

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

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SPORTS MEDICINE

# Disclosures

- I have no disclosures

# Learning Objectives

- Discuss on-the-field treatment
- Describe in-transport treatment
- Review Emergency Department treatment

# Exertional Heat Stroke

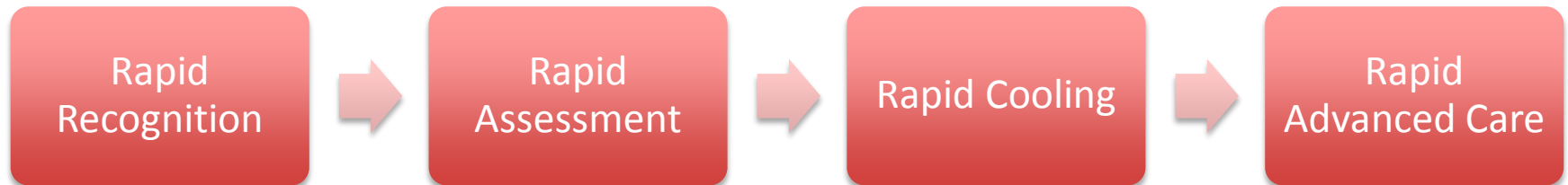
- Exertional Heat Stroke (EHS) is an emergent hyperthermic condition that occurs in athletes or individuals exercising/performing physical activity in warm or hot environments OR in individuals with impaired heat dissipation in cooler environments.
- Severe hyperthermia with a core temperature **> 40.0°C + end organ damage** (such as CNS dysfunction or AMS).

# CONSENSUS STATEMENT

## CONSENSUS STATEMENT- PREHOSPITAL CARE OF EXERTIONAL HEAT STROKE

Luke N. Belval, MS, ATC, Douglas J. Casa, PhD, ATC, William M. Adams, PhD, ATC, George T. Chiampas, DO, Jolie C. Holschen, MD, Yuri Hosokawa, PhD, ATC, John Jardine, MD, Shawn F. Kane, MD, Michele Labotz, MD, Renée S. Lemieux, BS, Kyle B. McClaine, MD, Nathaniel S. Nye, MD, Francis G. O'Connor, MD, MPH, Bryan Prine, MD, Neha P. Raukar, MD, Michael S. Smith, MD, PharmD, Rebecca L. Stearns, PhD, ATC

Prehosp Emerg Care. 2018



# 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

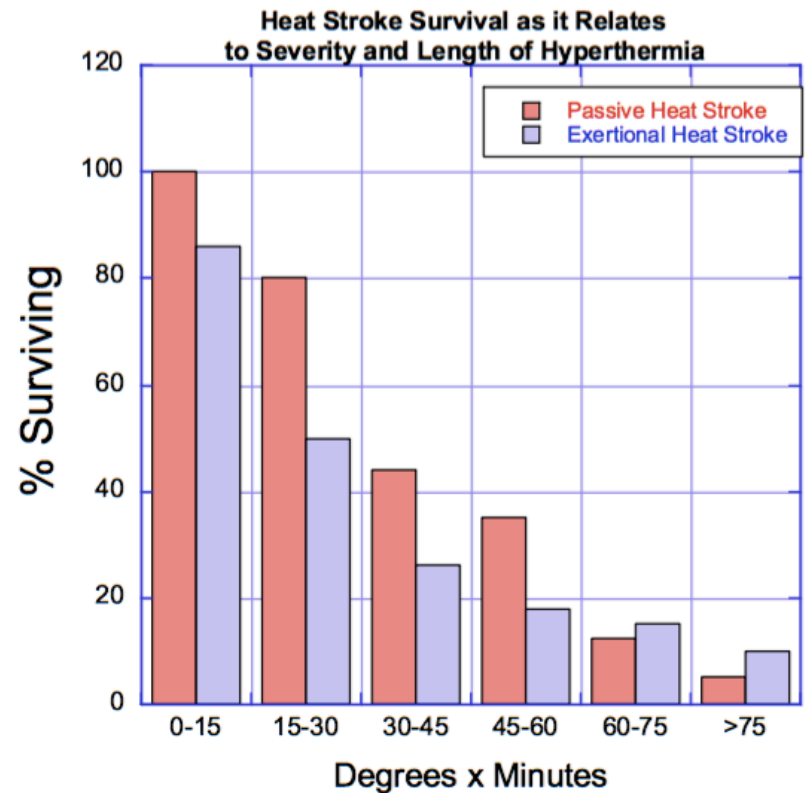


# Rapid Assessment

- A, B, C's including vitals 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**



Graph: Casa et al. *Medicine and Science in Sports and Exercise*, 2010;42(7):1-7. (redrawn from Hubbard et al, *J Applied Physiology* 42: 809-816, 1977)



