

A systematic review analysing the management of mild and moderate hypothermia in extreme environments – does a consensus exist in the evidence?

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Introduction

Accidental hypothermia (AH) is a common condition encountered in prehospital medicine, however its treatment is often not standardised. Within the broader condition of hypothermia, there are several categories: mild, moderate and severe. This systematic review focused on mild and moderate hypothermia, such terms describing a core body temperature of 35°C-32.2°C and 32.2°C-28°C respectively¹. The definitive treatment for AH is rewarming until core body temperature rises above 35°C², by passive (PR), active external (AER) or active internal rewarming (AIR). The aim of this review was to explore what consensus exists amongst the literature on the treatment of mild and moderate AH within extreme environments and when hospitalisation is necessary.

Method

A search on the database, PubMed (last accessed on 19 July 2023), was performed with the following search terms: '(accidental hypothermia) AND (management) AND (rewarming) AND (out-of-hospital) NOT (cardiac arrest)'; '(accidental hypothermia) AND (management) AND (rewarming) AND (severity of illness)'; '(accidental hypothermia) AND (management) AND (passive warming)'; '(accidental hypothermia) AND (management) AND (active warming) NOT (perioperative)'. Studies were excluded from analysis if they met exclusion criteria outlined in Figure 1.

PRISMA flow diagram

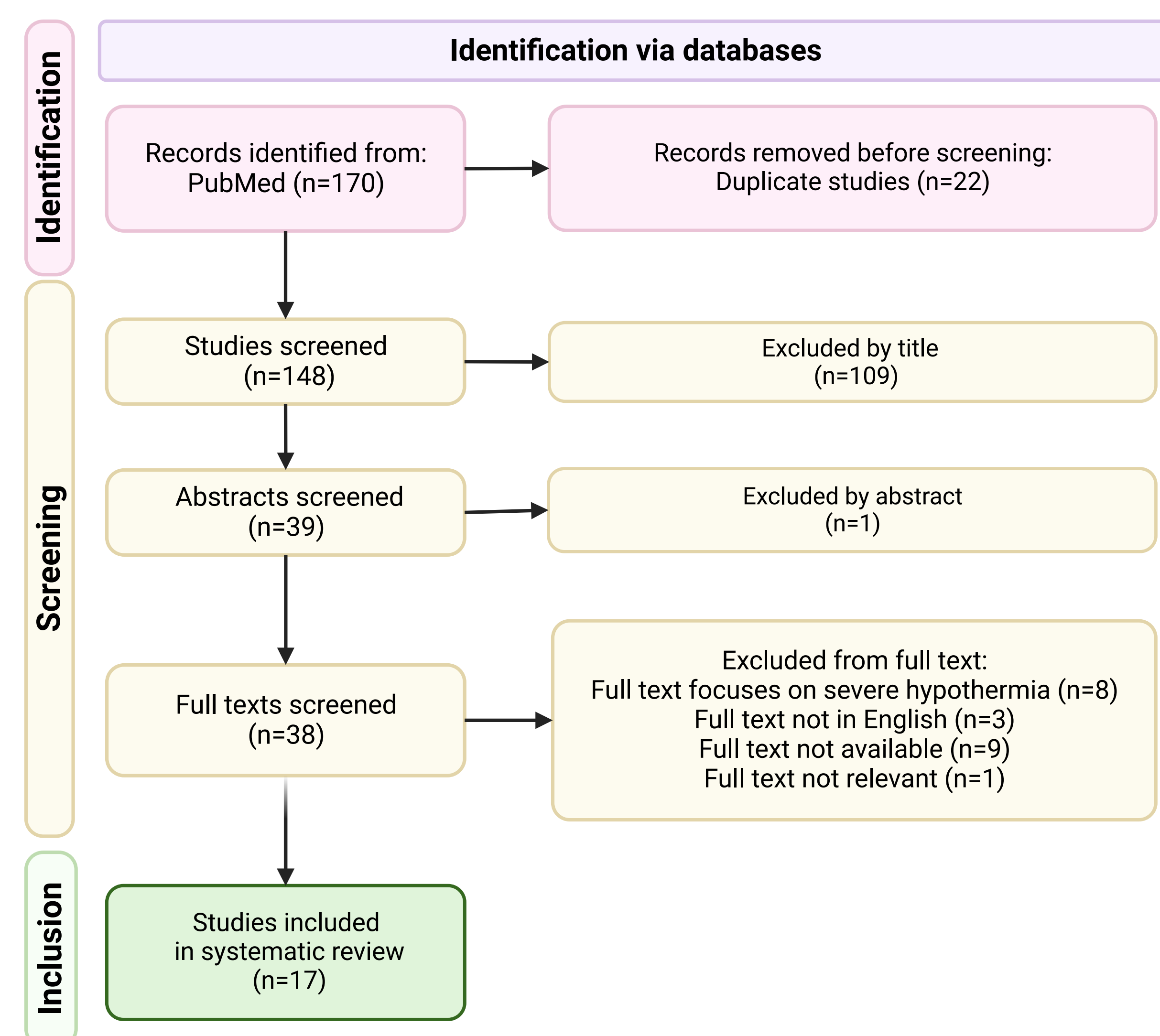
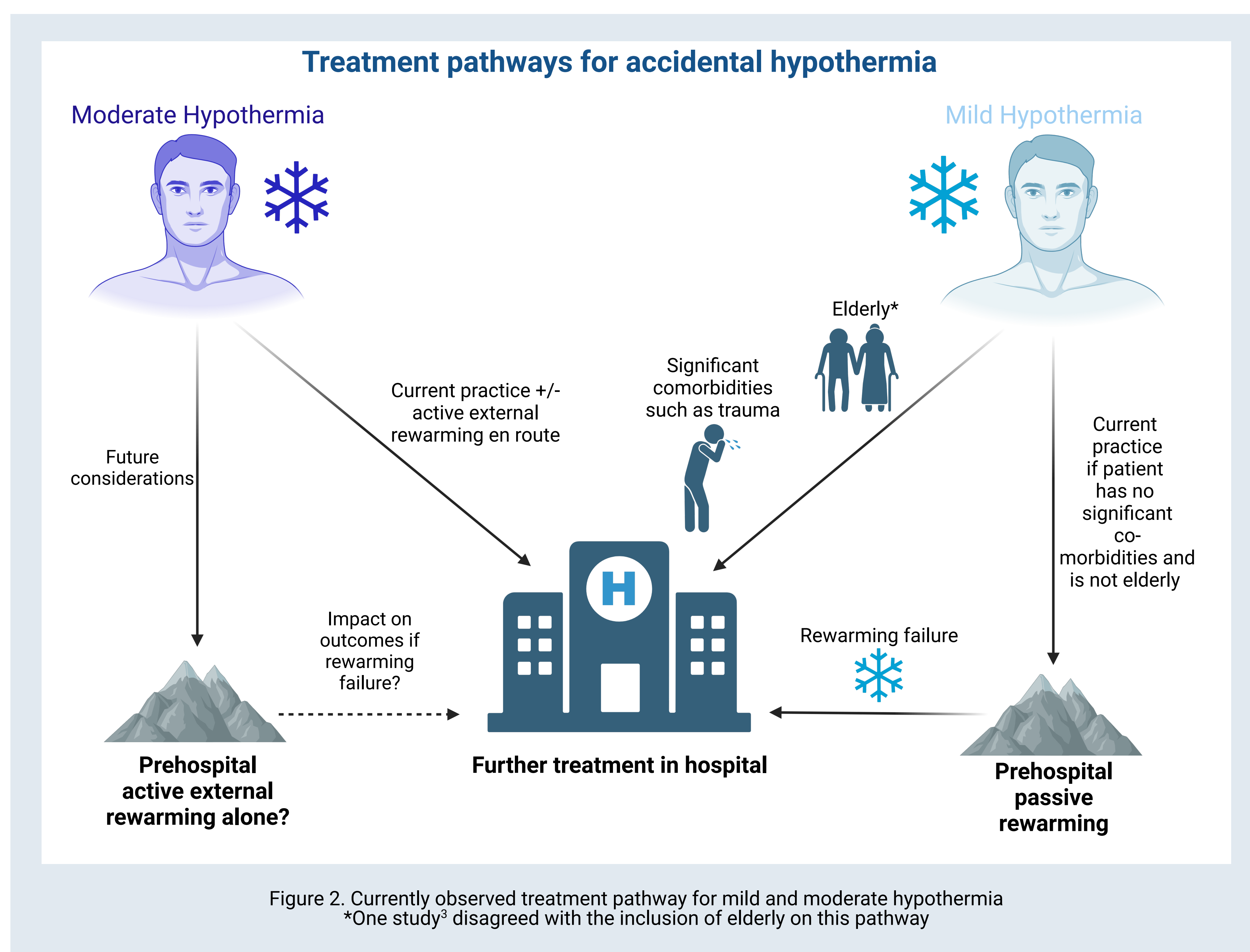


