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CADTH RAPID RESPONSE REPORT: SUMMARY OF ABSTRACTS

Active versus Passive Warming Devices for Patients with Hypothermia in Pre-Hospital Settings: Clinical and Cost-Effectiveness

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

Research Questions

1. What is the clinical effectiveness of active versus passive warming devices for patients with hypothermia in pre-hospital settings?
2. What is the cost-effectiveness of active versus passive warming devices for patients with hypothermia in pre-hospital settings?

Key Findings

One randomized controlled trial was identified regarding the clinical effectiveness of active versus passive warming devices for patients with hypothermia in pre-hospital settings.

Methods

A limited literature search was conducted on key resources including PubMed, The Cochrane Library, University of York Centre for Reviews and Dissemination (CRD) databases and a focused Internet search. No methodological filters were applied to limit the retrieval by study type. The search was limited to English language documents published between January 1, 2008 and January 25, 2018. Internet links were provided, where available.

Selection Criteria

One reviewer screened citations and selected studies based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Any patient in the pre-hospital setting experiencing mild hypothermia
Intervention	Active warming devices (e.g., Bair Hugger [forced warm air])
Comparator	Passive warming devices (e.g., warmed blankets)
Outcomes	Q1: Clinical effectiveness, change in body temperature, safety Q2: Cost-effectiveness
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies, economic evaluations

Results

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, and economic evaluations.

One randomized controlled trial was identified regarding the clinical of active versus passive warming devices for patients with hypothermia in pre-hospital settings. No relevant health technology assessments, systematic reviews, meta-analyses, non-randomized studies, or economic evaluations were identified.

Additional references of potential interest are provided in the appendix.

Overall Summary of Findings

One randomized controlled trial[1] was identified regarding the clinical effectiveness of active versus passive warming devices for patients with hypothermia in pre-hospital settings. The authors of this study[1] evaluated the effect of providing both active warming and passive warming to mildly hypothermic trauma patients during ambulance transportation. Patients were randomized to receive either passive warming with blankets or active warming with a chemical heat pad in addition to passive warming with blankets.[1] Both treatment groups showed similar increases in mean core temperature; however, patients treated with additional active warming demonstrated significant decreases in cold discomfort, heart rate, and respiratory frequency.[1] The authors concluded that although adequate passive warming is an effective treatment for mildly hypothermic trauma patients, the addition of active warming may improve cold discomfort and reduce the cold induced stress response.[1]

References Summarized

Health Technology Assessments

No literature identified.

Systematic Reviews and Meta-Analyses

No literature identified.

Randomized Controlled Trials

1. Lundgren P, Henriksson O, Naredi P, Bjornstig U. The effect of active warming in prehospital trauma care during road and air ambulance transportation - a clinical randomized trial. Scand J Trauma Resusc Emerg Med. 2011 Oct 21;19:59. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3214151 PubMed: PM22017799

Non-Randomized Studies

No literature identified.

Economic Evaluations

No literature identified.

Appendix — Further Information

Systematic Reviews and Meta-Analyses

Alternative Population – Patients Undergoing Surgery

2. Madrid E, Urrutia G, Figuls M, Pardo-Hernandez H, Campos JM, Paniagua P, et al. Active body surface warming systems for preventing complications caused by inadvertent perioperative hypothermia in adults. Cochrane Database Syst Rev. 2016 Apr 21;4:CD009016.
   PubMed: PM27098439

3. Moola S, Lockwood C. Effectiveness of strategies for the management and/or prevention of hypothermia within the adult perioperative environment. Int J Evid Based Healthc. 2011 Dec;9(4):337-45.
   PubMed: PM22093385

4. Galvao CM, Marck PB, Sawada NO, Clark AM. A systematic review of the effectiveness of cutaneous warming systems to prevent hypothermia. J Clin Nurs. 2009 Mar;18(5):627-36.
   PubMed: PM19239533

Non-Randomized Studies

In Vitro Studies

5. Zasa M, Flowers N, Zideman D, Hodgetts TJ, Harris T. A torso model comparison of temperature preservation devices for use in the prehospital environment. Emerg Med J. 2016 Jun;33(6):418-22.
   PubMed: PM26838037

Qualitative Studies

6. Alex J, Lundgren P, Henriksson O, Saveman BI. Being cold when injured in a cold environment--patients' experiences. Int Emerg Nurs. 2013 Jan;21(1):42-9.
   PubMed: PM23273803

Guidelines and Recommendations

7. NICE. Major trauma: assessment and management: national clinical guideline [Internet]. London (UK): National Clinical Guideline Centre; 2016 Feb [cited 2018 Feb 01]. Available from: https://www.nice.org.uk/guidance/ng39/evidence/full-guideline-2308122833
   See section 13: Warming, pages 246 – 251.

Clinical Practice Guidelines – Unspecified Methodology

8. Brown D, BC Accidental Hypothermia Working Group. Accidental hypothermia – evaluation, triage & management [Internet]. Vancouver (BC): BC Guidelines, Province of British Columbia; 2016 Dec [cited 2018 Feb 01].
   Available from: https://www2.gov.bc.ca/assets/gov/health/practitioner-pro/bc-guidelines/bc_hypothermia_cpg.pdf

9. Perlman R, Callum J, Laflamme C, Tien H, Nascimento B, Beckett A, et al. A recommended early goal-directed management guideline for the prevention of hypothermia-related transfusion, morbidity, and mortality in severely injured trauma patients. Crit Care. 2016 Apr 20;20(1):107. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC4837515 PubMed: PM27095272

10. Zafren K. Giesbrecht G. State of Alaska cold injuries guidelines [Internet]. Juneau (AK): Department of Health and Social Services, Government of Alaska; 2014 Jul [cited 2018 Feb 01]. Available from: http://dhss.alaska.gov/dph/Emergency/Documents/ems/documents/Alaska%20DHSS%20EMS%20Cold%20Injuries%20Guidelines%20June%202014.pdf

Review Articles

11. Haverkamp FJC, Giesbrecht GG, Tan ECTH. The prehospital management of hypothermia - an up-to-date overview. Injury. 2017 Nov 4. PubMed: PM29162267

12. Zafren K. Out-of-hospital evaluation and treatment of accidental hypothermia. Emerg Med Clin North Am. 2017 May;35(2):261-79. PubMed: PM28411927

13. Collins N, Daly S, Johnson P, Smith G. Pre-hospital use of intravenous in-line fluid warmers to reduce morbidity and mortality for major trauma patients: a review of the current literature. Australasian J Paramed; 2015 Jun [cited 2018 Feb 01];12(2). Available from: https://ajp.paramedics.org/index.php/ajp/article/view/139

14. Jensen KO, Jensen JM, Sprengel K. Practicability of avoiding hypothermia in resuscitation room phase in severely injured patients. J Med Eng Technol. 2015 May;39(4):223-5. PubMed: PM25879707

15. Moffatt SE. Hypothermia in trauma. Emerg Med J. 2013 Dec;30(12):989-96. PubMed: PM23243045

16. Beekley AC. Damage control resuscitation: a sensible approach to the exsanguinating surgical patient. Crit Care Med. 2008 Jul;36(7 Suppl):S267-S274. PubMed: PM18594252