near misses'. This will aid future expeditions in building an evidence base of hazards and mitigation strategies. Expedition providers have a legal responsibility for the safety of both paying clients and staff, including any locally employed. Thorough risk assessment is key to providing both physical and legal protection for both staff and clients.

Medical Risk and Mitigation

The experiential evidence backed up by limited published evidence suggest serious incidents on well-planned expeditions to remote areas are unusual. Most medical conditions or injuries seen during expeditions can be managed by a competent expedition medic with basic skills. However, incidents in the wilderness environment are often compounded by a number of factors;

- The incident occurs in a different location to the expedition medic
- The casualty may be travelling alone (e.g. between camps in a jungle or on a mountain)
- The casualty may not have the means, capacity or capability to identify their location
- The casualty may not have the means, capacity or capability to communicate and request help
- Bad weather / night / visibility / poor communications may hinder the realisation that someone is missing, that a medical incident has occurred and therefore delay any response

Good medical screening can reduce, but not eliminate, the medical risks to an expedition and should be an essential part of any medical planning. Consideration should be given to who has access to this medically confidential information and whether a certificate and disclosure from the participants' medical practitioner may be required. In addition to screening, education as to the likely hazards is a key part of reducing the medical risks on an expedition. It should be borne in mind that participants often fail to disclose key medical information and this only comes to light once the expedition starts. Participants should be medically risk assessed again if new information becomes available.

On many expeditions it may be impossible, impractical or unreasonable (as it would fundamentally change the character of the expedition) to provide the highest level of medical care and participants should be sufficiently well informed to consent to this risk. Suitable planning and development of guidelines and protocols for management of likely hazards is an

important part of medical planning and may remove the need for a medical professional on an expedition.

Human Factors

Human factors refer to the non-clinical aspects of wilderness medicine. It is important to recognise that the role of the expedition medic goes beyond the simple provision of medical care. The medical provider will often form part of the leadership team, with all the associated responsibilities that this entails.

In the best case, the expedition medic is an independent experienced professional who puts the health and safety of the participants above the objectives of the expedition. For every trip, the expectations and requirements of the expedition medic from the participants, expedition leaders and the organisers will be subtly different. On occasions, they may even be a source of conflict.

Therefore the expedition medic does not merely require appropriate clinical skills to deliver care in a wilderness setting but should have the personal skills to work within a team and the technical skills to be able to live comfortably in that environment. A deficiency in any part of the clinical-personal-technical triad will render the medical provider less effective.

Personal skills

Personal/interpersonal skills do not always come naturally yet are a vital part of being a functioning, respected team member. The manner in which one employs these 'soft' skills will vary depending on the expedition. For example, interaction with a group of ultra-marathon athletes will differ considerably from an inexperienced charity clientele group. The following areas should be considered:

- Communication skills and self-awareness
- Teamwork
- Leadership
- Decision making
- Coping with fatigue and stress

The ability to communicate and interact successfully with a team whilst living alongside them is incredibly important, particularly when fostering therapeutic relationships. The expedition medic must be aware of subtle differences in 'sense of humour', the need for compassion even with the trivial and regularly reflect on the need to adapt. Instructions or advice should be clear and unambiguous for those to whom they are directed. The expedition medic will often spend the majority of their time as an equal team colleague and friend. It is important to ensure boundaries are well defined and it is clear to participants when there is a swap to the "medic role".

Leadership styles vary greatly. The expedition medic should be capable of adapting their leadership skills to the needs and requirements of the group. Clear demarcation of roles, responsibilities and decision-making frameworks should be clarified before departure thus minimising the potential for conflict during times of increased stress. Both expedition leader and medic require clarity of jurisdiction, not only during a medical incidents, but also in a situation where failure to intervene pre-emptively may result in harm.

Decision-making on expedition carries with it far more responsibility than purely arriving at a treatable diagnosis. The decisions made will have consequences varying from temporary cessation of activities to permanent casualty evacuation, with all the associated logistical, financial and emotional implications.

The demands placed on the expedition medic have the potential to exceed any other expedition participant. Expedition medics should be prepared to carry out a full day's expedition activities and then face the possibility of providing the full range of expedition healthcare, irrespective of the time of day or night, including a complex casualty evacuation. Mental resilience and physical fitness are important, as stressors on expedition are many and varied. They include clinical pressures associated with independent/autonomous decision-making, stressors of living in a close-knit community or the difficulties of just living and surviving in uncomfortable surroundings with reduced communication with home.

Expedition skills

The expedition medic will need a range of skills specific to the expedition objectives. These skills are beyond the scope of this document.

Real life examples of the impact of personal or expedition skill deficiencies can be found at Appendix C.

Telemedicine

Radio use on expeditions heralded telemedicine and now in our digital satellite age there are very few areas on the surface of the world where advice cannot be received. Despite this the expedition medic still needs the old skills of self-reliance when technology fails but a problem shared is a problem halved. Rescue can be summonsed to a specific location by a Personal Locator Beacon (PLB), by PLB with text facility, satellite phones facilitate case discussions, e mail enables the transmission of photographs, and many "remote" areas are now covered by smartphone services. We are now seeing drones being used for search and to deliver medical supplies.

Even small teams can carry such devices if they are permitted in the host country. Teams should have a colleague with expedition experience at home who would be able to coordinate any request for help. Some teams will pre-brief an expedition medic who can also give remote advice to the team or their designated medic. Some commercial expedition companies employ a company doctor. Often the team medic knows the answer but gets confirmation, support and reassurance from such discussion.

Medical Kit

Designing and gathering a fit-for-purpose medical kit is frequently overlooked by expedition planners but it is a multifaceted and time-consuming job. It must be clear whose responsibility it will be to provide and pay for medical kit and it must be checked regularly for acceptable quality, including for damage, stock level and out-of-date contents. Meticulous labelling, organisation of the kit and a contents list or spreadsheet are of paramount importance.

