

Expedition Medicine

A practical guide to expedition medical planning

Capt D Wilkins RAMC, Capt C Handford RAMC, Col A Nicol L/RAMC



Abstract

Expedition medical planning is integral in ensuring participant safety and maximising the likelihood of achieving the expedition aims. The task of producing a medical plan will often fall to a medical officer of limited experience. The aim of this article is to provide a concise, practical guide to aid junior medical officers (MOs) in forming a robust and pragmatic medical plan.

Introduction

All expeditions involve exposure to risk. The risk can be specific to the activity being carried out on the expedition, it can be from exposure to environmental extremes, or it can be by virtue of remoteness from medical care. Medical planning in the pre-expedition phase aims to anticipate risks, prepare for them and, ultimately, mitigate the risk. The risk, however, cannot be fully eliminated, and it is by controlled exposure to such risk that expeditions are able to develop people. It is the medical officer (MO)'s role to advise the expedition leader on sensibly balancing risk aversion with a desire for the expedition to succeed. This paper aims to provide a framework for expedition medical planning for MOs.

Risk assessment

Risk assessment should be carried out in collaboration with the expedition leader and should aim to identify predictable risks. Once risks are identified they should be considered in terms of their likelihood, consequence and preventability, before implementing control measures. After implementing

control measures the key question is whether or not the residual risk is acceptable. Examples are provided in Table 1.

Risk assessment should consider the whole spectrum of risk, from the high-likelihood, low-consequence risks such as blisters, to the low-likelihood, high-consequence risks such as major trauma. In all expeditions, it is likely that hospitals and qualified medical help will not be immediately available, exacerbating the severity of most of the risks identified. When approaching risk a good expedition MO should be neither reckless, nor overly cautious. Getting this balance right can be difficult and may well require advice from experienced colleagues.

Population at risk

Early in the medical planning process the MO should consider the team members, and any inherent risk that they may bring to the expedition. Those who undertake arduous expeditions are typically a self-selecting group who are predominantly young, mentally and physically robust, and

Risk	Likelihood	Consequence	Preventable	Control	Acceptable
Blisters	High	Low	Yes	Good socks, broken in boots, simple treatment measures	Yes
Major trauma	Low	High	Mostly not	Route selection, team discipline, evacuation plan, trauma training	Yes

Table 1. Examples of expedition risk assessments.

free from significant illness, but this cannot be assumed. It is highly recommended that participants undergo medical screening prior to an expedition. The screening process should aim to identify any history of illness, medication use, allergies, vaccination status and susceptibility to ill-health. Individuals should also be asked about their prior exposure to altitude and extreme environments, and their tolerance of such conditions. It is important to note that those who have previously suffered from acute mountain sickness (AMS) (1) or heat illness (2) are at increased risk of recurrence. Dental examination prior to the expedition should be encouraged. The screening process should take place to allow sufficient time for completion of vaccination courses, stocking of medical kits (for example alternative antibiotics in the case of penicillin allergy) and, in extreme cases, for de-selection and replacement of individuals who represent an unacceptably high medical risk.

Common Problems

The medical adage '*common things are common*' is never more relevant than in expedition medicine. This sensible approach rightly alludes to the fact that most medical problems experienced on expeditions are at the more mundane end of the spectrum of risk. Gastrointestinal upset, minor medical ailments, musculoskeletal injury and 'problem feet' make up the bulk of any expedition MO's workload. The role of prevention should not be underestimated, with good hygiene and a proactive approach to blister prevention probably two of the most significant interventions that an MO can offer. Prevention and treatment of common expedition medical problems is summarised in Table 2.

Medical Problem	Prevention	Treatment
Gastrointestinal upset	Careful hand hygiene Safe drinking water Well cooked food	Oral rehydration Antimicrobials Antidiarrhoeals only when necessary Evacuate if severe
Common infections (respiratory tract, soft tissues, urinary tract)	Hygiene measures	Antimicrobials Analgesia and antipyretics Rest and supportive measures Evacuate if severe
Musculoskeletal injury	Supportive footwear Route selection Training of team	Rest Analgesia Supports, taping and splinting Evacuate if severe
Problem feet	Socks and footwear Antifungal powders Hygiene Tape and plasters	Blister dressings Lancing of troublesome blisters Treat any associated infection Reinforce prevention measures

Table 2. Prevention and treatment of common expedition medical problems.

