Exertional heat illness in the military: a voice from the past with lessons for the present

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INTRODUCTION

Heat stress—arising from strenuous physical exertion, severe environmental conditions, or a combination of both factors—presents a perennial challenge to military organisations.1,2 In the UK and other temperate countries, the Armed Forces are required to maintain physical fitness, undergo training and selection courses and respond to a wide range of potential civilian emergencies, all of which may engender significant thermal stress from increased metabolic heat production. Physiological strain may be increased even at low levels of activity when military duties are conducted during heat waves, on overseas deployments to hot climates and with exposure to encapsulating micro-environments, such as ballistic-blast and chemical—biological protective wear. The risks to Defence of exposing under-prepared or susceptible Service Personnel (SP) to excessive heat stress include incapacitation, up to and including death from heat stroke, and impaired capacity and capability from reduced manning, pressure on the deployed medical chain-of-care, reputational damage and the threat of sanctions from external agencies.

The aim of this editorial is to describe the relevance, to the military today, of a paper first prepared in 2000 by Everest and published in the same issue of this journal.3 This article fills an important gap in the exertional heat illness (EHI) literature, while demonstrating a progressive approach to training and commitment to organisational learning on the part of the British Army. Its publication offers opportunity to disseminate best practice beyond the Royal Military Academy Sandhurst (RMAS), which continues to model this in respect of prevention, detection and treatment of the inevitable—but potentially much reduced—incidence of EHI in military personnel.

DISCUSSION

In the face of the challenges described above, heat adaptation may be partially achieved through maintaining aerobic fitness and more fully realised through exposure—including regular work and exercise—to hot environments.1 Thus leaning into heat stress, rather than retreating from it, should provide at least part of the solution to maintaining operational effectiveness and personal wellbeing for our SP. In addition to directly fostering fitness for role, it has also been recognised that heat stress may indirectly contribute to military training and selection strategies, with directed supervision of ‘extremes of physical and mental pressure’ acting ‘to assess the ability of the individual... to not only cope, but to lead and to inspire their colleagues while coping’.2 Personal and corporate experience of completing Command tasks, physical endurance tests and occupational challenges (eg, marksmanship, engineering operations) while concurrently degraded by simulated conditions of peace-keeping, disaster relief or warfighting may prove invaluable to future performance on actual operations. In the British Army, the critical importance of preparing SP in this fashion has been recognised, responded to and refined, nowhere more so than in the training of Officer Cadets at the RMAS.

The publication of Everest’s paper ‘Heat Illness during Initial Military Training’,3 featured in this issue of BMJ Military Health, reflects a long-held personal commitment to understanding and improving the determinants of health and illness in Army personnel. It also represents a ‘full-circle’ moment, whereby the observations of Captain Everest, RMAS Junior Medical Officer, can be appraised from the offices of the Army Senior Health Advisor team. The timing of the article’s appearance in the peer-reviewed literature, some 20 years after its initial preparation and internal dissemination at the Academy, marks a renewed interest in the nature, preventability and treatment of all forms of exertional collapse in uniformed service, including but not limited to heat illness.4,5

In the intervening period, incapacitation caused by a rise in body temperature during physical exertion (EHI) has continued to cause frequent morbidity and sporadic mortality in the UK military. Yet EHI remains a poorly-understood clinical entity that can be difficult to discriminate or disentangle from other causes of collapse during exercise, such as post-exertional syncope, cardiac arrhythmias and metabolic disorders including hypotraemia.6,7 As such, developing a better understanding of how and in whom EHI manifests remains a pressing requirement for Defence.

A number of studies and intervention cycles directed at EHI prevention followed on from Everest’s investigations, both at RMAS—such as the measurement of body core temperature and adjustment of training practices prefaced by this work—and in the wider Army training environment.8 Nevertheless, we would argue that the analysis, interpretation and lessons presented in this paper fill a gap in the canon of performance and thermal-stress related literature, as well as holding significant relevance for the training and operational environments of today. To select but a few relevant examples from the text:

► Heat illness is clearly shown to affect not only the ‘fat, lame and lazy’, but to pose a significant potential threat to ‘fit, lean Officer Cadets who are working hard.’