The expedition medic must have knowledge of the indications and side effects of each medication carried, this will depend on the level of medical provider, but any provider must be competent dispensing or administering those medications and be familiar with the identification and timely treatment of any complications occurring. All expedition medics should have access to reference material in this regard. For example the British National Formulary (BNF) is available electronically as an App.

Medical kits should be bespoke to the expedition in question. Their composition will vary based on team composition, demographics and number of participants as well as destination, activities to be undertaken and the duration of the trip. Kits should reflect the likely illness and injury patterns of the planned activities and to some extent, the level and skills of the expedition medic. Published surveys suggest that first responder medical kits tend to be well equipped to support trauma but less well equipped for medical emergencies [13]. It should also be remembered that the majority of medical presentations on expeditions are not high level trauma or medical emergencies and medical kits should reflect this by including medications and equipment for treating simple illness and injuries.

Comprehensive advice on provision of medical kits is beyond the scope of this publication, broad areas for consideration are listed below.

1. A medical kit should be dictated by the medical plan and wilderness environment.
2. Medications (unlike dressings) cannot be improvised and expeditions need to have adequate supplies of trustworthy medications.
3. Import and export restrictions for medications vary between countries.
4. Medications that have a variety of uses should be taken.
5. Practitioners should be aware of expedition members with drug allergies or on regular medications and be aware of any interactions these may have.
6. Group medical kits should be appropriately and securely stored.
7. Ensure adequate means of diluting and administering drugs are available.
8. Individuals should have a personal first aid kit on their person at all times.
9. If travelling in areas with high incidence of HIV or hepatitis consider carrying sterile needles etc.

These points are expanded in Appendix D.

Cardiopulmonary resuscitation in the wilderness environment

The decision whether to attempt resuscitation or not in the event of cardio-respiratory arrest in the wilderness is a complex one and requires a pragmatic and realistic decision making process. Resuscitation efforts and extrication may take place in hazardous terrain and in extreme meteorological conditions. Additionally, resources may be very limited, and there may be multiple casualties amongst who these resources must be shared. Multiple casualty emergencies may fit the definition criteria for a major incident and appropriate Major Incident Medical Management systems may need to be applied in a wilderness setting to effectively utilise available resources.

In 2012, Paal et al published a position paper to establish scientifically supported guidelines under which cardiopulmonary resuscitation (CPR) could be terminated during mountain rescue [14]. This guidance was subsequently adopted as a formal recommendation by the

International Commission for Alpine Rescue (ICAR / CISA) and it is applicable both to medical and non-medical personnel.

As the same principles apply both to organised rescue in the mountains and to wilderness expeditions in terms of decision-making algorithms. The aim of these guidelines is to reduce unnecessary CPR, diminish risk to expedition members or rescuers, apportion limited human and material resources effectively and to identify special circumstances where extended CPR may be indicated.

These circumstances permit the termination of CPR in a patient with unwitnessed loss of vital signs in the wilderness:

1. No return of spontaneous circulation during 20 minutes of CPR
AND
2. No special circumstance (see below) warranting extended CPR
AND
3. When professional medical support is available, either that no shock is advised by an Automated External Defibrillator (AED) at any time, or that only asystole is observed by electrocardiogram (ECG) monitoring

Special circumstances are hypothermia, lightning strike and submersion (drowning). With these, prolonged CPR may be associated with a good neurological outcome and functional recovery.

A medical event in wilderness environment that requires CPR is likely to have poor outcome. Depending on circumstance for example a trauma scenario, and consideration of time to definitive care, CPR may not even be appropriate. CPR is often commenced such that all team members feel they did everything they could which is understandable in a distressing event. A debrief of the event and outcome should be offered to all team members at an appropriate time for them as should counselling and ongoing support be made available on return to the host country.

Conclusion

The role of an expedition medic can fall to either medically qualified professionals or to others providing medical care in addition to their primary duty. It is important to recognise that the role of expedition medic is multi-faceted and requires an extensive skill set in addition to suitable underpinning medical knowledge and skills. Expedition medical planning should enable all these aspects to be considered so that appropriate personnel are selected and medical threats recognised and mitigated against.

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Appendix A

Competencies – please see associated competency framework document.

Expedition Medicine Competencies

The expedition competencies are an adaptation of the FPHC Pre-Hospital Emergency Medicine Skills Framework (PHEM) ¹

The following descriptors relate specifically to the skills in the Expedition medic competencies matrix – Appendix A

Level 1 – a non-healthcare professional with advanced first aid training providing patient care as a secondary role, for example, an expedition leader or guide.

Level 2 – a health care professional working within the expedition environment, for example, a junior doctor, nurse or paramedic.

Level 3 – an advanced wilderness medical practitioner, for example, a senior doctor with extensive expedition experience.

Level 1 competencies are annotated as either * or D.

* These should be regarded as the minimum standard when operating at this level.

Skills relating to leadership, fitness, environmental awareness, the ability to plan and dynamically risk assess will have been gained through an individual's training and experience within their chosen environment. Skills relating to medical capability will have been obtained through a typical "Outdoor/Wilderness First Aid" course of 16 hours (minimum) duration.

D These are additional skills required to meet a specific medical threat.

Clinical skills that equate to Level D PHEM and/or additional knowledge relevant to a specific activity, for example, scuba diving or high altitude mountaineering.