Environmental hazards

The environment in which an expedition is taking place will have a significant impact on the MO's plan. The characteristic that links all of these environmental risks is preventability: adequate warm kit in the cold environment; hydration, bite prevention and malaria chemoprophylaxis in the tropical environment; controlled ascent rates and acclimatisation periods at high altitude. The risk still cannot be entirely eliminated, however, so medical kits need to be stocked accordingly. Prevention and treatment of key environmental pathologies are summarised in Table 3.

Medical kit

The type of medical equipment required is variable depending on the identified risks associated with the specific expedition planned. The following can be used as a generalised guide:-

- *Common things are common.* Ailments such as headache, gastrointestinal disturbance, chest infection and blisters are common on most expeditions. The medical kit should cover these by having blister kits, simple analgesia, anti-diarrhoeals, oral rehydration salts and suitable antibiotics, taking account of any allergies.
- *Expedition-specific.* The medical kit should cover specific threats associated with the expedition, for example when going to altitude it should include appropriate medications for the treatment of AMS.
- *Personal competency.* Only pack material that the MO is competent to use.
- *Ability to continue what is started.* This is an important consideration. For example, if a casualty is intubated,

Environmental pathology	Prevention	Treatment
Heat illness	Appropriate hydration Avoid unnecessary exertion Loose, light clothing	ABCDE resuscitation Active cooling Oral or IV rehydration Rest and supportive measures Evacuate if severe
Sun burn	Sun hats Sun cream Long-sleeved clothing Shade when possible	Treat associated heat illness Topical treatments
Insect bites & insect borne tropical disease (e.g. Malaria, Dengue)	Mosquito nets Insect repellent Long-sleeved clothing Malaria prophylaxis	Antihistamines Antimicrobials Evacuate if severe
Tropical disease	Good hygiene practice Immunisations	Antimicrobials Analgesia and antipyretics Rest and supportive measures Evacuate if severe
Hypothermia		ABCDE resuscitation Rewarming
Frostbite	Adequate cold weather kit Avoidance of exposure	Treat co-existing hypothermia Active rewarming of affected area Analgesia Prophylactic antibiotics Evacuate if severe
Non freezing cold injury		Slow rewarming Analgesia
Acute Mountain Sickness		Halt ascent and rest Analgesia, antiemetics Acetazolamide
High Altitude Pulmonary Oedema	Safe ascent rates Adequate acclimatisation Avoid unnecessary exertion Prophylactic acetazolamide (but not for all)	Descent High flow oxygen or Gamow bag Nifedipine Dexamethasone Evacuate
High Altitude Cerebral Oedema		Descent High flow oxygen or Gamow bag Dexamethasone Evacuate

Table 3. Examples of environmental pathologies and treatment options.

there must be medications available to keep him or her anaesthetised until extraction to an appropriately equipped hospital. This is often neither practical nor realistic.

- *Aides-mémoire*. Simple step-by-step algorithms in the medical kit are useful for when the MO is the casualty, so others can then follow these to deliver care. The team

must be aware that these aides exist, and it is helpful to brief a non-medical member prior to departure. It is in any expedition MO's interest to ensure someone on the team is trained and capable of looking after him or her if the MO should become the casualty.

- *Size and weight*. This is often a limiting factor, especially on unsupported trekking expeditions. For this reason,

kit must be prioritised and rationalised. There is no reason why group medical equipment cannot be split between multiple members of the team. However, the MO must know where the kit is at all times.

Alongside a team medical kit, each member of the party should have a personal medical kit. This should contain simple analgesia, blister care products and personal medications as a minimum.

Planning for the unpredictable

Local healthcare support

Depending on where the expedition is taking place, the capabilities and support offered by the host healthcare system will be variable. Prior to the expedition it is useful to know the local capabilities of surrounding health care centres, including their distance and accessibility from the likely route.