# 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

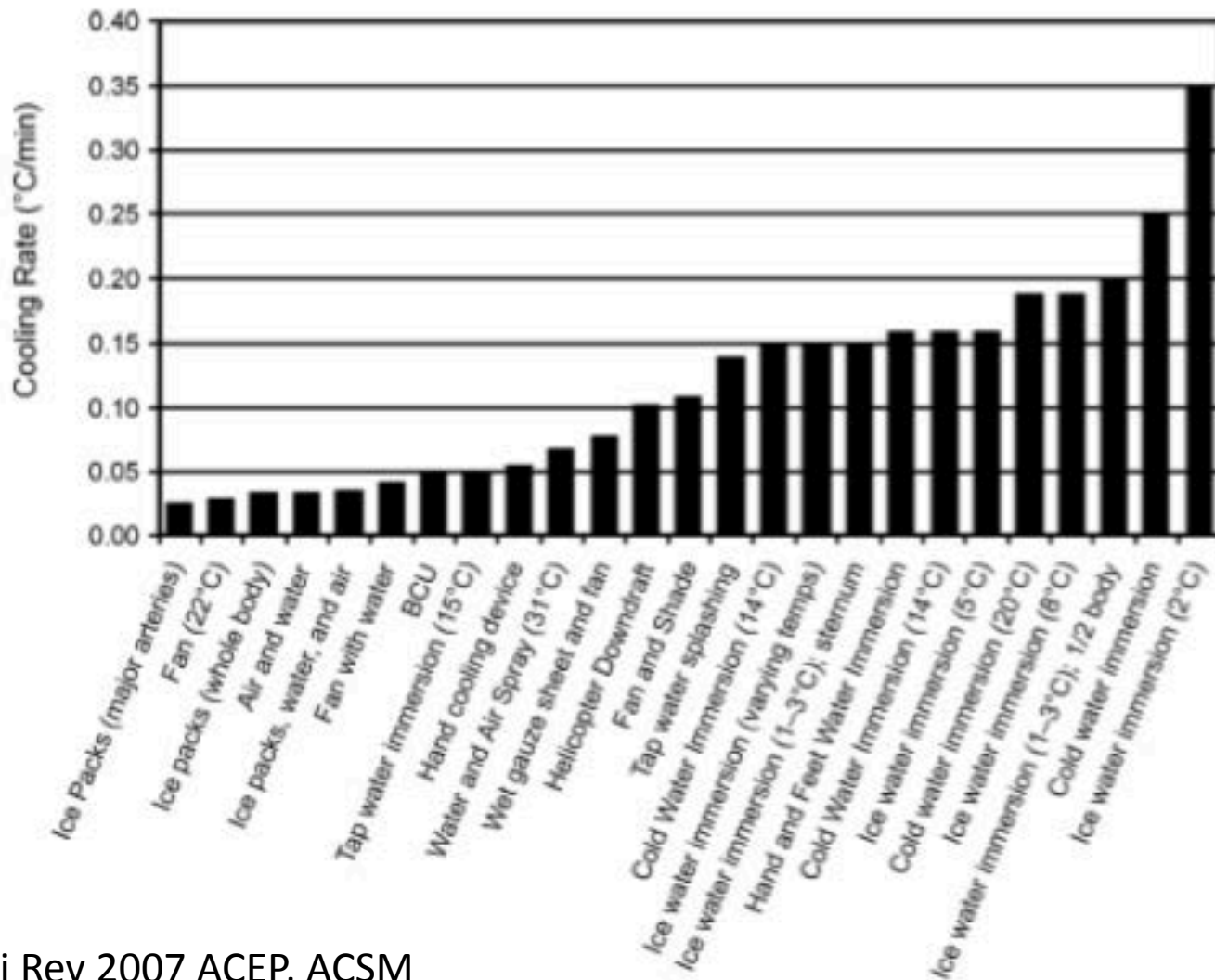
- Place rectal thermometer
  - insertion depth ~ 4-10 cm
  - Secure with Powerflex tape or similar to thigh
- Submerge athlete to level of upper chest if possible with support to keep athlete upright if altered or weak
- **Cool core temperature to <102°F**
  - Cold water emersion cooling rate: ~0.2°C (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



# Barriers to Treatment

- Emersion tub not available
  - **TACO**: Tarp-Assisted Cooling with Oscillation
    - **Tarp + 10 gallons Ice + 20 gallons H<sub>2</sub>O + ≥ 3 people**
    - Athlete in tarp, providers hold ends of tarp and oscillate water and ice around athlete
    - Only two studies on this method, subjects were 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

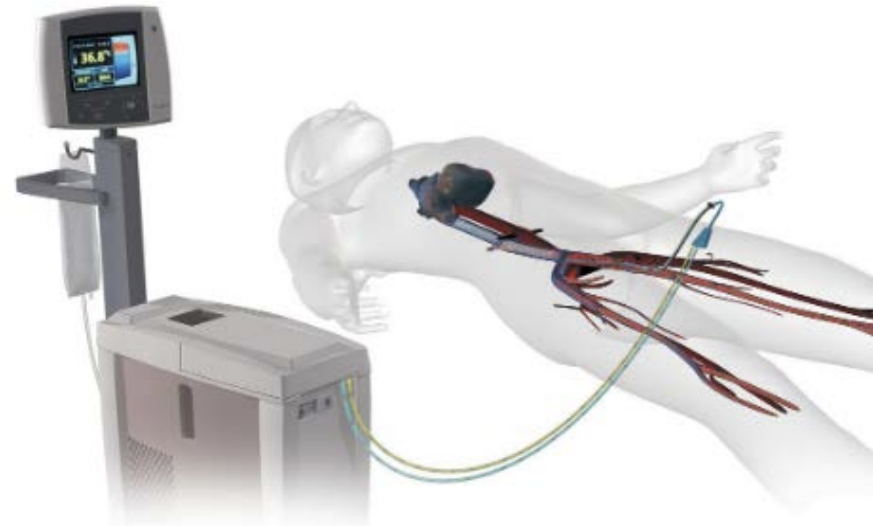


# Transport

- **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

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