¹ <https://fphc.rcsed.ac.uk/my-fphc/resources/academic-and-professional-resources/fphc-phem-skills-framework>

EXPEDITION MEDIC COMPETENCIES

		1	2	3
PRIMARY CARE				
Cardiovascular				
General	Be able to recognise classical ischaemic heart pain, TIAs and CVAs, provide immediate treatment and make rational decisions on need, and mode of evacuation.	x	x	x
Assessment	Be able to assess and interpret cardiovascular symptoms and signs and differentiate common ailments.		x	x
Angina	Recognise and treat angina and be able to make rational decisions on the need for, and mode of, evacuation.		x	x
Acute coronary syndromes	Recognise myocardial infarction and make rational decisions on the need for, and mode of, evacuation.	x	x	x
Acute coronary syndromes	Recognise dysrhythmias (SVT, AF etc) and make rational decisions on the need for, and mode of, evacuation.		x	x
DVT	Be able to differentiate, with some confidence, DVT from other lower leg pain		x	x
TIA and CVA	Be able to confidently diagnose and make rapid assessment (FAST), and make rational decisions on the need for, and mode of, evacuation.	x	x	x
Respiratory				
General	Have a good overview of asthma, understand basic treatments and be able to assist in improvising delivery devices; appreciate simple assessments of respiratory rate and shortness of breath and make rational decisions on the need for, and mode of evacuation.	x	x	x
Assessment	Be able to assess and interpret respiratory symptoms and signs, and differentiate common ailments.		x	x
Dyspnoea	Have a good understanding of the differential diagnosis and relevant treatments.		x	x
Cough	Be able to determine, with some certainty, the cause of cough and appropriate treatments.		x	x
Asthma	Have a comprehensive understanding of the BTS guidelines for both acute and chronic asthma, and be able to manage step up and down plans as well as acute events.		x	x
Pneumonia	Understand how to assess and manage a case of pneumonia and be able to make rational decisions on the need for, and mode of, evacuation.		x	x

Endocrinology				
General	Have a basic understanding of diabetes, be aware of symptoms and signs of hypoglycaemia and hyperglycaemia and be able to provide emergency treatment and appropriate evacuation arrangements for both.	x	x	x
Diabetes	Have a comprehensive understanding of how to modify diabetic treatment during episodes of ill health, and in response to altered meal times/exercise/dietary intake, as well as management of diabetic emergencies. Also to be able to advise on managing time zone changes, glucose monitoring in adverse conditions and storage of drugs and testing equipment in different environments.		x	x
Gastrointestinal				
General	Be conversant with simple measures for management of diarrhoea and vomiting; have a working knowledge of what constitutes an 'acute abdomen' and an understanding of the importance of prompt evacuation	D	x	x
Assessment of the abdomen	Be able to assess and interpret abdominal symptoms and signs, and differentiate common ailments		x	x
Acute abdomen	Be able to distinguish abdominal emergencies from milder conditions and be able to make rational decisions on the need for, and mode of, evacuation.		x	x
Vomiting and diarrhoea	Understand the difference between travellers' diarrhoea and more serious causes and their respective management plans.		x	x
Constipation	Be able to recognise and offer treatment options for constipation.		x	x
Dyspepsia and reflux	Be able to offer dietary advice as well as treatment options.	D	x	x
Management of Vibrio infections				
Haemorrhoids	Have a good understanding of the different degrees of pile and how they may be managed, and be able to make rational decisions on the need for evacuation.		x	x
Renal and urology				
Assessment of urinary symptoms	Be able to assess and interpret renal/urinary symptoms and signs, and differentiate common ailments.		x	x
Renal colic and stones	Understand the natural history of renal colic/stones and be able to confidently distinguish it from abdominal emergencies.		x	x
UTIs	Be able to instigate an appropriate management plan.		x	x
Assessment of testicular pain	Be able to recognise and treat the different causes of testicular pain, and be able to make reasoned decisions on the need, and mode, of evacuation.		x	x

Musculoskeletal				
Assessment of musculoskeletal pain	Be able to recognise common causes of musculoskeletal pain and appreciate their impact on function.	x	x	x
Fractures and dislocations	Have a good understanding of management of fractures/dislocations, including the ability to make cogent decisions on the need, and mode of, evacuation. Be able to apply standard splintage and have a good working knowledge of the principles of improvised splintage.	x	x	x
Low back pain	Be able to separate out those patients with back emergencies and those with benign disease, and make appropriate management plans including coherent decisions on need for, and mode of, evacuation.		x	x
Soft tissue injuries	Have an understanding of soft tissue injuries and be able to apply simple and common strapping techniques.	x	x	x
Soft tissue injuries	Have a good understanding of soft tissue injuries relating to exercise and trauma. Be able to discriminate between those problems that are liable to come to harm from further activity and those in whom this is unlikely.		x	x
Neurology				
Assessment	Be able to assess and interpret neurological symptoms and signs, and differentiate common ailments		x	x
Seizures	Have a good understanding of primary care management of fits.	x	x	x
Vasovagal	Be able to confidently distinguish faints from more malignant conditions.		x	x
Headache and migraine	Be able to assess and provide a differential diagnosis for headache, with appropriate management plans.		x	x
Dermatology				
Assessment	Be able to assess and interpret dermatological symptoms and signs, and differentiate common ailments		x	x
Blisters	Be able to manage blisters	x	x	x
Burns	Be able to recognise severity of burn and manage appropriately.	x	x	x
Eczema, fungal, viral and bacterial skin infections	Confidently diagnose and treat simple skin conditions.		x	x
Paronychia infection and subungual haematoma	Be able to undertake minor surgery to treat these conditions.		x	x
Infectious disease				
Assessment	Be able to recognise common infectious diseases.		x	x
Meningitis	Be conversant with emergency management of meningitis and need for evacuation.	x	x	x