Figure 1. Systematic Review PRISMA flow diagram

Results

148 original studies were identified prior to screening. Following the application of the exclusion criteria 17 studies remained. These studies varied greatly in type, with expert opinion reports (n = 5) and pre-existing guidelines (n = 3) being the most common. Most studies were conducted in the USA. All studies that mentioned the treatment of mild hypothermia agreed that it may be treated solely using prehospital PR¹⁻¹², except for in a few circumstances (Figure 2). In these circumstances, AER and evacuation to hospital are effective^{1,5,6,7,9,10,12,13}. AER was found to traditionally be the treatment for moderate hypothermia^{5-10,12,14}. Only one study² specified that AER should take place in hospital. Four studies^{9,10,12,15} described AER as a treatment to be initiated as packaging for the patient on the way to hospital, where AER might be continued. Other studies did not specify where AER should take place, and if evacuation to hospital is necessary.



Conclusion

It has been stated that the treatment of accidental hypothermia lacks an evidence base¹⁶. The results of this review emphasise high quality evidence is lacking, particularly in the appropriate management of moderate hypothermia. There is a consensus that mild hypothermia can generally be managed in the prehospital environment. This review suggests hospitalisation is advocated in moderate hypothermia, but that AER can be utilised safely in the prehospital environment^{14,17} whilst transporting patients to hospital. No evidence was found that highlighted whether pre-hospital AER for moderate hypothermia either helps prevent hospitalisation or alters patient outcomes should patients be admitted. This emphasises a gap in evidence and likely results in clinical decisions being based on experience, pragmatism and the availability of rewarming equipment. There is a need for research and discussion into whether moderate hypothermia in extreme environments necessitates hospital admission, as is current practice, or whether it may be entirely treated with prehospital AER.

References



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