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## SOCIETY MEETING PAPER

# Expedition medicine in the tropics: through heat and sleet<sup>☆</sup>

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**Summary** Expeditionary travel—for the purposes of scientific discovery, personal challenge, or survival—represents an essential human instinct. Risks come with the territory although not all the risks can be anticipated. This is part of the appeal of exploration. Risks can be minimised through proper planning and preparation. High risk appetite does not necessarily mean recklessness. For the expedition medic, behavioural modification and communication skills are every bit as important as clinical acumen. Extreme endurance events and unfamiliar surroundings provide both physical and mental challenges. These challenges are not uncommonly exploited by consumer reality television shows when novices are placed in such situations. Studies of human adaptation to extreme environments, such as at or near the summit of Everest, may provide new insights into human physiology that could translate into important medical interventions. Working in extreme environments—such as in tropical jungle heat or within Everest's 'death zone'—presents unique challenges but it also brings unique rewards and discovery. As long as humans have the urge to explore, whatever perils lie ahead boredom will not be one of them. © 2009 Royal Society of Tropical Medicine and Hygiene. Published by Elsevier Ltd. All rights reserved.

## 1. Introduction

Following previous successful joint meetings of the Royal Geographical Society and the Royal Society of Tropical Medicine and Hygiene, this meeting brought together explorers, geographers and medical men at the forefront of expedition medicine (known as wilderness medicine in the USA). This subspecialty, which encompasses tropical medicine, travel health and mountain medicine, is now finding recognition as a specialty in its own right.

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The meeting was convened by Russell Stothard of the Natural History Museum. Professor David Warrell, former President of the Royal Society of Tropical Medicine and Hygiene and Honorary Fellow of the Royal Geographical Society, whose own contributions to expedition medicine lie in the field management of snakebite, malaria and rabies, opened the meeting with a launch of the recently published *Oxford Handbook of Expedition and Wilderness Medicine*.

'If you can travel with a doctor so much the better. . . ' wrote Sir Ranulph Fiennes in the preface.<sup>1</sup> Whilst not every explorer will have the benefit of a personal physician, the opportunities and roles for an expedition doctor are becoming increasingly recognised. Dr Sam Allen spoke about risk management in expedition medicine, illustrating the talk with personal experiences from the field.

The popularity of endurance events such as the *Marathon des Sables* and *Jungle marathon*, and reality television programmes such as *I'm a Celebrity Get Me Out Of Here* produces both practical as well as ethical challenges to medical support teams. Mr James Moore, paramedic for the *Jungle marathon* and leader of numerous expeditions to hot climates, described what can happen when a long way from home as well as some of the ethical dilemmas.

Dr Mike Grocott, expedition leader of the *Caudwell Xtreme Everest* (CXE) expedition, then presented an overview of adaptive human physiology to altitude and the ongoing research programme that is being carried out. This work culminated with data being collected for the first time from the summit of Everest—a monumental achievement—and with it a monumental pile of data that may paradoxically provide insights into diseases of hot climates such as cerebral malaria.

Col. John Blashford-Snell, founder of Operation Raleigh and one of the world's foremost living explorers, rounded off the meeting with tales and reflections of a lifetime as an expedition leader.

The meeting concluded with dinner in the Palladian surroundings of the Royal Geographical Society. The fact that Sir Ranulph Fiennes had, at the age of 65 years, achieved the summit of Everest earlier that morning was the icing on the cake.

## 2. Stuff happens

'Men wanted for hazardous journey, small wages, bitter cold, long months of complete darkness, constant danger, safe return doubtful, honour and recognition in case of success'

Sir Ernest Shackleton's fabled advert in *The Times* to recruit for his 1914 Trans-Antarctic expedition. Still there were doctors willing to take the risk.

Risks may be actual or perceived (exaggerated risk) leading to frank paranoia (hyper-exaggerated)—the 'worst possible scenario'. Travellers' tales of derring-do tend to increase the public's consciousness of the risks but actual risks are generally low. The greatest risk to life (in non-combatants) when abroad is from road traffic accident (the leading cause of death in young adults at home or abroad). The risk of a tropical disease is significantly less, with the

type of disease acquired depending upon the continent or area visited [*Plasmodium falciparum* malaria tending to be more common in travellers to sub-Saharan Africa (particularly West Africa), dengue in visitors to the Caribbean and Southeast Asia, cutaneous leishmaniasis in Central and South America and typhoid fever in travellers to south central Asia].<sup>2</sup>

One exception where the risk is appreciable is attempting to summit Everest. The risk of death among climbers and Sherpas since people started attempting the summit in 1921 is approximately 1.3%. Most deaths on Everest occur in the so-called 'death zone' above 8000m due to high-altitude cerebral oedema (HACE). Eighty-six percent of deaths have occurred within 1 day of reaching the summit and 53% of these deaths have occurred during descent.<sup>3</sup>

Moral hazard is the term used for risk tolerance. This risk is calculated by the product of probability (P) of an event happening and the consequence (C). In the corporate world the level of acceptable risk of a fatal outcome is generally taken at less than 1 in a million or 'as low as reasonably possible' (ALARP).<sup>4</sup>

$$\text{Moral Hazard} = P(\text{probability}) \times C(\text{consequence})$$

A high risk appetite is not necessarily the same as recklessness. Those with a high appetite, such as climbers, will work hard to eliminate or mitigate any tangible risks as much as they are able. Conversely, risk aversion does not always make you safer. One can think, plan and prepare for those risks. Proper preparation and practice will reduce the risks but can never eliminate them.

The public may tolerate a higher risk if the consequence is low. But if the consequence is high, for example as in Hurricane Katrina, the public will expect the State to prepare for such a catastrophe no matter how infrequent the event may be. At some point the risk may no longer be tolerable and one may have to cut one's losses and get out, as for example, when *Medécins Sans Frontières* pulled out of Afghanistan following 24 years of continuous service after five of its aid workers were killed.

Murphy's law states that if anything can go wrong, it will go wrong. Another law, known as Super-Murphy's law, states that if something can *not* go wrong, it will still go wrong. This is the realm of extreme risk, when, in the proverbial Swiss cheese analogy, all the holes line up—the one-hundred year flood, the perfect storm. This is when stuff happens—stuff unexpected, unthinkable, impossible.

Extreme situations do not usually start that way. A chain of misfortune turns a bad situation into a critical situation which can easily become a catastrophe. Although some events may occur out of the blue, there is usually a downstream (or upstream, depending on your point of view) cause-and-effect that began remotely. As in finance, past performance offers no guarantees to future performance. Even the most experienced expeditioners can be caught short.

## 3. It Ain't Half Hot Mum

In 1860 nearly half of the Victorian Exploration Expedition died during their journey from Melbourne to the Gulf of

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