Immunology				
Assessment	Be able to assess and interpret infective/reactive symptoms and signs, and differentiate common ailments		x	x
Allergy and anaphylaxis	Be able to manage both simple allergic reactions and anaphylaxis.	x	x	x
Gynaecology & Sexual Health				
Assessment	Be able to assess and interpret gynaecological and obstetric symptoms and signs, and differentiate common ailments.		x	x
Ectopic pregnancy	Be able to assess risk and likelihood of ectopic pregnancy and make appropriate evacuation plans as part of management.		x	x
Contraception	Understand common methods of contraception and be able to offer advice.		x	x
ENT				
General	Be able to confidently manage epistaxis (nose bleed)	x	x	x
Assessment	Be able to assess and interpret ENT symptoms and signs, and differentiate common ailments.		x	x
Sore throat, sinusitis, earache, dizziness and vertigo, motion sickness, epistaxis	Have a comprehensive understanding of common ENT conditions and their management.	D	x	x
Quinsy	Be able to recognise and manage appropriately			x
Ophthalmology				
Assessment	Be able to assess and interpret eye symptoms and signs, and differentiate common ailments.	D	x	x
Eye trauma	Be able to irrigate an eye, remove superficial foreign bodies and treat minor trauma appropriately.	D	x	x
The red eye	Be able to distinguish between benign and more serious causes of red eye and the treatment of these conditions.			x
Eye emergencies	Have an understanding of what constitutes an eye emergency and how to manage this, including sensible decisions on need for evacuation.	D	x	x
Mental Health				
General	Be able to recognise commonly presenting mental health conditions such as depression and anxiety and be familiar with basic treatment measures.	D	x	x
Mental health assessment	Be able to conduct a primary care level mental health assessment.		x	x
Anxiety	Understand the aetiology and treatment of anxiety, both chronic and acute.		x	x
Depression	Understand depression.		x	x
Deliberate self harm	Perform a primary care level self-harm risk assessment		x	x
Psychosis	Be able to recognise psychosis and make informed decisions on management, including evacuation.		x	x

Adjustment	Have a good understanding of adjustment reaction and management options.		x	x
	Understand the implications of the expedition environment on team members	x	x	x
	Management of psychological reactions to traumatic events	D	x	x
Capacity and consent	Have a basic understanding of capacity and consent.	D	x	x
Eating disorders	Be familiar with the presentation and management of common eating disorders.	D	x	x
Substance abuse	Understand and be able to recognise common patterns of substance abuse, their immediate management and be able to make cogent decisions on the need for evacuation.	D	x	x
Psychology				
	Appreciate the range of behaviours found within any population, including a broad understanding of Aspergers, Adult ADHD, personality traits/disorders and how individuals with these are best supported in a group situation.	D	x	x
TRAUMA				
Safety and Scene Management				
	Have the ability to take on the leadership role at an incident and have a good understanding of the capabilities of other staff/helpers	x	x	x
	Have a good understanding of scene safety	x	x	x
	Be able to practice dynamic risk assessment of the scene	x	x	x
	Be able to perform dynamic risk assessment of casualties taking into account casualty safety	x	x	x
	Be competent in triage sieve, sort & management skills for multiple casualties	D	x	x
	Be able to make decisions on casualty evacuation and appropriate secondary care.	D	x	x
Catastrophic				
	Recognise life-threatening haemorrhage	D	x	x
Bleed				
	Effectively manage catastrophic limb bleed	D	x	x
	Effectively manage catastrophic junctional bleed	D	x	x
	Able to apply direct pressure	x	x	x
	Able to apply indirect pressure	D	x	x
	Competent application of tourniquet	D	x	x
	Competent in use of haemostatic / packing	D	x	x
Spinal				
	Appreciate mode of injury for high risk spinal injury	x	x	x
	Appropriate C-spine management including up to date knowledge on RTC extrication	D	x	x
	Put head in neutral alignment	x	x	x

Airway				
	Inspect and clear airway	x	x	x
	Head tilt chin lift + neutral alignment	x	x	x
	Jaw thrust	x	x	x
	Postural airway management	x	x	x
	Use of suction	D	x	x
	Size and insert nasopharyngeal airway	D	x	x
	Size and insert oropharyngeal airway	D	x	x
	Size and insert supraglottic airway device	D	x	x
	Manage choking patient	x	x	x
	Be able to competently determine the need for surgical airway and carry it out			x
Breathing				
	Identify if the patient is breathing normally	x	x	x
	Correctly assess breathing rate, depth and quality	x	x	x
	Perform basic chest examination	x	x	x
	Identify life-threatening chest conditions	x	x	x
Management of tension pneumothorax				
	Recognition of tension pneumothorax development	D	x	x
	Finger thoracostomy		x	x
	Needle decompression		x	x
	Chest drain insertion			x
Management of sucking chest wound				
	Recognition of a sucking chest wound	D	x	x
	Application & management of occlusive chest dressings	D	x	x
Management of flail chest				
	Recognition of immediately life-threatening flail chest	D	x	x
	Splintage of immediately life-threatening flail chest	D	x	x
	Appropriate pain management to assist ventilation	D	x	x
Management of massive haemothorax				
	Recognition and appropriate management of massive haemothorax/ internal chest bleeding			x
	Understanding of environmental limitations of pulse oximetry	D	x	x
	Ability to monitor & react to end tidal CO ₂ if available		x	x