Evacuation Plans

Evacuation planning is a fundamentally important part of medical plan. At each stage of the expedition an emergency evacuation plan must have been prepared prior to departure on the expedition.

Evacuation can be split into self-sufficient 'independent' evacuation and aided evacuation. Independent evacuation is how the team can evacuate a casualty without external support, for example using an improvised stretcher. External support will involve contacting and utilising local mountain rescue teams, health care services or governmental/embassy services. For this reason reliable communications (most likely with a satellite phone which is charged) is crucial.

Modern wilderness evacuation is increasingly performed by helicopter, for which an appropriate helicopter landing site (HLS) must be available. These can be identified and designated prior to the expedition. These evacuations will also likely necessitate a degree of independent evacuation to reach the HLS and thus, despite the increased availability of medical evacuation, independent skills should not be neglected. Marking of the HLS during day and at night should be considered.

References

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Authors

Captain D Wilkins BSc (Hons) MBChB RAMC
Army Medical Directorate Support Unit
d.wilkins@doctors.org.uk

Captain C Handford MBChB (Hons) MRCS RAMC, Army Medical Directorate Support Unit
Colonel A Nicol MSc FFSEM(UK) L/RAMC, Defence Medical Rehabilitation Centre

Insurance

The United Kingdom provides 'free' mountain rescue, emergency services and healthcare, certainly at the point of use. Insurance prior to going on expeditions is essential to fund potential evacuation, emergency treatment and repatriation. In some areas of the world a helicopter will not be dispatched without prior confirmation of insurance and/or the ability to pay for the service. All members of the team must therefore have comprehensive insurance cover. It is important to read the terms and conditions of the policy prior to purchase as 'standard' insurance will not cover many adventure training activities and a more specialist insurance plan must be purchased. One should ensure that all participants are aware of their insurance details and how to contact their insurance provider. For military adventurous training expeditions the requirements for personal insurance are laid out in Defence Instructions and Notices (3). As an addition to insurance when going to the European Union, all members should carry their European Health Insurance Card.

The completed medical plan

Throughout the medical planning process clear communication with the expedition leader is vital. The completed medical plan should be discussed with the expedition leader, to help make an informed decision as to whether or not the identified risks of the proposed expedition are acceptable. It should be emphasised that the expedition MO's role is advisory, and the ultimate responsibility for the safe conduct of the expedition rests with the expedition leader. Based on the medical plan the expedition leader may choose to continue with the expedition as planned, to make alterations, or to cancel the expedition altogether. Table 4 aims to provide a quick reference checklist to aid in medical planning.

Summary

A considered, detailed and realistic medical plan is important for all expeditions. It both safeguards the individuals on the expedition and maximises the chance of success. In order to achieve this every plan will be different: however, this article highlights the key areas that need to be addressed and aims to serve both as an educational piece and as a prompt for those forming a medical plan.

Step 1- General expedition information	<i>(Notes)</i>
Aim of expedition	
Activity being undertaken	
Country	
Environment	
Step 2- Country-specific	
Climate	
Local disease prevalence	
Health care system and capability	
Availability of embassy support	
Step 3- Participant-specific	
Allergies	
Fitness	
Previous and current injury/illness	
Previous significant/relevant injury/illness	
Regular medications	
Step 4- Common expedition pathology	
What is likely	
Simple treatment options	
Step 5- Activity/expedition-specific pathology	
Simple treatment and prevention options	
Step 6- Serious illness/injury and contingency	
Likelihood	
Initial management plan/capability	
Evacuation and definitive management plan	
Likely local support	
Insurance	
Step 7- Pre-expedition individual preparation and training	
Vaccinations	
Chemoprophylaxis	
Hygiene training	
Environment-specific (i.e. cold injury, sunburn)	
Step 8- Medical kit	
Competent to use all contents	
Appropriate size and weight	
Caters for common pathologies	
Easily treated (and likely) serious pathologies	
Personal medical kits	
Step 9- Final discussion	
Expedition leader reviewed and discussed plan	

Table 4. Medical expedition planning checklist.