

Practical Guidelines For Implementing Cold Water Immersion For An Exertional Heat Stroke Patient

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.** On the field or in a temporary medical tent, half-fill the tub or wading pool with water and ice (before an emergency, check the water source to see how quickly it fills the immersion tub).
 - a. The stock tank can be filled with ice and cold water before an event (or have tub half-filled with water and three to four coolers of ice next to tub; this prevents having to keep tub cold throughout the day).
 - b. Ice should cover the surface of the water at all times.
 - c. If the athlete collapses near an athletic training room, a whirlpool tub or cold shower may be used.
3. **Determine vital signs.** Just before immersing the heat-stroke patient, take vital signs.
 - a. 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).
 - b. Check airway, breathing, pulse, and blood pressure.
 - c. Assess the level of central nervous system dysfunction.
4. **Begin ice water immersion.** Place the athlete in the ice water immersion tub. Medical staff, volunteers, and teammates may be needed to assist with a smooth and safe entry and exit.
5. **Total body coverage.** Cover as much of the body as possible with ice water while cooling.
 - a. If full body coverage is not possible due to the container's size, cover the torso as much as possible.
 - b. To keep the athlete's head and neck above water, an assistant may hold the victim under the axillae – armpits – with a towel or sheet wrapped across the chest and under the arms.
 - c. Place an ice/wet towel over head and neck while body is being cooled in tub.
 - d. Use a water temperature under 15°C (under 60°F).
6. **Vigorously circulate water.** During cooling, water should be continuously circulated or stirred to enhance the water-to-skin temperature gradient, which optimizes cooling. Have an assistant stir the water during cooling.
7. **Continue medical assessment.** Vital signs should be monitored at regular intervals.
 - a. It may be helpful for an assistant to stand nearby in case the athlete becomes combative.
 - b. Other assistants may be needed to lift or roll the athlete if vomiting occurs.
8. **Fluid administration.** If a qualified medical professional is available, an intravenous fluid line can be placed for hydration and support of cardiovascular function.
 - a. Rest the arm to be used on the side of the water immersion tub.

9. **Cooling duration.** Continue cooling until the patient's rectal temperature lowers to 39°C (102°F)
 - a. If rectal temperature cannot be measured and cold water immersion is indicated, cool for 10-15 minutes and then transport to a medical facility.
 - b. An approximate estimate of cooling via cold water immersion is 1°C for every five minutes and 1°F every 3 minutes (if the water is aggressively stirred). 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 3°C or 5°F during that time.
10. **Patient transfer.** Remove the patient from the immersion tub only after rectal temperature reaches 39°C (102°F) and then transfer to the nearest medical facility via EMS as quickly as possible.
11. **Cooling is the primary goal before transport.** 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, ice/wet towel rotation, 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.
12. **Advanced medical support.** During transportation, maintain the rectal thermistor, which allows body temperature to be monitored continuously.
 - a. Once the athlete has arrived at the hospital, tests and other treatments will address issues resulting from the hyperthermia.

If cold water immersion is not available or feasible given the constraints of the athletic/military/labor task being performed, then cool via the best available means. A good (although not optimal) highly portable alternative is a cooler filled with ice, water, and 12 towels. Place six ice/wet towels all over body and leave on for 2-3 minutes, then place those back in cooler and put the six others on the patient. Continue this rotation every 2-3 minutes. Another alternative when a tub is not available is cold water dousing from a locker room shower or from a hose.

These recommendations are adapted from:

Casa D. J., B. M. McDermott, E. C. Lee, S. W. Yeargin, L. E. Armstrong, C. M. Maresh. "Cold-water immersion: The gold standard for exertional heat stroke treatment," *Exercise and Sports Science Reviews*. 35(3):141-149, 2007.
http://journals.lww.com/acsm-essr/Abstract/2007/07000/Cold_Water_Immersion__The_Gold_Standard_for.9.aspx