Administration of Oxygen				
	Safely configure an oxygen system for use	D	x	x
	Free-flow oxygen (+ correct mask choice)	D	x	x
	Nebulisation		x	x
	Oxygen delivery via Bag-valve-mask		x	x
	Use of expired air ventilation (mouth-to-mouth/to nose)	x	x	x
	Use of pocket-mask ventilation	x	x	x
Circulation				
	Assess presence of circulation	x	x	x
	Measure pulse rate and rhythm	x	x	x
	Assess blood pressure		x	x
	Measure capillary refill time	x	x	x
	Assessment of heart sounds		x	x
	Assessment of blood loss	x	x	x
Haemorrhage control				
	Apply direct pressure	x	x	x
	Elevation of limb	x	x	x
	Apply indirect pressure	D	x	x
	Wound packing	D	x	x
	Wound closure		x	x
	Splintage as a haemorrhage control method	D	x	x
	Use of haemostatic agents	D	x	x
	Application of windlass tourniquet	D	x	x
	Application of pelvic splintage	D	x	x
	Use of traction devices	D	x	x
	Attain intravascular access		x	x
	Administration of appropriate IV fluids		x	x
	Application of appropriate wound dressings	x	x	x
	Recognise the significance of hypothermia in trauma	x	x	x
Disability				
	Be able to effectively use the AVPU assessment of conscious level	x	x	x
	Assessment of pupil reaction + size	D	x	x
	Identify indicators of underlying head injury	x	x	x
	Assessment of traumatic brain injury		x	x
	Perform a more in-depth neurological examination		x	x
	Assess neurovascular status			x
	Assess Blood Glucose level	D	x	x
	Demonstrate a knowledge of the pharmacology of analgesic and anaesthetic agents used in remote medicine		x	x

Drowning				
	Recognition and management of unconscious drowned patient	x	x	x
	Recognition and management of conscious drowned patient	x	x	x
	Recognition of late complications of drowning		x	x
Medical Provider Characteristics				
	The medical provider should have the capacity to work autonomously and self-sufficiently under testing conditions, but also have the insight to know when to evacuate and handover care.	x	x	x
	They should act selflessly and always put the patient, or potential patient, above their own personal aspirations in the outdoors.	x	x	x
	The medical provider must have a standard of fitness comparable to the group, be competent in any required outdoor skills, and have good leadership qualities.	x	x	x
Pre-expedition planning				
	Understand the particular patterns of injury and associated pathology common to wilderness sports and activities (e.g. falls in mountaineering, avalanche incidents in skiing) and the associated additional effects from environmental injury (frostbite, hypothermia, hyperthermia etc)	x	x	x
	Be able to formulate a simple risk assessment matrix for the event and identify any appropriate mitigatory measures. Risk assessment should include country specific and event specific health risk, identification of in country medical facilities, casualty transport systems, and communications.	D	x	x
	Have to ability to produce a comprehensive Health Risk Assessment and Medical Intelligence Assessment		x	x
	Have the requisite knowledge to medically screen potential event participants, including those with pre-existing medical conditions; to offer advice on their suitability for inclusion and risk minimisation.		x	x
	Have a good understanding of travel medicine, be able to offer basic advice to participants on country specific health risks, and signpost them to comprehensive sources of information for risk reduction.		x	x
	Be able to compile a medical kit that reflects the demographics of the group, and the type and location of the event.	D	x	x
Post-expedition procedures				
	Advise upon infectious disease screening and prophylactic policy.		x	x

Communications				
	Have a comprehensive working knowledge of all modes of communication available for working in remote areas including mobile and satellite phones, radios and additional e-communication systems. Appreciate the pros and cons of all methods.	x	x	x
	Be able to quickly establish effective lines of communication between team members (both at location and remote) in an emergency situation.	x	x	x
	Be practised in relaying information to outside agencies in a recognised and systematic manner	x	x	x
	Have the skills to provide an effective handover of clinical care when transferring patients	D	x	x
	Have the ability to construct a telemedicine consultation.	D	x	x
	In support of telemedicine consultation have the ability to utilise equipment to provide the investigations needed to transmit to supporting medical professionals.		x	x
Environmental health				
	Understand the importance and provision of basic hygiene, and be able to offer pre-event planning advice, implement basic practical preventative measures, and counsel participants on the same	x	x	x
	Be able to oversee systems of food storage, handling and preparation methods that ensure high standards of hygiene	x	x	x
	Have a good understanding of the range of available water purification systems and manage the provision of safe drinking water	x	x	x
	Appreciate basic concepts of field sanitation and be able to supervise sensible latrine location and construction	x	x	x
	Be able to offer guidance on disposal of 'grey water' and all waste.	x	x	x
	Manage insect and vermin control measures	D	x	x
	Improvise quarantine methods	D	x	x
Travel Medicine				
	Have knowledge of where to signpost expedition members regarding pre-travel vaccinations and malaria prophylaxis	D	x	x
	Be able to intelligently assess country specific health risk and develop the knowledge and skills to manage any such illnesses/injuries including the preparation of appropriate drugs and equipment.		x	x
Thermal injury				
	Have a comprehensive knowledge of heat illness including risk, prevention, recognition and management.	x	x	x
	Have a comprehensive knowledge of cold illness (NFCI, frostbite, hypothermia) and be able to manage appropriately in terms of risk prevention, diagnosis and treatment.	D	x	x

