

Hendricks Regional Health (HRH) has adopted the following guidelines to help reduce the risk of exertional heat illnesses, such as heat exhaustion and heat stroke, which can result in deaths in athletes. HRH recognizes there are variable resources and regional climates differences and there is not absolute guideline that best suites all. There are variable resources at each site to calculate the wet bulb globe temperature or heat index. The below chart has category 2 and category 3 for WBFT, which is based on geographic location (1). To provide appropriate care, however, each school should have their own policy in place for calculating WBGT or heat index during warmer seasonal periods. This policy is recommended to be based on resources such as the IHSAA heat index, the NATA position statement and the Korey Stringer Institute. It is recommended that each school district have the tools available for cold water immersion.

WBGT is considered the “gold standard”. However, heat indexes are used commonly. Measuring the temperatures where athletes are at more of a risk would be preferred. For example, the turf football field readings at the same time and school may result in different temperature readings compared to a grassy soccer fields. In this instance, it would be recommended to record the temperature on the turf football field. Other factors could include, equipment, shade, and clothing which should be taken into consideration when making final practice recommendations.

WBGT Category 2	WBGT Category 3	Heat Index	Risk	Activity Guidelines
<79.9	<82.0	<90.0	Low	Normal activities; every 30 minutes provide at least 3-5 minutes rest/water breaks during the workout.
79.9-84.6	82.0-86.9	91.0-94.0	Light Caution	Use discretion for intense and prolonged exercise; watch at risk players carefully. Every 20-30 minutes provide at least 4-5 min rest/water breaks.
84.7-87.6	87.0-89.0	95.0-99.9	Moderate Caution	Watch/monitor athletes carefully. Every 20-30 minutes provide at least 5-10 minute water/rest breaks. Football/Equipment intensive sports: Players restricted to helmet, shoulder pads and shorts. All protective equipment must be removed for conditioning practice.

87.8-89.6	90.0-92.0	100.0-104.9	Extreme Caution	Every 15 minutes provide at least 5-10 minute water/rest break. Football/equipment intensive sports: no protective equipment may be worn during practice and no conditioning activities.
≥89.6	≥92.1	≥105	Danger	Outdoor Activities suspended



Fig. 2. Heat safety regions.

EXERCISE ASSOCIATED MUSCLE CRAMPS (EAMC)

Sign and Symptoms	Dehydration, thirst, sweating, short term muscle cramping, and fatigue
Predisposing Factors	Exercise induced muscle fatigue, excessive body water loss and excessive sodium loss (sweating)
Prevention	Maintain fluid and salt balance especially when exercising in the heat and sweat loss is great. Supplemental (extra) sodium may be needed
Treatment	Rest stretch and massage muscle in full length position. Provide fluids and/or food with salt content such as a sports drink. Remove any equipment, if necessary.
Return To Play	Can return to play usually with in the same practice or game with rest and fluid replacement.

HEAT SYNCOPE

Sign and Symptoms	Dizziness(vertigo), weakness, tunnel vision, pale or sweaty skin, nausea, decreased pulse rate
Predisposing Factors	Standing for long periods of time, usually wearing a uniform, immediately after cessation of activity, or rapidly standing from prolonged resting or sitting position.
Prevention	Acclimatization to exercise in the heat over 10-14 days by gradually increasing duration and intensity of work.
Treatment	Move to shaded or cool area, monitor vital signs, elevate legs, and rehydrate
Return To Play	Can return to play once symptoms have resolved and any other medical conditions have been ruled out.

HEAT EXHAUSTION

Sign and Symptoms	Fatigue, Nausea, Fainting, Weakness, Vomiting, Dizziness, Heavy Sweating, Headache, Decreased Blood Pressure, elevated core temp < 105 F.
Predisposing Factors	Exercising in hot and humid environment, inadequate fluid intake, and body mass index > 27 kg/m
Prevention	Acclimatization over 10-14 days increasing duration and intensity of work, be able to recognize heat exhaustion, know most updated treatment methods
Treatment	Move to cool shaded area, remove excessive clothing, elevate legs, cool with fans, rotating ice towels, or ice bags (armpits, neck and groin) Individuals should respond quickly to treatment. Provide oral fluids for rehydration. If symptoms do not improve and ATC feels further treatment warranted EAP activated and athlete transported to ED via EMS or referred to team physician (if available)
Return To Play	Returning to activity the same day of episode is not prudent or advised. Individuals should wait 24-48 hours before returning to activity.