► Many heat illness casualties confirmed among the affected Officer Cadets demonstrate no recognised risk factors for EHI, despite thorough review of the circumstances of their incapacity.

► Where individual susceptibility factors are identified, the modifiable nature of disease occurrence (ie, sheer preventability) is made clear for example, through avoiding very strenuous physical training when unwell, which necessitates showing the moral courage to declare this.

► The importance of early identification of heat illness and prompt, effective treatment are highlighted, as well as the significant ramifications when circumstances prevent this (including delays to progress through training and potentially avoidable medical discharges).

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Editorial

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Over-reporting of EHI, through initial mis-diagnosis or up-triage of casualties to include the possibility of EHI, is seen to be common.

The Academy training and medical staff demonstrate, over the course of the study, the willingness and with-what to modify rates of heat illness downwards, through flexible, forward thinking and adjustments to training patterns.

A key area of prevention highlighted by the paper is the identification of suspected EHI cases to the Medical services. This affords opportunity to protect vulnerable individuals from further injury, to discern the likely nature of their illness and to scrutinise the circumstances of incapacitation.

This latter function is reliant on accurate reporting and must be timely if it is to help prevent future adverse events, especially where modifiable risk has been found to reside in the training system. In the cohort studied by Everest, inflated reporting for EHI through initial ‘over-calling’ of the diagnosis was observed, accompanied by under-diagnosis of other conditions (25/60 cases re-categorised as non-EHI on critical review).

At that time and presently, this phenomenon may be an evil necessary to the protection of ‘true’ heat illness cases from further debility or even death, due to the potential for constitutional or acquired (secondary) intolerance of thermal stress in EHI-affected individuals.

The desirability of developing new tools for accurate diagnosis of EHI and associated conditions—such as ‘rule in/out’ tests applied at point-of-capacity—is also apparent, in order to fast-track return-to-duty, or to assist in identifying other causes of illness during or soon after exercise (which could be important in their own right). The ability to readily predict when, how and why ‘one soldier may fall over with heat stroke while those around him do not’ also remains work-in-progress, as it clearly was two decades ago.

While developments are progressing in this regard, the enduring principle of restricting physical and thermal stress following significant EHI, until successful completion of a Heat Tolerance Assessment (HTA; performed courtesy of the Environmental Medicine Service at the Institute of Naval Medicine), helps to safeguard return-to-duty decisions and to identify those rare individuals who will be unable to continue military service due to ongoing problems with heat stress.

In our experience, decisions on who to refer to this service should be firmly grounded in the policy provided in the relevant Joint Service Publication (JSP 539: Heat illness and cold injury: prevention and management), which is the successor document to the Defence Council Instruction extant at the time of Everest’s study.

A related observation is that the number of Army cases of heat illness referred to secondary care over the 5-year-period preceding Everest’s study (n=516) compares favourably with that reported between 2009 and 2013 (n=137), even when adjusted for the parallel fall in the size of the British Army.

Moreover, no cases of the most severe category of EHI were reported from RMAS in the later data set, suggesting suppressibility of EHI—in both frequency and seriousness—through greater awareness and preventative efforts, including judicious use of HTA.

CONCLUSION

In shining a light on the nature of heat illness and the scope for avoidance at RMAS, Everest’s manuscript raises awareness, adds value to existing knowledge and carves out its own special place in the history of preparing Officer Cadets to ‘serve to lead’. We believe that, in turn, a light should be shone on the service done by Everest in generating this work; and that the military leaders of today deserve the opportunity to share in the knowledge presented and reflect on the messages it may hold for their own training and operational practices.

This paper was worthy of inclusion in the pages of the Journal of the Royal Army Medical Corps at the time of its composition, but was subject to sensitivities and constraints less consistent with the contemporary practice of medicine as an open, internally self-critical discipline that seeks to learn from adverse events and disseminate good practice widely. As such, we commend it to today’s readership of BMJ Military Health and encourage their further familiarity and engagement—with contemporary policies, reporting practices and research efforts—in this important area of military medicine.

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