	Be aware of specialist advisors for cold and heat illness.	D	x	x
Tropical				
	Have the ability to differentiate a fever in the tropics		x	x
	Be able to remove tick / bot fly / tumbu fly / jigger flea /leech	D	x	x
	Initiate collective and individual mosquito control measures	D	x	x
	Recognition of rashes - dengue / cutaneous larva migraines / ECM	D	x	x
	Appropriate management of land and marine envenomation	D	x	x
	Application of pressure immobilisation following snake bite	D	x	x
High Altitude				
	Understand "normal" physiology at high altitude	D	x	x
	Understand the impact of high altitude environment on pre-existing disease	D	x	x
	Understand pathophysiology and mitigation of altitude illness	D	x	x
	Recognise signs and symptoms of AMS	D	x	x
	Recognise signs and symptoms of HAPE	D	x	x
	Recognise signs and symptoms of HACE	D	x	x
	Provide simple treatment for AMS, HACE, HAPE	D	x	x
	Use specific medication for AMS, HAPE, HACE (including IV/IM)	D	x	x
	Appropriate use of medical oxygen	D	x	x
	Understand the use and limitation of climbing oxygen systems	D	x	x
	Appropriate use of a hyperbaric bag	D	x	x
	Demonstrate a knowledge of the pharmacology of the agents used to manage the high altitude pathologies			x
	Understand specific issues around treatment of avalanche victims	D	x	x
Scuba Diving				
	Understand the effects of diving on physiology	D	x	x
	Understand the impact of diving on pre-existing conditions	D	x	x
	Recognise signs and symptoms of Decompression Illness	D	x	x
	Recognise signs and symptoms of Lung Overexpansion Injuries	D	x	x
	Recognise signs and symptoms of Oxygen Toxicity	D	x	x
	Recognise signs and symptoms of Carbon Monoxide Poisoning	D	x	x
	Recognise signs and symptoms of Carbon Dioxide Poisoning	D	x	x
	Recognise signs and symptoms of Nitrogen Narcosis	D	x	x
	Recognise signs and symptoms of Immersion Pulmonary Oedema	D	x	x

	Initiate initial management of diving related illnesses	D	x	x
	Appropriate use of medical oxygen	D	x	x
	Management of marine specific organism stings	D	x	x
	Management of Vibrio infections		x	x
Extended Care				
	Have a good understanding of positioning of patients during care, paying attention to airway and potential for pressure areas.	x	x	x
	Understand the importance of trends in observations and be able to instigate appropriate monitoring with respect to temperature, pulse, blood pressure, respiration, urinary output etc.	D	x	x
	Be able to adequately prepare a patient for evacuation, including packaging and administration, and assist in the same.	x	x	x
	Nursing and patient hygiene		x	x
	Pharmaceutical management including antibiotic therapy maintenance and sedation/analgesia management.		x	x
	Surgical interventions and post-surgery management, including the prevention and management of sepsis		x	x
Evacuation				
	Be conversant with improvised methods of extrication	x	x	x
	Have knowledge of international retrieval systems and the methods by which patients can be repatriated from remote world-wide locations	D	x	x
	Possess a theoretical knowledge of the common rescue systems in use by aeromedical operations world-wide (e.g. long-line, winch and their limitations)	D	x	x
Dentistry				
	Ability in differential diagnosis and medical management of dental pain	D	x	x
	Ability in differential diagnosis and management of facial pain		x	x
	Competent in placement of dental filling/ dressing	D	x	x
	Correctly assess and replant an avulsed front tooth	D	x	x
	Awareness of landmarks and techniques to achieve local dental anaesthesia		x	x
	Awareness of the principles and technique of dental extraction		x	x
	Awareness of risk levels and management of dental infection involving fascial spaces			x
Death				
	Understand how accepted resuscitation algorithms must be adapted for the wilderness (e.g. in hypothermic cardiac arrest) and understand the circumstances where conventional CPR is futile and ought not to be attempted	D	x	x

	Be conversant with current guidelines on confirmation of death.		x	x
	Be able to manage complex logistics surrounding a death.		x	x
	Patient packaging including Last Offices		x	x
	Be able to offer simple early grief counselling	D	x	x
Medico-legal				
	Be aware of the complex medico-legal aspects of practicing medicine overseas in remote locations, commercial or otherwise, including patient record keeping and treating local and international patients		x	x
	Apply for appropriate indemnity insurance with your defence organisation		x	x
	Adhere to national governing body's code of practice and relevant guidelines including BS 8848	D	x	x
	Be aware of national, international legislation governing the transport of medicines, devices and drugs.	D	x	x

NOTES

Level 1 – a non-healthcare professional with advanced first aid training providing patient care as a secondary role, for example, an expedition leader or guide.

* These should be regarded as the minimum standard when operating at this level. D additional skills required to meet a specific medical threat or knowledge relevant to a specialist activity, for example, scuba diving or high altitude mountaineering

Level 2 – a health care professional working within the expedition environment, for example, a junior doctor, nurse or paramedic.

Level 3 – an advanced wilderness medical practitioner, for example, a senior doctor with extensive expedition experience.

Additional note re indemnity; this can be difficult to obtain the BMM Society has recently negotiated a scheme for gold members see <https://thebmms.co.uk/indemnity>

Appendix B

https://www.theuiaa.org/documents/mountainmedicine/English_UIAA_MedCom_Rec_No_7_Check_Organization_2012_V2-3.pdf

Appendix C

This annex includes examples of where the expedition medic without the appropriate personal or expedition skills could potentially put themselves and others at risk. These examples are based on the real life experiences of those on the panel.

1. The expedition medic has never been to altitude and therefore has a lack of environmental experience. As a result is unable to cope with working at altitude and is less effective in providing medical care. Eventually falls prey to altitude illness and has to be evacuated to definitive medical care. The group is left without the originally intended medical care.
2. Expedition medic is required to independently arrive at a casualty in a remote environment. The expedition medic is not competent in navigating and fails to arrive at the casualty. The expedition medic potentially becomes a lost person and requires additional resources to mount a search and rescue effort.
3. Expedition medic lacks situational awareness and as a result becomes targeted by assailants at a market place in a foreign country. They are attacked and robbed of possessions. The expedition medic is psychologically affected for the duration of the expedition and is less effective in providing care with potential long-term health implications.
4. Expedition medic does not have experience in camp craft and lacks necessary personal admin skills. The expedition medic is late each morning in properly organising own equipment. As a result is not ready when the rest of group is ready and either the expedition is delayed or the group is left without the intended medical care until later.
5. A commercial television production taking expedition naive individuals to a hostile environment and filming the outcome. Production aims are to stress individuals physically, socially and mentally whilst filming results. Production company staff have limited understanding of both risk and consequence of harm in the expedition environment and as such encourage risky activities. Intervention by the expedition medic to mitigate risk is frowned upon as this reduces 'story potential'. These issues will be predicted by experienced expedition medics and mitigated for.
6. Expedition medic is required to treat a casualty on more technical terrain. Expedition medic does not have sufficient technical skills such as appropriate rope work to move competently over technical terrain. They become stranded as a result and require rescuing.
7. A production company wish to film a sequence where a presenter is attempting to recover a vehicle trapped in soft sand. Expedition porters are placing rocks and sand ladders in front of spinning wheels whilst the presenter is positioned behind the vehicle at great risk of being hit by flying debris. An astute and experienced medic with identify a significant risk of injury to the presenter and intervene promptly.

