Korey Stringer Institute
UNIVERSITY OF CONNECTICUT
Preventing sudden death in sport

How to Respond to an Exertional Heat Stroke Emergency

1) **Initial response.** Once exertional heat stroke is suspected, prepare to cool the patient and contact emergency medical services (EMS).
2) **Prepare for ice water immersion**.
   a) Before the start of activity, an ice-water immersion tub should be set up in a location that is accessible within 5-10 minutes of each field/venue.
   b) The tub should be set up as followed:
      i) Filled half way with water.
      ii) 3-4 coolers of ice next to the tub.
      iii) In a shaded area (e.g. under a tree, bleachers, or tent).
   c) If the athlete collapses near an athletic training room, a whirlpool tub or cold shower may be used.
3) **Determine vital signs.**
   a) Just before immersing the heat-stroke patient, take vital signs.
   b) Assess core body temperature with a rectal thermistor (thermistor implies flexible thermometer that stays in during cooling and allows for continuous monitoring of temperature during immersion therapy).
   c) Check airway, breathing, pulse, and blood pressure.
   d) Assess the level of central nervous system dysfunction.
4) **Begin ice water immersion**.
   a) Place the athlete in the ice water immersion tub up to mid-chest or neck with appropriate support.
   b) Medical staff, volunteers, and teammates may be needed to assist with a smooth and safe entry and exit.
   c) Consider using a mesh stretcher (poleless litter) to aid in transportation of the patient into the tub.
      i) This mesh stretcher can be submerged with the patient.
5) **Total body coverage**.
   a) Cover as much of the body as possible with ice water while cooling.
   b) If full body coverage is not possible due to the container's size, cover the torso as much as possible.
   c) To keep the athlete's head and neck above water, an assistant (e.g. additional healthcare professional, coach, athlete, etc.) may hold the victim under the axillae – armpits – with a towel or sheet wrapped across the chest and under the arms.
   d) Place an ice/wet towel over the head and neck while body is being cooled in tub.
      i) This towel should be rotated continuously throughout time in the tub to enhance cooling of body surface area not in contact with the cold water in the tub.
   e) Use a water temperature under 15C (under 60°F).

6) **Vigorously circulate water**.
   a) During cooling, water should be continuously circulated or stirred to enhance the water-to-skin temperature gradient, which optimizes cooling.
      i) When water is not circulated, the warmth of the body warms the water immediately closest to the skin creating a microenvironment, this decreases the efficacy and cooling rate due to decreasing the temperature gradient between water and skin, which is a primary factor in rate of cooling.
7) **Continue medical assessment**.
   a) Vital signs should be monitored at regular intervals.
      i) Documentation should continue to occur.
   b) It may be helpful for an assistant to stand nearby in case the athlete becomes combative.
   c) Other assistants may be needed to lift or roll the athlete if vomiting occurs.
8) **Cooling duration**.
   a) Continue cooling until the patient's rectal temperature lowers to 39ºC (102ºF)
   b) If rectal temperature cannot be measured and cold-water immersion is indicated, cool for 10-15 minutes and then transport to a medical facility.
   c) An approximate estimate of cooling via cold water immersion is 1ºC for every five minutes and 1ºF every 3 minutes (if the water is aggressively stirred).
      i) This means, the cooling rate will be slower initially, and increase the longer the person is in the tub. For example, if someone is in the tub for 15 minutes they would cool approximately 3ºC or 5ºF during that time.
9) **Patient transfer.**
   a) Remove the patient from the immersion tub only after rectal temperature reaches 39ºC (102ºF) and then transfer to the nearest medical facility via EMS as quickly as possible.
10) **Cooling is the primary goal before transport.**
   a) If appropriate medical staff is available on-site (team physician or athletic trainer); an aggressive cooling modality is readily available (i.e., cold-water immersion, tarp assisted cooling method, high flow cold water dousing); and no other emergency medical services are needed besides the rapid lowering of temperature, then always follow the "cool-first, transport second" doctrine.
      i) Communication with EMS staff prior to start of the athletic season can aid in this transition, as EMS personnel [typically] do not carry equipment necessary for CWI, the athlete should remain in the tub until appropriately cooled for transport.
11) **Advanced medical support**.
   a) During transportation, maintain the rectal thermistor, which allows body temperature to be monitored continuously.
   b) Once the athlete arrives at the hospital, tests will address issues from hyperthermia.
   c) Obtain acute blood enzyme readings to determine muscle, liver, and kidney function.

d) Check serum urea, electrolytes, glucose, hemoglobin, white blood cells, pH.

e) Check urine for protein, myoglobin, casts, osmolality, and volume.

f) Monitor for organ system complications for at least 24 hours and have the individual schedule a follow-up examination with a physician.\

If cold water immersion is not available or feasible given the constraints of the task being performed, then cool via the best available means. A good (although not optimal) highly portable alternative is the Tarp Assisted Cooling Method (TACo).

a) For this method you will need a tarp, ice and water.

b) Place the patient in the middle of the tarp.

c) Have assistants pick up each side of the tarp with the exception of where the head is (e.g. one on the left side of the patient, one on the right and one at the feet.

d) Slowly pour ice and water into the tarp.

e) Oscillate the tarp back and forth (slowly) to agitate the water and initiate cooling.

f) Remove the patient from the tarp only after rectal temperature reaches 39ºC (102ºF) and then transfer to the nearest medical facility via EMS as quickly as possible.

Another alternative when a tub is not available is cold water dousing from a locker room shower or from a hose.

Recommended Equipment List

- Rectal thermistor
- Lubricating gel
- Tub or kiddy pool
    - Tarp when tub is not feasible
- 3-4 coolers with ice
- Water source
- 3-4 towels
- Sheet or large towel
- Tent for shade (if needed)
- Mesh stretcher

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These recommendations are adapted from:

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