EXERTIONAL HEAT STROKE

Sign and Symptoms	Collapse, Aggressiveness, Irrational behavior, irritability, emotional instability, altered consciousness, coma, dizziness, headache, confusion, nausea or vomiting, rapid pulse, low blood pressure, dry mouth, thirst, profuse sweating, seizures, loss of muscle function, core body temp. >105 F.
Predisposing Factors	Athlete is out of shape or obese, hot and humid day, practice is near the start of the season, and near the end of practice, first full day in full pads and equipment
Prevention	Ensure hydration by having the athletes observe urine color, which should be straw yellow or color of lemonade, measure body weight before and after practice, encourage drinking throughout practice, practice and perform drills at appropriate times during the day (avoid 10am-5pm), sleep at least 6-8 hours, and eat well balanced diet
Treatment	Activate EMS, remove all equipment and excess clothing, cool athlete as quickly as possible ice water immersion (35-39 degrees Fahrenheit), stir water and ice throughout process, maintain ABC's. Assess cognitive function and vital signs, measuring core-body temperature via rectal thermometer to differentiate between heat exhaustion and heat stroke (heat stroke is 104 degrees Fahrenheit or higher). Re-check core body temperature every 5-10 minutes (if unable to use continuous monitoring). Do not remove student athlete until core body temperature is lowered to below 102 degrees Fahrenheit. Once removed from ice immersion tank, continue to use cooling methods mentioned for heat exhaustion while transported to decrease body-core temperature.
Return To Play	Physician clearance prior to return to physical activity, the athlete should avoid exercise for at least one week after the incident, the athlete should begin a return to play protocol in which they are under the direct supervision of a health care professional such as an athletic trainer or physician.

Following best practice, these guidelines are recommended for implementing cold-water immersion for a patient with exertional heat stroke. The HRH athletic training staff is trained in taking rectal thermometers and may administer as needed per school district guidelines.

References:

1. Grundstein et al. Regional heat safety thresholds for athletes in the contiguous United States. Appl. Geography.2015
2. <https://ksi.uconn.edu/prevention/wet-bulb-globe-temperature-monitoring/>
3. Casa DJ, Guskiewicz KM, Anderson SA, et al. National athletic trainer' association position statement: preventing sudden death in sports. J Athl Train. 2012