The above examples can happen to anyone even with sound non-medical skills and experience in the wilderness environment. However, expedition medics that have the required operational capability reduce any risk.

Appendix D

This annex composes some of the lessons identified from the experience of the panel with regard to preparing an expedition medical kit.

1. Know your environment and adapt the team medical kit accordingly. For example, for tropical environments where the risk of infection is high, take broad spectrum antibiotics, a malarial detection kit (with high sensitivity) and stand-by treatment. For high altitude environments, include medications following the most recent guidance in the treatment of acute mountain sickness, high altitude pulmonary and cerebral oedema.
2. You can't improvise medications. Dressings and splints can be improvised whereas medications can't be. You can't guarantee the quality of medications bought in many countries so whilst they may be easily available, they may not be as efficacious.
3. Know the import and export restrictions for countries. Know the Medicines Health and Regulatory Agency (MHRA) scheduling of different drugs and the restrictions that this imposes. Be aware of the restrictions imposed by other countries; for example, drugs such as codeine are robustly regulated in the Middle Eastern countries. The FCO website is a useful resource for more details of restrictions for individual countries.
4. Take medications with more than one use. For example, codeine has analgesic, antitussive and anti-diarrhoeal properties so is extremely versatile. Antibiotics such as co-amoxiclav and azithromycin have broad spectrums of cover so can be used to treat a wide range of infection.
5. Beware interactions between medicines in the medical kit. For example, ciprofloxacin and ibuprofen in combination can reduce the seizure threshold so make epileptics more prone to seize. Be aware what regular medications are being taken by group members and compile the group medical kit accordingly.
6. Choose the most appropriate container for the medical kit. Be aware that in a tropical environment, the medical kit will need to be stored in a damp proof, sealable container.
7. Ensure that all participants have their own personal medical kits containing basic medical supplies such as blister prevention and treatment, simple analgesia, dressings and a plentiful supply of their own regular medication.
8. Be aware that certain medications used for intramuscular injection have specific diluents. For example, ceftriaxone for intramuscular injection uses 1% lignocaine for reconstitution and injection. This is particularly important for groups where the medic is not confident or unable to achieve intravenous cannulation.
9. If travelling to regions of the world with a high incidence of HIV, consider taking a set of sterile needles and cannulae in the event that a participant requires local hospital admission.
10. Remember that other issues not normally associated with developed world medicine will fall to the expedition medic. For example, issues with contact lenses and hearing aids. Contact lenses can be problematic on expedition. The risk of keratitis is greater in contact lens wearers. Ensure all participants that plan to wear contact lenses take their glasses in addition. Ensure that anyone with a hearing aid takes spare batteries and that you and they know how to change them. If participants travel with specific pieces of equipment to manage their condition, consider asking for a demonstration on usage before the trip, for example, an insulin pump and carry low-tech spare alternatives.

Appendix E

BS 8848 and the FPHC Competency framework for medical provision for Wilderness Medicine

Healthcare professionals who accompany expeditions in remote and challenging environment, are usually just one member of a larger team of leaders and participants. The safety and indeed success of the venture they undertake is not only dependent on their competencies but is also a function of the environment in which the venture takes place and the activities they undertake.

The British Standard BS 8848:2014 takes a whole venture approach to ensure that these individual elements are joined up, as incidents frequently happen in the gaps.

By benchmarking a venture against BS 8848, the expedition medic should be able to evaluate the context in which they will be working and the competencies needed to support the venture.

This will provide an 'expedition' perspective to complement the recommended FPHC medical competencies, to help make them useable in a field situation.

BS 8848: 2014

Specification for the provision of adventurous activities, expeditions, visits and fieldwork outside the United Kingdom.

The standard aims to reduce risk from injury or illness and provides those that comply with the standard with a way of being able to demonstrate that they are following good practice (not best practice) to manage the venture safely.

BS 8848 specifies operational requirements for organisers of a wide variety of ventures. These include adventurous and educational activities abroad including university and academic fieldwork, gap year experiences, adventure holidays, charity challenges and research expeditions.

The Royal Geographical Society's expedition advisory centre is a member of the BSI technical committee that first drafted the BS 8848 in 2007, and was involved in its revision. The current edition of the standard was published in April 2014, and was reviewed in 2019 without amendment.

The objective of BS 8848 is to set out in clear, unambiguous language, the actions and associated responsibilities essential to the provision of a risk-based safety management system for expeditions. In so doing, it gives those intending to provide such ventures a means of organising their activities in accordance with currently accepted good practice in a manner that makes it possible to objectively verify compliance.

BSI describes two types of standard - 'Specifications' and 'Codes of Practice'. They appear to be very similar but they are fundamentally different in the way they work. A **specification** consists of a coherent set of absolute requirements for achieving specific outcomes through actions deemed to be in line with currently accepted good practice. These outcomes are objectively verifiable. BS 8848 is a specification.

