Treatment Of Exertional Heat Stroke: On The Filed, In Transport, And In The ED

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Disclosures

• I have no disclosures
Learning Objectives

• Discuss on-the-field treatment
• Describe in-transport treatment
• Review Emergency Department treatment
Exertional Heat Stroke

• Exertional Heat Stroke (EHS) is an emergent hyperthermic condition that occurs in athletes or individuals exercising/performing physical activity in warm or hot environments OR in individuals with impaired heat dissipation in cooler environments.

• Severe hyperthermia with a core temperature > 40.0°C + end organ damage (such as CNS dysfunction or AMS).
CONSSENSUS STATEMENT

CONSSENSUS STATEMENT- PREHOSPITAL CARE OF EXERTIONAL HEAT STROKE

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Rapid Recognition → Rapid Assessment → Rapid Cooling → Rapid Advanced Care
Rapid Recognition

• In order to recognize EHS early, one must have a high level of suspicion

• EHS usually occurs in warm environments with high humidity but, in reality, it can happen at any time in any “warmer climate”

• CNS dysfunction: confusion, irritability, collapse, loss of consciousness, seizure
Rapid Assessment

• A, B, C’s including vital signs and rectal temp
• Consider differential diagnosis
  – A correct diagnosis early on may help facilitate more focused treatment
• Initiate Treatment and Activation of Emergency Action Plan
Rapid Cooling: Treatment on the Field

- Start the clock: Core Body Temp <102°F within 30 min

Rapid Cooling: Treatment on the Field

• Once you have identified or suspect EHS
  – Move player to shaded or air conditioned area with access to cold water emersion or alternative
    • Water temp goal: 2-10°C, vigorously circulated
  – Remove any excess clothing and equipment (but do not delay care if this is not easy)
Rapid Cooling: Treatment on the Field

– Place rectal thermometer
  • insertion depth ~ 4-10 cm
  • Secure with Powerflex tape or similar to thigh

– Submerge athlete to level of upper chest if possible with support to keep athlete upright if altered or weak

– Cool core temperature to <102°F
  • Cold water emersion cooling rate:~0.2°C (0.08 – 0.35°C)/min
Rapid Cooling: Treatment on the Field

• Hydration
  – IV Fluids: consider sodium level, check if able, consider 1-2 L Normal saline
  – PO Fluids: athlete must be able to drink safely

• Other medical issues
  – Check blood sugar
  – Does the athlete have other medical problems such as sickle cell disease or have they sustained head trauma?

• Repeat vital signs q3-5 min and reassess for changing conditions
Cooling Rate By Technique

Exer Sport Sci Rev 2007 ACEP, ACSM
Barriers to Treatment

• Emersion tub not available
  – **TACO**: Tarp-Assisted Cooling with Oscillation
    • Tarp + 10 gallons Ice + 20 gallons H₂O + ≥ 3 people
    • Athlete in tarp, providers hold ends of tarp and oscillate water and ice around athlete
    • Only two studies on this method, subjects where not actually suffering from EHS, but cooling rates were 0.14° C/min, 0.17° C/min making it a satisfactory alternative
    • Consider IV fluids ideally after STAT sodium
TACO
Barriers to Treatment

• Emersion tub not available
  – Military Method (Marine Corp Marathon)
    • Patient placed on litter over tub filled w/ ice slurry
    • Team dumps ice slurry over victim repeatedly
    • Fans augment w/ evaporative & convective cooling
    • Consider IV fluids ideally after STAT sodium

Picture from Dr. Maj Nathaniel Nye, Lecture: Practical Treatment of Heat Illness – A Review of the Evidence for TACO
Barriers to Treatment

• Athlete combative or refusing rectal thermometer
  – Although this is the best assessment of core temperature, sometimes it is not possible. In such a case where EHS is suspected, initiate cooling.
  – Cool for ~10-15 minutes, trend mental status and transport to a medical facility
  – An estimation of cooling via ice water immersion is 1 °F for every three minutes submerged
Transport

• **Cool first and transport later in the setting of heat stroke.**
  – Core temp should be **<102°F** prior to transport (unless there is another life threatening condition)
• Continue to monitor core temperature through transport if able
• Continue cooling with ice packs if able
• Continue IV fluids if able (be aware of hypoglycemia and hypernatremia)

• Maryland State Law gives EMS the authority to make a decision to transfer the patient to the nearest medically facility, unless there is physician verbal order to override the state EMS protocol.
Rapid Advanced Care: ED

- Cooling modalities are similar to the field however TACO technique likely more feasible
- Intubation as needed
- Assessment for electrolyte abnormalities, renal function and liver function
- Other Cooling Options: Artic Sun, intravascular cooling (Thermoguard), iced gastric lavage
References