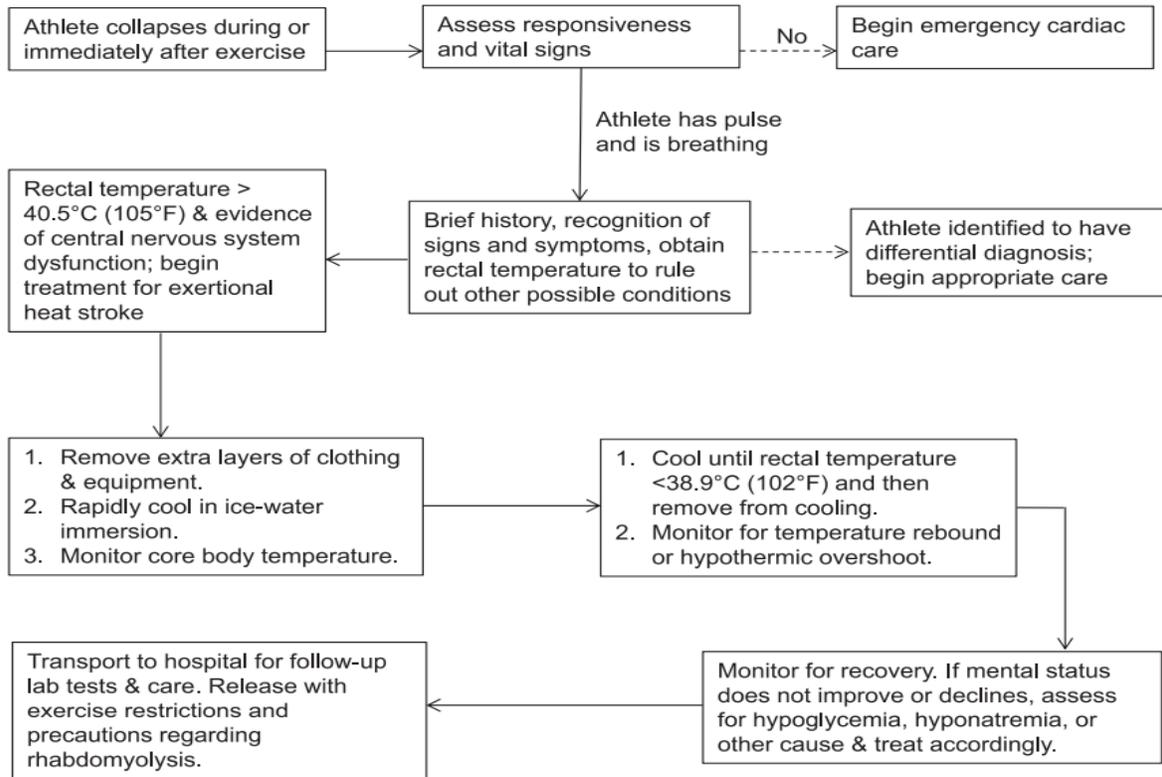


Figure 3. Algorithm for treatment of exertional heat stroke.



Table 4. Guidelines for Implementing Cold-Water Immersion for a Patient With Exertional Heat Stroke

1. Initial response. Once exertional heat stroke is suspected, prepare to cool the patient and contact emergency medical services.
2. Prepare for ice-water immersion. On the playing field or in close proximity, half-fill a stock tank or wading pool with water and ice (make sure there is a sufficient water source).
 - a. The tub can be filled with ice and water before the event begins (or have the tub half-filled with water and keep 3 to 4 coolers of ice next to the tub; this prevents having to keep the tub cold throughout the day).
 - b. Ice should cover the surface of the water at all times.
 - c. If the athlete collapses near the athletic training room, a whirlpool tub or cold shower may be used.
3. Determine vital signs. Immediately before immersing the patient, obtain vital signs.
 - a. Assess core body temperature with a rectal thermistor.
 - b. Check airway, breathing, pulse, and blood pressure.
 - c. Assess the level of central nervous system dysfunction.
4. Begin ice-water immersion. Place the patient in the ice-water-immersion tub. Medical staff, teammates/coaches, and volunteers may be needed to assist with entry to and exit from the tub.
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 tub size, cover the torso as much as possible.
 - b. To keep the patient's head and neck from going under water, an assistant may hold him or her under the axillae with a towel or sheet wrapped across the chest and under the arms.
 - c. Place an ice/wet towel over the head and neck while body is being cooled in the tub.
 - d. Use a water temperature under 15°C (60°F).
6. Vigorously circulate the 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.
8. Fluid administration. If a qualified medical professional is available, an intravenous fluid line can be placed for hydration and support of cardiovascular function.
9. Cooling duration. Continue cooling until the patient's rectal temperature lowers to 38.9°C (102°F).
 - a. If rectal temperature cannot be measured and cold-water immersion is indicated, cool for 10–15 min and then transport to a medical facility.
 - b. An approximate estimate of cooling via cold-water immersion is 1°C for every 5 min and 1°C for every 3 min (if the water is aggressively stirred). For example, someone in the tub for 15 min would cool approximately 3°C or 5°C during that time.
10. Patient transfer. Remove the patient from the immersion tub only after rectal temperature reaches 38.9°C (102°F) and then transfer to the nearest medical facility via emergency medical services as quickly as possible.