A code of practice takes the form of guidance and recommendations. The **FPHC Competency framework** is guidance and therefore **a code of practice**.

All standards are voluntary, unless required by legislation or as part of a contract.

BS 8848 takes a whole venture approach to ensure that everything is joined up, and focuses on key management processes:

- Defined purpose for venture
- Risk Management
- Leader selection and supervision
- Incident & emergency planning

BS 8848 helps minimise incidents by

- Promoting rigorous planning
- Mandating a risk management system
- Requiring key processes to be documented enabling repeated application of practices
- Requiring transparent communication of risks to enable informed consent
- Aligning risk with competence
- Mandating a continuous learning culture
- Providing clear accountability and defined responsibilities for everyone involved (including participants and third party providers of services including transport and accommodation)

Clause 5: People (leaders and participants) focuses on

- Competencies required of leadership team and evidence required (minimum competencies)
- Criteria for inclusion as a participant
- Arrangements to manage remote/indirect supervision (and sanctions)
- Training requirements and how these will be assessed.
- Evidence of competence
- Induction and training

Clause 3.72 Incident and Emergency Response plans mandates

- A written plan in advance
- Risk assessment determines level of detail required.
- Instruct leadership team on procedures & their roles and responsibilities within the plan
- Emergency communication
- Summary for leadership team & participants prior to contract.

These clauses seek to specify desired outcomes rather than the methods used to achieve them:

i.e. What you must do, not *How* you do it

Extract of the specific requirements relating to Medical Provision from BS 8848: 2014
reproduced with permission from BSI. © British Standards Institution, 2014.
Compliance with these clauses alone does not imply compliance with BS 8848 in its entirety

6.7 Medical

6.7.1 General

The venture provider shall have access to medical advice, services and support for each venture. The availability of these services shall be outlined to the participants and leadership team (and other stakeholders on request) before the contract is concluded.'

6.7.2 Medical planning

6.7.2.1 The venture provider shall undertake a risk assessment of the medical hazards associated with the venture in accordance with 4.3.

6.7.2.2 The venture provider shall have a medical screening process for the leadership team and participants in accordance with 6.7.3.

6.7.3 Pre-existing medical conditions

6.7.3.1 The venture provider shall obtain written confirmation of whether or not the members of the venture have any known pre-existing medical conditions, including psychological health issues, and any medication being taken.

6.7.3.2 The venture provider shall examine the information on any pre-existing medical conditions provided in accordance with the medical screening process in 6.7.3.1 and, in cases where the condition might be exacerbated by the venture, a letter from the participant's medical specialist shall be requested confirming fitness to participate in the venture. In these cases, the venture provider shall provide details of the venture to enable the doctor to make an informed decision.

6.7.4 Prevention of ill health: vaccinations and prophylaxis

The venture provider shall ensure that the leadership team and participants are informed about sources of information on vaccinations and prophylaxis necessary for the venture and shall advise them to seek guidance as to the health implications of travel to the intended destination from their general practitioner, practice nurse or travel health clinic. This information shall be provided in time to enable the participants to complete any necessary courses of vaccination.

6.7.5 Environment-related illnesses

6.7.5.1 The venture provider shall ensure that the leadership team has knowledge of the risks, prevention, recognition and treatment of environment-related illnesses as identified by the risk assessment.

6.7.5.2 The venture provider shall ensure that participants are informed as to the prevention, recognition and actions to be taken on recognition of signs of the onset of environment-related illnesses (e.g. dehydration, heat-related illness, altitude sickness) which could be experienced on the venture.

6.7.5.3 For ventures in malarial zones the venture provider shall ensure that all the leadership team and participants are informed as to the recommended health information to minimize the risks of malaria, including prevention tablets, standby treatment, mosquito nets, insect repellents and clothing.

6.7.5.4 The venture provider shall identify and manage the hazards associated with food, drink and hygiene overseas because these might vary substantially from the UK.

6.7.6 Medical expertise

6.7.6.1 The venture provider shall ensure that medical services are provided by registered medical professionals with expertise relevant to the venture.

6.7.6.2 The venture provider shall check the first aid qualifications of the leadership team and ensure that they are commensurate with the needs of the venture.

6.7.6.3 The venture provider shall provide a method for the leadership team to communicate during the venture with a medical professional who has expertise relevant to the venture.

6.7.6.4 The venture provider shall establish and operate a procedure to ensure that any medical treatment or support that has been administered during the venture is documented. With the patient's consent, this information shall be made available to their general practitioner when requested.

6.7.7 First aid provision

The venture provider shall ensure that first aid provision, including first aid and medical kits: a) meet a specification prepared by a medical professional with knowledge and experience relevant to the venture; and b) are available on the venture.

6.7.8 Medical protocols

6.7.8.1 The venture provider shall ensure that the leadership team are informed of the medical protocols specific to the venture.

6.7.8.2 The venture provider shall ensure that the leadership team have received training in the use of the first aid and medical kits used on the venture.

6.7.8.3 Any prescription drugs carried shall be logged and only prescribed to a participant on the authorization of a registered medical professional.

References:

BS 8848: 2014

a specification for the provision of adventurous activities, expeditions, visits and fieldwork outside the United Kingdom. British Standards Institution. www.rgs.org/bsi

There is a helpful review of BS 8848 and its relevance to expedition doctors written Jim Moonie on the Adventure Medic website.

<https://www.theadventuremedic.com/features/british-standard-8848-bs8848/>

<https://www.gov.uk/guidance/safer-adventure-travel-and-volunteering-overseas>

<https://fphc.rcsed.ac.uk/my-fphc/resources/academic-and-professional-resources/guidance-for-medical-provision-for-wilderness-medicine>

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